SSD 2022

SSD'2022

المـلـتـقـى الـدولـي التـاسع عشر IEEE حول الأنظمة، الإشارات والأجهزة

19th IEEE International Multi-Conference on Systems, Signals & Devices

May 06-10, 2022 SETIF, ALGERIA

Department of Electrical Engineering, Faculty of Technology, Ferhat ABBAS Setif-1 University

May 14, 2022

Certificate of presentation

This is to certify that the authors:

Smail Dilmi; Farida Kebaili; Mohamed Ladjal

Have attended the *19th IEEE International Multi-Conference on Systems, Signals & Devices SSD'2022* held in SETIF - Algeria on May 06th - 10th, 2022 and presented orally the following paper:

Ref: 1570775404

Title: A soft sensor of stator winding temperature prediction for PMSMs based on extreme learning machine

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May 6–10, 2022

Sétif, Algeria

IEEE

19th International Multi-Conference on Systems, Signals and Devices (SSD'22)

May 6–10, 2022, Sétif, Algeria

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Preface

Following the success of SSD'01 held in Hammamet-Tunisia, the nineteenth International Multi-Conference on Systems, Signals and Devices - SSD'22 to be held in Sétif, Algeria, from 6^{th} to the 10^{th} of May 2022. The conference program consists of 4 plenary sessions, 8 Keynote Lectures and 70 oral sessions. SSD'22 multi-conference is organized to include 4 conferences covering different fundamental and applied aspects:

1. "Int. Conf. on Systems, Automation & Control" (SAC)
2. "Int. Conf. on Conference on Power Systems & Smart Energies" (PSE)
3. "Int. Conf. on Communication, Signal Processing & Information Technology" (CSP)
4. "Int. Conf. on Sensors, Circuits and Instrumentation Systems" (SCI)

SSD'22 secretariat has received 597 submissions from 36 countries: Algeria, Australia, Bahrain, Belgium, Canada, China, Egypt, France, Georgia, Germany, Greece, India, Indonesia, Iraq, Italy, Jordan, Kuwait, Libya, Luxembourg, Malaysia, Morocco, Norway, Oman, Qatar, Romania, Saudi Arabia, Spain, Sri Lanka, Switzerland, Sweden, The Netherlands, Tunisia, Turkey, United Arab Emirates, United Kingdom, USA.

Each paper has been reviewed by at least two reviewers of the program committee which consisted of more than 100 scientists from more than 30 countries. Only 394 papers have been accepted, with an acceptance rate equal to 66.1%.

We would like to express our deep gratitude to all chairs and members of the program committee for their substantial reviews. Special thanks are due to all members of the organizing committees for their determination to make this event a promising success.

Finally, we would like to extend our deep gratitude to all those who have contributed to the financial support of SSD'22.

Professors Lazhar Rahmani, Faouzi Derbel and Kasim Mousa Al-Aubidy

Sétif, Algeria

May, 2022

General Informations
Location

SSD'2022 Multiconference has been held in Setif, Algeria. Setif is the capital of the highlands of eastern Algeria. It occupies a strategic position among the wilayas of the East and constitutes a major hub crossed by the North-South and East-West axes. Setif is situated 300 km east of the capital Algiers and rises to an altitude of 1100 m, while it is only 110 km from the coast.

Once you arrive in Setif, the darling of the highlands, the legend saying that when you drink water from the fountain of Ain El Fouara you will inevitably come back there, is quickly validated. The visitor is, in fact, attached and attracted by its splendor and above all sublimated by its cleanliness, its architectural charm and its brilliance. Setif has managed to preserve its ancestral urban legacy, perfectly marrying the touch of modernity instilled in the region. In Setif there is no risk of getting bored. The region offers its visitors a multitude of choices and places to visit. It encompasses four types of tourism: business and commercial, historical spa and finally mountain tourism.

The Wilaya of Setif conceals an important tourist potential constituted by the important number of thermal springs as well as archaeological and natural sites. One of the most beautiful in Algeria, the Setifis amusement park where you can find traces of the civilizations that have marked their passage since antiquity, including the Roman and Byzantine empires. Located in the center of the city, this gigantic park offers its visitors an array of choices to unwind. Between the Ferris wheel, the merry-go-round and the waterfalls... there's something for everyone. It is also a favorite place for young and old and other picnic lovers to share good times around the large and magnificent artificial lake. Otherwise, restaurants offer their services.

The central square of the city worth a visit. This place marks the starting point of the massacre of May 8, 1945, a harbinger of the Revolutionary War. For the collective memory, a statue of Bouzid Saâl, the first victim of the massacres of this fateful date, is erected. The tram bears the color red symbolizing the blood of the martyrs. On the road to Constantine, not far from the fountain of Ain El Fouara, it is impossible to miss the imposing El Atik Mosque which attracts the simple passerby to discover its emblematic architecture and its minaret with a double Roman and Islamic character. Going to Setif without seeing the allegorical fountain of Ain El Fouara is like visiting China without going to the Great Wall. With a statue of a woman made in 1898 within it, the fountain is one of the emblematic monuments of the wilaya.

With its historical past and its multi-faceted cachet, Setif has significant potential in terms of thermal resources, from Hammam Sokhna to Hamman Guergour. The latter conceals important tourist resources located in a picturesque natural setting. It is particularly distinguished by the curative vocation of its waters discovered for the first time by the Romans who elected this site to build their city and the baths of Adsava. It is famous thanks to the specificity of its natural source of hot water at 44°C, and especially by its high level of radioactivity which places it first in Algeria, and third in the world.

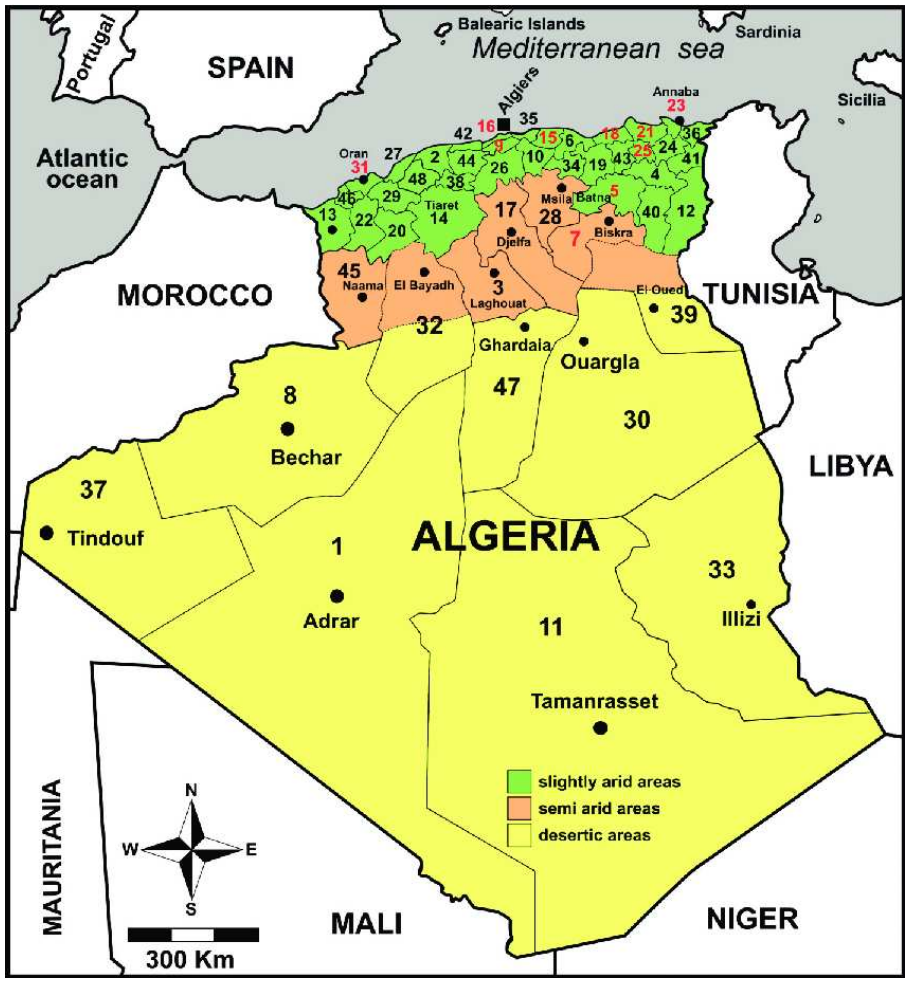
Setif city was part of Phoenician Empire then it became part of the ancient Berber kingdom of Numidia, the capital of Mauretania Sitifensis under the rule of the Roman Empire. It became a city of the Islamic World after becoming Muslim during the Muslim conquest of the Maghreb.

Setif was numid before undergoing Roman rule. The name of Setif is not drawn from Latin, but it is a Berber word "Zdif" or Canaanite word "Sadif", i, which means "black lands" according Lissan El Arab, referring to the fertility of its lands.

Setif has a semi-arid climate. Its summers are hot and dry, while its winters are cool with low-moderate rainfall. The maximum temperature in Setif is on average 22°C over the year. It rains 887mm over the year, with a minimum of 17mm in July and a maximum of 113mm in March. The climate is pleasant to go on a trip to Setif from April to October, but the weather is really ideal from May to October.

Setif is served by an international airport, located in Ain Arnat 10 km from the city center. The transfer from the airport to the city center is provided by taxis. Setif has a railway station and a bus station, which serves the capital Algiers as well as several cities in the country.

The Host Country Algeria



Official Language:

The official language in Algeria is Arabic. The second language is French and is spoken by almost all people. The third language, which is taught at school until baccalaureate is English. Note that the official language of the SSD is English.

Currency Exchange:

The exchange rates to and from € and US$ are approximately:

1000 Algerian Dinars ≃ 6,466 €	1 € ≃ 154,65 Algerian Dinars
1000 Algerian Dinars ≃ 7.00 US$	1 US$ ≃ 143 Algerian Dinars

Conference Web-Site

- www.ssd-conf.org

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Topics:

- Intelligent control
  - Fuzzy systems & fuzzy control
  - Neuro-fuzzy systems
  - Learning processes in control
  - Neural Networks & Neural control
  - Machine learning & artificial intelligence in control
- Complex systems
  - Analysis & control of large-scale autonomous networks
  - Control & dynamics of domplex network systems
  - Agent-based control systems
  - Discrete event systems
  - Hierarchical & man-machine systems
  - Infinite dimension systems
  - Biological & economical models & control
  - Biology-based and behavioral control
- Linear & nonlinear system analysis
  - Advances in linear systems
  - Nonlinear systems
  - System identification
  - Hybrid systems
- Control approaches
  - Adaptive control
  - Distributed control
  - Geometric control
  - Optimal & stochastic control
  - Predictive control
  - Robust control
  - Sliding mode control
  - System optimization
  - Fractional order systems
- Faulty systems
  - Fault detection, diagnosis & pronostics
  - Fault tolerant control
  - Machine learning for fault detection & diagnosis
- Robotics & automation
  - Robotics
  - Traffic control
  - Unmanned aerial vehicles
  - Mechatronics

Conference on Power Systems & Smart Energies

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Topics:

- Electric Machines
  - Modeling & design
  - Machine control
  - Variable speed drives
  - Special machines
- Power electronics
  - Converters
  - Multilevel inverters
  - Electromagnetic compatibility
  - Facts
  - Semiconductor devices
- Power Systems
  - Distributed power systems
  - Smart grid & security
  - Micro-Grids & virtual power plants
  - Transformers
  - Power quality
  - Measurements & protection
  - DC micro-grid
  - Reconfiguration & power flow solutions
  - Storage systems
- Renewable energy systems
  - Photovoltaic systems
  - Concentrated solar plants
  - Wind energy
  - Tide & wind energy
  - Smart grids & distribution networks
  - Grid connected power electronics converters
  - Hybrid and storage systems
  - Fuel cells
- Automotive power systems
  - Hybrid electric vehicle
  - Electric vehicle and safety
  - Storage systems in EV
  - Flywheel Energy
- Monitoring and diagnosis
  - Variable speed drives and monitoring
  - Fault detection and diagnosis
  - Predictive diagnosis
  - Tolerent control
  - Pronostics

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Topics:

- Signal, image & video processing:
  - Theory & methods
  - Speech, audio & acoustic
  - Image, video & multidimensional signal processing
  - Biomedical Signal & Image Processing
- Signal processing for IoT
  - Wireless sensors networks
  - Smart systems
  - E-health & health informatics
  - Smart cities
  - Energy efficiency & sustainability in the IoT
  - IoT security
- Signal processing for communications
  - Optical systems
  - Radar & sonar systems
  - Wireless communications
  - Design & implementation
- Emerging Technology Applications
  - Big data analytics
  - Cloud computing
  - Cyber security
  - Machine learning models
  - Artificial intelligence technology
  - Distributed & real time systems
  - Augmented & virtual reality
  - Geographical information systems
- Engineering Education
  - E-Learning & blended learning
  - Remotes laboratories
  - Multidisciplinary education
  - Undergraduate research
  - Strategic planning
  - Curriculum of engineering studies
  - Engineering design programs
  - Accreditation of engineering programs

Conference on Sensors, Circuits & Instrumentation Systems

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Piuri, Vincenzo ..... (Italy)
Postolache, Octavian ..... (Portugal)
Satour, Fatima Zohra ..... (Algeria)
Silva Girao, Pedro ..... (Portugal)
Slamani, Mustapha ..... (USA)
Tamersit, Khalil ..... (Algeria)
Trabelsi, Hatem ..... (Tunisia)
Yakoubi, Nourdin ..... (France)
Yan, Ruqiang ..... (China)
Zegadi, Ameur ..... (Algeria)
Zerrouki, Chouki ..... (France)

Topics:

- Physical and chemical sensors
  - Mechanical and flow sensors
  - Position and Radar sensors
  - Temperature and humidity sensors
  - Electrochemical and biomedical sensors
  - Ultrasonic and acoustic sensors
  - Magnetic and electromagnetic field sensors
  - Optical and photonic sensors
  - Surface acoustic wave sensors
- Measurement methods and metrology
  - Spectroscopy methods and systems
  - Optical methods and systems
  - Impedance spectroscopy
  - Metrology and measurement uncertainty
- Sensors and circuits technology
  - MEMS and NEMS technology
  - Molecular electronics
  - Polymer sensors, actuators and electronics
  - Actuators and actuator technologies
  - Optoelectronic devices
  - Microfluidic and lab-on-chip devices
  - Additive manufacturing
  - Sensor testing and evaluation
  - Aging, reliability, stability and EMC
- Sensor and measurement systems
  - Signal conditioning and interface electronics
  - Conversion and digitalization
  - Data acquisition and distributed measurements
  - Embedded systems
  - Sensor arrays and matrices
  - Multi sensor system
  - Sensor signal processing and modeling
  - Multi sensor data fusion
  - Design & implementation
- Electronic systems and technologies
  - Design, modeling and simulation
  - Custom and semi-custom circuits
  - Packaging and reliability
  - Materials, devices and interconnects
  - Analog and mixed circuits design
  - Low-voltage, low-power VLSI design
  - Resonators and oscillators
  - Sensor communication circuits
  - Circuit test and device characterization
- Sensor Systems for IoT
  - Low-power sensor networks
  - Sensor telemetry and monitoring
  - Energy harvesting and conversion
  - Energy management for low power systems
  - Energy saving strategies
  - Analog and digital low-power electronics
  - Soft sensors
- Sensor and Instrumentation Applications
  - Industry and robotics
  - Medicine and health
  - Agriculture and environment
  - Mobility and automotive
  - Smart grids
  - Smart buildings
  - Smart cities
  - Safety and security

Sétif, Algeria May 6–10, 2022

SSD'22 Multi-Conference Program

SSD 2022

Time \ Date	Saturday, May 7	Sunday, May 8	Monday, May 9	Tuesday, May 10
08:15	**Opening**			
08:30		Plenary Session 2	Plenary Session 3	SAC-15 CSP-17 PSE-22, PSE-23
08:45	Plenary Session 1			
09:20			Plenary Session 4	
09:30	Keynote Sessions 1	Keynote Sessions 2		
10:15	Break	Break	Break	Break
10:30	SAC-1, SAC-2 CSP-1, CSP-2 PSE-1, PSE-2 SCI-1	SAC-6, SAC-7 CSP-7, CSP-8 PSE-7, PSE-8 SCI-4	SAC-11, SAC-12 CSP-12, CSP-13 PSE-14, PSE-15 SCI-7	SAC-16 CSP-18 PSE-24, PSE-25
12:30	Break	Break	Break	**Closure**
13:30	SAC-3, SAC-4, CSP-3, CSP-4, PSE-3, PSE-4, SCI-2	SAC-8, SAC-9 CSP-9 PSE-9, PSE-10 SCI-5	SAC-13 CSP-14 PSE-16, PSE-17, PSE-18 SCI-8	
14:30				
15:15	Break	Break	Break	
15:30	SAC-5 CSP-5, CSP-6 PSE-5, PSE-6 SCI-3	SAC-10 CSP-10, CSP-11 PSE-11, PSE-12, PSE-13 SCI-6	SAC-14 CSP-15, CSP-16 PSE-19, PSE-20, PSE-21 SCI-9	
17:30	**SSD Meeting**	–		
18:30				

Information during the Conference

Link: Room 10: https://meet.google.com/qqc-nvfv-xch

Saturday, 7 of May, 2022

Link: Room 9: https://meet.google.com/qwc-igap-umf Saturday, May 7, 2022, 8h15–8h45 (GMT+1)

Official Opening

Link: Room 9: https://meet.google.com/qwc-igap-umf Saturday, May 7, 2022, 8h45–9h30 (GMT+1)

Plenary Session 1:

Chairs : Lazhar Rahmani (Algeria)
Abdellah Kouzou (Algeria)

PL-1 Smart Micro Grid with high penetration of renewable based Generation and Electric Vehicles .....
Mousa Marzband ..... (UK)

Link: Room 4: https://meet.google.com/kfm-naep-pnd Saturday, May 7, 2022, 9h30–10h15 (GMT+1)

Keynote Lecture KL-CSP 1:

Chairs : Abd Essalam Badoud (Algeria)
Omar Daoud (Jordan)

KL-CSP 1 New horizons in deep learning-assisted multimodality medical image analysis ..
Habib Zaidi ..... (Switzerland)

Link: Room 1: https://meet.google.com/pup-hwpy-ong Saturday, May 7, 2022, 9h30–10h15 (GMT+1)

Keynote Lecture KL-PSE 1:

Chairs : Abdallah Kouzou (Algeria)
Hafedh Trabelsi (Tunisia)

KL-PSE 1 Impacts of Digital Transformation on Alternative and Green Energies .....
Ilhami Colak ..... (Turkey)

Link: Room 6: https://meet.google.com/pyv-uhno-cfv Saturday, May 7, 2022, 9h30–10h15 (GMT+1)

Keynote Lecture KL-SAC 1:

Chairs : Mujahed Al Dhaifallah (Saudi Arabia)
Bilal Sari (Algeria)

KL-SAC 1 State of the art of Energy & Artificial Intelligence and New Challenges .....
Fausto P. G. Márquez ..... (Spain)

Link: Room 8: https://meet.google.com/xwd-zdxv-rbr Saturday, May 7, 2022, 9h30–10h15 (GMT+1)

Keynote Lecture KL-SCI 1:

Chairs : Imed Ben Dhaou (Saudi Arabia)
Ameur Zegadi (Algeria)

KL-SCI 1 The Role of Precision Farming in Sustainable Agriculture .....
Youcef Remram ..... (Algeria)

Break

Saturday, May 7, 2022, 10h15–10h30 (GMT+1)

Link: Room 4: https://meet.google.com/kfm-naep-pnd

Saturday, May 7, 2022, 10h30–12h30 (GMT+1)

Session CSP 1 : Signal Processing

Chairs : Abd Essalam Badoud (Algeria)
Kasim Mousa Al-Aubidy (Jordan)

CSP 1.1 Estimation of ARMA Parameters Using Cholesky Factorization .....
Adnan M. Al-Smadi .....(Jordan)

CSP 1.2 Radar Cross Section Modeling of Complex Objects. Application to a Target Over Sea Surface .....
Yacine Bennani; Youssef Kebbati .....(Algeria–France)

CSP 1.3 On the relation between chaotic processes generated by family of piecewise linear maps .....
Ahmed Sahnoune; Daoud Berkani .....(Algeria)

CSP 1.4 Improved Bayesian Denoising Algorithm for Signal of Centrifugal Microfluidic Immunoassay System .....
Yuxing Shi; Jinhong Guo; Peng Ye; Jiawen Xie; Chuang Wang; Bayin Qiaoge .
.....(China–UK)

CSP 1.5 Performance Evaluation of Bit-Flipping Based Algorithms for LDPC Convolutional Codes .....
Laouar Oulfa; Imed Amamra; Nadir Derouiche .....(Algeria)

CSP 1.6 Phase Retrieval: Application to Audio Signal Reconstruction .....
Zied Mnasri; Raja Bedoui; Faouzi Benzarti .....(Tunisia)

Link: Room 5: https://meet.google.com/arb-xmda-ymp

Saturday, May 7, 2022, 10h30–12h30 (GMT+1)

Session CSP 2 : Emerging Technology Applications

Chairs : Diab Mokeddem (Algeria)
Mohammad Younes (Egypt)

CSP 2.1 Emerging New Technologies in Undergraduate Engineering Curricula .....
Mohammed Baniyounis; Omar R. Daoud .....(Jordan)

CSP 2.2 A Distributed Fault Tolerant Algorithm for Load Balancing in Cloud Computing Environments .....
Abderraziq Semmoud; Mourad Hakem; Badr Benmammar .....(Algeria-France)

CSP 2.3 Task Scheduling in Cloud Computing Based on FPA Metaheuristic Algorithm .
Arslan N Malti; Badr Benmammar; Mourad Hakem .....(Algeria)

CSP 2.4 Students' performance-prediction-Model based on Physical and Physiological Constraints .....
Amjad H Alkilani; Mohammad Nusir .....(USA-Jordan)

CSP 2.5 Experimental realization using a dSPACE card of the PI control for an active power filter .....
Younes Lahiouel .....(Algeria)

Link: Room 5: https://meet.google.com/arb-xmda-ymp Saturday, May 7, 2022, 10h30–12h30 (GMT+1)

CSP 2.6 Fault detection in wheeled mobile robot based Machine Learning .....
Fedia Ibrahim; Boumedyen Boussaid; Mohamed Naceur Abdelkrim ....(Tunisia)

CSP 2.7 Credit Card Fraud Detection via Machine Learning .....
Azzedine Zerguine .....(Saudi Arabia)

Room 1: https://meet.google.com/pup-hwpy-ong Saturday, May 7, 2022, 10h30–12h30 (GMT+1)

Session PSE 1 : Monitoring & Diagnosis 1

Chairs : Kamel Eddine Hemsas (Algeria)
Youcef Soufi (Algeria)

PSE 1.1 Remaining useful life of bearings based on temporal features and support vector regression .....
Abdallah Faleh; Ammer Medoued; Noussaiba Mennai; Youcef Soufi ...(Algeria)

PSE 1.2 Detailed Analysis of Rotor Eccentricity Fault Signatures in Induction Motors using DWT-FFT Technique .....
Noureddine Bessous; Radouane Bousseksou; Laid Zarour; Salim Sbaa; Remus Pusca; Romary Raphael; Mohamed Mounir Rezaoui; Imad Merzouk; Abdelhalim Borni .....(Algeria–France)

PSE 1.3 Study of the Best IMF Selection Methods using Kurtosis Parameter for Bearing Fault Diagnosis .....
Yasser Damine; Ahmed Chaouki Megherbi; Salim Sbaa; Noureddine Bessous ...
.....(Algeria)

PSE 1.4 Investigation of LVRT Capability of a DFIG Based WECS Under Different Grid Codes .....
Brahim Djidel, Lakhdar Mokrani, Mohamed Mechmoum, Abdellah Kouzou .....
.....(Algeria–France)

PSE 1.5 A technique for diagnosing short-circuit and open-circuit faults of the three-phase inverter .....
Chakib Drif; Nouri Hamou; Abdenour Soualhi .....(Algeria)

PSE 1.6 Fault Diagnosis of Power Transmission Line using Park's Method .....
Khaled Omer; Mokhtar Touati; Mohamed Boudiaf; Lakhmissi Cherroun (Algeria)

Link: Room 2: https://meet.google.com/pec-tzfi-who Saturday, May 7, 2022, 10h30–12h30 (GMT+1)

Session PSE 2 : Power Quality 1

Chairs : Ahmed Gherbi (Algeria)
Hasan Komurcugil (Turkey)

PSE 2.1 Direct Power Control of three-Level SAPF with Space Vector Modulation for Power Quality improvement .....
Naamane Debdouche .....(Algeria)

PSE 2.2 Off-grid Photovoltaic System Power Output Medium-Term Forecasting Using Artificial Neural Network .....
Muhammad Risqi Risfianda; Desri Kristina Silalahi; Muhammad Dimas; Bandiyah Sri Aprillia; Azman Hanifan ..... (Indonesia)

PSE 2.3 Investigation on low frequency parameter of WTGS buried in homogeneous and stratified soil .....
Ines Chami, Chiheb Sofaine, Abdelhak Djellad, Nacer Bouderres .....(Algeria)

Link: Room 2: https://meet.google.com/pec-tzfi-who Saturday, May 7, 2022, 10h30–12h30 (GMT+1)

PSE 2.4 Reliability Enhancement of an Emergency Power Supply Benchmark based on Testing Optimization .....
Rabah Benabid; Dallal Kemikem .....(Algeria)

PSE 2.5 Model Predictive Control of Three-Level Shunt Active Power Filter Connected to a Photovoltaic System .....
Nadhir Mesbahi .....(Algeria)

PSE 2.6 An APF for Enhancing the PF of an Arc Welding Power Supply using an Optimized FO-PID .....
B. Badreddine; Hamouda Noureddine; Sami Kahla; Abdelmalek Reddaf (Algeria)

Link: Room 6: https://meet.google.com/pyv-uhno-cfv Saturday, May 7, 2022, 10h30–12h30 (GMT+1)

Session SAC 1 : Intelligent Control 1

Chairs : Ahmed Hafaifa (Algeria)
Bilal Sari (Algeria)

SAC 1.1 Fuzzy PI Gains Tuning By PSO And Genetic Algorithms Controls A Hybrid Indirect Matrix Converter .....
Taki Eddine Ameur; Aissa Ameur and Atallah Benalia .....(Algeria)

SAC 1.2 Processor-In-the-Loop Simulation of a Neuro-Fuzzy Controller on Raspberry Pi 3 board .....
Hocine Khati; Hand Talem; Rabah Mellah; Mohand Achour Touat and Mohamed Amine Nehmar .....(Algeria)

SAC 1.3 Fuzzy reference model H_∞ integral fuzzy maximum power tracking of WECS based on DFIG .....
Keltoum Houda; Dounia Saifia; Mohammed Chadli and Mohamed Nasri (Algeria–France)

SAC 1.4 Adaptive Fuzzy Control for State Constrained Pure-Feedback Nonlinear Systems with Input nonlinearity .....
Mohammed Haddad and Abdesselem Boulkroune .....(Algeria)

SAC 1.5 Modeling and Simulation of 10 MW PV array with ARV MPPT based on ANN model .....
Chaouki Messasma; Seif Eddine Chouaba; Bilal Sari and Abdallah Barakat (Algeria–France)

SAC 1.6 Finite-Time Adaptive Fuzzy Control of Output Constrained Nonlinear Systems with Disturbance Observer .....
Mohammed Haddad and Abdesselem Boulkroune .....(Algeria)

Link: Room 7: https://meet.google.com/nty-smgi-pzf Saturday, May 7, 2022, 10h30–12h30 (GMT+1)

Session SAC 2 : Faulty Systems 1

Chairs : Djamel Eddine Chouaib Belkhiat (Algeria)
Mohamed Zerrougui (France)

SAC 2.1 Interval Observers Fault Detection for Linear Parameter Varying Systems with H- Fault Sensitivity .....
Rihab Lamouchi; Tarek Raissi; Messaoud Amairi and Mohamed Aoun .....
.....(Tunisia–France)

Link: Room 7: https://meet.google.com/nty-smgi-pzf Saturday, May 7, 2022, 10h30–12h30 (GMT+1)

SAC 2.2 Interval Valued PCA-Based Approach For Fault Detection In Complex Systems
Abdelhalim Louifi; Salah Eddine Louhab; Abdelmalek Kouadri; Lahcene Rouani; Abderazak Bensmail and Mohamed Faouzi Harkat ..... (Algeria–USA)

SAC 2.3 Gear Features Extraction And Classification Using MODWPT and Neural Network .....
Adel Afia; Hand Ouelmokhtar; Fawzi Gougam; Walid Touzout; Chemseddine Rahmoune and Djamel Benazzouz ..... (Algeria)

SAC 2.4 Set-Membership Fault Detection for Discrete-time Switched Linear Systems ...
Leila Dadi ..... (Tunisia)

SAC 2.5 Bearing Fault Diagnosis Method Based on VMD-DWT and CMWPE .....
Ahmed Taibi ..... (Algeria)

SAC 2.6 Adaptive observer design for unmatched faults estimation: An LMI-based parameterization method .....
Nabil Oucief; Sofiane Doudou; Ahsene Boubakir and Salim Labiod .... (Algeria)

SAC 2.7 A signal processing approach to modeled bearing faults detection in electric system .....
Azeddine Ratni; Djamel Benazzouz and Hicham Bouregba ..... (Algeria)

Room 8: https://meet.google.com/xwd-zdxv-rbr Saturday, May 7, 2022, 10h30–12h30 (GMT+1)

Session SCI 1 : Physical & Chemical Sensors 1

Chairs : Imed Ben Dhaou (Saudi Arabia)
Ameur Zegadi (Algeria)

SCI 1.1 A Comparative Study of Simulation Methods for Patch Antenna Strain Sensor
Dhivakar Rajendran; Olfa Kanoun ..... (Germany)

SCI 1.2 Transmissive Eddy Current Sensor for Gap Detection Between Sheet Metal Materials .....
Zheng Hu; Frank Wendler; Olfa Kanoun ..... (Germany)

SCI 1.3 Improved Compressive Sensing based on Sampling Rate Adjustments in Wireless Sensor Networks .....
Faouzi Derbel ..... (Germany)

SCI 1.4 Cooling the Car while Parking Under the Sun .....
Abdulwahid A. Saif; Mujahed Aldhaifallah ..... (Saudi Arabia)

SCI 1.5 Comparative Study of Transmitter and Resonator Coils for Wireless Power Transfer .....
Abdallah Adawy; Ghada Bouattour; Mohammed Ibbini; Olfa Kanoun .. (Jordan-Tunisia-Germany)

SCI 1.6 Electrical and optical properties of Black Phosphorus under Strain effects: A First-principles Study .....
Hichem Ferhati; Fayçal Djeffal; Seyfelislam Farah; Zohir Dibi ..... (Algeria)

Saturday, May 7, 2022, 12h30–13h30 (GMT+1)

Break

Link: Room 4: https://meet.google.com/kfm-naep-pnd Saturday, May 7, 2022, 13h30–15h15 (GMT+1)

Session CSP 3 : System Design & Implementation

Chairs : Diab Mokeddem (Algeria)
Abdul-Wahid Al-Saif(Saudi Arabia)

CSP 3.1 Diagnosis of supply voltage imbalance using WPD energy enhanced by current space vector (CSV) .....
Meriem Behim; Leila Merabet; Salah Saad .....(Algeria)

CSP 3.2 Unbalance Faults diagnosis using Wavelet Transform, FFT And ANFIS Algorithms. .....
Issam Attoui .....(Algeria)

CSP 3.3 Deep Learning-based Edge FPGA Co-design for IoT Application .....
Seifeddine Messaoud; Rim Amdouni; Mohamed Ali Hajjaji; Abdellatif Mtibaa ..
.....(Tunisia)

CSP 3.4 Real time H264 HD intra coding process implementation on TMS320DM642 DSP
Imen Werda; Amna Maraoui; Amina Kessentini; Nouri Massmoudi ..(Tunisia)

CSP 3.5 Design of a Ku Band Corrugated Conical Feed Network Dedicated to Parabolic Antennas .....
Omar Adib Safer .....(Algeria)

Link: Room 5: https://meet.google.com/arb-xmda-ymp Saturday, May 7, 2022, 13h30–15h15 (GMT+1)

Session CSP 4 : Communication Systems & IoT

Chairs : Qadri Hamarsheh (Jordan)
Abdelhamid Iratni (Algeria)

CSP 4.1 Effect of Non-Integer Order Moments on Parameter Estimation of Pareto Distributed Clutter plus Noise .....
Taha Hocine Kerbaa; Amar Mezache; Houcine Oudira .....(Algeria)

CSP 4.2 8×30 Gbps RZ-RoF-WDM System Using Optical DSB-SC For Long-Distance Networks .....
Abderraouf Fares; Kaddour Saouchi; Fatima Brik; Nadira Boukhatem (Algeria)

CSP 4.3 Aircraft Wing Vibration Monitoring based on FBG Sensor Network .....
Maha Sliti; Noureddine Boudriga .....(Tunisia)

CSP 4.4 A CFAR Detection Algorithm for Weibull and Lognormal Clutter Mixture in SAR Images .....
Hicham Madjidi; Toufik Laroussi; Farah Faiçal .....(Algeria)

CSP 4.5 T-Shaped Demultiplexer Based on Core-Shell Rods Photonic Crystals .....
Imane Chergui .....(Algeria)

Link: Room 1: https://meet.google.com/pup-hwpy-ong Saturday, May 7, 2022, 13h30–15h15 (GMT+1)

Session PSE 3 : Wind Energy 1

Chairs : Achour Betka (Algeria)
Abdelmadjid Chaoui (Algeria)

PSE 3.1 Backstepping Sliding mode control of DSIG driven by variable speed wind turbine
Meryem Benakcha, Abdelhamid Benakcha, Abdelkarim Ammar .....(Algeria)

PSE 3.2 Optimization of grounding conductor in WPP .....
Chiheb Sofaine, Ines Chami, Abdelhak Djellad, Nacer Bouderres .....(Algeria)

Link: Room 1: https://meet.google.com/pup-hwpy-ong Saturday, May 7, 2022, 13h30–15h15 (GMT+1)

PSE 3.3 Synthesis and high-performance analysis of Synergetic control MPPT for PMSG

Mohamed Seddik Mahgoun; Abdessalam Badoud ..... (Algeria)

PSE 3.4 Investigation of Modeling and Control of a Grid Side System based DFIG for a Wind Turbine Machine .....

Abdelmoumen Saci; Lakhmissi Cherroun; Mohamed Boudiaf ..... (Algeria)

PSE 3.5 Short Time Forecasting of Wind Power Generation Using Artificial Neural Network .....

Jannet J. Jamii; Majdi Mansouri; Faouzi Mimouni ..... (Tunisia)

Link: Room 2: https://meet.google.com/pec-tzfi-who Saturday, May 7, 2022, 13h30–15h15 (GMT+1)

Session PSE 4 : Power Quality 2

Chairs : Samir Sayah (Algeria)
Tahar Bahi (Algeria)

PSE 4.1 Power Quality Monitoring of Rooftop Photovoltaic Penetration Level on Low Voltage System .....

Saliha Boulahchiche; Amar Hadj Arab; Salim Haddad; Salim Bouchakour; Saida Makhloufi; Ismail Bendaas; Abdelhak Razagui ..... (Algeria)

PSE 4.2 Neural Network controller for Three phase Shunt Active Power Filter using Self Tuning Filter .....

Zakaria Laala; Amar Benaissa ..... (Algeria)

PSE 4.3 Power Quality Enhancement of PV System Based on Modified Three-Phase Cascaded Multilevel Inverter .....

Ali Abedaljabar Al-Samawi; Hafedh Trabelsi ..... (Iraq–Tunisia)

PSE 4.4 Energy management strategy based on fuzzy logic for electric vehicle with hybrid source .....

Imen Jarraya; Jihed Hmad; Hafedh Trabelsi; Nassim Rizoug; Azeddine Houari ..... (Tunisia)

PSE 4.5 Automatic Classification Mechanism for the Two Most Common Power Quality Disturbances: Sag and Swell .....

Yamina Simhamed; Farid Ykhlef; Abdelhamid Iratni ..... (Algeria)

Link: Room 6: https://meet.google.com/pyv-uhno-cfv Saturday, May 7, 2022, 13h30–15h15 (GMT+1)

Session SAC 3 : System Identification

Chairs : Nadia Ait Ahmed (France)
Seif Eddine Chouaba (Algeria)

SAC 3.1 New Financial Distress Prediction Technique based on Genetic Algorithm and Multi-Layer Perceptron .....

Ahmed Khedr and Abdulwahid A. Saif ..... (UAE Saudi–Arabia)

SAC 3.2 Identification of the AM2HN Model Parameters in the Context of Organic matter Recycling .....

Abdelhani Chaabna and Samia Semcheddine ..... (Algeria)

SAC 3.3 Reduction method for parameters calculation of the characteristic equation of a photovoltaic module .....

Abdelhamid Mraoui ..... (Algeria)

Link: Room 6: https://meet.google.com/pyv-uhno-cfv Saturday, May 7, 2022, 13h30–15h15 (GMT+1)

SAC 3.4 Optimal Informative Data Selection for Historical Data Driven Process Identification
Ridouane Oulhiq; Khalid Benjelloun; Yassine Kali and Maarouf Saad (Morocco–Canada)

Link: Room 7: https://meet.google.com/nty-smgi-pzf Saturday, May 7, 2022, 13h30–15h15 (GMT+1)

Session SAC 4 : Fault Tolerant Control

Chairs : Nabil Derbel (Tunisia)
Amine Sid (Algeria)

SAC 4.1 Comparison between the additive tolerant control and PID control for nonlinear delayed system
Tayssir Abdelkrim (Tunisia)

SAC 4.2 Fault Tolerance Control and Diagnosis of Induction Machine Under Stator Fault Conditions
Fatima Babaa and Abderrahim Touil (Algeria)

SAC 4.3 Emergency Control Strategy of a Reconfigurable Quadrotor with Total Loss of One Rotor
Abdenour Salmi; Mohamed Guiatni; Yasser Bouzid and Saddam Hocine Derrouaoui (Algeria–France)

SAC 4.4 Fault tolerant control for neutral systems with delayed inputs
Rabeb Benjemaa (Tunisia)

Link: Room 8: https://meet.google.com/xwd-zdxv-rbr Saturday, May 7, 2022, 13h30–15h15 (GMT+1)

Session SCI 2 : Physical & Chemical Sensors 2

Chairs : Brahim Mezghani (Tunisia)
Ameur Zegadi (Algeria)

SCI 2.1 Performance Investigation of Screen-Printed Carbon Electrodes Activated by MES-Acid
Hussamaldeen Jaradat; Ammar Al-Hamry; Qiming Wang; Junfei Wang; Yu Zhou; Yucheng Song; Mohammed Ibbini; Olfa Kanoun (Jordan-Germany)

SCI 2.2 Flexible Lead-Free BCT/PDMS-Based Nanogenerator as Piezoelectric Energy Harvester
Dalel Missaoui; Ayda Bouhamed; Khawla Jeder; Amina Ben Ayed; Anouar Njeh; Olfa Kanoun (Tunisia-Germany)

SCI 2.3 Temperature Display on Web Browser Using Ethernet Shield And LM35 Sensor based on Arduino Board
Ahmed Bouraiou; Ammar Necaibia; Abdeldjabbar Babahadj; Rachid Dabou; Abderrezzaq Ziane; Salah Lachtar; Nordine Sahouane; Seyfallah Khelifi; Abdelkrim Rouabhia; Issam Attoui; Mohammed Salah Bouakkaz; Naceredine Labed (Algeria)

SCI 2.4 Effects of doping profile and temperature on the bifacial solar cell performances
Asma Benchiheb; Nedjoua Benchiheb; Yasmina Saidi; Samira Dib (Algeria)

SCI 2.5 Passive Wireless Optical Sensor In The Near Field For Atmospheric Corrosion Monitoring
El Bouslemti Rahmouna; Salah Belkhodja Faouzi; Sayah Abd El Kader (Algeria)

Break

Saturday, May 7, 2022, 15h15–15h30 (GMT+1)

Link: Room 4: https://meet.google.com/kfm-naep-pnd Saturday, May 7, 2022, 15h30–17h30 (GMT+1)

Session CSP 5 : Wireless Communications 1

Chairs : Diab Mokeddem (Algeria)
Abdul-Wahid Al-Saif (Saudi Arabia)

CSP 5.1 Conception and study of patch antenna for wireless application
Mouloud Ayad; Mourad Benziane; Mohamed Rezki; Smail Medjedoub; Abderrazak Arabi; Kamel Saoudi (Algeria)

CSP 5.2 Magnetically Tunable Bandpass Filter Based on High Order Mode SIW Resonator
Halima Ammari; Farouk Grine; Mohamed lahdi Riabi (Algeria)

CSP 5.3 CPW-Fed LTCC Based Broadband Microstrip Antenna for Millimeter-Wave Applications at 60 GHz
Djamel Khezzar; Djamel Khedrouche; Camilla Karnfelt; Tayeb A. Denidni; François Gallée (Algeria–Canada–France)

CSP 5.4 A Review on Clustering in VANET: Algorithms, Phases, and Comparisons
Mays Kareem Jabbar Alsabah; Hafedh Trabelsi (Iraq–Tunisia)

CSP 5.5 FPGA SoC-Based Edge Computing for Multimedia IoT System with CNN Accelerators
Seifeddine Messaoud; Soulef Bouaafia; Safa Teboulbi; Mohamed Ali Hajjaji; Abdellatif Mtibaa (Tunisia)

CSP 5.6 On the Performance of SISO, SIMO and MISO-NOMA Systems under Perfect and Imperfect SIC
Saber Menaa; Abdellatif Khelil (Algeria)

Link: Room 5: https://meet.google.com/arb-xmda-ymp Saturday, May 7, 2022, 15h30–17h30 (GMT+1)

Session CSP 6 : Image, Video, Multidimensional Signal Processing 1

Chairs : Faouzi Derbel (German)
Mohammed Mustefai (Algeria)

CSP 6.1 A spatial multiple description coding scheme for HEVC video coding resiliency
Sara Khalfa; Saliha Harize; Nasreddine Kouadria (Algeria)

CSP 6.2 Covid-19 Image Segmentation based on Masi Entropy and HGS Optimization Algorithm
Amir Hamza; Morad Grimes; Abdelkrim Boukabou (Algeria)

CSP 6.3 A novel Feature combination approach for Driver Fatigue Detection
Imen Hamrouni Trimech; Nada Messaoudi; Najoua Essoukri Ben Amara (Tunisia)

CSP 6.4 SVM-Based method to reduce HEVC CU partition complexity
Amna Maraoui; Imen Werda; Nacir Omran; Fatma Ezzahra Sayadi (Tunisia)

Link: Room 5: https://meet.google.com/arb-xmda-ymp Saturday, May 7, 2022, 15h30–17h30 (GMT+1)

CSP 6.5 U-Net based Deep Learning Architectures for Latent Fingerprint Segmentation
Roua Jaafar; Hajer Walhazi; Ahmed Maalej; Najoua Essoukri Ben Amara ..... (Tunisia)

CSP 6.6 An Image Encryption Application of Chaotic Map based True Random Bit Generator .....
Esra Ince; Barış Karakaya; Mustafa Türk ..... (Turkey)

Link: Room 1: https://meet.google.com/pup-hwpy-ong Saturday, May 7, 2022, 15h30–17h30 (GMT+1)

Session PSE 5 : Hybrid & Storage Systems 1

Chairs : Abdelhalim Kessal (Algeria)
Hafedh Trabelsi (Tunisia)

PSE 5.1 The State of Charge estimating methods for rechargeable Lead-acid batteries ..
Aicha Degla ..... (Algeria)

PSE 5.2 CFD analysis on baffle arrangement effect in hybrid solar collector design PVT/Bi-fluid .....
Abdelkrim Khelifa ..... (Algeria)

PSE 5.3 Effect of factors influencing on the total electricity cost of hybrid energy system
Abir Hasnaoui, Abdelhafid Omari, Zin-Eddine Azzouz ..... (Algeria)

PSE 5.4 Wavelet-based control approach for hybrid energy storage system .....
Malika Hasrouri; Omar Charrouf, Achour Betka; Sabrina Abdeddaim . (Algeria)

PSE 5.5 Sizing Stand-Alone "Photovoltaic/Battery" using PVSYST Software with Domestic Variable Demand .....
Roua Toujani, Achraf Abdelkafi; Lotfi Krichen ..... (Tunisia)

PSE 5.6 Prediction of energy consumption based on LSTM artificial neural network ....
Sameh Mahjoub; Larbi Chrifi-Alaoui; Bruno Marhic; Laurent Delahoche; Jean-Baptiste Masson; Nabil Derbel ..... (Tunisia–France)

PSE 5.7 A SMC-Based MPPT Controller for Proton Exchange Membrane Fuel Cell System .....
Badreddine Kanouni; Abdessalam Badoud; Saad Mekhilef .. (Algeria–Australia)

Link: Room 2: https://meet.google.com/pec-tzfi-who Saturday, May 7, 2022, 15h30–17h30 (GMT+1)

Session PSE 6 : Converters 1

Chairs : Ammar Moussi (Algeria)
Abdelouahab Bouafia (Algeria)

PSE 6.1 Experimental Measurement of Common and Differential Modes for Variable Speed Drive DC Motor .....
Abdelhakim Zeghoudi, Bendaoud Abdelber, Helima Slimani, Houcine Miloudi, Mohamed Miloudi, Nawel Chikhi ..... (Algeria)

PSE 6.2 Predictive current control two-step of a single-phase inverter for grid-connected PEMFC system .....
Badreddine Kanouni; Abdessalam Badoud; Saad Mekhilef .. (Algeria–Australia)

PSE 6.3 Fabrication and characterization of ZnO/Al2O3 thin film transistors: channel length effect study .....
Walid Filali; Fouaz Lekoui; Boumediene Zatout; Laaid Henni; Abdelmoumene Sidali; Elyes Garoudja; Rachid Amrani; Slimane Oussalah ..... (Algeria)

Link: Room 2: https://meet.google.com/pec-tzfi-who Saturday, May 7, 2022, 15h30–17h30 (GMT+1)

PSE 6.4 Dynamic performance of parallel active filter control techniques .....
Moufid Mohammedi .....(Algeria)

PSE 6.5 Comparative study of power converters topologies using wind energy conversion system based on DFIG .....
Said Chikha, Kamel Barra, Nadhir Mesbahia .....(Algeria)

PSE 6.6 Enhancing electrical and mechanical by Sn doping in BCZT for high performance nanogenerators .....
Sarra Missaoui .....(Tunisia)

PSE 6.7 Investigation of a new power junctionless MOSFET using 2-D numerical simulation .....
Badreddine Zerroumda; Fayçal Djeffal; Said Benaggoune; Hichem Ferhati .....
.....(Algeria)

Link: Room 6: https://meet.google.com/pyv-uhno-cfv Saturday, May 7, 2022, 15h30–17h30 (GMT+1)

Session SAC 5 : Robotics 1

Chairs : Luis C.F. Herran (Mexico)
Jawhar Ghommam (Oman)

SAC 5.1 Modeling and Computed torque control for lower limb exoskeleton contacting with ground .....
Mohammad A. Faraj; Boutheina Maalej; Nabil Derbel and Mohamed Deriche ..
.....(Iraq–Tunisia–UAE)

SAC 5.2 Adaptive Regulation of the Position and Yaw angle of an UAV .....
Asma Dob; Kelttoum Ghedjati and Abdelaziz Mourad .....(Algeria)

SAC 5.3 Simulation of Robust Controllers for Disturbance Rejection in Quad-copter ....
Imane Bourouis; Razika Boushaki; Rabia Belkheir; Moussa Haddad and Abdellah Kouzou .....(Algeria)

SAC 5.4 Control of the Lateral and Longitudinal Dynamics of Autonomous Drone .....
Yasmine Zamoum; Karim Baiche; Khaled Mohammed Benkada; Mohammed Rahou; Razika Boushaki Zamoum and Kouzou Abdellah .....(Algeria)

SAC 5.5 Adaptive Backstepping Control for Upper Limb Rehabilitation Robot using PSO Tuning .....
Mawloud Aichaoui and Ameur Ikhlef .....(Algeria)

SAC 5.6 Advanced Backstepping Control: Application on a Foldable Quadrotor .....
Amina Belmouhoub; Yasser Bouzid; Medjmadj Slimane; Saddam Hocine Derrouaoui and Mohamed Guiatni .....(Algeria)

SAC 5.7 UAV Autonomous Flight for crop Monitoring based on NDVI and VARI Maps Generation .....
Ismat Meslouli; Chihab Brahim; Mouaad Dali Yahia; Amal Choukchou Braham and Brahim Cherki .....(Algeria–France)

Link: Room 8: https://meet.google.com/xwd-zdxv-rbr Saturday, May 7, 2022, 15h30–17h30 (GMT+1)

Session SCI 3 : Measurements Methods & Metrology

Chairs : Brahim Mezghani (Tunisia)
Lazhar Rahmani (Algeria)

SCI 3.1 sEMG Features Selection by a Chaotic Salp Swarm Algorithm for Hand Gestures Classification
Hiba Hellara; Rim Barioul; Salwa Sahnoun; Ayoub Choura; Ahmed Fakhfakh; Dhouha Bouchaala; Mohamed Deriche; Olfa Kanoun (Tunisia–Germany–UAE)

SCI 3.2 A ternary composite's dielectric modeling as a binary one
Rabah Delfouf; Abdelhalim Brahimi; Nacerdine Bourouba; Nacerdine Bouzit; Juan Pablo Martìnez Jiménez (Algeria–Spain)

SCI 3.3 A Monitoring Smart Insole for Walking Performance
Samir Boukhenous (Algeria)

SCI 3.4 Evanescent optical Kerr effect using silica nanofibers immersed in nonlinear liquids
Oussama Laouedj; Abderrahim Azzoune; Azzedine Bouaraba (Algeria)

SCI 3.5 Magnetic properties of RF sputtered NbO-Ni and NiO-Nb thin films: Application of Preisach model
A. Bendjerad; A. Benhaya; Hichem Ferhati; F. Smaili; S. Rahmani; Fayçal Djeffal; A. Lahmar (Algeria–France)

SCI 3.6 Extraction of the complex permittivity from single pulse terahertz transmission spectroscopy
Feriel Latreche; Mohamed Lazoul; Ayoub Boutemedjet (Algeria)

SCI 3.7 Evaluation of a Pyroelectric Sensor Transfer Function Model Using Measurements
Nejmeddine Sifi; Raja Maghrebi (Tunisia)

Link: Room 9: https://meet.google.com/qwc-igap-umf Saturday, May 7, 2022, 17h30–18h30 (GMT+1)

SSD Meeting

Sunday, 8 of May, 2022

Link: Room 9: https://meet.google.com/qwc-igap-umf — Sunday, May 8, 2022, 8h30–9h30 (GMT+1)

Plenary Session 2:

Chairs : Hocine Labar (Algeria)
Lazhar Rahmani (Algeria)

PL-2 The Role of Energy Storage in the Future Energy Supply Mix .....
Saad Mekhilef ..... (Australia)

Link: Room 4: https://meet.google.com/kfm-naep-pnd — Sunday, May 8, 2022, 9h30–10h15 (GMT+1)

Keynote Lecture KL-CSP 2 :

Chairs : Mohamed Deriche (UAE)
Mohammed Mostefai (Algeria)

KL-CSP 2 Computational Visual Perception for Image and Video Processing and Analysis in the Era of Deep Learning. .....
Azeddine Beghdadi ..... (France)

Link: Room 1: https://meet.google.com/pup-hwpy-ong — Sunday, May 8, 2022, 9h30–10h15 (GMT+1)

Keynote Lecture KL-PSE 2 :

Chairs : Abdellah Kouzou (Algeria)
Hamou Nouri (Algeria)

KL-PSE 2 Low rotational Inertia Systems and Grid Friendly Power Electronic Converters
F. M. Gonzalez-Longatt ..... (Norway)

Link: Room 6: https://meet.google.com/pyv-uhno-cfv — Sunday, May 8, 2022, 9h30–10h15 (GMT+1)

Keynote Lecture KL-SAC 2 :

Chairs : Ahmed Hafaifa (Algeria)
Abdul-Wahid Al-Saif (Saudi Arabia)

KL-SAC 2 Artificial Intelligence: Concepts, challenges, opportunities and Ethics .....
A. Ouahabi .....(France)

Link: Room 8: https://meet.google.com/xwd-zdxv-rbr — Sunday, May 8, 2022, 9h30–10h15 (GMT+1)

Keynote Lecture KL-SCI 2 :

Chairs : Brahim Mezghani (Tunisia)
Ameur Zegadi (Algeria)

KL-SCI 2 Wearables for embodied interaction in hybrid societies: Technologies, Sensors and Systems .....
Olfa Kanoun .....(Germany)

Sunday, May 8, 2022, 10h15–10h30 (GMT+1)

Break

Link: Room 4: https://meet.google.com/kfm-naep-pnd Sunday, May 8, 2022, 10h30–12h30 (GMT+1)

Session CSP 7 : Biomedical Systems

Chairs : Mohammed Al Betar (UAE)
Mohammed Mostefai (Algeria)

CSP 7.1 Support Vector Machine for Heart Beats Classification Based on Robust Filtering
Khaled Arbateni ..... (Algeria)

CSP 7.2 A Deep Pair Siamese Convolutional Neural Network for Multi-Class Classification of Alzheimer Disease .....
H. Alaeddine; Jihene Malek ..... (Tunisia)

CSP 7.3 Multi-Classification of epileptic High Frequency Oscillations using a Time-Frequency image-based CNN .....
Fatma Krikid; Ahmad Karfoul; Abdennaceur Kachouri; Régine Le Bouquin Jeannès ..... (Tunisia–France)

CSP 7.4 Baseline wander removal from ECG signal using a fixed-point adaptive noise canceller .....
Mohammed Mujahid Ulla Faiz; Izzet Kale ..... (UK)

CSP 7.5 Remote platform for lung monitoring based on Electrical Impedance Tomography measurements .....
Mariem Hafsa; Ons Bchir; Oumaima Bader; Najoua Essoukri Ben Amara; Olfa Kanoun ..... (Germany)

CSP 7.6 Classification of EEG signals using deep Learning .....
Lassaad Zaway; Larbi Chrifi-Alaoui; Nader Ben Amor; Mohamed Jallouli; Laurent Delahoche ..... (Tunisia–France)

Link: Room 5: https://meet.google.com/arb-xmda-ymp Sunday, May 8, 2022, 10h30–12h30 (GMT+1)

Session CSP 8 : New IoT Communication Technologies & IoT Security

Chairs : Abd Essalam Badoud (Algeria)
Abdul-Wahid Al-Saif (Saudi Arabia)

CSP 8.1 Confident Security Relation for Edge Computing based IoT Applications .....
Ahmed Jedidi; Hameed Almubarak ..... (Saudi Arabia)

CSP 8.2 Blockchain based access control for home hospitalization during covid-19 .....
Hideyat Zerga; Asma Amraoui; Badr Benmammar ..... (Algeria)

CSP 8.3 Smart electronic medical record based on blockchain technology to combat Covid-19 pandemic .....
Halima Mhamdi; Soufiene Ben Othman; Ahmed Zouinkhi; Hedi Sakli . (Tunisia)

CSP 8.4 Remote Control and Supervision of a Factory Automation System based on Internet of Things .....
Yehya Aniba; Mounir Bouhedda; Mourad Bachene; Hamza Benyezza; Benyoucef Kaddour; Abdelghani Chabira ..... (Algeria)

CSP 8.5 Implementation of an AES-based real-time Video Encryption/Decryption using FPGA/HPS .....
Ahmed Maache; Anouar Touati; Ayoub Ouali ..... (Algeria)

CSP 8.6 A novel approach for designing S-boxes based on Chaotic Boolean Functions and G.A Techniques .....
Mohamed Khaldi; Ramzi Guesmi; Mohamed Ali Hajjaji ..... (Tunisia)

Link: Room 1: https://meet.google.com/pup-hwpy-ong Sunday, May 8, 2022, 10h30–12h30 (GMT+1)

Session PSE 7 : Photovoltaic Systems 1

Chairs : Youcef Soufi (Algeria)
Abdelaziz Talha (Algeria)

PSE 7.1 Design of a Portable Solar PV System
Munzer Ebaid (Jordan)

PSE 7.2 FFT analysis-based P&O with IC for 100 kW two stage grid-connected PV system: Comparative study
Hicham Bouregba; Madjid Hachemi; Saad Mekhilef; Azeddine Ratni (Algeria–Australia)

PSE 7.3 Fuzzy Logic Based MPPT for PV System Connected to Shunt Active Power Filter
Sohaib Abdeslam Boulanouar; Amar Benaissa; Abdellah Kouzou; Ali Teta (Algeria)

PSE 7.4 Optimal Sizing and Placement of Photovoltaic Generators to Mitigate Unbalanced Factor
Slimane Sadoudi; Mohamed Boudour; Nour El Yakine Kouba (Algeria)

PSE 7.5 Forecasting of PV generation for Energy Management System in microgrid using LSTM
Abderrahman Bensalem; Belgacem Toual; Abdellah Kouzou; Zakaria Belboul (Algeria)

PSE 7.6 Maximum Power Point Tracking Dual Integral Sliding Mode Control for a Pumping System
Amira Lakhdara; Tahar Bahi; Abdelkarim Moussaoui (Algeria)

Link: Room 2: https://meet.google.com/pec-tzfi-who Sunday, May 8, 2022, 10h30–12h30 (GMT+1)

Session PSE 8 : Microgrid

Chairs : Atif Iqbal (Qatar)
Samir Sayah (Algeria)

PSE 8.1 MPC and MPPT Control of Fuel Cell/ Photovoltaic/ Supercapacitor Hybrid Grid-Connected System
Fatima Toureche; Djaafer Lalili; Hamza Bouaouaou (Algeria)

PSE 8.2 Control of PV based Standalone DC Microgrid Using HESS
Mohammed Abdulelah Albasheri (Algeria)

PSE 8.3 Adaptive Resonant Controller Based SOGI-FLL for Three-Phase Voltage Source Inverters
Ilyas Bennia; Abdelghani Harrag; Yacine Daili (Algeria)

PSE 8.4 An Economic Strategy for Energy Management of a Residential Grid-Connected PV-Battery System
Yehya Houam; Si Tayeb Abdelkader; Abdelkrim Khelifa (Algeria)

PSE 8.5 FSC-MPC for single-stage grid connected PV system
Abdessalam Badoud (Algeria)

PSE 8.6 MPPT techniques for PV applications in radial distribution grid at various load levels using FFA
Souhil Mouassa; Djabali Chabane; Hamou Nouri (Algeria)

Link: Room 6: https://meet.google.com/pyv-uhno-cfv Sunday, May 8, 2022, 10h30–12h30 (GMT+1)

Session SAC 6 : Control Approaches 1

Chairs : Samir Ladaci (Algeria)
Bilal Sari (Aalgeria)

SAC 6.1 PID controller optimized by using Genetic Algorithm for Active Suspension System of a Quarter car
Zineb Boulaaras; Abdelaziz Aouiche and Kheireddine Chafaa (Algeria)

SAC 6.2 ADRC control of an induction motor with varying parameters
Anwar Zorig; Ahmed Belkheiri; Mohammed Belkheiri and Katia Kouzi (Algeria)

SAC 6.3 Controlling chaos in the new 4-D hyper chaotic system using evolutionary algorithms
Guessas Laarem and Yacine Slimani (Algeria)

SAC 6.4 Real Time Tuneable Analogue PID Controller Realization
Walid Ounis; Mohamed Aoun and Slahedine Najjar (Tunisia)

SAC 6.5 Modelling and control of a gas blending station: A real industrial case study
Ahmed Anes Azouz Reguig; Bilal Sari and Saad Berber (Algeria)

SAC 6.6 An improved DC-link control for dual-stage grid connected PV system using three-level NPC inverter
Nadjah Attik and Abdessalam Badoud (Algeria)

SAC 6.7 Soft computing based control approach applied to an under actuated system
Larbi Kharroubi; Hichem Maaref and Vincent Vigneron (Algeria–France)

Link: Room 7: https://meet.google.com/nty-smgi-pzf Sunday, May 8, 2022, 10h30–12h30 (GMT+1)

Session SAC 7 : Faulty System 2

Chairs : Amine Sid (Algeria)
Zhongliang Li (France)

SAC 7.1 Diagnosis of Nonlinear Delay Systems
Walid Ben Hassen (Tunisia)

SAC 7.2 Deep Learning for Fault Detection and Diagnosis: Application to Photovoltaic System
Manel Marweni; Radhia Fezai; Mansour Hajji and Majdi Mansouri (Qatar–Tunisia)

SAC 7.3 Uncertain Fault Diagnosis of Grid-Connected PV Systems based Improved Data-Driven Paradigms
Khaled Dhibi; Majdi Mansouri; Kais Bouzrara; Hazem N. Nounou and Mohamed Nounou (Qatar–Tunisia)

SAC 7.4 Reduced KPCA based Ensemble Learning Approach for Fault Diagnosis of Grid-Connected PV Systems
Khaled Dhibi; Majdi Mansouri; Kais Bouzrara; Hazem N. Nounou and Mohamed Nounou (Qatar–Tunisia)

SAC 7.5 Bearing Fault Detection and Classification Based on Vibration Signal Analysis and ANFIS Classifier.
Issam Attoui; Nadir Boutasseta; Nadir Fergani; Brahim Oudjani; Mohammed Salah Bouakkaz and Ahmed Bouraiou (Algeria)

Link: Room 7: https://meet.google.com/nty-smgi-pzf Sunday, May 8, 2022, 10h30–12h30 (GMT+1)

SAC 7.6 Broken Rotor Bars Fault Detection in Induction Machine Using Machine Learning Algorithms .....
Saddam Bensaoucha; Sandrine Moreau; Sid Ahmed Bessedik and Aissa Ameur .....(Algeria–France)

Link: Room 8: https://meet.google.com/xwd-zdxv-rbr Sunday, May 8, 2022, 10h30–12h30 (GMT+1)

Session SCI 4 : Sensors & Measurement Systems

Chairs : Imed Ben Dhaou (Saudi Arabia)
Ameur Zegadi (Algeria)

SCI 4.1 Design of a Wearable Multi-Sensor Node for Human Movement Identification based on RSSI Measurements .....
Mahdi Mnif; Bilel Ben Atitallah; Dhouha El Houssaini; Salwa Sahnoun; Ahmed Fakhfakh; Olfa Kanoun .....(Tunisia–Germany)

SCI 4.2 A Combination of Energy Harvesting and Wireless Power Transfer for Applications in Harsh Environments .....
Kholoud Hamza; Ghada Bouattour; Carlo Trigona; Roberto La Rosa; Salvatore Baglio; Ahmed Fakhfakh; Olfa Kanoun .....(Tunisia–Italy–Germany)

SCI 4.3 A Comparative Analysis of Different Diaphragm Shaped for MEMS Capacitive Pressure Sensor .....
Tahar Lahreche; Malika Kandouci; Yacine Hadjadj .....(Algeria)

SCI 4.4 Energy Aware Disjoint Dominating Sets Algorithm for Heterogeneous Wireless Sensor Networks .....
Ahmed Khedr .....(UAE)

SCI 4.5 Improved Sample Volume in Cylindrical Perturbed Cavity for Permittivity Calculation .....
Khawla Ghorab; Mohamed lahdi Riabi; Rawdha Thabet; Jun Wu Tao .....
.....(Algeria–France)

SCI 4.6 Very high sensitivity of one dimensional photonic crystal biosensor for glucose monitoring .....
Faiza Bounaas .....(Algeria)

Sunday, May 8, 2022, 12h30–13h30 (GMT+1)

Break

Link: Room 4: https://meet.google.com/kfm-naep-pnd Sunday, May 8, 2022, 13h30–15h15 (GMT+1)

Session CSP 9 : Speech, audio & acoustic

Chairs : Omar Daoud (Jordan)
Diab Mokkedem (Algeria)

CSP 9.1 Speaker Diarization in Overlapped Speech .....
Hadjer Bounazou; Nassim Asbai; Sihem Zitouni .....(Algeria)

Link: Room 4: https://meet.google.com/kfm-naep-pnd Sunday, May 8, 2022, 13h30–15h15 (GMT+1)

CSP 9.2 A synthetic sleep snoring study through the use of linear predictive speech techniques
Mohamed Rezki; Mouloud Ayad (Algeria)

CSP 9.3 Joint Dereverberation and Separation of Reverberant Speech Mixtures
Mina Kemiha; Abdellah Kacha; Lotfi Chouikhi (Algeria)

CSP 9.4 Maghrebian Accent Recognition Using SVM Classifier and MFCC Features
Kamel Mebarkia; Aicha Reffad; Rania Maatoug (Algeria)

Link: Room 1: https://meet.google.com/pup-hwpy-ong Sunday, May 8, 2022, 13h30–15h15 (GMT+1)

Session PSE 9 : Wind Energy 2

Chairs : Ammar Moussi (Algeria)
Hammoud Radjeai (Algeria)

PSE 9.1 Integrating SMES in Wind Farms for Improving Rotor Power Flow During GSC Disconnection
Fatma Bouaziz; Achraf Abdelkafi; Abdelkarim Masmoudi; Lotfi Krichen (Tunisia)

PSE 9.2 Performance Enhancement of Wind Turbine Systems using Type-2 Fuzzy Logic Control: comparative study
Amal Dendouga; Abdelhakim Dendouga; Najib Essounbouli (Algeria)

PSE 9.3 Active and Reactive Power Control of the PMSG based on wind energy conversion system using STSMC
Mohamed Seddik Mahgoun; Abdessalam Badoud (Algeria)

PSE 9.4 Controlling a DFIG Wind Farm Equipped by SMES for an Absolute Power Constraint and Voltage Sag
Fatma Bouaziz; Achraf Abdelkafi; Abdelkarim Masmoudi; Lotfi Krichen (Tunisia)

PSE 9.5 Economic Feasibility Study on Solar PV-Wind Hybrid Power System in Telkom University
Indra Padmajaya; Bandiyah Sri Aprillia; Jangkung Raharjo; Kharisma Bani Adam; Dea Ashari Oktavia; Basuki Rahmat (Indonesia)

Link: Room 2: https://meet.google.com/pec-tzfi-who Sunday, May 8, 2022, 13h30–15h15 (GMT+1)

Session PSE 10 : Smart grid & Security/ Measurements & Protection

Chairs : Abdelhafid Bayadi (Algeria)
Ahmed Gherbi (Algeria)

PSE 10.1 Optimal Coordination Of Directional Overcurrent Relays Using Various Metaheuristic Methods
Nabil Mancer (Algeria)

PSE 10.2 Grid Synchronization Techniques Analysis of DG Systems Under Grid Fault Conditions
Noussaiba Mennai; Youcef Soufi; Ammer Medoued; Abdallah Faleh (Algeria)

PSE 10.3 Backup Overcurrent Relays Coordination with First and Second Zones Distance Relays in Power Systems
Asma Assouak; Rabah Benabid (Algeria)

Link: Room 2: https://meet.google.com/pec-tzfi-who Sunday, May 8, 2022, 13h30–15h15 (GMT+1)

PSE 10.4 Placement of DFIG power plants for Improving Static Voltage Stability .....
Ghada Machane; Ahmed Gherbi .....(Algeria)

PSE 10.5 Impact of High Renewable Integration on Inter-area Oscillations. Koopman Modal Analysis .....
Yassine Boussaâ; Mabrouka Ghiloufi; Zahra Jlassi; Khadija Ben Kilani; Mohamed Elleuch .....(Tunisia)

Link: Room 6: https://meet.google.com/pyv-uhno-cfv Sunday, May 8, 2022, 13h30–15h15 (GMT+1)

Session SAC 8 : System Estimation & Observation

Chairs : Djamel Eddine Chouaib Belkhiat (Algeria)
Mohamed Assaad Hamida (France)

SAC 8.1 A soft sensor of stator winding temperature prediction for PMSMs based on extreme learning machine .....
Smail Dilmi; Farida Kebaili and Mohamed Ladjal .....(Algeria)

SAC 8.2 IMU Measurements-Based Attitude Estimation Using Extended Sliding Innovation Filter .....
Djamel Dhahbane; Abdelkrim Nemra and Samir Sakhi .....(Algeria)

SAC 8.3 Functional Interval Observers Design for Multivariable Linear Discrete-time System .....
Rihab Akremi; Rihab Lamouchi and Messaoud Amairi .....(Tunisia)

SAC 8.4 Observer-based state feedback controller of PMSM using convex optimization via Feedforward Technique .....
Khalida Mimoune .....(Algeria)

SAC 8.5 Estimation of speed, Stator and Rotor Winding Temperature of the Induction Machine using a CFNN .....
Hacene Mellah; Kamel Eddine Hemsas; Hamza Sahraoui and Ismail Bouyakoub .....(Algeria)

Link: Room 7: https://meet.google.com/nty-smgi-pzf Sunday, May 8, 2022, 13h30–15h15 (GMT+1)

Session SAC 9 : Fractional Order Systems

Chairs : Djamel Boukhetala (Algeria)
Ahmed Said Nouri (Tunisia)

SAC 9.1 Simulink Blocks Implementation for Fractional Order Models Simulation based On DAFI Filter .....
Hemza Abdel Fettah Berkani; Abdelbaki Djouambi; Mohamed Lashab and Bouziane Keziz .....(Algeria)

SAC 9.2 Bias Recursive Least Squares Method for Fractional Order System Identification
Zaineb Yakub; Messaoud Amairi; Manel Chetoui and Mohamed Aoun (Tunisia)

SAC 9.3 State Space Fractional Order PI control for Cryptovirology Stabilization .....
Mohsen Mohamed Hadji and Samir Ladaci .....(Algeria)

SAC 9.4 MRAC with fractional order adaptation law design for a class of fractional order systems .....
Mohammed Islam Leulmi and Samir Ladaci .....(Algeria)

Link: Room 7: https://meet.google.com/nty-smgi-pzf Sunday, May 8, 2022, 13h30–15h15 (GMT+1)

SAC 9.5 An Optimal FO-PID Controller of an Arc Welding Power Supply Incorporating a Novel PFC Converter .....
Hamouda Noureddine; B. Badreddine; Sami Kahla and Abdelmalek Reddaf .....
..... (Algeria)

Link: Room 8: https://meet.google.com/xwd-zdxv-rbr Sunday, May 8, 2022, 13h30–15h15 (GMT+1)

Session SCI 5 : Sensors & Circuits Technology

Chairs : Brahim Mezghani (Tunisia)
Ameur Zegadi (Algeria)

SCI 5.1 A mononuclear nickel(II) complex as a redox mediator for electrochemical sensors

Saddam Weheabby; Ammar Al-Hamry; Salem Nasraoui; Tobias Rueffer; Olfa Kanoun ..... (Germany–Tunisia)

SCI 5.2 Online Pressure Measurement in the Ski Boot to Analyze the Carving Technique
Fabian Hildebrandt; Roman Gruden ..... (Germany)

SCI 5.3 An on-chip transformer in ferrite-based technology .....
Yamina Benhada, Kheria Mendez and Mokhteria Derkaoui ..... (Algeria)

SCI 5.4 Enhanced Photoresponse of Ultraviolet Photodetector via RF Sputtered ZnO/a-SiC Heterostructure .....
Fayçal Djeffal; Hichem Ferhati; A. Benhaya; A. Bendjerad ..... (Algeria)

SCI 5.5 Probe Characterization Using Stochastic Search Algorithms and Radial Basis Functions Neural Networks. .....
Ahmed Melahi; Boukhalfa Bendahmane ..... (Algeria)

Sunday, May 8, 2022, 15h15–15h30 (GMT+1)

Break

Link: Room 4: https://meet.google.com/kfm-naep-pnd Sunday, May 8, 2022, 15h30–17h30 (GMT+1)

Session CSP 10 : Image, Video & Multidimensional Signal Processing 2

Chairs : Abd Essalam Badoud (Algeria)
Aladine Chetouani (France)

CSP 10.1 Hardware implementation of a new solution to transmit digital video in GSM interfaces .....
Dalenda Bouzidi; Youssef Oudhini; Fahmi Ghozzi ..... (Tunisia)

CSP 10.2 Retinal Image Segmentation Using Clustering Methods: Performance Analysis
Imane Mehidi; Dalel Jabri; Djamel Eddine Chouaib Belkhiat ..... (Algeria)

CSP 10.3 Implementation and Comparison of U-net networks for Automatic COVID-19 Lung Infection Segmentation .....
Ayoub Koudia; Seif Eddine Chouaba; Djamel Eddine Chouaib Belkhiat .....
..... (Algeria)

Link: Room 4: https://meet.google.com/kfm-naep-pnd Sunday, May 8, 2022, 15h30–17h30 (GMT+1)

CSP 10.4 Robust Hybrid Watermarking Algorithm based on DCT-PMF-DWT-SVD .....
Razika Souadek .....(Algeria)

CSP 10.5 A Novel COVID-19 Detection Model using CT Scan .....
Larbi Messaouda; Abdelghani Rouini .....(Algeria)

CSP 10.6 On the Performance of GLRT-LTD Processor in Correlated Pareto Clutter Under Different Estimators .....
Taha Hocine Kerbaa; Amar Mezache; Houcine Oudira .....(Algeria)

CSP 10.7 Post-processing for Thorax Imaging based on Electrical Impedance Tomography using Deep Learning
Hamdi Haddad; Mariem Hafsa; Oumaima Bader; Olfa Kanoun; Najoua Essoukri Ben Amara .....(Tunisia–Germany)

Link: Room 5: https://meet.google.com/arb-xmda-ymp Sunday, May 8, 2022, 15h30–17h30 (GMT+1)

Session CSP 11 : Image & Signal Processing for Medical Applications 3

Chairs : Mohamed Deriche (UAE)
Abdelhamid Iratni (Algeria)

CSP 11.1 Evaluation of Local Binary Pattern for Osteoporosis Classification .....
Meriem Mebarkia .....(Algeria)

CSP 11.2 A New Deep Learning Architecture for Pneumonia Detection in Pediatrics ....
Ibrahim Remaigui; Laid Kahloul; Saber Benharzallah .....(Algeria)

CSP 11.3 Multiclassification Model of Histopathological Breast Cancer Based on Deep Neural Network .....
Nadia Smaoui .....(Tunisia)

CSP 11.4 Gammatonegram based Pulmonary Pathologies Classification using Convolutional Neural Networks.....
Zakaria Neili; Sundaraj Kenneth .....(Algeria–Malaysia)

CSP 11.5 Pectoral Muscle Removal Techniques: A review .....
Hela Boulehmi; Hela Mahersia; Kamel Hamrouni .....(Tunisia)

CSP 11.6 Motor Imagery Hand Movements Recognition Using SVM Classifier and Genetic Algorithm Optimization .....
Aicha Reffad; Kamel Mebarkia .....(Algeria)

Room 1: https://meet.google.com/pup-hwpy-ong Sunday, May 8, 2022, 15h30–17h30 (GMT+1)

Session PSE 11 : Monitoring & diagnosis 2

Chairs : Abdellah Kouzou (Algeria)
Youcef Soufi (Algeria)

PSE 11.1 Simulation of Different Faults in Photovoltaic Installation .....
F. Bait; S. Latreche; M. Khemliche .....(Algeria)

PSE 11.2 On line inter-turn short-circuit fault diagnosis and nonlinear control of PMSM
Samir Bouslimani; Said Drid; Larbi Chrifi-Alaoui; Laurent Delahoche .....
.....(Algeria–France)

PSE 11.3 Application of Support Vector Machine Classifier For Transformer Winding Faults Diagnosis .....
Ezziane Hassane; Hamza Houassine; Samir Moulahoum .....(Algeria)

Room 1: https://meet.google.com/pup-hwpy-ong Sunday, May 8, 2022, 15h30–17h30 (GMT+1)

PSE 11.4 Deep Learning based Fault diagnosis in Grid-Connected Photovoltaic Systems
Amal Hichri; Mansour Hajji; Majdi Mansouri; Kais Bouzrara; Hazem N. Nounou; Mohamed Nounou (Tunisia–Qatar)

PSE 11.5 Reliability Evaluation of GSR Prediction Using Neural Networks with Variant Atmospheric Parameters
Murad Al-Omary, Aiman Albatayneh, Rafat Aljarrah and Khaled Alzaareer (Jordan)

PSE 11.6 Open circuit fault diagnosis of NPC inverter in grid connected photovoltaic system
Amina Mimouni; Souad Laribi; Morsli Sebaa; Taieb Allaoui, Abdelkader Azzeddine Ben Gharbi (Algeria)

PSE 11.7 Rolling Bearing Fault diagnosis Using an Enhanced CEEMDAN Algorithm and a Modified Soft Thresholding
Rabah Abdelkader (Algeria)

Room 2: https://meet.google.com/pec-tzfi-who Sunday, May 8, 2022, 15h30–17h30 (GMT+1)

Session PSE 12 : Grid Connected Power Electronics Converters 1

Chairs : Abdelmadjid Chaoui (Algeria)
Lakhdar Mokrani (Algeria)

PSE 12.1 PV system optimization in shading conditions using MPPT control with PSO and IncCond algorithms
Nacer Bouderres; Djallel Kerdoun; Chiheb Sofaine; Abdelhak Djellad; Azzeddine Dekhane; Tarek Kebabsa (Algeria)

PSE 12.2 Dynamic Surface Controller for a Three-Phase Grid-Connected Photovoltaic System
Imene Boukerroume; Ahsene Boubakir; Nabil Oucief (Algeria)

PSE 12.3 An Enhanced Primary Control Level for a DC Microgrid Systems
Khalil Louassaa; Aissa Chouder; Mahdi Boukerdja; Abdelhafid Cherifi; Ali Aillane (Algeria)

PSE 12.4 Control of a Three-Phase Grid-Connected Inverter based on Super-Twisting Sliding mode Algorithm
Ali Aillane; Karim Dahech; Aissa Chouder; Tarak Damak; Abdelhafid Cherifi; Jihed Hmad (Tunisia–Algeria)

PSE 12.5 An Overview of Photovoltaic Power Plant (PV) Connection to HVDC Grid
Abdelghani Guechi; Mohammed Saaidia; Nedjem-Eddine Benchouia (Algeria)

PSE 12.6 Twisting Sliding Mode Based Control of Grid Following Inverter
Mohammed Benzoubir; Mohammed Benmiloud; Mohamed Bougrine; Noureddine Gazzam; Benalia Atallah (Algeria)

Room 3: https://meet.google.com/xeq-mazg-pja Sunday, May 8, 2022, 15h30–17h30 (GMT+1)

Session PSE 13 : Modeling & Design/Wind Energy

Chairs : Achour Betka (Algeria)
Atif Iqbal (Qatar)

PSE 13.1 Pitch Angle Control of Wind Turbine Based on Fractional Order PI and Integer Order PID Controllers
Mohamed lamine Frikh (Algeria)

PSE 13.2 Numerical modelling of the coupling electromagnetic-thermic equations of an annular induction MHD pump
Nassima Bergoug; Fatima Zohra Kadid; Rachid Abdessemed (Algeria)

PSE 13.3 Power control strategy for a SCIG Wind turbine generator
Achwak Alazrag; Lassaad Sbita (Tunisia)

PSE 13.4 Optimal Torque Control for Power Optimization in PMSG Based Wind Energy Conversion System
Farid Merahi; Hamza Mernache (Algeria)

PSE 13.5 A Comparative study between MPPT using PI and Fuzzy Logic Control for Wind Turbine system
Abdeldjalil Dahbi; Miloud Benmedjahed, Abderrahman Khelfaoui and Nouar Aoun; Abdelghani Harrag; Ahmed Bouraiou; Boualam Benlahbib; Sara Kadi; Abdeldjalil Slimani; Ammar Necaibia; Djilali Chogueur; Samir Mouhadjer; Messaoud Hamouda; Boudjema Tidjar; Abdellatif Oudran; Ahmed Yassine Kadri; Zahra Belhadj (Algeria)

PSE 13.6 Design and analysis of pseudo direct drive generator used in a large wind turbine
Dorra Abdeljalil; Naourez Benhadj; Mohamed Chaieb; Manel Krichen; Mohamed Benbouzid; Rafik Neji (Tunisia–France)

Link: Room 6: https://meet.google.com/pyv-uhno-cfv Sunday, May 8, 2022, 15h30–17h30 (GMT+1)

Session SAC 10 : Sliding Mode Control

Chairs : Tarak Damak (Tunisia)
Gerasimos Rigatos (Greece)

SAC 10.1 Global sliding mode control for teleportation systems with fixed-time delay
Asma Ounissi; Neila Mezghani Ben Ramdhane and Mohamed Boukattaya (Tunisia)

SAC 10.2 Modified Sliding Mode Control of Autonomous Quadrotor
Fadhila Lachekhab; Razika Boushaki Zamoum; Ramzi Belatreche; Abdellah Kouzou and Dalila Acheli (Algeria)

SAC 10.3 Adaptive Finite-Time Robust Sliding Mode Controller For Upper Limb Exoskeleton Robot
Ratiba Fellag; Mohamed Guiatni; Mustapha Hamerlain and Nouara Achour (Algeria)

SAC 10.4 ACO Base Optimal MIMO Sliding Mode Controller for UAV Trajectory Tracking Under External Disturbance
Khedidja Bouhabza; Mohamed Guiatni; Yasser Bouzid and Mustapha Hamerlain (Algeria–France)

Link: Room 6: https://meet.google.com/pyv-uhno-cfv Sunday, May 8, 2022, 15h30–17h30 (GMT+1)

SAC 10.5 Adaptive Fuzzy Sliding Mode Control of TRMS
Khadidja Saoudi; Kamel Guesmi; Khansa Bdirina and Mohammed Zinelaabidine Ghellab (Algeria)

SAC 10.6 High Order Sliding Mode based Direct Power Control of Connected DFIG-Variable Speed Wind Turbine
Sara Kadi; Khoukha Imarazene; El Madjid Berkouk; Mohamed Horch and Emad Abdelkarim (Algeria–Egypt)

SAC 10.7 Discrete Adaptive second order sliding mode control for Uncertain Hammerstein Nonlinear systems
Aicha Znidi; Khadija Dehri and Ahmed Said Nouri (Tunisia)

Link: Room 8: https://meet.google.com/xwd-zdxv-rbr Sunday, May 8, 2022, 15h30–17h30 (GMT+1)

Session SCI 6 : Sensor Systems for IoT

Chairs : Imed Ben Dhaou (Saudi Arabia)
Ameur Zegadi (Algeria)

SCI 6.1 Energy Harvesting from Rose of Jericho Movements
Carlo Trigona, Erika Costa, Nicolò Cascone, Salvatore Baglio (Italy)

SCI 6.2 Multi Objective Task Offloading in Fog Computing using Sparrow Search algorithm
Marya Jehad Alseid, Ali A. El-Moursy, Ahmed Khedr (UAE)

SCI 6.3 Effect of sonication Amplitude on Piezoelectric and Mechanical Properties of BCZT/PVDF-HFP Composite
Khawla Jeder; Ayda Bouhamed; Hamadi Khemakhem; Olfa Kanoun (Tunisia–Germany)

SCI 6.4 High overtone acoustic resonator HBAR based on IDT's/c-tilted ZnO/Si for timing applications
Farouk Laidoudi; Cinzia Caliendo; Muhammad Hamidullah; Fares Kanouni; Fouad Boubenider; Fayçal Medjili (Algeria–Italy)

SCI 6.5 Numerical modeling of electrical/optical combination for the simulation of PIN photodiode
Samir Labiod (Algeria)

SCI 6.6 Modeling of Birefringent Photonic Waveguide Based Sensor
Abdelbaki Cherouana; Idris Bouchama; Abdelhalim Bencheikh (Algeria)

SCI 6.7 Thermal model for heat conduction in octagonal integrated inductor multilayer
Amina Benhada; Mokhtaria Derkaoui; Fatima Zohra Medjaoui; Azzeddine Hamid (Algeria)

Monday, 9 of May, 2022

Link: Room 9: https://meet.google.com/qwc-igap-umf Monday, May 9, 2022, 8h30–9h20 (GMT+1)

Plenary Session 3:

Chairs : Bilal Sari (Algeria)
Mohamed Amine Sid (Algeria)

PL-3 Characterization of Learning Models via Contrastive Reasoning and Uncertainty
Al-Regib Ghassan ..... (Georgia)

Link: Room 9: https://meet.google.com/qwc-igap-umf Monday, May 9, 2022, 9h20–10h15 (GMT+1)

Plenary Session 4:

Chairs : Mohammed Mostefai (Algeria)
Mohamed Deriche (UAE)

PL-4 Leak Monitoring in Water Distribution Networks .....
Vicenç Puig ..... (Spain)

Monday, May 9, 2022, 10h15–10h30 (GMT+1)

Break

Link: Room 4: https://meet.google.com/kfm-naep-pnd Monday, May 9, 2022, 10h30–12h30 (GMT+1)

Session CSP 12 : Wireless Sensors Networks

Chairs : Diab Mokkedem (Algeria)
Azzedine Zerguine (Saudi Arabia)

CSP 12.1 Effect of ACI and CCI on AWGN and Rayleigh Channels Performance Using 64-QAM Modulation .....
Amer M. Daeri; Amer Zerek; Nahla Hweesa; Fatima Zahra Messaoud ..(Lybia)

CSP 12.2 5G Wireless Communications Performance Based on Multiparallel Processing Algorithm .....
Omar R. Daoud; Qadri Hamarsheh; Ahlam Damati ..... (Jordan)

CSP 12.3 Robust Jamming Attacks Detection Algorithm for Healthcare Applications ....
Mbarka Belhaj Mohamed .....(Tunisia)

CSP 12.4 Reverse Engineering Based PSA Chemical Oxygen Concentrators Design .....
Kasim M. Al-Aubidy; Abdallah W. Al-Mutairi ..... (Jordan)

CSP 12.5 Millimeter-Wave Rectenna and Rectifying Circuits for Wireless Power Transfer in 60 GHz .....
Chayma Bahhar; Chokri Baccouch; Hedi Sakli ..... (Tunisia)

CSP 12.6 Exploiting traffic seasonality for anomaly detection in IEEE 802.15.4 networks
M'hammed Achour; Mohammed Mana; Saadi Achour ..... (Algeria)

CSP 12.7 Region-of-Interest based Video Coding Strategy for Low Bitrate Surveillance Systems .....
Ahcen Aliouat; Nasreddine Kouadria; Saliha Harize; Moufida Maimour (Algeria)

Link: Room 5: https://meet.google.com/arb-xmda-ymp Monday, May 9, 2022, 10h30–12h30 (GMT+1)

Session CSP 13 : Image & Signal Processing

Chairs : Kasim Mousa Al-Aubidy (Jordan)
Omar Daoud (Jordan)

CSP 13.1 A Fast CFAR Algorithm based on a Novel Region Proposal Approach for Ship Detection in SAR Images
Farah Faiçal; Toufik Laroussi; Hicham Madjidi (Algeria)

CSP 13.2 Ensemble learning-CNN for reducing JPEG artifacts
Djamel E. Boudechiche; Said Benierbah (Algeria)

CSP 13.3 Study and implementation of the down sampling module of SHVC extension
Ibtissem Wali (Tunisia)

CSP 13.4 Novel Quantisation Table For Lossy Image Compression
Nabila Brahimi; Toufik Bouden; Tahar Brahimi (Algeria)

CSP 13.5 Tumor Detection in Mammography Images using Discrete Wavelet Transform and Bayes Fusion Technique
Abdelkader Zitouni (Algeria)

CSP 13.6 A Robust Stochastic Image Segmentation Model for Medical Images
Larbi Messaouda; Rouini Abdelghani (Algeria)

Link: Room 1: https://meet.google.com/pup-hwpy-ong Monday, May 9, 2022, 10h30–12h30 (GMT+1)

Session PSE 14 : Photovoltaic Systems 2

Chairs : Arkadiusz Lewicki (Poland)
Hocine Labar (Algeria)

PSE 14.1 Comparative Study MPPT between FLC and Incremental Conductance Applied on PV Water Pumping System
Ahmed Mesai Belgacem (Algeria)

PSE 14.2 Hybrid MPPT method based on Neural Network and Perturb & Observe for PV systems
Wafa Hayder; Dezso Sera; Emanuele G.C. Ogliari; Aicha Abid (Tunisia–Australia–Italy)

PSE 14.3 Real-Time Wireless Monitoring System of Photovoltaic Power Plants with Different Technologies
Houria Assem (Algeria)

PSE 14.4 Fuzzy Logic Algorithm Based on PSO Technique Dedicated to Improve Photovoltaic Water Pumping Systems
Abdelhak Bouchakour (Algeria)

PSE 14.5 Real-Time Experimental Analysis of Hybrid BG-FL Based MPPT Controller for a Photovoltaic
Abdessalam Badoud (Algeria)

PSE 14.6 Four leg Interleaved DC/DC boost Converter based PV system using PSO Algorithm based PI controller
Mohamed Cherif O. Daia Eddine; Ali Chebabhi; Abdelhalim Kessal (Algeria)

Link: Room 2: https://meet.google.com/pec-tzfi-who Monday, May 9, 2022, 10h30–12h30 (GMT+1)

Session PSE 15 : Grid Connected Power Electronics Converters 2

Chairs : Sertac Bayhan (Qatar)
Tahar Bahi (Algeria)

PSE 15.1 Reduced Rules Neuro-Fuzzy based MPPT Controller in Photovoltaic Array Connected to Grid .....
Lotfi Farah; Nadir Farah; Kamar Zaeim .....(Algeria)

PSE 15.2 Sliding Mode Control of a Shunt Active Filter-Comparative analysis with conventional PI control .....
Brahim Deffaf .....(Algeria)

PSE 15.3 Experimental and Digital Simulation Investigations of Harmonics Injection By CFLs Into a LV Network .....
Mohamed Hajjej; Khalil Elkssayer Mohamed; Mohamed Naoui ; Lassaad Sbita .
.....(Tunisia)

PSE 15.4 A robust PWM control for a three leg shunt active power filter .....
Abdelkarim Chemidi; Mohamed Choukri Benhabib .....(Algeria)

PSE 15.5 Boost converter sizing and its impact on photovoltaic system yield .....
Hamiche Ait Mimoune; Amine Boudghene Stambouli .....(Algeria)

PSE 15.6 Performance Analysis of Four Level NPC Inverters using FCS-MPC Voltage Balancing Method .....
Nadjah Attik; Abdessalam Badoud .....(Algeria)

Link: Room 6: https://meet.google.com/pyv-uhno-cfv Monday, May 9, 2022, 10h30–12h30 (GMT+1)

Session SAC 11 : Control Approaches

Chairs : Abdelghani Bekrar (France)
M'hammed Sahnoun (France)

SAC 11.1 Investigate the Performace of Torque Distribution Strategy in Dual Electric Vehicle .....
Ismail Benmiloud; Katia Kouzi and Aissa Ameur .....(Algeria)

SAC 11.2 DeadBeat Controller Based Luenberger Current Observer for Single-phase Islanded Inverter .....
Abdelhak Hadjkaddour; Ouahid Bouchhida; Hani Benguesmia; Aissa Chouder; Abdelhafid Cherifi and Mohammed Saoudi .....(Algeria)

SAC 11.3 Power reserve control (PRC) of PV systems techniques overview .....
Chaouki Messasma; Seif Eddine Chouaba; Bilal Sari and Abdallah Barakat ....
.....(Algeria–France)

SAC 11.4 Control of a Voltage Source Inverter in a Microgrid Architecture using PI and PR Controllers .....
Abdelhafid Cherifi; Aissa Chouder; Abdelhalim Kessal; Abdelhak Hadjkaddour; Khalil Louassaa and Ali Aillane .....(Algeria–Tunisia)

SAC 11.5 Power Factor Control for PWM Rectifier using Predictive Current Control and various DC-controllers .....
Sarah Djabali; Abdelkarim Ammar and Aissa Kheldoun .....(Algeria)

Link: Room 7: https://meet.google.com/nty-smgi-pzf Monday, May 9, 2022, 10h30–12h30 (GMT+1)

Session SAC 12 : Intelligent Control 2

Chairs : Djamel Eddine Chouaib Belkhiat (Algeria)
Khier Benmahammed (Algeria)

SAC 12.1 Optimal Fuzzy Logic Controller Using Teaching Learning Based Optimization for asynchronous motor
Mohamed Benrabah and Kamel Kara (Algeria)

SAC 12.2 Control of Squirrel Cage Induction Motor using Conventional controllers and fuzzy logic
Fadhila Lachekhab; Razika Boushaki Zamoum; Dhya Eddine Bougheloum; Sofiane Benyahia; Dalila Acheli and Abdellah Kouzou (Algeria)

SAC 12.3 An Optimal PSO-Based Fuzzy Controller for a Nonlinear System
Khayreddine Saidi; Abdelmadjid Boumediene; Djamila Boubekeur and Sarra Massoum (Algeria)

SAC 12.4 Comparative study of the intelligent techniques (fuzzy logic and neural network) of the ABS system
Billel Naceri; Hamou Ait Abbas; Khaled Mouhab and Cylia Aliouat (Algeria)

SAC 12.5 Robust unified Observer-based Fuzzy Controller of Perturbed Uncertain Multivariable Systems
Loubna Merazka; Abdesselem Boulkroune and Sami Labdai (Algeria)

SAC 12.6 Switching Function Analysis of DC-DC Converters under Pontryagin's Maximum Principle
Abdulwahid A. Saif; Ali Alameer; Mujahed Aldhaifallah; Hegazy Rezk and Ahmed Mohamed (Saudi Arabia–USA)

SAC 12.7 On Smoothing the Duck Curve: A Control Perspective
Maitham AL-Sunni; Turki Bin Muhaya; Khaled Alshehri; Haitham Saleh and Abdulwahid A. Saif (Saudi Arabia–USA)

Link: Room 8: https://meet.google.com/xwd-zdxv-rbr Monday, May 9, 2022, 10h30–12h30 (GMT+1)

Session SCI 7 : Electronic Systems & Technologies 1

Chairs : Ameur Zegadi (Algeria)
Imed Ben Dhaou (Saudi Arabia)

SCI 7.1 Reliable Wake-up Receiver with Increased Sensitivity using Low-Noise Amplifiers
Robert Fromm; Olfa Kanoun; Faouzi Derbel (Germany)

SCI 7.2 Improving the Current Ratio and ambipolar behavior in Junctionless CNTFETs Using GMGWF
Khalil Tamersit; Hocine Bourouba; Abdellah Kouzou (Algeria)

SCI 7.3 Energy-Aware Cluster Head selection protocol with Balanced Fuzzy C-mean Clustering in WSN
Imen Azzouz; Boumedyen Boussaid; Ahmed Zouinkhi; Mohamed Naceur Abdelkrim (Tunisia)

SCI 7.4 Optimal tapers for efficient entangled photon pair generation in silica tapered optical fibers
Abderrahim Azzoune; Oussama Laouedj (Algeria)

Link: Room 8: https://meet.google.com/xwd-zdxv-rbr Monday, May 9, 2022, 10h30–12h30 (GMT+1)

SCI 7.5 A Low-Power Maximally-Flat Transconductor in Subthreshold CMOS .....
Lazhar Fekih-Ahmed ..... (Tunisia)

SCI 7.6 Design and Analysis of SAW Delay Lines for Sensors Applications .....
Saad Amara; Fares Kanouni ..... (Algeria)

Monday, May 9, 2022, 12h30–13h30 (GMT+1)

Break

Link: Room 4: https://meet.google.com/kfm-naep-pnd Monday, May 9, 2022, 13h30–15h15 (GMT+1)

Session CSP 14 : Artificial Intelligence Technology

Chairs : Ghazi Al-Naymat (UAE)
Mohammed Mostefai (Algeria)

CSP 14.1 New Based GPR Model For FGCPW Coplanar Waveguide Analysis .....
Abdelmalek Reddaf; Fatima Djerfaf; Mounir Boudjerda; Khaled Hamdi-Chérif; B. Badreddine ..... (Algeria)

CSP 14.2 Areas Division and Multiple UAV Coverage Path Planning For Gas Distribution Map .....
Abdelwahhab Bouras; Yasser Bouzid; Mohamed Guiatni ..... (Algeria)

CSP 14.3 A New Chaotic Oscillator generated from the Duffing Analysis and Chaos Control
Laarem Guessas; Sohaib Bendris ..... (Algeria)

CSP 14.4 Online Exam Monitoring System based on Factor analysis (FA) Method .....
Amjad H. Alkilani; Mohammad Nusir ..... (USA–Jordan)

CSP 14.5 Emotion Tracking System for Students during Online Exams .....
Amjad H. Alkilani; Mohammad Nusir ..... (USA–Jordan)

Link: Room 1: https://meet.google.com/pup-hwpy-ong Monday, May 9, 2022, 13h30–15h15 (GMT+1)

Session PSE 16 : Concentrated Solar

Chairs : Mohamed Abdelrahem (Germany)
Messaoud Guellal (Algeria)

PSE 16.1 Modeling of an Efficient Solar Absorption Cooling System for a Building in Souk Ahras City, Algeria .....
Brahim Bacha; Nor Rebah; Salah Eddine Hachani ..... (Algeria)

PSE 16.2 Techno-economic feasibility of a new combined CSP-geothermal power plant ...
Taqiy Eddine Boukelia; Oguz Arslan ..... (Algeria–Turkey)

PSE 16.3 A comparative study of a new PSO and P&O of the MPPT algorithm under partial Shading Conditions .....
Abdelouadoud Bendaoud; Houssem Saber; Radjeai Hammoud; Lazhar Rahmani ..... (Algeria)

PSE 16.4 Energy analysis of integrating a waste heat recovery system to a DSG Central Tower Power Plant .....
Taqiy Eddine Boukelia; Oguz Arslan; Abderrezak Laouafi ..... (Algeria–Turkey)

Link: Room 1: https://meet.google.com/pup-hwpy-ong Monday, May 9, 2022, 13h30–15h15 (GMT+1)

PSE 16.5 Improved Particle Swarm Optimizer-Based MPPT Control of PV Systems Under Dynamic Partial Shading
Samia Dziri; Mohammed Alhato; Soufiene Bouallegue; Patrick Siarry (Tunisia–France)

Link: Room 2: https://meet.google.com/pec-tzfi-who Monday, May 9, 2022, 13h30–15h15 (GMT+1)

Session PSE 17 : Storage Systems

Chairs : Claudia Martis (Romania)
Hamou Nouri (Algeria)

PSE 17.1 Model Predictive Control and MPPT of Fuel Cell/Supercapacitor Hybrid Grid-Connected System
Fatima Toureche; Djaafer Lalili; Hamza Bouaouaou (Algeria)

PSE 17.2 Optimization of Hybrid PV/Wind/Battery/DG Microgrid Using MOALO: A Case Study in Djelfa, Algeria
Zakaria Belboul; Belgacem Toual; Abdellah Kouzou; Abderrahman Bensalem (Algeria)

PSE 17.3 Planning of domestic electricity consumption using storage element and photovoltaic production
Majdi Frikha, Faouzi Derbel; Ahmed Fakhfakh (Germany)

PSE 17.4 Survey a Superconducting Magnetic Energy Storage SMES with PV System to Enhance the Microgrid
Ahmed Samawi Alkhafaji; Hafedh Trabelsi (Iraq–Tunisia)

PSE 17.5 Intelligent Contingencgy Overload-Avoiding Control of BESS for Renewable-Rich Local Area
Francisco Gonzalez-Longatt; Peter Palensky; Kouzou Abdellah; Harold Chamorro (Norway–Netherlans–Algeria–Sweeden)

Link: Room 3: https://meet.google.com/xeq-mazg-pja Monday, May 9, 2022, 13h30–15h15 (GMT+1)

Session PSE 18 : Machine Control

Chairs : Marcin Morawiec (Poland)
Mokrani Lakhdar (Algeria)

PSE 18.1 Supervision and Speed Vector Control of Photovoltaic/Single-Phase Induction Machine System
Daoud Rezzak (Algeria)

PSE 18.2 Advanced control for DFIG with MPPT Based on Artificial Neural Network
Hamid Chojaa; Aziz Derouich; Fayssal Amrane; Othmane Zamzoum; Mohammed Taoussi; Mourad Yessef (Morocco)

PSE 18.3 Improved Performance for the PMSM Control Based on PCH Controller and Computational Intelligence
Marcel Nicola; Claudiu Nicola (Romania)

PSE 18.4 Real-time control of PMSM motor drive based MRAS-STC technique
Meryem Benakcha; Abdelhamid Benakcha; Abdelkarim Ammar; Salah Eddine Zouzou (Algeria)

Link: Room 3: https://meet.google.com/xeq-mazg-pja Monday, May 9, 2022, 13h30–15h15 (GMT+1)

PSE 18.5 Efficient Model Predictive Control for Induction Machine with SOGI-FLL Based Flux Estimator
Abdelkarim Ammar; Aissa Kheldoun; Brahim Metidji; Meryem Benakcha; Tarek Ameid (Algeria)

Link: Room 6: https://meet.google.com/pyv-uhno-cfv Monday, May 9, 2022, 13h30–15h15 (GMT+1)

Session SAC 13 : Robust Control 1

Chairs : Bilal Sari (Algeria)
Seifeddine Benelghali (France)

SAC 13.1 Robust Constrained Gain-Scheduled Static Output Feedback Controller for NLPV descriptor systems
Ines Righi (Algeria)

SAC 13.2 Nonlinear optimal control for VSI-fed asynchronous motors
Gerasimos Rigatos; Med. Assaad Hamida; Pierluigi Siano; Masoud Abbaszadeh; Godpromesse Kenné and Patrice Wira (France–Greece–Italy–USA)

SAC 13.3 Nonlinear optimal control for electropneumatic actuators
Gerasimos Rigatos; Med. Assaad Hamida; Masoud Abbaszadeh and Pierluigi Siano (France–Greece–Italy–USA)

SAC 13.4 H_∞ Static Output Feedback Control for Path Tracking of Autonomous Vehicles with input constraints
Amine Kennouche; Dounia Saifia; Mohammed Chadli and Mohamed Nasri (Algeria–France)

SAC 13.5 Crow Search Algorithm Based An Optimal Control for Switched Nonlinear Systems
Marwen Kermani and Anis Sakly (Tunisia)

Link: Room 8: https://meet.google.com/xwd-zdxv-rbr Monday, May 9, 2022, 13h30–15h15 (GMT+1)

Session SCI 8 : Electronic Systems & Technologies 2

Chairs : Ameur Zegadi (Algeria)
Brahim Mezghani (Tunisia)

SCI 8.1 LMC for upper limbs physical rehabilitation in post-stroke patients: a usability evaluation
Zineb Hadjadj; Mostefa Masmoudi; Abdelkrim Meziane; Nadia Zenati (Algeria)

SCI 8.2 Enhanced Dielectric and Mechanical Properties of PVDF-HFP/Zn-BCZT Composite
Amina Ben Ayed; Ayda Bouhamed; Najmeddine Abdelmoula; Hamadi Khemakhem; Olfa Kanoun (Tunisia–Germany)

SCI 8.3 Thin film bulk acoustic resonators based on c-axis tilted yttrium-doped AlN for Viscosity sensors
Fares Kanouni; Farouk Laidoudi; Saad Amara (Algeria)

SCI 8.4 Simultaneous extraction of related semiconductor parameters based on EBIC and Genetic Algorithms
Souhaila Soualmia (Saudi Arabia)

SCI 8.5 Comparison between a simple serial and a voltage doubler rectifiers circuits
Mounira Ben Yamna; Nabil Dakhli; Hedi Sakli (Tunisia)

Break

Monday, May 9, 2022, 15h15–15h30 (GMT+1)

Link: Room 4: https://meet.google.com/kfm-naep-pnd

Monday, May 9, 2022, 15h30–17h30 (GMT+1)

Session CSP 15 : Smart Systems

Chairs : Mohammed Mostefai (Algeria)
Mohammed Al Betar (UAE)

CSP 15.1 A Tunable Stop-Bands Filter with Switchable CLLs For Wireless Communications
Saber Dakhli; Moheddine Smari; F. Choubani (Tunisia)

CSP 15.2 Quality of service optimization in OFDM-based cognitive radio network
Mohammed Salih Bendella; Badr Benmammar; Baghdadi Absari; Francine Krief (Algeria–France)

CSP 15.3 Improved DOA Estimation Algorithms Using Modified Covariance Matrix
Naceur Aounallah; Smail Labed (Algeria)

CSP 15.4 Gain Enhancement of CPW Triangular Antenna Using Dual-Band AMC Structure
Arab Azrar; Azzedine Bouaraba; Azdine Messani (Algeria)

CSP 15.5 Internet of Things (IoT) System with Matlab interface for Multi Patient ECG's Monitoring
Nizar Sakli; Chokri Baccouch; Ahmed Zouinkhi; Hedi Sakli; Mustapha Najjari (France–Tunisia)

Link: Room 5: https://meet.google.com/arb-xmda-ymp

Monday, May 9, 2022, 15h30–17h30 (GMT+1)

Session CSP 16 : Biomedical Systems & Image Processing

Chairs : Mohamed Nasor (UAE)
Abdelhamid Iratni (Algeria)

CSP 16.1 Glucose Insulin Regulation Based Input Output Linearization
Meriem Samai; Kelttoum Ghedjati; Mourad Abdelaziz (Algeria)

CSP 16.2 An efficient deep learning model to predict cardiovascular disease based on ECG signal
Nizar Sakli; Haifa Ghabri; Ahmed Zouinkhi; Hedi Sakli; Mustapha Najjari (Fance–Tunisia)

CSP 16.3 FPGA Hardware Co-Simulation of a Stream Cipher Image Cryptosystem based on Fixed-Point Chaotic Map
Ichraf Aouissaoui; Toufik Bakir; Anis Sakly (Tunisia)

CSP 16.4 Electrical Impedance Tomography Image Reconstruction with apriori Knowledge for Gesture Recognition.
Hayat Odeh; Mariem Hafsa; Oumaima Bader; Mohammed Ibbini; Sameer Hasan; Olfa Kanoun (Jordan–Tunisia–Germany)

CSP 16.5 Study of Three Non-Coherent Integration Techniques for Multiple-Pulses Trimmed-Mean CFAR Detector
Souad Chabbi; Toufik Laroussi (Algeria)

Link: Room 5: https://meet.google.com/arb-xmda-ymp Monday, May 9, 2022, 15h30–17h30 (GMT+1)

CSP 16.6 Elliptic Curve Cryptography for Medical Image Security
Samira Dib; Amina Khaoula Amzert; Morad Grimes; Asma Benchiheb; Fadila Benmeddour (Algeria)

Room 1: https://meet.google.com/pup-hwpy-ong Monday, May 9, 2022, 15h30–17h30 (GMT+1)

Session PSE 19 : Converters 2

Chairs : Abdelouahab Bouafia (Algeria)
Ebrahim Babaei (Iran)

PSE 19.1 Fixed Switching Frequency Predictive Direct Power Control with Three Vectors Voltage
Zakaria El Zair Laggoun (Algeria)

PSE 19.2 Robust Control of a PV-Wind Hybrid System Using DISO DC/DC Converter
Farouk Mechnane; Said Drid; Boutheyna Hadmer; Nasreddine Nait-Said; Larbi Chrifi-Alaoui; Laurent Delahoche (Algeria–France)

PSE 19.3 Modified 3LSVPWM for Circulating Currents Control in Paralleled 3Level T-type Inverters
Abdelmalik Zorig; Barkat Said; Abdelhamid Rabhi (Algeria)

PSE 19.4 Design and Simulation of Closed Loop DC-DC Cuk Converter for Photovoltaic Systems
Mohamed Kaouane (Algeria)

PSE 19.5 Experimental Study of PWM Based Hysteresis Controller and Amplifier Regulator for a DC/DC Converter
Rabia Behloul; Mohamed Boudiaf; Kamel Guesmi; Lakhdar Mazouz (Algeria–France)

PSE 19.6 Hybrid PV-battery pumping system based on quasi Z source boost and bidirectional DC-DC converters
Seifeddine Boukebbous (Algeria)

Room 2: https://meet.google.com/pec-tzfi-who Monday, May 9, 2022, 15h30–17h30 (GMT+1)

Session PSE 20 : High Voltage

Chairs : Abdelhafid Bayadi (Algeria)
Hamou Nouri (Algeria)

PSE 20.1 Modeling of inductive coupling on aerial metallic Pipeline from HV overhead power line
Rabah Djekidel; Nourredine Tadj; Abde-Chafik Hadjadj (Algeria)

PSE 20.2 Lightning Return Stroke Current Above Tower Analysis Using EM Models and the 3D FDTD Method
Mohamed Abdelghani Talbi; Kaddour Arzag; Zin-Eddine Azzouz (Algeria)

PSE 20.3 Calculation and Mitigation of the Magnetic Field Under High Voltage Overhead Transmission Line
Salah-Eddine Houicher (Algeria)

PSE 20.4 Study of the different parameter corona discharge in point-plane Electrostatic Separator
Nacereddine Guettaf; Seif el islem Guettaf; Faouzi Hassaine; Zahira Anane; Hamou Nouri; (Algeria)

Room 2: https://meet.google.com/pec-tzfi-who Monday, May 9, 2022, 15h30–17h30 (GMT+1)

PSE 20.5 Modeling Effects of Partial Discharge Void Geometry on Various Dielectrics ...
Mohamed Ayoub Sahnoune; Boubakeur Zegnini; Tahar Seghier ..... (Algeria)

PSE 20.6 An Approach To Predict Flashover Voltage on Polluted Outdoor Insulators Using ANN .....
Lazreg Taibaoui; Boubakeur Zegnini; Abdelhalim Mahdjoubi ..... (Algeria)

Room 3: https://meet.google.com/xeq-mazg-pja Monday, May 9, 2022, 15h30–17h30 (GMT+1)

Session PSE 21 : Modeling & Design 1

Chairs : Hammoud Radjeai (Algeria)
Achour Betka (Algeria)

PSE 21.1 Adapted Amperian Approach for 3D Magnetic Quantities Calculations Generated by Particular PM Shapes .....
Ahmed Hamane; Hicham Allag; Abdelmalek Saoudel .....(Algeria)

PSE 21.2 Parameter Tuning of Power Systems Stabilizer Using Stochastic Fractal Search Optimisation .....
Elrachid Bendaoud; Radjeai Hammoud; Oussama Boutalbi; Meriem Harbadji ..
..... (Algeria)

PSE 21.3 Implemented Frequency Tracking Technique for Resonant Wireless Power Transfer System .....
Imene Drici; Hicham Allag; Mohamed Chebout .....(Algeria)

PSE 21.4 Non-conventional implementation of a speed controller applied to a brushless DC motor .....
Fouad Zebiri; Adel Choudar; Abedelhalim Kessal; Lazhar Rahmani ... (Algeria)

PSE 21.5 Inrush current influence on the hysteresis loop of a Single-Phase Transformer ..
Abdelghani Yahiou; Abdelhafid Bayadi; Hassene Mellah; Mokhtar Abid; Mohamed Salem Rgueyeg; Abderaouf Ouadi Mrabet .....(Algeria)

Link: Room 6: https://meet.google.com/pyv-uhno-cfv Monday, May 9, 2022, 15h30–17h30 (GMT+1)

Session SAC 14 : Robotics 2

Chairs : Abdessemed Foudil (Algeria)
Mourad Ait-Ahmed (France)

SAC 14.1 Robust Trajectory Tracking with Adaptive Non-singular Fast TSM Control of a Robot Manipulator .....
Brahim Moudoud; Hicham Aissaoui and Mohammed Diany ..... (Morocco)

SAC 14.2 A Comparative Trajectory Tracking Controls of a Mobile Robot .....
Salim Refoufi .....(Algeria)

SAC 14.3 Inverse Kinematic Model of Continuum Robots Using Artificial Neural Network
Abdelhamid Ghoul; Kamel Kara; Selman Djeffal; Mohamed Benrabah and Mohamed Laid Hadjili .....(Algeria–Belgium)

SAC 14.4 Flatness Design Control for therapeutic Robot Based on Fuzzy Controller .....
Brahim Brahmi; Mohammad Habibur Rahman and Soraya Bouden .....
.....(Algeria–Canada)

SAC 14.5 HPC Exploration for Mobile Robotics Under Energy Constraints .....
Igor A. Silva and Omar Hammami .....(France)

Link: Room 6: https://meet.google.com/pyv-uhno-cfv Monday, May 9, 2022, 15h30–17h30 (GMT+1)

SAC 14.6 Fuzzy-PID tracking control of a ball and plate system using a 6-Degrees-of-freedom parallel robot .....
Oussama Hadoune and Mohamed Benouaret ..... (Algeria)

SAC 14.7 Wheeled Mobile Robot Control Approaches: Comparative Analysis .....
Marwa Manita; Boumedyen Boussaid and Mohamed Naceur Abdelkrim .....
..... (Tunisia)

Link: Room 8: https://meet.google.com/xwd-zdxv-rbr Monday, May 9, 2022, 15h30–17h30 (GMT+1)

Session SCI 9 : Sensors & Instrumentation Applications

Chairs : Brahim Mezghani (Tunisia)
Ameur Zegadi (Algeria)

SCI 9.1 Terahertz Spectroscopy And Imaging Based On A Soft Lock-in Implementation
Boufateh Bezziou; Mohamed Lazoul; Ayoub Boutemedjet ..... (Algeria)

SCI 9.2 Assessing the electrical properties of DPLF-CNT/PDMS bio-composite using impedance measurements .....
Jawhar Aloulou; Ayda Bouhamed; Olfa Kanoun; Chedly Bradai .....
..... (Tunisia–Germany)

SCI 9.3 Indoor Human Identification Using Advanced Machine-Learning-Based Strategy
Ibrahim Naimi; Mohammed Baniyounis ..... (Oman–Jordan)

SCI 9.4 A multi-sensor farming prototype system for growing tomato in Algeria .....
Omrane Bouketir ..... (Algeria)

SCI 9.5 ECG Data Forecasting Based on Linear Models Approach: a Comparative Study
Ghada Ben Othman; Lilia Sidhom; Ines Chihi; Ernest Kamavuako; Mohamed Trabelsi ..... (Tunisia–Luxembourg–UK–Kuwait)

SCI 9.6 Explicit modeling of the electrostatic surface-potential for the surrounding-gate FETs.....
Billel Smaani ..... (Algeria)

SCI 9.7 Graphene Biosensor for Carbon Monoxide Monitoring .....
Mohamed Bouherour; Nabila Aouabdia; Meryem Lamri Zeggar; Nourelhouda Touidjen; Sawsen Rouabah ..... (Algeria)

Tuesday, 10 of May, 2022

Link: Room 4: https://meet.google.com/kfm-naep-pnd Tuesday, May 10, 2022, 8h30–10h15 (GMT+1)

Session CSP 17 : Image, Video & Multidimensional Signal Processing 4

Chairs : Mohammed Mostefai (Algeria)
Mohamed Deriche (UAE)

CSP 17.1 DCT-based compression algorithm using reduced adaptive block scanning for color image
Abdelhamid Messaoudi (Algeria)

CSP 17.2 Comparison and evaluation of IPPG methods for HR estimation under different face regions
Wafa Mellouk; Wahida Handouzi (Algeria)

CSP 17.3 A Medical Image Encryption Scheme Based on a Modified CKBA
Yousra Sadou; Samira Dib; Morad Grimes (Algeria)

CSP 17.4 CNN-NoC: A Dynamic Hardware Architecture Of A CNN Using NoC For Deep Learning.
H. Alaeddine; Jihene Malek (Tunisia)

CSP 17.5 Application of ARMA model optimized by the GA to detect broken rotor bars faults of induction motor
Khadidja Boudraa (Algeria)

CSP 17.6 Current Challenges of Facial Recognition using Deep Learning
Marwa Kebir (Tunisia)

Room 1: https://meet.google.com/pup-hwpy-ong Tuesday, May 10, 2022, 8h30–10h15 (GMT+1)

Session PSE 22 : Hybrid & Storage Systems 2

Chairs : Hadi Y. Kanaan (Lebanon)
Lazhar Rahmani (Algeria)

PSE 22.1 Electrical behavior of a photovoltaic-thermoelectric hybrid system
Salah-Eddine Bensalem; Nasreddine Belhaouas; Amar Hadj Arab; Mohamed Chegaar (Algeria)

PSE 22.2 Fuzzy Logic Controller based Maximum Power Point Tracking Using DC/DC Boost Converter for PV System
Cherif Kellal; Lakhdar Mazouz; Abdellah Kouzou; Ahmed Elotttri; Djaloul Karboua (Algeria)

PSE 22.3 Boost Converter Control using LQR and P&O Technique for Maximum Power Point Tracking
Aboubakr Brahimi; Djallel Kerdoun; Abderraouf Boumassata (Algeria)

PSE 22.4 GWO parameter enhancement for the MPPT of PV system under multiple CPS
Djallal Eddine Zabia; Okba Kraa; Hamza Afghoul (Algeria)

PSE 22.5 Simulation and Experimental Study of MPPT Control for PV System using Perturb and Observe Algorithm
Abdelhalim Borni; Abdelhak Bouchakour; Laid Zarour; Noureddine Bessous; Mohcene Bechouat; Layachi Zaghba (Algeria–Tunisia)

Room 1: https://meet.google.com/pup-hwpy-ong Tuesday, May 10, 2022, 8h30–10h15 (GMT+1)

PSE 22.6 A comparative study of the FLC, INC and P&O methods of the MPPT algorithm for a PV system
Houssem Saber; Abdelouadoud Bendaoud; Lazhar Rahmani; Radjeai Hammoud (Algeria)

Room 2: https://meet.google.com/pec-tzfi-who Tuesday, May 10, 2022, 8h30–10h15 (GMT+1)

Session PSE 23 : Reconfiguration & Power Flow Solutions

Chairs : Ahmed Gherbi (Algeria)
Lakhdar Mokrani (Algeria)

PSE 23.1 Optimization of distributed generators to improve the performance of power system
Houria Salhi; Sabah Louarem; Hamou Nouri; Sebaa Haddi (Algeria)

PSE 23.2 Africa vultures optimization algorithm for optimal power flow solution including SVC devices
Houssam Alouache; Samir Sayah; Abdelatif Hamouda (Algeria)

PSE 23.3 Solving Various Energy Management Optimization Using Global Metaheuristics Methods
Zahia Djeblahi (Algeria)

PSE 23.4 Optimal Capacitor Allocation Based On Hourly Load Variation Via New Optimization Algorithms
Anes Bouhanik; Ahmed Salhi; Djemai Naimi (Algeria)

PSE 23.5 Optimal power flow incorporating stochastic wind power using Artificial gorilla troops optimizer
Ramzi Kouadri (Algeria)

Link: Room 6: https://meet.google.com/pyv-uhno-cfv Tuesday, May 10, 2022, 8h30–10h15 (GMT+1)

Session SAC 15 : Robust Control 2

Chairs : Safanah Mudheher Raafat (Iraq)
Abdul-Wahid Al-Saif (Saudi Arabia)

SAC 15.1 Robust Control of an Induction Motor with Speed and Flux Estimator based on Synergetic approach
Samira Benaicha (Algeria)

SAC 15.2 Optimal control of three stages supply chain model with shortages
Abdulwahid A. Saif and Sami El Ferik (Saudi Arabia)

SAC 15.3 Tracking Power Photovoltaic System with Robust Polynomial Output Feedback Control Strategy
Noureddine Boubekri; Dounia Saifia; Sofiane Doudou and Mohammed Chadli (Algeria–France)

SAC 15.4 A robust linear feedback control of PEMFC's air feed system
Asma Rahmani; Mohamed Bougrine; Mohammed Benzoubir and Atallah Benalia (Algeria)

Break

Tuesday, May 10, 2022, 10h15–10h30 (GMT+1)

Link: Room 4: https://meet.google.com/kfm-naep-pnd Tuesday, May 10, 2022, 10h30–12h30 (GMT+1)

Session CSP 18 : Wireless Communications 2

Chairs : Diab Mokeddem (Algeria)
Youcef Soufi (Algeria)

CSP 18.1 Analysis and Design of Printed Antenna based on Photonic Crystal Substrate for 5 GHz Applications
Tarek Messatfa; Fouad Chebbara; Abderrahim Annou (Algeria)

CSP 18.2 A Reconfigurable Multi-band Antenna with a High Selectivity in Frequency on the Basis of PIN Diodes
Boualem Mekimah; Tarek Djerafi; Abderraouf Messai; Abdelkrim Belhedri (Algeria)

CSP 18.3 Efficient Quantized Soft Decision for Cooperative Sensing System in Cognitive Radio
Younes Bouzegag; Djamel Teguig; Abdelmadjid Maali (Algeria)

CSP 18.4 RSSI signal processing for short distances estimation: Case study hand movement detection
Cherif Ouni; Dhouha El Houssaini; Bilel Ben Atitallah; Ahmed Fakhfakh; Salwa Sahnoun; Olfa Kanoun (Tunisia–Germany)

CSP 18.5 A Side-Edge Microstrip Antenna for 5G Applications
Fatima AlHarazneh; Dia I. Abualnadi; Yanal S Faouri (Jordan)

Room 1: https://meet.google.com/pup-hwpy-ong Tuesday, May 10, 2022, 10h30–12h30 (GMT+1)

Session PSE 24 : Modeling & Design 2

Chairs : Abdellah Kouzou (Algeria)
Claudia Martis (Romania)

PSE 24.1 Speed Control of Induction Motor Using Three Fuzzy-Logic-Based Controllers
Saliha Boutora; Amina Yahia; Hadjer Bouyahia; Razika Boushaki Zamoum; Abdellah Kouzou (Algeria)

PSE 24.2 Comparing performances of three CFNN used for DC machine combined parameter and states estimation
Hacene Mellah; Abdelghani Yahiou; Kamel Eddine Hemsas; Carlo Cecati; Hamza Sahraoui; Rachid Taleb (Algeria–Italy)

PSE 24.3 On-Chip Micro-Transformer Modeling For Power ICs Applications
Mokhtaria Derkaoui (Algeria)

PSE 24.4 Sliding Mode Control of PMSM Drive for Lightweight Electric Vehicles
Bachir Bendjedia (Algeria)

PSE 24.5 Modeling of the innovative magnetic pulse joining technology
Ilhem Boutana; Salah Eddine Bouferroum; Ahmed Laouira (Algeria)

PSE 24.6 Sensorless Scalar Control Based On SOGI-FLL for an Induction Motor Used in Electric Vehicle
Mohammed Boukhari; Ismail Ghadbane; Riad Bouzidi (Algeria)

Room 2: https://meet.google.com/pec-tzfi-who Tuesday, May 10, 2022, 10h30–12h30 (GMT+1)

Session PSE 25 : Automotive Power Systems

Chairs : Messaoud Guellal (Algeria)
Hafedh Trabelsi (Tunisia)

PSE 25.1 Energy Management of Fuel Cell-Battery-Super capacitor Hybrid power source for Tramway applications
Faiçal Briber; Nasserdine Boudjerda; Rezzak Daoud (Algeria)

PSE 25.2 Integral Sliding Mode Control of Synchronous Reluctance Machine based Electric Vehicle
Ghadbane Houssam Eddine; Said Barkat; Azeddine Houari; Ali Djerioui; Tedjani Mesbahi (Algeria–France)

PSE 25.3 A Review of Factors Influencing the Adoption of Electric Vehicles in the World
Marwa Ben Ali; Ghada Boukettaya (Tunisia)

PSE 25.4 Motor and Regenerative Braking Operations for an Electric Vehicle using Field Oriented Control
Idris Azizi (Algeria)

PSE 25.5 Robust Sensorless Synergetic Control of Electric Vehicle Using Algebraic Observer
Mohammed Kabir Billal Boumegouas; Katia Kouzi; M'hamed Birame (Algeria)

PSE 25.6 Modeling of Lithium-ion battery open-circuit voltage using incremental and low current test
Djamila Abbas; Mohamed Mourad Lafifi; Brahim Boulebtateche (Algeria)

Link: Room 6: https://meet.google.com/pyv-uhno-cfv Tuesday, May 10, 2022, 10h30–12h30 (GMT+1)

Session SAC 16 : Robotics 3

Chairs : Mourad Ait Ahmed (France)
Lamia Iftekhar (Bengladesh)

SAC 16.1 Increasing workspace and trajectory planning of the parallel robot PAR4
Ahlem Saidi; Neila Mezghani Ben Ramdhane and Tarak Damak (Tunisia)

SAC 16.2 Design and Development of Controllers for a Modular Pipe Climbing Robot
Aymen Ahmed; Ines Chihi and Mohamed Gharib (Luxembourg–Qatar–Tunisia)

SAC 16.3 Robust Hovering Control of a Quadrotor
Muhammad Maaruf; Sami El Ferik and Abdulwahid A. Saif (Saudi Arabia)

SAC 16.4 A Genetic Algorithm for tasks allocation and sequencing in a human robot assembly system
Soraya Izghouti; Mehdi Gaham and Moufid Mansour (Algeria)

SAC 16.5 Enhanced Fast Vision-Based Obstacle Avoidance Algorithm
Sid Mohamed Amine (Algeria)

SAC 16.6 Lateral and Longitudinal Tire Force Prediction Using Soft Computing
Foudil Abdessemed (Algeria)

Link: Room 9: https://meet.google.com/qwc-igap-umf Tuesday, May 10, 2022, 12h30–13h30 (GMT+1)

Closure

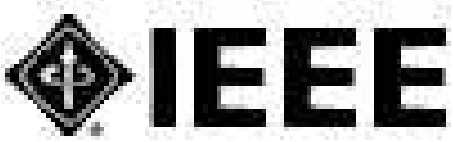
We are looking forward to seeing you in Erbil-Iraq, during the 20th International Multi-Conference on Systems, Signals & Devices, May 6–10, 2023.

SSD'23: www.ssd-conf.org

Abstract Book of the Multi-Conference on Systems, Signals & Devices

May 6–10, 2022

Sétif, Algeria



19th International Multi-Conference on Systems, Signals and Devices (SSD'22)

May 6–10, 2022, Sétif, Algeria

Organized by:

University Ferhat Abbas Setif 1, Faculty of Technology, Algeria,

University of Ziane Achour, Djelfa, (Algeria),

University of Sfax, Ecole Nationale d'Ingénieurs de Sfax (Tunisia),

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Preface

Following the success of SSD'01 held in Hammamet-Tunisia, the nineteenth International Multi-Conference on Systems, Signals and Devices - SSD'22 to be held in Sétif, Algeria, from 6^{th} to the 10^{th} of May 2022. The conference program consists of 4 plenary sessions, 8 Keynote Lectures and 70 oral sessions. SSD'22 multi-conference is organized to include 4 conferences covering different fundamental and applied aspects:

1 "Int. Conf. on Systems, Automation & Control" (SAC)

2 "Int. Conf. on Conference on Power Systems & Smart Energies" (PSE)

3 "Int. Conf. on Communication, Signal Processing & Information Technology" (CSP)

4 "Int. Conf. on Sensors, Circuits and Instrumentation Systems" (SCI)

SSD'22 secretariat has received 597 submissions from 36 countries: Algeria, Australia, Bahrain, Belgium, Canada, China, Egypt, France, Georgia, Germany, Greece, India, Indonesia, Iraq, Italy, Jordan, Kuwait, Libya, Luxembourg, Malaysia, Morocco, Norway, Oman, Qatar, Romania, Saudi Arabia, Spain, Sri Lanka, Switzerland, Sweden, The Netherlands, Tunisia, Turkey, United Arab Emirates, United Kingdom, USA.

Each paper has been reviewed by at least two reviewers of the program committee which consisted of more than 100 scientists from more than 30 countries. Only 394 papers have been accepted, with an acceptance rate equal to 66.1%.

We would like to express our deep gratitude to all chairs and members of the program committee for their substantial reviews. Special thanks are due to all members of the organizing committees for their determination to make this event a promising success.

Finally, we would like to extend our deep gratitude to all those who have contributed to the financial support of SSD'22.

Professors Lazhar Rahmani, Faouzi Derbel and Kasim Mousa Al-Aubidy

Sétif, Algeria

May, 2022

General Informations

Location

SSD'2022 Multiconference has been held in Setif, Algeria. Setif is the capital of the highlands of eastern Algeria. It occupies a strategic position among the wilayas of the East and constitutes a major hub crossed by the North-South and East-West axes. Setif is situated 300 km east of the capital Algiers and rises to an altitude of 1100 m, while it is only 110 km from the coast.

Once you arrive in Setif, the darling of the highlands, the legend saying that when you drink water from the fountain of Ain El Fouara you will inevitably come back there, is quickly validated. The visitor is, in fact, attached and attracted by its splendor and above all sublimated by its cleanliness, its architectural charm and its brilliance. Setif has managed to preserve its ancestral urban legacy, perfectly marrying the touch of modernity instilled in the region. In Setif there is no risk of getting bored. The region offers its visitors a multitude of choices and places to visit. It encompasses four types of tourism: business and commercial, historical spa and finally mountain tourism.

The Wilaya of Setif conceals an important tourist potential constituted by the important number of thermal springs as well as archaeological and natural sites. One of the most beautiful in Algeria, the Setifis amusement park where you can find traces of the civilizations that have marked their passage since antiquity, including the Roman and Byzantine empires. Located in the center of the city, this gigantic park offers its visitors an array of choices to unwind. Between the Ferris wheel, the merry-go-round and the waterfalls... there's something for everyone. It is also a favorite place for young and old and other picnic lovers to share good times around the large and magnificent artificial lake. Otherwise, restaurants offer their services.

The central square of the city worth a visit. This place marks the starting point of the massacre of May 8, 1945, a harbinger of the Revolutionary War. For the collective memory, a statue of Bouzid Saâl, the first victim of the massacres of this fateful date, is erected. The tram bears the color red symbolizing the blood of the martyrs. On the road to Constantine, not far from the fountain of Ain El Fouara, it is impossible to miss the imposing El Atik Mosque which attracts the simple passerby to discover its emblematic architecture and its minaret with a double Roman and Islamic character. Going to Setif without seeing the allegorical fountain of Ain El Fouara is like visiting China without going to the Great Wall. With a statue of a woman made in 1898 within it, the fountain is one of the emblematic monuments of the wilaya.

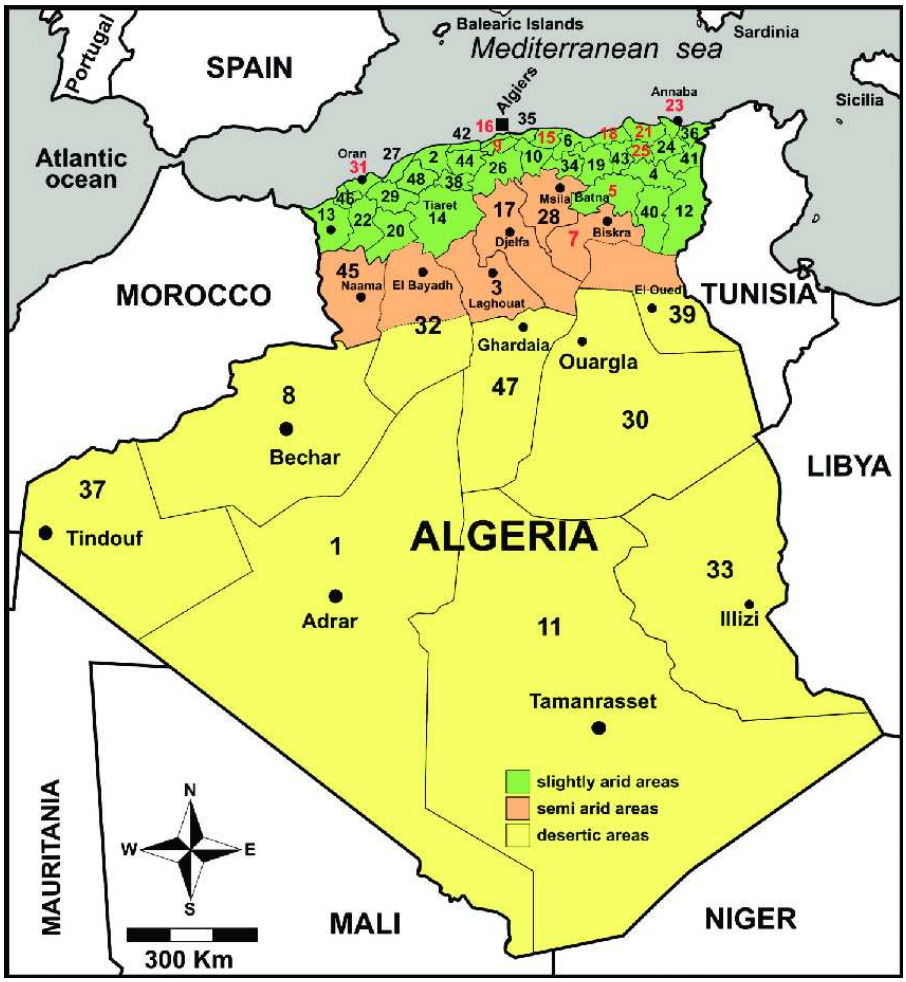
With its historical past and its multi-faceted cachet, Setif has significant potential in terms of thermal resources, from Hammam Sokhna to Hamman Guergour. The latter conceals important tourist resources located in a picturesque natural setting. It is particularly distinguished by the curative vocation of its waters discovered for the first time by the Romans who elected this site to build their city and the baths of Adsava. It is famous thanks to the specificity of its natural source of hot water at 44°C, and especially by its high level of radioactivity which places it first in Algeria, and third in the world.

Setif city was part of Phoenician Empire then it became part of the ancient Berber kingdom of Numidia, the capital of Mauretania Sitifensis under the rule of the Roman Empire. It became a city of the Islamic World after becoming Muslim during the Muslim conquest of the Maghreb. Setif was numid before undergoing Roman rule. The name of Setif is not drawn from Latin, but it is a Berber word "Zdif" or Canaanite word "Sadif", i, which means "black lands" according Lissan El Arab, referring to the fertility of its lands.

Setif has a semi-arid climate. Its summers are hot and dry, while its winters are cool with low-moderate rainfall. The maximum temperature in Setif is on average 22°C over the year. It rains 887mm over the year, with a minimum of 17mm in July and a maximum of 113mm in March. The climate is pleasant to go on a trip to Setif from April to October, but the weather is really ideal from May to October.

Setif is served by an international airport, located in Ain Arnat 10 km from the city center. The transfer from the airport to the city center is provided by taxis. Setif has a railway station and a bus station, which serves the capital Algiers as well as several cities in the country.

The Host Country Algeria



Official Language:

The official language in Algeria is Arabic. The second language is French and is spoken by almost all people. The third language, which is taught at school until baccalaureate is English. Note that the official language of the SSD is English.

Currency Exchange:

The exchange rates to and from € and US$ are approximately:

1000 Algerian Dinars ≃ 6,466 €	1 € ≃ 154,65 Algerian Dinars
1000 Algerian Dinars ≃ 7.00 US$	1 US$ ≃ 143 Algerian Dinars

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- www.ssd-conf.org

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Topics:

- Intelligent control
  - Fuzzy systems & fuzzy control
  - Neuro-fuzzy systems
  - Learning processes in control
  - Neural Networks & Neural control
  - Machine learning & artificial intelligence in control
- Complex systems
  - Analysis & control of large-scale autonomous networks
  - Control & dynamics of domplex network systems
  - Agent-based control systems
  - Discrete event systems
  - Hierarchical & man-machine systems
  - Infinite dimension systems
  - Biological & economical models & control
  - Biology-based and behavioral control
- Linear & nonlinear system analysis
  - Advances in linear systems
  - Nonlinear systems
  - System identification
  - Hybrid systems
- Control approaches
  - Adaptive control
  - Distributed control
  - Geometric control
  - Optimal & stochastic control
  - Predictive control
  - Robust control
  - Sliding mode control
  - System optimization
  - Fractional order systems
- Faulty systems
  - Fault detection, diagnosis & pronostics
  - Fault tolerant control
  - Machine learning for fault detection & diagnosis
- Robotics & automation
  - Robotics
  - Traffic control
  - Unmanned aerial vehicles
  - Mechatronics

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Topics:

- Electric Machines
  - Modeling & design
  - Machine control
  - Variable speed drives
  - Special machines
- Power electronics
  - Converters
  - Multilevel inverters
  - Electromagnetic compatibility
  - Facts
  - Semiconductor devices
- Power Systems
  - Distributed power systems
  - Smart grid & security
  - Micro-Grids & virtual power plants
  - Transformers
  - Power quality
  - Measurements & protection
  - DC micro-grid
  - Reconfiguration & power flow solutions
  - Storage systems
- Renewable energy systems
  - Photovoltaic systems
  - Concentrated solar plants
  - Wind energy
  - Tide & wind energy
  - Smart grids & distribution networks
  - Grid connected power electronics converters
  - Hybrid and storage systems
  - Fuel cells
- Automotive power systems
  - Hybrid electric vehicle
  - Electric vehicle and safety
  - Storage systems in EV
  - Flywheel Energy
- Monitoring and diagnosis
  - Variable speed drives and monitoring
  - Fault detection and diagnosis
  - Predictive diagnosis
  - Tolerent control
  - Pronostics

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Topics:

- Signal, image & video processing:
  - Theory & methods
  - Speech, audio & acoustic
  - Image, video & multidimensional signal processing
  - Biomedical Signal & Image Processing
- Signal processing for IoT
  - Wireless sensors networks
  - Smart systems
  - E-health & health informatics
  - Smart cities
  - Energy efficiency & sustainability in the IoT
  - IoT security
- Signal processing for communications
  - Optical systems
  - Radar & sonar systems
  - Wireless communications
  - Design & implementation
- Emerging Technology Applications
  - Big data analytics
  - Cloud computing
  - Cyber security
  - Machine learning models
  - Artificial intelligence technology
  - Distributed & real time systems
  - Augmented & virtual reality
  - Geographical information systems
- Engineering Education
  - E-Learning & blended learning
  - Remotes laboratories
  - Multidisciplinary education
  - Undergraduate research
  - Strategic planning
  - Curriculum of engineering studies
  - Engineering design programs
  - Accreditation of engineering programs

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Topics:

- Physical and chemical sensors
  - Mechanical and flow sensors
  - Position and Radar sensors
  - Temperature and humidity sensors
  - Electrochemical and biomedical sensors
  - Ultrasonic and acoustic sensors
  - Magnetic and electromagnetic field sensors
  - Optical and photonic sensors
  - Surface acoustic wave sensors
- Measurement methods and metrology
  - Spectroscopy methods and systems
  - Optical methods and systems
  - Impedance spectroscopy
  - Metrology and measurement uncertainty
- Sensors and circuits technology
  - MEMS and NEMS technology
  - Molecular electronics
  - Polymer sensors, actuators and electronics
  - Actuators and actuator technologies
  - Optoelectronic devices
  - Microfluidic and lab-on-chip devices
  - Additive manufacturing
  - Sensor testing and evaluation
  - Aging, reliability, stability and EMC
- Sensor and measurement systems
  - Signal conditioning and interface electronics
  - Conversion and digitalization
  - Data acquisition and distributed measurements
  - Embedded systems
  - Sensor arrays and matrices
  - Multi sensor system
  - Sensor signal processing and modeling
  - Multi sensor data fusion
  - Design & implementation
- Electronic systems and technologies
  - Design, modeling and simulation
  - Custom and semi-custom circuits
  - Packaging and reliability
  - Materials, devices and interconnects
  - Analog and mixed circuits design
  - Low-voltage, low-power VLSI design
  - Resonators and oscillators
  - Sensor communication circuits
  - Circuit test and device characterization
- Sensor Systems for IoT
  - Low-power sensor networks
  - Sensor telemetry and monitoring
  - Energy harvesting and conversion
  - Energy management for low power systems
  - Energy saving strategies
  - Analog and digital low-power electronics
  - Soft sensors
- Sensor and Instrumentation Applications
  - Industry and robotics
  - Medicine and health
  - Agriculture and environment
  - Mobility and automotive
  - Smart grids
  - Smart buildings
  - Smart cities
  - Safety and security

Sétif, Algeria — May 6–10, 2022

SSD'22 Multi-Conference Program

SSD 2022

Time \ Date	Saturday, May 7	Sunday, May 8	Monday, May 9	Tuesday, May 10
08:15				
08:30	**Opening**			
08:45		Plenary Session 2	Plenary Session 3	SAC-15 CSP-17 PSE-22, PSE-23
09:20	Plenary Session 1			
09:30			Plenary Session 4	
10:15	Keynote Sessions 1	Keynote Sessions 2		
10:30	Break	Break	Break	Break
12:30	SAC-1, SAC-2 CSP-1, CSP-2 PSE-1, PSE-2 SCI-1	SAC-6, SAC-7 CSP-7, CSP-8 PSE-7, PSE-8 SCI-4	SAC-11, SAC-12 CSP-12, CSP-13 PSE-14, PSE-15 SCI-7	SAC-16 CSP-18 PSE-24, PSE-25
13:30	Break	Break	Break	**Closure**
14:30	SAC-3, SAC-4, CSP-3, CSP-4, PSE-3, PSE-4, SCI-2	SAC-8, SAC-9 CSP-9 PSE-9, PSE-10 SCI-5	SAC-13 CSP-14 PSE-16, PSE-17, PSE-18 SCI-8	
15:15	Break	Break	Break	
15:30	SAC-5 CSP-5, CSP-6 PSE-5, PSE-6 SCI-3	SAC-10 CSP-10, CSP-11 PSE-11, PSE-12, PSE-13 SCI-6	SAC-14 CSP-15, CSP-16 PSE-19, PSE-20, PSE-21 SCI-9	
17:30	**SSD Meeting**	_		
18:30				

Abstracts

Plenary and Keynote Lectures

Reference: (PL-1)
Title: Smart Micro Grid with high penetration of renewable based Generation and Electric Vehicles
Author(s): Mousa Marzband (UK)

Abstract – Due to the numerous benefits of electric vehicle (EV)s, the growth of EVs is significantly increasing over the globe. For instance, nearly 10 million EVs have been registered worldwide at the end of 2020. Further, a greater number of leading vehicle manufacturers have been focused on EVs technologies and their improvements to satisfy the EVs demand in near future. For example, the UK government has been announced to fully convert the light-duty vehicles from fossil fuel to battery-electric vehicles by 2030 and heavy-duty vehicles by 2050. Rapid EV adoption without optimal planning/ deployment of charging stations (CSs) could lead to new coincidental peaks on the power grid. This project aims at developing novel techniques to optimally estimate day-ahead charging demand of EVs, considering socio-technical and environmental factors; battery level, type-of-day, tourist activities/events, traffic conditions and weather. This agent-based model will be validated at prime locations; residential, offices, restaurants, shopping malls and public parks. To support the gig economy, we will investigate how EV digital footprints influence siting of new CSs. This project will enable us to test risky assumptions and provide a deeper understanding of the challenges and implications of rapid EV uptake. Moreover, the success of the future EV demand depends mainly on several factors such as universal standards, international codes and infrastructure, convenient and accessible software, widespread availability of the related components. However, the trending demand for EV usage could result in significant stress on the local power distribution system and increase the EV congestion and charging prices.

Reference: (PL-2)
Title: The Role of Energy Storage in the Future Energy Supply Mix
Author(s): Saad Mekhilef (Australia)

Abstract – Energy storage is an attractive tool to support electrical grid supply, transmission, and distribution systems. There are different methods for storing energy that has been developed so that the grid can meet everyday energy needs. These are: electrical, mechanical, electrochemical, thermal, and chemical. Storage technologies are rapidly and continuously evolving. For example, with technical advances and a fall in prices, wind and solar coupled with storage are becoming cost-competitive with fossil fuel power plants. This trend will rise in the future as renewables and storage both become more affordable in cost. In this lecture, we will discuss the background of power conversion & energy storage, energy storage (ES) devices, and applications of ES in the current and the future energy supply.

Reference: (PL-3)
Title: Characterization of Learning Models via Contrastive Reasoning and Uncertainty
Author(s): Al-Regib Ghassan (Georgia)

Abstract –Abstract: In this talk, I will share our most recent work on providing robust representations of visual data while providing explainability to the neural network models. Model-based characterization of neural networks and visual explanations are logical arguments based on visual features that justify the predictions made by neural networks. Our work has been based on quantifying the model changes per input data. We believe that model responses to data and the interaction between the model and the data gives us a window into the model. This can be utilized to provide a number of capabilities such as explainability, uncertainty quantification, and behavior prediction.

Reference: (PL-4)
Title: Leak Monitoring in Water Distribution Networks
Author(s): Vicenç Puig (Spain)

Abstract – This talk will present different approaches to detect, estimate and locate water leaks (with the main focus in the localization problem) in water distribution networks (WDNs) using hydraulic models and machine learning techniques. First, the actual state of the art will be shortly revised. Then, the theoretical basis of the machine learning techniques considered will be introduced as well as WDN hydraulic models usually used by WDN management companies. Different real WDNs and district metered areas (DMA) will be used to illustrate the presented approaches using simulated and real scenarios. The talk will finalize with a discussion about the comparison results of the different presented approaches and with the current and future research trends in the field of leak monitoring in WDNs.

Reference: (KL-SAC-1)
Title: State of the art of Energy & Artificial Intelligence and New Challenges
Author(s): Fausto P. G. Márquez (Spain)

Abstract – To-date, most of the energy sector's transition efforts have focused on hardware: new low-carbon infrastructure that will replace legacy carbon-intensive systems. Relatively little effort and investment has focused on another critical tool for the transition: next-generation digital technologies, in particular artificial intelligence (AI). These powerful technologies can be adopted more quickly at larger scales than new hardware solutions, and can become an essential enabler for the energy transition. AI is already proving its value to the energy transition in multiple domains, driving measurable improvements in renewable energy forecasting, grid operations and optimization, coordination of distributed energy assets and demand-side management, and materials innovation and discovery. AI holds far greater potential to accelerate the global energy transition, but it will only be realized if there is greater AI innovation, adoption and collaboration across the industry. The principles define the actions that are needed to unlock AI's potential in the energy sector across three critical domains: Governing the use of AI:
Standards - implement compatible software standards and interoperable interfaces.
Risk management - agree upon a common technology and education approach to managing the risks presented by AI.
Responsibility - ensure that AI ethics and responsible use are at the core of AI development and deployment.
Designing AI that's fit for purpose:
Automation - design generation equipment and grid operations for automation and increased autonomy of AI.
Sustainability - adopt the most energy-efficient infrastructure as well as best practices around sustainable computing to limit the carbon footprint of AI.
Design - focus AI development on usability and interpretability.
Enabling the deployment of AI at scale:
Data - establish data standards, data-sharing mechanisms and platforms to increase the availability and quality of data.
Education - empower consumers and the energy workforce with a human-centred AI approach and invest in education to match technology and skill development.
Incentives - create market designs and regulatory frameworks that allow AI use cases to capture the value that they create.

Reference: (KL-SAC-2)
Title: Artificial Intelligence: Concepts, challenges, opportunities and Ethics
Author(s): A. Ouahabi (France)

Abstract – If the United States dominates the development and use of artificial intelligence (AI), China intends to challenge this supremacy...Algeria needs to pay attention to and respond to this new AI craze because a country that develops and uses AI will shape its

future and significantly improve its economic competitiveness, while a country that falls behind risks losing out its competitiveness in key industries, and even its national sovereignty will be threatened. Of course, we must not lose sight of the fact that AI arouses both enthusiasm and skepticism, albeit in different measures. In this plenary session, we recall the concept of Artificial Intelligence and Deep Learning and the importance of Data. We show interest in some key applications in the fields of medicine, telecommunications, intelligent transportation systems, and security. Ethical issues arise such as surveillance by AI, the role of AI in promoting misinformation and disinformation, the role of AI in politics and international relations, governance of AI, etc. New technologies are always created in the interest of something good, and AI offers us amazing new capabilities to help people and make the world a better place. But to make the world a better place, we must choose to do so, ethically. With the concerted effort of many people and organizations, we can hope that AI technology will help us create a better world.

Reference: (KL-PSE-1)
Title: Impacts of Digital Transformation on Alternative and Green Energies
Author(s): Ilhami Colak (Turkey)

Abstract – Digital transformation is a new concept of integrating the today's digital technology into our life in all areas of a business including social, science, production, education, energy and culture. Digital transformation is the process of using digital technologies to create new - or modify existing - business processes, culture, and customer experiences to meet changing business and market requirements. This reimagining of business in the digital age is digital transformation. In another word, digital transformation is the integration of digital technology into all areas of a business resulting in fundamental changes to how businesses operate and how they deliver value to customers. Beyond that, it's a cultural change that requires organizations to continually challenge the status quo, experiment often, and get comfortable with failure. It is not possible to describe the digital transformation with few technologies of the digital transformation. However web 2.0, mobile techs, broadband internet services, cloud services, digital media, big data, artificial intelligence, augmented reality, IoT and 3D printers have started a new term by effecting the people. In this keynote, the effects of digital transformation on Green and alternative (renewable) energy systems will be highlighted.

Reference: (KL-PSE-2)
Title: Low rotational Inertia Systems and Grid Friendly Power Electronic Converters
Author(s): F. M. Gonzalez-Longatt (Norway)

Abstract – The total system inertia (H) is the primary source of electricity system robustness to frequency disturbances. The traditional large synchronous generators directly connected to the grid are the primary sources of inertia, and they play a crucial role in limiting the rate of change of frequency (ROCOF) and provide a natural response to the system frequency changes following an unscheduled loss of generation or demand from the power system. The transition to a low carbon society is the driving force pushing the traditional power system to increase the volume of non-synchronous technologies, which mainly use power converters (PCs) as an interface to the power network. The PCs decoupled the primary source from the power network; therefore, they are not able to contribute with "natural" inertia in the same way as classical synchronous generators. During a system frequency disturbance (SFD), the system frequency will change at a rate initially determined by the total system inertia (H). As a result, the inertial response of the system might be negatively affected, with devastating consequences for system security and reliability. Power Electronic converters (PECs) have been in the power system for many decades; however, it has been just in recent times when the PECs start to be a considerable share of the generation, transmission, and demand. PEC has dramatically changed from a minimal support role to the power system operation to a critical element to the transition to a zero-carbon society. The early developments on high voltage direct current (HVDC) based on Thyristor were a formidable step forward for bulk power transmission. However, the development of more flexible commutation devices and sophisticated control mechanisms, together with appropriate practices and grid codes, are making the voltage source converter (VSC) interfaced technologies a precious component of the operation of modern and future power systems and pavement the secure transition to a zero-carbon society. This seminar presents fundamental aspects of system frequency control in low inertia systems. The seminar initiates with a general introduction of power electronic converter and its transition from the concept of grid-following to grid forming converter, including some practical discussion about the importance of several elements and control philosophy. The seminar includes (but is not limited) to discuss the benefits of an intelligent grid-friendly converter.

Reference: (KL-CSP-1)
Title: New horizons in deep learning-assisted multimodality medical image analysis
Author(s): Habib Zaidi (Switzerland)

Abstract – Positron emission tomography (PET), x-ray computed tomography (CT) and magnetic resonance imaging (MRI) and their combinations (PET/CT and PET/MRI) provide powerful multimodality techniques for in vivo imaging. This talk presents the fundamental principles of multimodality imaging and reviews themajor applications of artificial intelligence (AI), in particular deep learning approaches, in multimodality medical image analysis. It will inform the audience about a series of advanced development recently carried out at the PET instrumentation & Neuroimaging Lab of Geneva University Hospital and other active research groups. To this end, the applications of deep learning in five generic fields of multimodality medical imaging, including imaging instrumentation design, image denoising (low-dose imaging), image reconstruction quantification and segmentation, radiation dosimetry and computer-aided diagnosis and outcome prediction are discussed.Deep learning algorithms have been widely utilized in various medical image analysis problems owing to the promising results achieved in image reconstruction, segmentation, regression, denoising (low-dose scanning) and radiomics analysis. This talk reflects the tremendous increase in interest in quantitative molecular imaging using deep learning techniques in the past decade to improve image quality and to obtain quantitatively accurate data from dedicated combined PET/CT and PET/MR systems.The deployment of AI-based methods when exposed to a different test dataset requires ensuring that the developed model has sufficient generalizability. This is an important part of quality control measures prior to implementation in the clinic.Novel deep learning techniques are revolutionizing clinical practice and are now offering unique capabilities to the clinical medical imaging community. Future opportunities and the challenges facing the adoption of deep learning approaches and their role in molecular imaging research are also addressed.

Reference: (KL-CSP-2)
Title: Computational Visual Perception for Image and Video Processing and Analysis in the Era of Deep Learning.
Author(s): Azeddine Beghdadi (France)

Abstract – Over the last fifty years, research and development in visual information processing and analysis have been driving advances in many high-tech areas, including medical and scientific imaging, computational photography, visual cryptography, biometrics, remote sensing, among others. The research focus is however steadily shifting towards developing new mathematical models rather than understanding the image signal as a physical quantity and its interaction with the observer; unfortunately, the human user is often ignored in the image and video processing chain. Whereas, in many applications, such as diagnosis, recognition and evaluation, the human observer plays a prominent role in decision-making, based on visual assessment of images. Therefore, exploiting knowledge about the Human Visual System (HVS) in the design of multimedia processing techniques appears as a promising direction. This talk provides an overview of the most recent trends and of the future research in image and video processing in a common perceptually based computational framework. The most relevant characteristics and properties of the HVS are presented, on the light of current trends and in particular the renewed interest in neural network models, in a concise and practical way. The concepts and methods will be introduced and illustrated through various real-world applications. A particular focus will be put on the links between retino-cortical mechanisms and neural network-based architectures in the field of visual information processing and analysis.

Reference: (KL-SCI-1)
Title: The Role of Precision Farming in Sustainable Agriculture
Author(s): Youcef Remram (Algeria)

Abstract − Precision agriculture consists of three components: capturing data in an accurate manner, interpreting and evaluating the data, make better decisions for crop production. The increase in the production of food using precision agriculture is a key priority without generating an increase in the exploitation of vital resources such as water and fertilizer. It is also essential to achieve these results without compromising the physical and chemical qualities of the soil: this is the only way to implement a sustainable food production model. In this presentation, we try to define the benefits that offer precision farming and present some projects developed in precision farming
Weather station for precision agriculture and plant protection
Precision dosing fertilizers, and soil protection.
Control of aquaponic farming system.
Internet of Things applied to agriculture

Reference: (SCI-KL-2)
Title: Wearables for embodied interaction in hybrid societies: Technologies, Sensors and Systems
Author(s): Olfa Kanoun (Germany)

Abstract − The demand for wearable systems for human-human or human-machine interactions is nowadays continuously increasing. Especially in hybrid societies, where people interact with embodied digital technologies, novel sensors and technologies are necessary. Examleas thereby are biocompatible flexible sensors based on polymer carbon nanotubes composites (PCN), bio-impedance spectroscopy, surface electrical impedance myography (sEIM) and electrical impedance tomography (EIT), Electromyography (EMG) and inertial measurement units (IMU). The combination of several sensors and techniques in multi modal systems is supporting a higher accuracy and reliability for a continuous monitoring of human activity, behavior, latency and intentions, where cognitive feedbacks can be also concluded. Wearable embodied solutions offer the opportunity to build body attached sensors networks for complex scenarios fulfilling the requirements of compactness, accuracy and reliability.

CSP Papers

Paper Reference: (CSP-1-1) 1570768403
Title: Estimation of ARMA Parameters Using Cholesky Factorization
Author(s): Adnan M. Al-Smadi (Jordan)

Abstract – This paper introduces an algorithm to estimate the parameters of a general Autoregressive Moving Average (ARMA) model. The proposed method uses the Cholesky Factorization (CF) of the Gramian matrix with entries of higher order cumulants (HOC) of the available output data. The available output data may be contaminated by additive Gaussian noise of unknown power spectral density. The main concept of the algorithm is to obtain a matrix of third order cumulants, and calculate the Gramian matrix of the obtained matrix. Then, the Gramian matrix will be decomposed using the Cholesky factorization to calculate the parameters of the ARMA system. Simulation results indicate that the proposed method achieves performance comparable to existing well-known methods.

Paper Reference: (CSP-1-2) 1570775447
Title: Radar Cross Section Modeling of Complex Objects. Application to a Target Over Sea Surface
Author(s): Yacine Bennani; Youssef Kebbati (Algeria–France)

Abstract – The work presented in this paper encloses the study of the interaction of an electromagnetic (EM) wave with a complex target observed in the bi-static and monostatic configuration. So, an efficient approach for calculating Radar Cross Section (RCS) of an arbitrary target which is modeled with a sum of triangular facets. The proposed model uses the Physical Optics (PO) to compute the first order reflection (direct scattering (SR), and Geometrical Optics GO) to track the path of reflected ray and PO to compute the second order reflection (DR). The proposed model has been validated by comparing theoretical results to FEKO simulation results, and then it was applied to a marine scene by considering the sea surface and the target as a single complex object.

Paper Reference: (CSP-1-3) 1570780357
Title: On the relation between chaotic processes generated by family of piecewise linear maps
Author(s): Ahmed Sahnoune; Daoud Berkani (Algeria)

Abstract – The last decades have seen a growing interest of chaos application in telecommunications. Due to the importance of frequency bandwidth in telecommunications, spectral properties of chaotic signals have been investigated. In this work, we derive statistical properties of chaotic signals generated by family of piecewise linear maps. Furthermore, we deduce a relation between chaotic processes generated from such maps. Our results reveal that increasing the number of segments accelerates the decay of autocorrelation.

Paper Reference: (CSP-1-4) 1570787613
Title: Improved Bayesian Denoising Algorithm for Signal of Centrifugal Microfluidic Immunoassay System
Author(s): Yuxing Shi; Jinhong Guo; Peng Ye; Jiawen Xie; Chuang Wang; Bayin Qiaoge (China–UK)

Abstract – Signal denoising technology is one of the key technologies that need to be broken through in centrifugal microfluidic immunoassay system. Among various signal denoising technologies, wavelet threshold denoising is commonly used, while the traditional wavelet threshold denoising algorithms have difficulty in adapting to the wavelet coefficient distribution of noise at different scales. To solve this problem, firstly, an improved Bayesian threshold method was proposed to solve the problem of inaccurate threshold caused by its noise variance estimation algorithm. Secondly, for the defects of soft and hard threshold function, we proposed to use weighted threshold function and semi soft threshold function. Finally, the proposed improved Bayesian threshold method was simulated with various threshold functions, and their denoising performance was compared. The simulation results showed that compared with the existing traditional wavelet threshold denoising algorithms (adaptive threshold combined with hard threshold function, the SNR was 75.21db) and the traditional Bayesian threshold denoising algorithm (the SNR was increased to 76.99db), the denoising algorithm based on the combination of improved Bayesian threshold method and hard threshold function proposed in this paper can greatly adapt to the distribution of wavelet coefficients of noise under different scales and had strong denoising ability and peak feature retention ability. It improved the SNR to 83.31db and reduced the root mean square error. Its comprehensive denoising parameter Dr reached 0.71 which achieved satisfactory results in denoising of spectral signal. This method is expected to be a powerful means to improve the sensitivity of centrifugal microfluidic immunoassay system.

Paper Reference: (CSP-1-5) 1570788861
Title: Performance Evaluation of Bit-Flipping Based Algorithms for LDPC Convolutional Codes
Author(s): Laouar Oulfa; Imed Amamra; Nadir Derouiche (Algeria)

Abstract – It has previously been shown that ensembles of terminated LDPC convolutional codes (LDPC-CC) have an error performance comparable to that of their counterparts LDPC block codes. Also they are capable of achieving capacity approaching performance with iterative message-passing decoding on the AWGN channel. Several interesting tradeoffs have been identified between the two different types of codes with respect to complexity, throughput, and latency of iterative decoding algorithms. In this paper, we review Bit-Flipping (BF) decoding algorithm and its variants. We adapt BF, WBF (Weighted Bit-Flipping), MWBF (Improved Weighted Bit-Flipping) and IRRWBF (Implementation-Efficient Reliability Ratio-based WBF) decoding variants, in order to evaluate the bit error rate (BER) performance of LDPC-CCs. Extensive computer simulations and comparisons are provided to demonstrate the efficiency of LDPC-CCs and the differences between the considered variants of BF decoding algorithm.

Paper Reference: (CSP-1-6) 1570789153
Title: Phase Retrieval: Application to Audio Signal Reconstruction
Author(s): Zied Mnasri; Raja Bedoui; Faouzi Benzarti (Tunisia)

Abstract – Theoretically, phase retrieval is an efficient method for signal reconstruction given only the magnitude spectrum of the short-term Fourier transform (STFT). This topic has recently regained popularity due to its utility in a variety of applications such as compressive sensing, speech synthesis, speech enhancement, source separation, and so on. As a result, based on an explicit relationship between STFT magnitude and phase, this paper presents an efficient algorithm for audio signal reconstruction using phase retrieval from the STFT magnitude spectrum. The standard metrics in signal reconstruction, such as time-domain segmental signal-to-noise ratio (segSNR), time-frequency domain signal-to-error ratio (SER), and cepstrum-related distance measures, such as log-likelihood ratio (LLR), Itakura-Saito distortion (IS), and cepstrum distance, are used to perform an objective evaluation. The results support the proposed approach's improvement.

Paper Reference: (CSP-2-1) 1570765988
Title: Emerging New Technologies in Undergraduate Engineering Curricula
Author(s): Mohammed Baniyounis; Omar R. Daoud (Jordan)

Abstract – The requirements for electrical engineering programs in Jordan are provided by the Accreditation and quality commission for higher education institutions. The request on changing the curricula of the program to cope with the demand of the national and the global market is increasing rapidly. To in line with these requests the IREEDER funded by Erasmus Plus Project came into existence. The aim of this project is to improve the curricula of the undergraduate students in electrical engineering and its associated disciplines. A brief introduction about these technologies is introduced in the scope of this paper. A comparison and a concise list of intentional institutions that have embedded these technologies as an important part of their studies is given. The challenges that hinder changing the programs to

be able to apply these technologies are described and analyzed. Where the survey of the current status and requirements of the Jordanian industry is taken into consideration to change the programs to serve the industry in Jordan.

Paper Reference: (CSP-2-2) 1570774496
Title: A Distributed Fault Tolerant Algorithm for Load Balancing in Cloud Computing Environments
Author(s): Abderraziq Semmoud; Mourad Hakem; Badr Benmammar (Algeria-France)

Abstract − Cloud computing is a promising paradigm that provides users with higher computing benefits in terms of cost, availability and flexibility. Nevertheless, with potentially thousands of connected machines, faults become more frequent and may have an adverse effect on the application. Consequently, fault-tolerant load balancing becomes necessary in order to optimize resource utilization while ensuring the reliability of the system. Common fault tolerance and load balancing techniques in cloud computing have been proposed in the literature. However, they suffer from several shortcomings: some fault tolerance techniques use task replication which reduce the cloud's efficiency in terms of resource utilization. While other models rely on checkpoint-recovery to tolerate failures, which results in an increase in average waiting time and thereby the mean response time. To address these deficiencies, an efficient and adaptive fault tolerant algorithm for load balancing is proposed. Based on the CloudSim simulator, some series of test-bed scenarios are considered to assess the behavior of the proposed algorithm.

Paper Reference: (CSP-2-3) 1570775613
Title: Task Scheduling in Cloud Computing Based on FPA Metaheuristic Algorithm
Author(s): Arslan N Malti; Badr Benmammar; Mourad Hakem (Algeria)

Abstract − Task scheduling is an important issue that influences significantly the performance of the Cloud computing environment where cloud service providers and users have conflicting goals and requirements. A good scheduler must offer an acceptable compromise between these objectives. Thus, scheduling tasks in the Cloud becomes a multi-objective optimization problem. Our contribution in this paper is to address the problem of task scheduling in the Cloud computing in order to find the best assignment of the submitted tasks to the set of virtual machines. To this end, the Flower Pollination Algorithm metaheuristic has been used by evaluating its objective function with three QoS metrics which are makespan, cost and reliability. The obtained results from simulations performed with CloudSim are very satisfactory and clearly show the interest of our approach based on FPA.

Paper Reference: (CSP-2-4) 1570775972
Title: Students' performance-prediction-Model based on Physical and Physiological Constraints
Author(s): Amjad H Alkilani; Mohammad Nusir (USA-Jordan)

Abstract − The consequences of the Covid-19 pandemic change the education system and the lifestyle of all students in Jordan. To reduce the infection rate among students, the education institute in Jordan decided to adopt online learning as an alternative to face-to-face education. The fast shift to online education raises a potent concern regarding its efficiency. For instance, many students in Jordan cannot afford digital tools and do not have an internet connection. Furthermore, the psychological impact of enforcing online learning is not fully recognized. This study presents two regression models based on Multilayer-Perceptron (MLP) neural network and Random-Forest-(RF) regressor to analyze and predict students' performance in Jordan before and during the lockdown and under physical and psychological constraints. In this study, the Dataset of Jordanian University Students' Psychological Health Impacted by Using E-learning Tools during COVID-19 (JUSPH) is divided into four subsets based on their chronological timeline (Before/After Covid-19), physical and psychological states. Besides, the four subsets are pre-processed using a Simple Imputer (SI), label encoder, and on-hot encoding to impute the missing value and handle the categorical data, respectively. Then, the features are selected by using the Low Variance (LV) filter. Afterward, MLP and RF regressor is used to predict the future students' performance under online education in the following semester. Results showed that the proposed MLP models achieved the best accuracy score of 99.94 percent on the Before Covid-19 physical Subset, while the RF model achieved the best accuracy score of 85.58 oercent on the After Covid-19 Psychological subset.

Paper Reference: (CSP-2-5) 1570783713
Title: Experimental realization using a dSPACE card of the PI control for an active power filter
Author(s): Younes Lahiouel (Algeria)

Abstract − In this project, we treated the parallel active power filter (APF) which seems to be the most effective solution for current harmonics and its problems. To control this system, Direct Current Control (DCC) is used for its simplicity. This technique is divided into an internal current loop and an external voltage loop where we use a conventional PI controller to improve the static and dynamic regimes of the system. This controller was implemented using dSPACE in order to confirm the performances obtained from the simulation.

Paper Reference: (CSP-2-6) 1570784001
Title: Fault detection in wheeled mobile robot based Machine Learning
Author(s): Fedia Ibrahim; Boumedyen Boussaid; Mohamed Naceur Abdelkrim (Tunisia)

Abstract − Robotics gained in importance the attention of researchers nowadays in many fields, in particular monitoring and control. Deployed in harsh environments, Artificial intelligence has shown a powerful ability to detect and diagnose faults. In this paper, a classification of defects is evaluated using different machines. learning techniques such as Random Forest (RF), Support Vector Machine (SVM), Artificial Neural Network (ANN) and Recurrent Neural network (RNN). A comparative analysis is carried out among the techniques previously mentioned on the basis of detection accuracy (DA), true Positive rate (TPR), Matthews correlation coefficients (MCC) and false alarm rate (FAR).

Paper Reference: (CSP-2-7) 1570791389
Title: Credit Card Fraud Detection via Machine Learning
Author(s): Azzedine Zerguine (Saudi Arabia)

Abstract − Credit card fraud has recently been a more severe problem since fraudsters are continuously developing more sophisticated fraud techniques. In this work, we have developed a software-based machine learning (ML) system for detecting credit card fraud. Data pre-processing was the first step at which Pearson correlation coefficient was used to decide which features are worth using in our model. Then, k-folds cross validation was used to evaluate the performance of different classifiers such as k-NN, NaÃ¯ve Bayes, Support Vector Machine (SVM), Bagging, Random Forest and Multilayer Perceptron (MLP). To overcome the imbalanced data issue, synthetic minority oversampling technique (SMOTE) was applied to the dataset to generate more fraud data points. To evaluate the model's performance, precision, recall, accuracy and F1 score evaluation metrics were used. With feature correlation of 0.1, SVM had the highest recall score: 88.5 percent. Also, when implementing SMOTE, the k-NN classifier showed the highest F1 score and precision.

Paper Reference: (CSP-3-1) 1570783255
Title: Diagnosis of supply voltage imbalance using WPD energy enhanced by current space vector (CSV)
Author(s): Meriem Behim; Leila Merabet; Salah Saad (Algeria)

Abstract − The present study focuses on the diagnosis of an important external defect which is the supply voltage imbalance due to its primary impact on the motor proper operation. The wavelet packet decomposition (WPD) energy method and current space vector (CSV) analysis are used. These techniques are applied on the stator current signals obtained from induction motor simulation. The results of tests

in Matlab/Simulink environment are discussed and analyzed. It can be concluded that the proposed techniques are effective in induction motor supply voltage imbalance diagnosis and can be extended to other induction motor external or internal defects.

Paper Reference: (CSP-3-2) 1570783611
Title: Unbalance Faults diagnosis using Wavelet Transform, FFT And ANFIS Algorithms
Author(s): Issam Attoui (Algeria)

Abstract – Automatic fault detection and diagnosis techniques have become promising in the industry due to the integration of intelligent procedures in machine monitoring systems. The unbalance faults in the rotor of rotating machines is considered as one of the most frequently occurring fault in rotating machines. In this paper, an automatic and online procedure for monitoring and diagnosing of the unbalance faults in rotor of rotating machines is proposed by applying the Wavelet Transform WT algorithm as a signal decomposition procedure, Fast Fourier Transform FFT algorithm as a frequency signal transformation technique and Adaptive Neuro-Fuzzy Inference System ANFIS algorithm as an intelligent classifier. The type of wavelets used in this application is Daubechies 2 (db2) with level 4. To validate this procedure, different vibration signals are collected on a test bench on which an unbalance faults for various severities is simulated. The experimental results confirm that the proposed method is appropriate to automatically identifying and monitoring the unbalance faults in rotating machines and that the DWT is suited to the analysis of non-stationary vibration signals.

Paper Reference: (CSP-3-3) 1570787049
Title: Deep Learning-based Edge FPGA Co-design for IoT Application
Author(s): Seifeddine Messaoud; Rim Amdouni; Mohamed Ali Hajjaji; Abdellatif Mtibaa (Tunisia)

Abstract – Nowadays, with the high needs of deep learning-based IoT applications, it is difficult to develop a deep learning model for resource-constrained IoT devices, as it is difficult to achieve both High-quality results and inference accuracy of the DNN/CNN model, as well as QoS metrics such as throughput, latency, and power consumption. Existing methodologies frequently separate the stage of building the DNN/CNN model from its deployment on IoT devices, leading to suboptimal results. In this study, we present some related work on such a unique design approach, along with empirical evidence as to why it may lead to inferior solutions. We then propose a new realistic bidirectional co-design technique based on these observations. For the creation of DNN accelerators, a first-level DNN template design technique is combined with a second-level flow. It enables continuous optimization of both DNN/CNN models, as well as their deployment parameters on edge FPGA, compute for IoT applications. Using the Pynq-Z1 FPGA and exploiting its reconfigurability and physical ARM processor, we illustrate the success of the suggested co-design technique on an object detection application. Our scheme gives effective results in terms of precision and quality of service, as well as high throughput (FPS) and energy efficiency.

Paper Reference: (CSP-3-4) 1570789154
Title: Real time H264 HD intra coding process implementation on TMS320DM642 DSP
Author(s): Imen Werda; Amna Maraoui; Amina Kessentini; Nouri Massmoudi (Tunisia)

Abstract – The H.264 standard was previously designed to allow the development of an encoder that significantly improves compression rates compared to previous standards while ensuring similar visual quality. The H.264 standard has incorporated advanced techniques which fully exploit the redundancies present in video sequences to the great benefit of compression. Intra 4x4 prediction is one of the most powerful innovations brought by the h.264 standard. This technique exploits the spatial redundancies present at the level of the sequences, thus contributing to better compression. However, the effectiveness of this technique comes at the expense of additional complexity justifying the delicacy of the optimization task. In this paper we propose to study and optimize the intra coding process implementation TMS320DM642 digital signal processor. As a result of this work the encoder complexity was reduced up to 64% without any objective video quality degradation.

Paper Reference: (CSP-3-5) 1570790039
Title: Design of a Ku Band Corrugated Conical Feed Network Dedicated to Parabolic Antennas
Author(s): Omar Adib Safer (Algeria)

Abstract – This paper describes the design and Simulation of a wideband corrugated conical horn feed for satellite and very small aperture terminal applications dedicated to parabolic reflectors. The design was performed using CST software. The proposed design operates in the frequency range 12-18 GHz (Ku band) which usied in ALCOMSAT-1 the fist Algerian telecommunication satellite. The horn feed is linearly polarized due to the feeding of by rectangular waveguide with TE10 mode. Simulation results show good Ku-band radiation characteristics including S-parameter.

Paper Reference: (CSP-4-1) 1570771493
Title: Effect of Non-Integer Order Moments on Parameter Estimation of Pareto Distributed Clutter plus Noise
Author(s): Taha Hocine Kerbaa; Amar Mezache; Houcine Oudira (Algeria)

Abstract – In this paper, accurate estimate of the Pareto plus noise shape parameter using a modified non-integer positive and negative order moment estimator is investigated. Closed form of the NIPNOME is derived in a previous work [16]. In single pulse case with a fixed value of the order moment, undesirable shape parameter estimates are obtained for high values of the shape parameter. In the prospect of improving the estimation performance, the Nelder-Mead simplex algorithm is used to optimize the unknown parameters of the fitness function which are the order moment and the shape parameter of the considered model. Via simulated Pareto plus noise data, the impact of the order moment on the NIPNOME is studied firstly. Then, Via IPIX databases, comparisons are carried out using Pareto plus noise PDFs and CCDFs where [zlog(z)] and NIPNOME are employed to illustrate the efficiency of the proposed estimator.

Paper Reference: (CSP-4-2) 1570775693
Title: 8×30 Gbps RZ-RoF-WDM System Using Optical DSB-SC For Long-Distance Networks
Author(s): Abderraouf Fares; Kaddour Saouchi; Fatima Brik; Nadira Boukhatem (Algeria)

Abstract – 8x30 Gbps WDM system will be adapted with Radio-over-Fiber system destined for long distance networks. The Optisystem will be the simulation environment for this proposed WDM system using the RZ encoding system. 60 GHz is chosen as the radio-frequency because it represents the 5G future band and its applications. The results are reported in terms of quality factor, bit error rate and the eye diagrams. The obtained results indicate that the laser's power of 10 dBm in each channel allows the transmission over a distance of 2400 Km with the desired performances.

Paper Reference: (CSP-4-3) 1570775706
Title: Aircraft Wing Vibration Monitoring based on FBG Sensor Network
Author(s): Maha Sliti; Noureddine Boudriga (Tunisia)

Abstract – In this paper, we present an FBG sensor network for monitoring aircraft wing vibration. The implemented FBG network allows the estimation of the vibration positions on the aircraft wings. Based on the measurements taken and if the wing vibration exceeds a preset threshold, the decision is made to reduce the aircraft's speed in order to decrease the vibrations. A series of laser pulses is transmitted to the deployed FBG arrays to achieve this goal. When an external strain is applied to the wing, the deployed FBG responds by shifting the reflected wavelength proportionally. A data acquisition module estimates the FBG displacement and fiber elongation in a given FBG point in the wing based on the wavelength of the reflected optical pulse.

Paper Reference: (CSP-4-4) 1570775942
Title: A CFAR Detection Algorithm for Weibull and Lognormal Clutter Mixture in SAR Images
Author(s): Hicham Madjidi; Toufik Laroussi; Farah Faiçal (Algeria)

Abstract − In this paper, a Constant False Alarm Rate (CFAR) detector based on a Weibull Lognormal Mixture Model (WLMM) for Synthetic Aperture Radar (SAR) clutter images is proposed. In doing this, the clutter parameters of the mixture and the corresponding percentiles are first estimated through Maximum Likelihood Estimators (MLEs). Then, an adaptive threshold is set to maintain constant the Probability of False Alarm PFA. The Simulated Annealing (SA) optimization algorithm is used to reduce the searching time in an efficient manner to approximate the global optimum percentiles. Application of the obtained CFAR framework on a real-world image, i.e., MSTAR BTR 60 (Moving and Stationary Target Acquisition and Recognition Bronetransporter), shows that an optimized weighting yields a good detection.

Paper Reference: (CSP-4-5) 1570789353
Title: T-Shaped Demultiplexer Based on Core-Shell Rods Photonic Crystals
Author(s): Imane Chergui (Algeria)

Abstract − In this research, T-shaped demultiplexer based on photonic crystal appropriate for WDM communication application is proposed. The device is formed by cubic lattice of silicon (Si) rods embedded in air background. We used six resonant cavities for performing the demultiplexer task. The resonant cavity is composed of core/shell (C/S) rod placed in the middle of six dielectrique rods. The C/S rod is formed by etching circular hole in the center of Si particle. We demonstrated that demultiplexing of six wavelength channels may be achieved by adjusting the values for the inner and the outer radius of the core-shell rods. Finite Difference Time Domain (FDTD) method is chosen for simulation to demonstrate the performance of the proposed device. For our proposed demultiplexer, the output transmission efficiency for channels was obtained in the range of 97.6–99.47%, with an average channel spacing of 7.4 nm. The minimum and maximum crosstalk between ports is –55dB and –40 dB, respectively. In addition our structure has a total footprint less than $160\mu m^2$, which is relatively small for photonic integrated circuits (PICs).

Paper Reference: (CSP-5-1) 1570775930
Title: Conception and study of patch antenna for wireless application
Author(s): Mouloud Ayad; Mourad Benziane; Mohamed Rezki; Smail Medjedoub; Abderrazak Arabi; Kamel Saoudi (Algeria)

Abstract − The VSAT system is a satellite telecommunications systems. It comprises two parts, a spatial part concerns the satellite, and a terrestrial part concerns earth stations. In these stations, the antennas play a vital role in transmitting and receiving data. These antennas have very advantageous characteristics (wide frequency band, security, and high speed). This work is based on the study and simulation of a printed microwave patch antenna designated for use in the VSAT system per the software tool CST STUDIO SUIT to obtain a good adaptation and functioning.

Paper Reference: (CSP-5-2) 1570776011
Title: Magnetically Tunable Bandpass Filter Based on High Order Mode SIW Resonator
Author(s): Halima Ammari; Farouk Grine; Mohamed lahdi Riabi (Algeria)

Abstract − In this paper, a magnetically tunable passband filter based on TE102 substrate integrated waveguide (SIW) resonator is presented. To achieve the magnetic tuning, a ferrite slab is loaded the SIW cavity center, where the concentration of the magnetic field of the TE102 mode is strongest. With changing of the magnetic biasing field, the resonant frequency of the second mode can be adjusted. A second-order tunable passband filter is implemented by cascading two high-order mode SIW cavities. The filter operating frequency can be controlled from 14.3 GHz to 16.3 GHz. Insertion losses ranging from 0.5 dB to 1 dB with minimum return loss better than 16.5 dB have been obtained.

Paper Reference: (CSP-5-3) 1570783243
Title: CPW-Fed LTCC Based Broadband Microstrip Antenna for Millimeter-Wave Applications at 60 GHz
Author(s): Djamel Khezzar; Djamel Khedrouche; Camilla Karnfelt; Tayeb A. Denidni; François Gallée (Algeria–Canada–France)

Abstract − In this paper, a new design of a low-profile and multilayer broadband microstrip antenna is proposed for millimeter-wave applications at 60 GHz. The antenna is a metamaterial inspired structure that consists of a non-uniform octagon shape radiating element on the top of six layers of substrate and a periodic structure at the second layer. The proposed antenna geometry is designed using Low Temperature Co-Fired Ceramic (LTCC) technology for 3D multilayer vertical integration. This antenna achieves 24.16 of bandwidth ranging from 55.5 GHz to 70 GHz, with a peak gain of 5.1 dBi at 60 GHz. HFSS is used for design and simulation of this LTCC based broadband antenna. Three prototypes are fabricated for measurement and a good agreement of numerical and practical results is obtained which makes this antenna very attractive for the use in future wireless communication systems.

Paper Reference: (CSP-5-4) 1570785219
Title: A Review on Clustering in VANET: Algorithms, Phases, and Comparisons
Author(s): Mays Kareem Jabbar Alsabah; Hafedh Trabelsi (Iraq–Tunisia)

Abstract − A Vehicular Ad hoc Network (VANET) is a kind of mobile ad hoc network (MANET), where the nodes in VANET are vehicles. VANET is the main component for the development of the Intelligent Transportation System (ITS). VANET has a high dynamic topology due to continuous stopping and movement with different speeds of vehicles. These characteristics lead to untrustworthy information transmission in VANET. To enhance connection reliability and network scalability, clustering in VANET is introduced. It is a technique for organizing network nodes into small groupings called clusters. In this work, we provide a review of the most notable clustering algorithms introduced between 1999 and 2020. Different clustering algorithms from the aspects of Cluster Head (CH) selection metrics, cluster formation according to hop distance, and cluster maintenance are explored. Also, different performance parameters used to evaluate the clustering approaches are summarized. Then, our proposed approach is summarized and compared with the most usable algorithms in literature to show its supremacy.

Paper Reference: (CSP-5-5) 1570785742
Title: FPGA SoC-Based Edge Computing for Multimedia IoT System with CNN Accelerators
Author(s): Seifeddine Messaoud; Soulef Bouaafia; Safa Teboulbi; Mohamed Ali Hajjaji; Abdellatif Mtibaa (Tunisia)

Abstract − Convolutional Neural Networks (CNNs) are becoming the most important technique that helps deliver a powerful edge multimedia IoT system (MIoT). Nonetheless, traditional CNNs are characterized by high computation time and high power consumption, which makes them unsuitable for deployment in the large-scale MIoT application. To resolve this issue, we propose a network architecture consisting of edge and centralized cloud computing. The former, which is based on the Field Programmable Gate Network (FPGA), includes an intelligent system based on Artificial Intelligence, Internet of Things (AIoT), and CNN accelerators for the purpose of implementing Face recognition (FR) application based on MobileNet with low power and latency. While centralized cloud computing is used to process multimedia data that need hard preprocessing steps. This, aim at creating a conscious MIoT system, in which a task-manager is implemented at the edge FPGA to assign tasks to the centralized or edge system. The numerical results of the computer system-based FPGA have proven the effectiveness of the proposed approaches to reduce latency and power consumption for FR applications.

Paper Reference: (CSP-5-6) 1570788099
Title: On the Performance of SISO, SIMO and MISO-NOMA Systems under Perfect and Imperfect SIC
Author(s): Saber Menaa; Abdellatif Khelil (Algeria)

Abstract − This paper improves a two-user downlink non-orthogonal multiple access (NOMA) system by using multi antennas at both the transmitter and the receiver. Three NOMA scenarios: a single-input single-output (SISO), a single-input multi-output (SIMO) and a multi-input single-output (MISO) are considered and compared. Assuming that the two users were over Rayleigh fading channels, the expressions of achievable capacity and outage probability (OP) on closed-form are derived and compared. To gain further insights into these scenarios, perfect and imperfect successive interference cancellation (SIC) are considered. The results of these three scenarios are presented and discussed, and it found that the improvement of the diversity order at the transmitter or the receiver enhances the performance of NOMA systems.

Paper Reference: (CSP-6-1) 1570783979
Title: A spatial multiple description coding scheme for HEVC video coding resiliency
Author(s): Sara Khalfa; Saliha Harize; Nasreddine Kouadria (Algeria)

Abstract − The increase in demand for video delivery over the last few years has led to a need for more compression efficiency. High efficiency video coding (HEVC) offers a better compression rate compared to other standard coding. However, the robustness of the coded stream is reduced in the low delay mode used for real-time applications. When a bitstream is transmitted in a hostile network there is a high probability of burst network packet loss which can result in the loss of the entire frame. On one hand, this paper studies the effect of whole-frame loss on the Quality of Experience (QoE) in the predictive low delay configuration on Single description coding (SDC). The study simulates frame loss in 5 different burst and uniform strategies. On the other hand, an HEVC encoder parameter adaptation schema based on Spatial Multiple description coding (MDC) is modeled with the encoder parameter and QoE model. A comparative study with SDC has shown that our proposed Spatial MDC technique is effective in improving the quality of the reconstructed video in the five cases studied with an average gain of 18.41 and 26.1 for QP= 22 and 37 respectively.

Paper Reference: (CSP-6-2) 1570786737
Title: Covid-19 Image Segmentation based on Masi Entropy and HGS Optimization Algorithm
Author(s): Amir Hamza; Morad Grimes; Abdelkrim Boukabou (Algeria)

Abstract − The covid-19 epidemic has killed a lot of people over the past three years. A lot of solutions have been proposed to prevent the outbreak of the disease, including the fast diagnosis which helps to control the number of people infected across the world by providing the best treatment to the patient in a timely manner. A chest X-ray is a quick way to detect the infected area in the lungs. However, it is difficult to determine whether the lungs are infected or not? Hence, this paper proposes a powerful computer vision technology that is an efficient approach of multi-level thresholding based on the hunger game search (HGS) optimization algorithm. This algorithm used Masi's entropy as an objective function until the best solution was arrived at and, in particular, to determine the infection areas of lungs. Thus there are two kinds of images sets used to demonstrate the efficiency of the proposed approach. The first one is Non-COVID-19 chest X-ray images used as a reference and the second one COVID-19 chest X-ray images to test and detect affected areas in the lungs.

Paper Reference: (CSP-6-3) 1570787044
Title: A novel Feature combination approach for Driver Fatigue Detection
Author(s): Imen Hamrouni Trimech; Nada Messaoudi; Najoua Essoukri Ben Amara (Tunisia)

Abstract − Driver drowsiness is one of the major causes of traffic accidents. For instance, according to the National High Way Traffic Safety Organisation in Tunisia, 39.84% of accidents are caused by somnolence, in 2022. In that context, various state of the art methods were developed to detect distracting driving and hence prevent traffic accidents. In this paper, we propose a novel approach for driver drowsiness detection based on a new set of combined features (HOG-SURF and HOG-HARRIS). We start by an effective detection, from each frame, of the driver face. Then, we extract a Region Of Interest (ROI) containing the main expressive facial parts. Once the ROI are delimited, we extract the HOG descriptors from both HARRIS and SURF key points. The developed method was evaluated on the YAWDD database. Experimental results show the performance and competitivenes of the proposed approach. We reach an average rate of 99.15.

Paper Reference: (CSP-6-4) 1570788871
Title: SVM-Based method to reduce HEVC CU partition complexity
Author(s): Amna Maraoui; Imen Werda; Nacir Omran; Fatma Ezzahra Sayadi (Tunisia)

Abstract − The compression efficiency of the High Efficiency Video Coding (HEVC) standard is accomplished at the expense of spectacularly increasing coding complexity. HEVC adopts a hybrid video coding structure like its predecessor H.264 Advanced Video Coding (H.264/AVC). The innovative block-based constitution provides a highly flexible hierarchy of the coding unit (CU) representation that takes the lion's share of the HEVC encoding complexity. This paper goal is to reduce the CU decision module complexity based on Support Vector Machine (SVM) model the HEVC encoder at all intra configuration. Following the selection of relevant characteristics, an online SVM-based method is created to forecast the CU partition module effectively. Experimental findings show that the suggested SVM-based model may reduce complexity by up to 48.8% on average while only losing 1.5% of coding efficiency.

CSP-6-5 Paper Reference: (CSP-6-5) 1570789094
Title: U-Net based Deep Learning Architectures for Latent Fingerprint Segmentation
Author(s): Roua Jaafar; Hajer Walhazi; Ahmed Maalej; Najoua Essoukri Ben Amara (Tunisia)

Abstract − Latent fingerprints are crucial kind of physical evidence in law enforcement investigations. Although used successfully for suspect identification for decades, latent fingerprint identification failure could occur, which causes criminal investigations misleading. Poor latent image quality, distorted friction ridge pattern, cognitive bias of experts verification, and ever-increasing amount of fingerprint data, are potential causes of latent search failure. To alleviate this problem, latent fingerprint preprocessing techniques, such as enhancement, filtering, and segmentation, are primarily required prior to the latent search run. In this paper we propose to train different CNN-based encoder-decoder models for latent fingerprint segmentation. Model selection is conducted through hyper-parameters tweaking, and performance assessment, of individual models. Qualitative and quantitative evaluations, involving standard metrics, learning curves, and mask prediction versus ground truth, are reported using the NIST SD 27 and NIST SD 301 databases. The best deep learning model producing the lowest generalisation error on the segmentation task is highlighted.

Paper Reference: (CSP-6-6) 1570789414
Title: An Image Encryption Application of Chaotic Map based True Random Bit Generator
Author(s): Esra Ince; Barış Karakaya; Mustafa Türk (Turkey)

Abstract − This paper presents an implementation of discrete chaotic map based true random bit generation by using two Tent maps which are driven different initial conditions. As the chaotic systems are very sensitive to initial conditions, the same Tent map circuits give different value for different initial conditions. From the start of this point of view, the proposed electronic circuits are simulated on Orcad-Pspice environment and the random bit stream is obtained from the output of comparator circuit. Obtained bit stream is tested by using NIST 800.22 statistical test suite to demonstrate the randomness of proposed system. The results of statistical tests show that the proposed random bit generation is suitable for the usage in basic encryption systems. An image encryption application is executed using obtained bit stream successfully.

Paper Reference: (CSP-7-1) 1570783933
Title: Support Vector Machine for Heart Beats Classification Based on Robust Filtering
Author(s): Khaled Arbateni (Algeria)

Abstract − The Electrocardiogram (ECG) signal is by far the most intensive tool used to inspect the condition of the Heart and to detect early arrhythmia abnormalities, which is a life-saving process. The classification process highly depends on the quality of the ECG signal. Through this paper, we present a comparative study of two preprocessing techniques, namely high-pass derivative and robust neural network preprocessing filters. Our work involves developing a Super Vector Machine (SVM) detector and assessing its performance by two preprocessing methods. We evaluated the detector's performance by using the MIT-BIH database under the AAMI EC57 standard and using Synthetic Minority Over-sampling Technique (SMOTE). The robust-based classifier shows higher performance with an overall accuracy of 99,51% for intra-patient detection and 82,23% for inter-patient classification compared to the derivative-based one. that has an overall accuracy of 99,34% for intra-patient and 73,51% for inter-patient detection.

Paper Reference: (CSP-7-2) 1570786420
Title: A Deep Pair Siamese Convolutional Neural Network for Multi-Class Classification of Alzheimer Disease
Author(s): H. Alaeddine; Jihene Malek (Tunisia)

Abstract − Alzheimer's disease is a neurodegenerative disease (progressive brain damage leading to neuronal death) characterized by a progressive loss of memory and certain intellectual (cognitive) functions leading to repercussions in the activities of daily living. Early diagnosis of Alzheimer's disease is a problematic task for researchers. In clinical research, magnetic resonance imaging (MRI) is used to diagnose Alzheimer's disease. MRI can detect cortical atrophy and in particular atrophy of the hippocampi (a brain structure involved in memory, the size of which is often reduced in Alzheimer's disease). Approaches based on deep convolutional neural network (CNN) and machine learning represent one solution and they are readily available and described to solve various problems related to the analysis of brain image data. High-dimensional classification approaches have been widely used to study magnetic resonance imaging (MRI) data for automatic classification of Alzheimer's disease (AD). In this research, we proposed a Deep Siamese Convolutional Neural Network model for a Multi-class Classification of Dementia Stages in Alzheimer's Disease. The experiments are performed on a series of publicly available Open Access Imaging Studies (OASIS), using the proposed approach. We compared our model with the top models and found that the proposed model outperformed the top models in terms of different performance.

Paper Reference: (CSP-7-3) 1570786510
Title: Multi-Classification of epileptic High Frequency Oscillations using a Time-Frequency image-based CNN
Author(s): Fatma Krikid; Ahmad Karfoul; Abdennaceur Kachouri; Régine Le Bouquin Jeannès (Tunisia–France)

Abstract − High Frequency Oscillations (HFOs) in intracranial ElectroEncephaloGraphic (iEEG) signals are considered as promising biomarkers for localizing the epileptogenic zone. Visual marking of these particular activities is the typical way not only for the identification of HFOs but also for their discrimination from other transient events such as Interictal Epileptic Spikes (IESs). However, this remains a highly time-consuming process. To cope with this issue, several approaches have been already proposed for an automatic detection of HFOs. Most of these approaches are based on machine learning algorithms where relevant features are to be extracted for efficient classification. Looking for these relevant features is however a challenging task and can be avoided by resorting to deep learning. In this paper, a new method for HFOs multi-classification based on a convolutional neural network (CNN) is proposed. The proposed CNN model is based on Time-Frequency representation of HFOs computed using Stockwell transform. The efficiency of the proposed method is confirmed using real iEEG signals and compared with a supervised machine learning approach based on support vector machine (SVM) as classifier

Paper Reference: (CSP-7-4) 1570787692
Title: Baseline wander removal from ECG signal using a fixed-point adaptive noise canceller
Author(s): Mohammed Mujahid Ulla Faiz; Izzet Kale (UK)

Abstract − In this paper, we present a fixed-point Least Mean Square (LMS) based adaptive noise canceller, which has been employed for the removal of baseline wander from ElectroCardioGram (ECG) signals. A unique feature of the fixed-point LMS-based adaptive noise canceller used in this work is that it is fully quantized, i.e., all the input signals, output signals, filter coefficients, step-size, as well as the data paths are quantized using an in-house quantize function developed by us. The performance of such a fully quantized fixed-point LMS-based adaptive noise canceller has not been studied before in the open literature. The most effective number of quantization bits required are found to be 8 and are determined through rigorous simulations. The error performance of the four types of quantization methods, viz. truncate, round, round-to-zero, and convergent round is compared in order to establish the number of acceptable quantization bits. Finally, the quantized filtered ECG signal free from baseline wander is examined for the four types of quantization methods as mentioned above.

Paper Reference: (CSP-7-5) 1570788820
Title: Remote platform for lung monitoring based on Electrical Impedance Tomography measurements
Author(s): Mariem Hafsa; Ons Bchir; Oumaima Bader; Najoua Essoukri Ben Amara; Olfa Kanoun (Germany)

Abstract − Electrical Impedance Tomography (EIT) is a non-invasive, non-ionizing medical imaging method that has been on the rise in biomedical field. For lung monitoring, electrodes are attached around patient's thorax. Several boundary voltages are measured on the surface of these electrodes, which result from the injection of a small alternating current. Based on these measurements, the inner conductivity distribution of the patient's lung can be determined and used for monitoring and diagnosis. EIT can be used for extended periods of time, which makes it ideal for continuous monitoring, especially for intensive care patients. Several stationary EIT-based lung monitoring platforms have been developed for this reason. In this work, however, we propose a web and cloud-based monitoring solution that allows remote access for the doctors and medical staff. The implemented solution provides real-time, continuous monitoring as well as a visualization of extracted lung features that aid the diagnosis.

Paper Reference: (CSP-7-6) 1570789107
Title: Classification of EEG signals using deep Learning
Author(s): Lassaad Zaway; Larbi Chrifi-Alaoui; Nader Ben Amor; Mohamed Jallouli; Laurent Delahoche (Tunisia–France)

Abstract − The electroencephalogram (EEG) is an efficient modality applied to record brain signals that corresponds to different states from the scalp surface area. These signals can be classified according to their physiological parameters to be used later for the recognition of a state of confusion. Such state is characterized by the inability of paying attention, the inability of thinking, disorientation and fluctuations in the level of alertness. In this work, the EEG signals are generated by the Mindset device and collected from several candidates. These data were classified using deep neural networks. Next, various algorithms such as Conventional Neural Network (CNN), K-Nearest Neighbors (KNN) and Long-Short Term Memory (LSTM) were applied to decode students' state of mind based on their brain waves. To improve the classification results, we propose a hybrid classification method based on CNN-LSTM. Our proposal method outperforms the other ones. Indeed, the precision obtained by this model is up to 98.59%.

Paper Reference: (CSP-8-1) 1570775765
Title: Confident Security Relation for Edge Computing based IoT Applications
Author(s): Ahmed Jedidi; Hameed Almubarak (Saudi Arabia)

Abstract − Smart city, health care, agriculture etc applications under the umbrella of the Internet of Things (IoT) which they present a new technology with a millions of devices connected together. In the End, all IoT devices are connected to cloud computing which the

process of the data flow. However, IoT applications generate a huge data flow which present a major problem with the system performance. In fact, edge computing is proposed as solution to solve the problem of data flow processing. Moreover, edge computing is the first line of the data processing mostly for the particular applications such as smart city which the huge number of the IoT devices. The edge computing resources are limited performance compared to the cloud computing. This nature of the edge computing presents a major problem for the security issues in the IoT applications. In fact, this paper proposes a novel security system to secure the relation between the IoT devices and edge computing. Further, Confident Security Relation (CSR) suggests four levels which each one proposes recommendation about the security protocol applied. CSR is lined with the different requirements requested by IoT application to improve the real time data processing.

Paper Reference: (CSP-8-2) 1570775980
Title: Blockchain based access control for home hospitalization during covid-19
Author(s): Hideyat Zerga; Asma Amraoui; Badr Benmammar (Algeria)

Abstract − With the emergence of the Covid-19 disease, hospitals and healthcare professionals (HP) had to deal with a huge number of patients presenting with the virus that kept increasing every day, resulting in the increase of the pandemic transmission. To deal with this issue, minimize patients' and healthcare professionals' exposure, and be able to treat all patients, HP turned to home hospitalization. In-home hospitalization, doctors need to monitor their patient's health status remotely, and patients need to share this data with them. But in this scenario, patient privacy is exposed to several external threats and intrusions, sometimes resulting in the loss of patient life. To deal with the above issues, our focus in this article is on access control (AC). Thus, we propose a Blockchain (BC) smart contract-based model, where each object owner creates one ACC (Access control contract) for each subject in the system and defines his access policies in it.

Paper Reference: (CSP-8-3) 1570783380
Title: Smart electronic medical record based on blockchain technology to combat Covid-19 pandemic
Author(s): Halima Mhamdi; Soufiene Ben Othman; Ahmed Zouinkhi; Hedi Sakli (Tunisia)

Abstract − The medical record is a crucial element in the follow-up of a patient. It includes the opinions of healthcare specialists, analyses, prescriptions, and all information concerning the patient. In fact, several actors such as the patient, the doctor, the pharmacist participate in the process of sharing and managing this file. But after the Covid-19 virus pandemic, the use and exchange of paper became dangerous. This need has pushed researchers to find solutions to minimize contact and save medical data in a secure and accessible way. For this purpose, we propose to investigate blockchain distributed ledger technology to manage electronic medical record. Blockchain technology provides just such a solution in the form of a distributed and secure registry that allows patients not only to have visibility over their data, but also to control access to it. In this article, we present a smart electronic medical record based on smart contract. We discuss relevant requirements to guarantee the security of patient data and then propose the system communication process.

Paper Reference: (CSP-8-4) 1570784025
Title: Remote Control and Supervision of a Factory Automation System based on Internet of Things
Author(s): Yehya Aniba; Mounir Bouhedda; Mourad Bachene; Hamza Benyezza; Benyoucef Kaddour; Abdelghani Chabira (Algeria)

Abstract − The paper proposes a new architecture for the control and supervision of a factory automation system based on Internet of Things (IoT). For this purpose, a hardware implementation is done through a Raspberry Pi (Rpi) 3 B+ and a power electronic power interface is developed to control the trainer's actuators. The communication is done adopting secure shell (SSH) protocol to connect the factory trainer to the server. The software solutions are developed under a visual programming environment using Node-Red IBM Platform where a Human Man Interface (HMI) is designed for the IoT application using JavaScript language. The test results show the success of the proposed system.

Paper Reference: (CSP-8-5) 1570784056
Title: Implementation of an AES-based real-time Video Encryption/Decryption using FPGA/HPS
Author(s): Ahmed Maache; Anouar Touati; Ayoub Ouali (Algeria)

Abstract − Data communication security is a vital aspect of our daily life especially with the current shift to online alternative ways due to the pandemic. One of these ways is online video meetings. The aim of this work is not only to implement the AES-128 algorithm but to maximize its performance while using it in a video recording encryption/decryption application within the low-cost constrained embedded hardware of the Terasic DE10 Standard FPGA Board. First, the AES-128 algorithm was implemented in C for comparison purposes, and then multiple designs of a HPS-based system that make use of the SoC HPS and FPGA were evaluated. Finally, we implemented the fastest designs in a real-time video encryption/decryption application. The results showed that the system has the advantage of faster execution by a factor of over 4 times when compared to the software implementation.

Paper Reference: (CSP-8-6) 1570789136
Title: A novel approach for designing S-boxes based on Chaotic Boolean Functions and G.A Techniques
Author(s): Mohamed Khaldi; Ramzi Guesmi; Mohamed Ali Hajjaji (Tunisia)

Abstract − In this paper, we propose a new method for drawing a cryptographically strong S-box using the Lorenz system and Genetic Algorithm techniques. We used the chaotic function to generate an initial random sequence of bits. The crossover and mutation are used to provide a new improved s-box with an increased non-linearity. The main idea is to obtain strong Substitution-box (S-box) which can be injected in a cryptosystem. We applied the most relevant tests to approve the efficiency of the results of our proposed algorithm. The main cryptographic properties of the generated S-box have been validated. The randomness of the generated S-box has been confirmed by the NIST tests.

Paper Reference: (CSP-9-1) 1570781625
Title: Speaker Diarization in Overlapped Speech
Author(s): Hadjer Bounazou; Nassim Asbai; Sihem Zitouni (Algeria)

Abstract − In this paper, the effect of the overlapping speech on speaker diarization performances developed in our work, using NIST evaluation metrics (DER: diarization error rate, MR: misclassification rate and ACP: average cluster purity) on NIT2005 database is studied. Using cepstral features MFCCs for a speaker diarization system, its evaluation is done by including the overlapped speech regions. If an overlapped speech region is assigned to only one speaker, this region is considered as Missed speech for the second speaker. Through our experiences, the effects of this strategy using various overlapping speech scenarios show that the speaker diarization performances (in terms of DER, MR and ACP) are drastically degraded in all situations (DER=21.08, MR=23.8 and ACP=80.14).

Paper Reference: (CSP-9-2) 1570781974
Title: A synthetic sleep snoring study through the use of linear predictive speech techniques
Author(s): Mohamed Rezki; Mouloud Ayad (Algeria)

Abstract − Snoring is a disagreeable sound produced by humans while they sleep and in some dimensions, it is considered pathology. Characterized by inspiratory signals, it is closely related to the breathing function. This paper deals with the sleeping snore using an efficient approach based on the synthesis of a recorded snoring signal. The advantages of this approach are very varied such as offers of a non-contact substitute, artificial reproduction by machine of the original signal (snoring), which can even be integrated later in humanoid robots as

an example. The method itself of this reconstitution is a reproduce of the signal through the application of some predictive techniques such as LPC (linear predictive coding), and CELP (Code-excited linear prediction). The difference between original and synthetic signals, called also residuals, can be explained by a scanning factor and different types of noises. Finally, to evaluate our approach, we compute the Segmental Signal to Noise Ratio (called segmental SNR which is a special SNR very useful for segmented signals.), and Root Mean Square Error (RMSE), both of which are suitable criteria for sound signals, decisive for us in order to show the effectiveness of these different methods.

Paper Reference: (CSP-9-3) 1570783101
Title: Joint Dereverberation and Separation of Reverberant Speech Mixtures
Author(s): Mina Kemiha; Abdellah Kacha; Lotfi Chouikhi (Algeria)

Abstract − This paper proposes a joint dereverberation and separation method for speech mixtures. In the literature, several studies consider the problems of blind separation and blind dereverberation as two separate problems and propose a solution to each problem. The dereverberation method consists to estimate the log of maximum likelihood parameter which depends on three parameters. So the reverberation algorithm returns to jointly maximize the likelihood function. The bivariate empirical mode decomposition (BEMD) algorithm combined with complex independent component analysis by entropy bound minimization (ICA-EBM) technique is proposed as an alternative to separate convolutive mixtures of speech signals reverberant environnement. The proposed algorithm is considered as a connection in tandem of the dereverberation network and separation network to estimate the source signals. The performance of the proposed approach is tested on real speech sounds chosen from available databases. Two sets of room impulse responses with reverberation times of 0.3 and 0.5 s, with a total of 410 test samples for each reverberation condition are simulated. The proposed method is compared to the conditional separation and dereverberation (CSD) method and Frequency domain blind source separation (FDBSS) method using objective measures which are segmental signal-to-reverberation ratio (SRRseg), signal-to-interference ratio (SIR) and direct-to-reverberationr (DRR).

Paper Reference: (CSP-9-4) 1570783922
Title: Maghrebian Accent Recognition Using SVM Classifier and MFCC Features
Author(s): Kamel Mebarkia; Aicha Reffad; Rania Maatoug (Algeria)

Abstract − This work aims to design a system to automatically recognize the accent of Maghrebian speakers (Algerian, Tunisian and Moroccan). The recognition system is a support vector machine (SVM) classifier fed by the well-known Mel frequency cepstral coefficients (MFCC) features and their derivatives. The SVM classifier was trained and tested using database of 30 speakers from the three accents. The cumulative sum of the ranked MFCC features seems to have more discrimination between accents than the MFCC features and reaches a classification accuracy of 91.7.

Paper Reference: (CSP-10-1) 1570775608
Title: Hardware implementation of a new solution to transmit digital video in GSM interfaces
Author(s): Dalenda Bouzidi; Youssef Oudhini; Fahmi Ghozzi (Tunisia)

Abstract − Actually, digital television has taken a long time to take root, both in its context of basic processing and coding, and in the context of broadcasting and transporting the processes associated with this branch of modern technology. It is known that this recorded delay is mainly due to the difficulty encountered in basic digital processing techniques and digital image storage. Some solutions are proposed to provide digital picture reception in hand devices. We propose in this work an original idea to insert digital video in GSM interfaces without modify or change any parameters of the norm. Then, the new proposed solution allows achieving this aim using directly GSM channels. The main task is to make reduction of the bit rate coming from the video encoder using H265 advanced norm by interposing a new design "Brewer-buffer". The outputs of this new proposed element will be directed to the time division multiple access TDMA frames of the GSM norm in order to make the RF channels. To restore the digital video our receiver must be equipped by the symmetric component "Invert brewer-buffer". In fact, we will propose also, a new architecture of the receiver used in this application of hand-held video reception. We specify the originality of the proposed solution and demonstrate the fundamental architecture. For the simulation and the implementation of the main circuits proposed in this work, we have based on the VHDL language.

Paper Reference: (CSP-10-2) 1570783114
Title: Retinal Image Segmentation Using Clustering Methods: Performance Analysis
Author(s): Imane Mehidi; Dalel Jabri; Djamel Eddine Chouaib Belkhiat (Algeria)

Abstract − Clustering is a popular method for segmenting retinal images due to its effectiveness in performance. This paper investigates the ability of multiple clustering algori thms to segment the retinal image to isolate blood vessels. The flowchart of this analyzes two phases. First, the pre-processing phase aims to increase the contrast of the image by applying a series of operations: Contrast Limited Adaptive Histogram Equalization (CLAHE), median filtering, and bottom-hat filtering. Furthermore, the second phase deals with the segmentation of the pre-processed image using one of the clustering algorithms selected for this study: k-means (KM), k-medoids (KD), Gaussian Mixture Model (GMM), and fuzzy c-means (FCM). The experimental part is carried out on the DRIVE and STARE databases, and the performance measure of each algorithm is acc omplished using sensitivity, specificity, and accuracy performance metrics. In addition, the running times of different algorithms are compared. Finally, the obtained results are extensively discussed, and some suggestions are proposed at the end of this paper

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Paper Reference: (CSP-10-3) 1570783423
Title: Implementation and Comparison of U-net networks for Automatic COVID-19 Lung Infection Segmentation
Author(s): Ayoub Koudia; Seif Eddine Chouaba; Djamel Eddine Chouaib Belkhiat (Algeria)

Abstract − With the big number of COVID-19 patients, efficient detection tools are necessary. In this work, we proposed an automatic detection and quantification tool based on deep learning model. The architecture used is U-Net architecture, one of the most known for medical applications. This network was introduced as a binary semantic segmentation tool. It uses a dataset of 101 images, seventy-two of them for training, ten for validation, and eighteen for testing. The model will be compared with other deep learning models and evaluated using several evaluation metrics. The results have shown an accuracy of 0.958, sensitivity of 0.900, dice coefficient of 0.726, and a specificity of 0.962. Compared with other related works, our network has the best accuracy and specificity. The obtained results show the ability of the model as a binary segmentation tool to separate infection tissue and healthy tissue.

Paper Reference: (CSP-10-4) 1570783553
Title: Robust Hybrid Watermarking Algorithm based on DCT-PMF-DWT-SVD
Author(s): Razika Souadek (Algeria)

Abstract − The algorithm are proposed in this paper based on DCT-PMF-DWT-SVD. We use in first step the DCT transform and apply a PMF function (Pixel Movement Function) to mixture the frequencies. After that, we apply three levels of DWT transform then embed the watermark done by SVD technique. The system proposed in this paper give a good robustness against various attacks. The PMF function bestows more security where the bit which one selects to insert the watermark bit always remains unknown. Its achieve a height quality of invisibility of watermark. The proposed algorithm detailed step by step all instructions are used and the experimental results determine the efficiency of our algorithm. The evaluation metrics used in this algorithm are the parameters PSNR (Peak Signal to Noise Ratio) and NC (Normalized Correlation).

Paper Reference: (CSP-10-5) 1570783693
Title: A Novel COVID-19 Detection Model using CT Scan
Author(s): Larbi Messaouda; Abdelghani Rouini (Algeria)

Abstract − Presently, COVID-19 is considered to be the most dangerous and deadly disease to human caused by the new Coronavirus. Early discovery of COVID-19 through precise diagnosis, especially for cases without clear symptoms, can reduce the patient's mortality rate. In this paper, using CT scans images, we present a novel method Level Set evolution (NSDRLS), wherein we propose to utilize both color intensity and saliency map as region external energy to motivate an initial evolution of Level Set Function (LSF). Herein, a complete comparative quantitative study of the considered approaches was established. Various criteria were calculated to evaluate the methods of segmentation.

Paper Reference: (CSP-10-6) 1570783869
Title: On the Performance of GLRT-LTD Processor in Correlated Pareto Clutter Under Different Estimators
Author(s): Taha Hocine Kerbaa; Amar Mezache; Houcine Oudira (Algeria)

Abstract − Pareto type II distribution is a class of high-resolution sea-reverberation data models. Application of the GLRT-LTD (Generalized Likelihood Ratio Test Linear Threshold Detector) algorithm requires an accurate estimation of the clutter parameters. Under the assumption of correlated Pareto clutter, several estimators could be applied. In this work, we investigate the effect of the MLE (Maximum likelihood Estimation), Integer order moments, fractional-order moments, and zlog(z) estimators on the detection performance of the GLRT-LTD procedure. From simulated datasets, it is shown that approximate results are obtained by MLE and zlog(z) methods. Moreover, the zlog(z) approach is advantageous when complicated parameter estimation scenarios occur (i.e., correlation coefficient tends to one).

Paper Reference: (CSP-10-7) 1570783999
Title: Post-processing for Thorax Imaging based on Electrical Impedance Tomography using Deep Learning
Author(s): Hamdi Haddad; Mariem Hafsa; Oumaima Bader; Olfa Kanoun; Najoua Essoukri Ben Amara (Tunisia–Germany)

Abstract − Pareto type II distribution is a class of high-resolution sea-reverberation data models. Application of the GLRT-LTD (Generalized Likelihood Ratio Test Linear Threshold Detector) algorithm requires an accurate estimation of the clutter parameters. Under the assumption of correlated Pareto clutter, several estimators could be applied. In this work, we investigate the effect of the MLE (Maximum likelihood Estimation), Integer order moments, fractional-order moments, and zlog(z) estimators on the detection performance of the GLRT-LTD procedure. From simulated datasets, it is shown that approximate results are obtained by MLE and zlog(z) methods. Moreover, the zlog(z) approach is advantageous when complicated parameter estimation scenarios occur (i.e., correlation coefficient tends to one).

Paper Reference: (CSP-11-1) 1570775849
Title: Evaluation of Local Binary Pattern for Osteoporosis Classification
Author(s): Meriem Mebarkia (Algeria)

Abstract − Osteoporosis is a disease that affects the bone mass manifested by low bone mineral density and micro-architectural deterioration to increased fragility bone. The early osteoporosis identification can prevent the disease and predict fracture risk. Usually, the diagnosis is based on the analysis of X-ray images. However, the healthy and osteoporotic subject radiography shows a great resemblance. The aim of this study is to develop evaluation of automatic osteoporosis identification system based on texture analysis. This paper proposes a Local Optimal Oriented Pattern (LOOP) to address some of the shortcomings of existing feature descriptors such as Local Binary Pattern (LBP) and Local Directional Pattern (LDP). Ensemble and SVM learning algorithms were used for classification task. The obtained results were compared with some state-of-art methods used in the literature. Experimental results show that the proposed approach outperforms the previous binary descriptor in terms of recognition accuracy proving that the proposed approach is efficient for real clinical applications.

Paper Reference: (CSP-11-2) 1570776025
Title: A New Deep Learning Architecture for Pneumonia Detection in Pediatrics
Author(s): Ibrahim Remaigui; Laid Kahloul; Saber Benharzallah (Algeria)

Abstract − This paper proposes a new convolutional neuronal network architecture for pneumonia detection in pediatric healthcare. The model was constructed from the scratch and was trained, validated, and tested using a public data set composed of 5863 images classified into two distinguished classes: normal and pneumonia. Indeed, the obtained results show an improvement compared to the existing works which have used the same data set. In this work, our achieved experimentations have reached an accuracy equal to 99.3 with a validation accuracy equal to 95.89% and a test accuracy equal to 97.10%. Thus, obtained results are very encouraging compared to existing models in the literature.

Paper Reference: (CSP-11-3) 1570779803
Title: Multiclassification Model of Histopathological Breast Cancer Based on Deep Neural Network
Author(s): Nadia Smaoui (Tunisia)

Abstract − Breast cancer is one of the most important diseases that lead to death, according to the reports of the World Health Organization. Reports also indicated that breast cancer affects women more than men. Late or wrong diagnosis leads to a deterioration in the patient's condition and may lead to death. Therefore, automated multiple classifications using machine learning of breast cancer from histopathological images plays a major role in the early diagnosis of the disease. Multiple classifications of breast cancer is the identification of tumors such as Carcinoma, Fibroadenoma, Cysts, etc. However, this type of classification faces many challenges such as extracting subtle differences between the binary classes of tumors and whether they are benign or malignant, strong coherence of tumor cells and widespread color heterogeneity. Therefore, we propose in this paper the use of a sophisticated model that works on semantic segmentation and extracting distinctive patterns and classifying them using a deep neural network. The structured deep learning model performed impressively (average accuracy of 98.7%) on a large-scale data set, demonstrating the power of our method in providing an effective tool for classifying multiple breast cancers in clinical settings.

Paper Reference: (CSP-11-4) 1570781198
Title: Gammatonegram based Pulmonary Pathologies Classification using Convolutional Neural Networks
Author(s): Zakaria Neili; Sundaraj Kenneth (Algeria–Malaysia)

Abstract − Many classification algorithms have been implemented to differentiate between different pulmonary diseases. In recent years, machine learning techniques have been widely used for lung sound classification, and have particularly focused on deep neural networks, which appear advantageous with large training datasets. In this paper, intending to provide a fully automatic classification system, we propose an alternative representation of input data called Gammatonegrams. Our approach was implemented on two different deep neural network architectures - Visual Geometry Group 16 (VGG16) and residual networks (ResNets) for pulmonary pathologies classification. The ICBHI database was chosen as input to classify three kinds of pulmonary conditions - healthy, chronic and non-chronic. The results show that the two architectures gave an accuracy of 67.97% and 60.80% for VGG16 and ResNet-50 respectively. Our results provide initial evidence that in the gammatonegram based classification of pulmonary conditions, the deep neural networks, can achieve significant accuracy.

Paper Reference: (CSP-11-5) 1570783106
Title: Pectoral Muscle Removal Techniques: A review
Author(s): Hela Boulehmi; Hela Mahersia; Kamel Hamrouni (Tunisia)

Abstract – Breast lesions early detection is the only key to reduce breast cancer mortallity rate and increase recovering chances. Computer aided diagnosis (CAD) systems can assiste radiologists in detecting breast abnormalities at an early stage. However, CAD systems are facing many challenges such as the existence of artifacts and pectoral muscle on digital mammograms. These components have to be removed from considered images to get more accurate segmentation results. This paper is a survey of pectoral muscle removal techniuques that were developped since the year 2000 and performed on digital mammograms from the mini-MIAS database.

Paper Reference: (CSP-11-6) 1570783909
Title: Motor Imagery Hand Movements Recognition Using SVM Classifier and Genetic Algorithm Optimization
Author(s): Aicha Reffad; Kamel Mebarkia (Algeria)

Abstract – In this paper, we introduce two types electroencephalography (EEG) features to design Brain-Computer Interfaces (BCI) applications: the fist type is based on Mel Frequency Cepstral Coefficients (MFCC), and the second one is based on the wavelet transform (WT). The goal is to identify, the motor imagery (MI) of left and right hand movements using the proposed EEG signals features from 3 subjects. The features are fed to the Support Vector Machine (SVM) classifier. Evaluation of the algorithm has been done using a 10-fold cross-validation procedure. To improve the classification performance, suitable features were selected by genetic algorithm (GA) optimization. Results show the effectiveness of the combination of these features to improve the classification of MI tasks. The recognition accuracy was improved with respect to existing works using the same database and reached 90.02%.

Paper Reference: (CSP-12-1) 1570766957
Title: Effect of ACI and CCI on AWGN and Rayleigh Channels Performance Using 64-QAM Modulation
Author(s): Amer M. Daeri; Amer Zerek; Nahla Hweesa; Fatima Zahra Messaoud (Lybia)

Abstract – In wireless communication, for a system to perform adequately there has to be a balance between the transmission bandwidth and the immunity to interference as well as fading. This certainly will affect the frequency of re-use. Co-channel and adjacent channel interferences dictate the kind of modulation to be implemented in the desired wireless communication system to be used since immunity to interference is one of the requirements for the modulation method to be selected. In this paper the effect of co-channel interference (CCI) and adjacent channel interference (ACI) on AWGN and Rayleigh communication channels is studied, where a 64-QAM modulation is used to evaluate the effect of these interferences on system performance is analyzed using Matlab Simulink package version 19.0 by considering constellation and bit error rate (BER) of the mentioned QAM technique. The obtained results showed that these interference signals have an effect, which resulted in an average power increase of about 1.77 dB.

Paper Reference: (CSP-12-2) 1570768955
Title: 5G Wireless Communications Performance Based on Multiparallel Processing Algorithm
Author(s): Omar R. Daoud; Qadri Hamarsheh; Ahlam Damati (Jordan)

Abstract – Due to its powerfulness in supporting higher data rates, OFDM became a popular technique especially in the most recent technologies. However, it has a major drawback, namely Peak to Average Power Ratio, which reflexes on the whole systems design complexity. In this paper, a proposition of reducing the effect of this draw back has been made based on a multiparallel processing algorithm. That is based on the use of Daubechies wavelet baby functions. In order to validate our proposition, a comparison has been made with some techniques in the literature such as the Logarithmic Rooting Companding and the SLM techniques. The achieved results show a noticeable enhancement in terms of the Peak to Average Power ratio minimization. It shows a performance improvement that reaches up to 15 over the hybrid nonlinear companding technique and SLM.

Paper Reference: (CSP-12-3) 1570771460
Title: Robust Jamming Attacks Detection Algorithm for Healthcare Applications
Author(s): Mbarka Belhaj Mohamed (Tunisia)

Abstract – Due to the growth of Wireless Body Sensor Networks (WBSNs), smart wearable sensors have emerged that support efficient healthcare solutions. WBSNs are commonly used in unattended hostile environments. As a result, they are vulnerable to various security threats. The jamming attack, in which the attacker uses the same frequency signals to jam the network transmission, is one of the most popular types of vulnerability threat. In this paper, a jamming attack detection algorithm is proposed, where types of jamming attacks are distinguished, which are constant jamming, deceptive jamming, random jamming, and reactive jamming experienced in WBSNs. The advisor aims to disturb the normal operation of nodes by sending random signals through the network, which severely affect network throughput, latency, and energy consumption. Our research provides insight into ElectroCardioGram (ECG) physiological signals. For the indication of a jamming attack in the network, the Received Signal Strength Indicator (RSSI), Packet Delivered Ratio (PDR) and Packet Sent Ratio (PSR) are used to check the high frequency interference in the studied signals. Simulation on real physiological datasets proves that the suggested solution achieves high detection accuracy (96.41) while also having a low false alarm rate (3.6).

Paper Reference: (CSP-12-4) 1570780141
Title: Reverse Engineering Based PSA Chemical Oxygen Concentrators Design
Author(s): Kasim M. Al-Aubidy; Abdallah W. Al-Mutairi (Jordan)

Abstract – There is an increasing need for portable respirators due to the Corona pandemic, and these devices need small size and low cost oxygen concentrators. This paper aims to use reverse engineering concepts in the design and implementation of a portable oxygen concentrator to assist respiratory patients. It also deals with the study of the properties of chemicals suitable for use in the proposed device. Practical tests of the device showed its ability to produce 10 liters per minute with a purity of 98 oxygen. The engineering style of the device is low cost, compact and can be easily used in homes, ambulances and work sites.

Paper Reference: (CSP-12-5) 1570782841
Title: Millimeter-Wave Rectenna and Rectifying Circuits for Wireless Power Transfer in 60 GHz
Author(s): Chayma Bahhar; Chokri Baccouch; Hedi Sakli (Tunisia)

Abstract – This work offers a 60 GHz antenna-based rectenna in millimeter band. In this paper, we describes the concept of wireless energy transmission that allows the transfer of RF energy from one point to another through open space. A parametric study is carried out to monitor the influence of the input power and the number of floors on the performance of rectenna system. It has been shown that the efficiency can reach 54.6 for a load resistance of 100 Î© and an input power of 15dBm.

Paper Reference: (CSP-12-6) 1570782926
Title: Exploiting traffic seasonality for anomaly detection in IEEE 802.15.4 networks
Author(s): M'hammed Achour; Mohammed Mana; Saadi Achour (Algeria)

Abstract – Traffic variation is one of the important components of the network behavior. It encompasses, explicitly and implicitly, many performance indicators such as network real bandwidth, retransmissions and error rate. Therefore, modeling the network traffic is, literally, modeling the network behaviour. This latter could not be possible if the model misses the seasonality hidden in the traffic. IEEE 802.15.4 superframe alters the traffic periodicity in a deterministic way and introduces a seasonality behaviour that should be taken in

consideration when studying the communication system. In this paper, we introduce an algorithm that detects anomalies in IEEE 802.15.4-based networks, by extracting the seasonality of the traffic, and then estimating the local Packet Error Rate (PER) in a sliding window to assess the divergence from actual PER. The algorithm detection rate was perfect and the false positive rate and detection accuracy were quite good for reasonable window sizes.

Paper Reference: (CSP-12-7) 1570783957
Title: Region-of-Interest based Video Coding Strategy for Low Bitrate Surveillance Systems
Author(s): Ahcen Aliouat; Nasreddine Kouadria; Saliha Harize; Moufida Maimour (Algeria)

Abstract – In this work, we propose a fast and efficient Region-of-Interest based video coding strategy for surveillance systems involving low bitrate. The proposed algorithm is based on a combination of three major techniques, namely, edge detection, frame differencing and sum of absolute differences. We improve the algorithm accuracy through the use of morphological operations. A thresholding is performed to classify the frame blocks into moving and non-moving blocks. This allows to compress and sent to the destination only moving blocks in an object-based video coding scenario. The obtained results prove the efficiency of our proposal in terms of accurate detection, data reduction and bitrate saving.

Paper Reference: (CSP-13-1) 1570775827
Title: A Fast CFAR Algorithm based on a Novel Region Proposal Approach for Ship Detection in SAR Images
Author(s): Farah Faiçal; Toufik Laroussi; Hicham Madjidi (Algeria)

Abstract – In the last decades, ship detection has become of great interest to researchers in Synthetic Aperture Radar (SAR) imaging for maritime surveillance. Nowadays, tremendous progress has been made in this respect. Ship detection algorithms are, generally, evaluated through their probability of detection, probability of false alarm, and running time. Nevertheless, most of the adaptive Constant False Alarm Rate (CFAR) ship detection algorithms realized in the existing works, do not consider the real-time operating conditions in their implementation strategies. In this regard, a fast CFAR detection algorithm for ship targets in sea SAR images is proposed in this paper. It is based upon a new region proposal approach and devoted to the Generalized Gamma Distribution (GΓD), as a statistical model of sea-clutter in high-resolution SAR images. Experiment results show that the suggested fast ship detection algorithm significantly reduces the regions considered by the traditional CFAR detectors.

Paper Reference: (CSP-13-2) 1570775999
Title: Ensemble learning-CNN for reducing JPEG artifacts
Author(s): Djamel E. Boudechiche; Said Benierbah (Algeria)

Abstract – In this paper, we considered the problem of reducing the artifacts that result when images are compressed by the JPEG encoder. In the last years, many deep learning based techniques, for reducing the JPEG artifacts, appeared. None of these techniques gives always the best quality. In addition, the results depend on the image content and the used quantization. In our work, we proposed to improve the results of existing techniques by an ensemble learning method. Our goal is to obtain the best result for most of the images. For this, we have combined three of the state-of-the-art techniques namely DnCNN, MwCNN, and RidNET. The results of artifacts reduction show a high performance of the proposed network, compared to the individual networks. Thus, it improves the quality PSNR with a gain ranging from 0.01 dB up to 0.34 dB.

Paper Reference: (CSP-13-3) 1570783707
Title: Study and implementation of the down sampling module of SHVC extension
Author(s): Ibtissem Wali (Tunisia)

Abstract – The programmable processors newest technologies, as for example the multicore Digital Signal Processors (DSP), offer a promising solution for overcoming the complexity of the real time video encoding application. In this paper, the SHVC down sampling module was effectively implemented on a single core of TMS320C6678 DSP for a Common Intermediate Format (CIF)input video sequence resolution(352×288). Results show the implementation of the down sampling module on TMS320C6678 with verifying the presence of the three LCrCb components on the output down sampled video sequence.

Paper Reference: (CSP-13-4) 1570783821
Title: Novel Quantisation Table For Lossy Image Compression
Author(s): Nabila Brahimi; Toufik Bouden; Tahar Brahimi (Algeria)

Abstract – The Discrete Tchebichef Transform (DTT) has been considered to be comparable to Discrete cosine Transform (DCT) in terms of data compression performance. In this paper, we propose an integer DTT-based image compression scheme. Based on the energy distribution of approximate integer DTT coefficients for many standard test images of different statistical properties, a new and effective quantisation matrix can be generated. In other hand, since the majority integer DTT matrices are not normal, their diagonal matrices have to be merged into quantisation process.The experimental results show that the gray scale images compression by integer DTT-based JPEG standard combined with our proposed quantisation matrix can lead to an amelioration in terms of performances compared to the conventional JPEG luminance quantisation matrix and high visual quality of reconstructed image.

Paper Reference: (CSP-13-5) 1570783942
Title: Tumor Detection in Mammography Images using Discrete Wavelet Transform and Bayes Fusion Technique
Author(s): Abdelkader Zitouni (Algeria)

Abstract – This research presents supervised classification algorithm based on information fusion for detecting masses in mammography images. Discrete wavelet transform can preserve information regarding both high and low frequencies and offer great discriminatory power between areas with strong similarities. This motivates us to use this type of features to improve image segmentation. So, in the first stage, the suggested technique used this feature extraction approach on mammography images in order to obtain additional information. After that in the second stage, estimated feature vector of each pixel is sent to a neural network classifier for initial-labeling. Then, in the third stage of the suggested technique, Bayes fusion method is used to combine the scores, within a sliding window, obtained by the neural network for each pixel. The performance of the proposed segmentation algorithm was evaluated on mammography images from Mammography Image Analysis Society (MIAS) dataset. The achieved classification results by the proposed fusion system leads to higher classification precision in detecting masses on mammography images, which are one of breast cancer signs.

Paper Reference: (CSP-13-6) 1570783948
Title: A Robust Stochastic Image Segmentation Model for Medical Images
Author(s): Larbi Messaouda; Rouini Abdelghani (Algeria)

Abstract – Image segmentation is one of the key problems in image processing. Among the different models and approaches developed, some of the commonly used statistical methods are based on the intensity homogeneity. In this paper, we present a novel robust stochastic method for medical image segmentation, which is able to treaty with intensity inhomogeneities in these type of images. The proposed method is based on the well-known Gaussian Probability Distribution. We designe a Partial Differential Equation (PDE)-based flow in order to achieve a maximum and best segmentation of the image. Herein, a complete comparative quantitative study of the considered approaches was established. Various criteria were calculated to evaluate the methods of segmentation.

Paper Reference: (CSP-14-1) 1570769353
Title: New Based GPR Model For FGCPW Coplanar Waveguide Analysis
Author(s): Abdelmalek Reddaf; Fatima Djerfaf; Mounir Boudjerda; Khaled Hamdi-Chérif; B. Badreddine (Algeria)

Abstract – In this paper, we propose a new model using the machine learning method GPR to modeling the electromagnetic behavior of a transmission line coplanar with finite ground FGCPW. This model is based on the geometrical dimensions of the line and the relative permittivity of the substrate. The database was created by the use of a high-frequency simulator and for a multi-dimensional transmission line with several lossless materials whose relative permittivity varied between 2,1 and 9,2. The method of the S-parameters is used to find the effective permittivity; in addition, this parameter is defined as an output in our model. The results obtained show that our model is efficient to translate this electromagnetic behavior by comparing with the CMT technique, and which show the criterion of the chosen method.

Paper Reference: (CSP-14-2) 1570774773
Title: Areas Division and Multiple UAV Coverage Path Planning For Gas Distribution Map
Author(s): Abdelwahhab Bouras; Yasser Bouzid; Mohamed Guiatni (Algeria)

Abstract – Scientific researchers working on multi-UAVs agree that they provide a lot of advantages over using just one. Indeed, a multi-UAV system can handle more complex operations on larger surfaces with better efficiency. Collecting information and sharing it with each other still makes it possible to tackle new missions. However, the most delicate task is to ensure optimal and efficient planning. In this work, a fleet of drones (quadcopters) is deployed in a polluted area to ensure spatial sampling of this region of interest (ROI). The purpose is to gather data and rebuild the Gas Distribution Map (GDM) and/or how the pollution assessment is dispersed. First, after an adequate environmental simulation, the division of the ROI between UAVs is addressed. Then, according to the desired sampling resolution, a grid of measurement points is established in each resulting sub-region. After that, the aerial coverage mission is modeled as a Traveling Salesman Problem (TSP) and resolved by adapting Genetic Algorithms (GA). The last step consists of data collection and the GDM reconstruction. Through several simulation scenarios, the proposed techniques show that they can offer effective solutions for several coverage applications, especially for GDM.

Paper Reference: (CSP-14-3) 1570775012
Title: A New Chaotic Oscillator generated from the Duffing Analysis and Chaos Control
Author(s): Laarem Guessas; Sohaib Bendris (Algeria)

Abstract – In this paper, a chaotic system with nine terms and three quadratic non-linearity is proposed. The new 3 - D chaotic oscillator generated from the 2 - D Duffing one, obtained by adding a nonlinear state feedback to the first equation and a cross-product term to the second one, with two new optimized additive control parameters. Basic dynamical properties of the proposed system are analyzed by means of phase portraits, stability of equilibrium, Lyapunov exponent and bifurcation. The new system has four limit cycles, the unforced model has four equilibrium points, three Lyapunov exponents $L_1 = 1.670798$; $L_2 = -1.421639$; $L_3 = -9.999158$, which show a chaotic behavior. The bifurcation plots for all system's parameters show denser points confirming the existence of the parameter dependence of system. Also, the proposed system is controlled using a genetically optimized control based on Lyapunov function(CLF).

Paper Reference: (CSP-14-4) 1570775968
Title: Online Exam Monitoring System based on Factor analysis (FA) Method
Author(s): Amjad H. Alkilani; Mohammad Nusir (USA–Jordan)

Abstract – Nowadays, humanity faces a significant threat due to the current pandemic. To protect adolescents and young adults from potential health hazards, the government enforced online education. Online-education provides a multitude of benefits like flexibility, cost-efficiency, and convenience. However, there are also potent gaps in online education. For instance, schools and universities find it difficult to keep track of students, especially during the examinations period. Unfortunately, this encourages some students to cheat in exams, which affects the overall learning experience and the entire society ultimately. An Online-Exam-Monitoring-System (OEMS) is proposed in this study to handle this issue. The OEMS has three main steps: preprocessing the image using the Contrast Limited Adaptive Histogram Equalization (CLAHE) method to improve the contrast of the face images, feature extraction using Factor Analysis (FA), and Face recognition using Support-Vector-Machine (SVM), Multilayer-Perceptron (MLP) neural network, and Logistic Regression (LR) classifiers. In the proposed system. The accuracy of the proposed OEMS system is evaluated on two well-known face images datasets, namely AT&T and Extend Yale face dataset B using MLP, SVM, and LR classifiers. Additionally, the accuracy result of the proposed system is compared with the accuracy result produced by a state-of-the-art HFR, which is based on Principle Component Analysis (PCA). The experiential result shows the effectiveness of the proposed system compared to the HFR model. The best classification accuracy (93, and 94) were obtained by the proposed OEMS using the SVM, and LR classifiers on the extended Yale face dataset B and AT&T, respectively.

Paper Reference: (CSP-14-5) 1570783997
Title: Emotion Tracking System for Students during Online Exams
Author(s): Amjad H. Alkilani; Mohammad Nusir (USA–Jordan)

Abstract – Many students worldwide endure heavy life events that impact their emotional and mental state, which affect their overall academic performance. The facial expressions recognition system is a great tool to analyze students' performance and behavior during exams period. Unfortunately, there are hardly any studies proposed to develop automatic facial expression recognition systems to trace students and analyze the impact of the emotional state on the student's performance. An Emotional Tracking System (ETS) for students during online exams based on Factor Analysis (FA) and the Very Deep Convolutional Neural Network (VDCNN) classifier is suggested in this study. The proposed ETS is consists of three main procedures: preprocessing using Non-Local Means (N-LM) technique; dimensionality reduction using Factor Analysis (FA) method; and recognition using the VDCNN. Furthermore, the accuracy of the proposed ETS system is evaluated on CK+ face images datasets using VDCNN classifiers. Besides, the accuracy result of the proposed system is compared with the accuracy result produced by a state-of-the-art FERS, which is based on CNN. The experiential results show the effectiveness of the proposed system compared to the FERS. The proposed ETS obtained the best Recognition accuracy (96.05, 94.9, and 95.96) in the training, validation, and testing dataset, respectively, while the state-of-the-art FERS produced (91.96, 86.73, and 83.84) in the training, validation, and testing dataset, respectively.

Paper Reference: (CSP-15-1) 1570756666
Title: A Tunable Stop-Bands Filter with Switchable CLLs For Wireless Communications
Author(s): Saber Dakhli; Moheddine Smari; F. Choubani (Tunisia)

Abstract – In this paper, we present a tunable quad-band RF filter with high tunability in the frequency range of 1.8-2.6 GHz. The stop-bands filter with four rejected bands consists of a micro-strip line coupled to four switchable capacitively loaded loops (CLLs). We achieve tuning of individual notched frequency bands using open circuits used as switches and employed in each CLL element. This filter is designed to operate in next generation transceivers using GSM, UMTS, Wi-Fi and LTE wireless standards. Simulation results in term of S parameters and surface currents distribution are presented and discussed. This proposed tunable RF filter is considered as a promising solution which can be implemented in the front-end RF receivers to make them suitable for multistandard wireless applications.

Paper Reference: (CSP-15-2) 1570783358
Title: Quality of service optimization in OFDM-based cognitive radio network
Author(s): Mohammed Salih Bendella; Badr Benmammar; Baghdadi Absari; Francine Krief (Algeria–France)

Abstract − In this paper, we are interested in the use of two algorithms in an OFDM-based cognitive radio network, the flower pollination algorithm and the cuckoo search algorithm. Our objective is to optimize the performance of this network in order to adapt its transmission parameters which have been formulated as a multi-objective optimization problem. The results obtained show that the flower pollination algorithm is faster than the cuckoo search algorithm, and the latter gives a better overall convergence compared to the flower pollination algorithm.

Paper Reference: (CSP-15-3) 1570783374
Title: Improved DOA Estimation Algorithms Using Modified Covariance Matrix
Author(s): Naceur Aounallah; Smail Labed (Algeria)

Abstract − Despite the high resolution that the min-norm algorithm has proven in estimating the directions of arrival of non-coherent signals, this subspace based method is fail to work when signals are highly correlated or coherent such as in the multipath scenario. In this paper, a new improved min-norm method is developed to estimate both coherent and non-coherent signals basing on covariance matrix reconstruction. The reconstructed matrix can highly decorrelate the spatial coherency between signals due to its ability in eliminating rank loss. The rooting version of the min-norm approach basing on the new reconstructed covariance matrix is also developed and tested. The effectiveness of the proposed modification is verified through computer simulations, and it is shown that the improved methods perform well in the situation of low SNR and small angular separation.

Paper Reference: (CSP-15-4) 1570783506
Title: Gain Enhancement of CPW Triangular Antenna Using Dual-Band AMC Structure
Author(s): Arab Azrar; Azzedine Bouaraba; Azdine Messani (Algeria)

Abstract − With the expansion of new communication technology, the devices require to be operated more than a communication standard. This provides a path to work more on antennas with multiband operating. However, these antennas present a low gain of each operating frequency bands. In this paper, we present a design of coplanar waveguide (CPW)-fed dual band triangular antenna and the performance is improved using an artificial magnetic conductors (AMC) structure with two zero crossing phases, which are consistent with the antenna structure. The CPW triangular antenna with the proposed unit cell; operate at wireless communication frequencies 2.458GHz and 5.2GHz with a better gain.

Paper Reference: (CSP-15-5) 1570783604
Title: Internet of Things (IoT) System with Matlab interface for Multi Patient ECG's Monitoring
Author(s): Nizar Sakli; Chokri Baccouch; Ahmed Zouinkhi; Hedi Sakli; Mustapha Najjari (France–Tunisia)

Abstract − The wireless sensor network (WSN) is used to monitor environmental or phenomena physical, such as noise, pressure, motion or temperature, and to transmit data to the capital. Nowadays, with the explosive growth of IoT technology, more and more practical applications can be found in many fields, including security, smart metering, agriculture, smart cities and more domestic intelligence. There are other applications, especially military, home automation, industrial, sanitary, and especially medical applications and sanitary.This article suggests and explores home health care. The Arduino can be used to perform a portable ECG with the heart condition reading function. The main component of this system is the AD8232 sensor which can read the heart rate and process the voltage of the electrodes connected to the body. By combining the Arduino UNO microprocessor and HC 05 FC-114 as Bluetooth or Wifi, ZigBee antenna, GSM/GPRS and even XBee, the ECG screen is displayed in real time on a smartphone.We used an ECG simulator as an artificial corrective agent which is used as a tool to justify the performance of a portable ECG supported on the results obtained from the test. The EGC can be sent via the simulator to the smartphone or to the Matlab interface through a wireless communication module (ZigBee, Bluetooth, Wifi, GSM / GPRS or XBee). The exact result shows the patient's condition in real time. In this article, ECG results are published through the Matlab interface.

Paper Reference: (CSP-16-1) 1570775105
Title: Glucose Insulin Regulation Based Input Output Linearization
Author(s): Meriem Samai; Kelttoum Ghedjati; Mourad Abdelaziz (Algeria)

Abstract − This paper treats the regulation of the level of the blood glucose which represent an nonlinear system using the Input Output Linearization theory. the purpose of this work is to make an artificial pancreas. Simulations examples are given to demonstrate the usefulness of the command developed.

Paper Reference: (CSP-16-2) 1570775217
Title: An efficient deep learning model to predict cardiovascular disease based on ECG signal
Author(s): Nizar Sakli; Haifa Ghabri; Ahmed Zouinkhi; Hedi Sakli; Mustapha Najjari (Fance–Tunisia)

Abstract − The electrocardiogram (ECG) signal is widely used to assess the cardiac status of patients. It represents variations in the electrical activity of the heart as a function of time. The classification of cardiovascular diseases based on ECG signal is a very complex recognition task for cardiologists. In this paper, an efficient deep learning model, ResNet-50, was developed to facilitate cardiologists in their diagnosis of ECG signals with 27 classes, including normal sinus rhythm and 26 types of diseases. Our proposed model achieves 99.99 in terms of accuracy and precision. These experimental results obtained demonstrate the effectiveness of our proposed model compared to other existing methods in the literature.

Paper Reference: (CSP-16-3) 1570775778
Title: FPGA Hardware Co-Simulation of a Stream Cipher Image Cryptosystem based on Fixed-Point Chaotic Map
Author(s): Ichraf Aouissaoui; Toufik Bakir; Anis Sakly (Tunisia)

Abstract − As communication technology advances, the security and real-time exchange of images have become a primary concern. Chaotic systems exhibit interesting features for image cryptography, and their hardware implementation is a challenging task to accelerate the cryptosystem. This paper proposes an FPGA implementation of a robust Fixed-Point Cubic-Tent Map Pseudorandom Bit Generator (FPCTM-PRBG) image cryptosystem for a real-time application based on the Xilinx System Generator (XSG). We designed the new FPCTM-PRBG using XSG to produce the keystream sequence. Then, the encryption is performed using the XOR operation between the plain image and the FPCTM-PRBG stream sequence to get the cipher image. The decryption process is executed by XORing the encrypted image sequence with the FPCTM-PRBG. The algorithm is designed, implemented, and validated using Vivado/System Generator tool through the FPGA-ZC702 evaluation board. The performance of the proposed cryptosystem is evaluated based on statistical analysis, differential analysis, PSNR, and image entropy. Also, hardware co-simulation is performed to test the image encryption system in real-time using a generated JTAG co-simulation system. Thus, the architecture of the proposed cryptosystem is flexible due to the FPGA design. The obtained results prove the higher performance and high-security level of the proposed cryptosystem with low power consumption (238 mW) and a reduced encryption time.

Paper Reference: (CSP-16-4) 1570775846
Title: Electrical Impedance Tomography Image Reconstruction with apriori Knowledge for Gesture Recognition
Author(s): Hayat Odeh; Mariem Hafsa; Oumaima Bader; Mohammed Ibbini; Sameer Hasan; Olfa Kanoun (Jordan–Tunisia–Germany)

Abstract − Electrical impedance tomography is an image reconstruction technique used to reconstruct the conductivity of a target object using boundary electrodes placed on the object's surface. EIT cannot be used as a standard gold technique instead of computed tomography (CT)and magnetic resonance imaging (MRI) because signal-to-noise ratio (SNR) and spatial resolution are both poor. A small error or input noise at the input generates a significant output noise. In this article, eight electrodes with the adjacent current pattern were used. Forty data points for each Gesture are collected. Image reconstruction using gauss newton and back projection incorporating priori knowledge of the human forearm from MRI images was proposed. We used boundary data of the forearm, ulna, and radius to build the mesh for image reconstruction. The results show that structural information enhances image quality and distribution of the conductivity in the region of two bones in the gauss newton algorithm. Reconstructed images obtained from gauss newton better than reconstructed images obtained from the back-projection algorithm.

Paper Reference: (CSP-16-5) 1570775922
Title: Study of Three Non-Coherent Integration Techniques for Multiple-Pulses Trimmed-Mean CFAR Detector
Author(s): Souad Chabbi; Toufik Laroussi (Algeria)

Abstract − The Pareto distribution has recently been validated as an appropriate model of the clutter echoes specific to X-band high-resolution maritime surveillance radar. As single-pulse and multiple-pulses Constant False Alarm Rate (CFAR) detectors operating in homogeneous and non-homogeneous Pareto clutter have been proposed in the radar literature, with the aim of improving the detection performances, this paper focuses on the analysis and the comparison of the performances of three non-coherent techniques for the multiple-pulses Trimmed-Mean (TM-) CFAR detector with unknown parameters. We cite the TM Conventional (TMC-) CFAR detector, the TM Non-Conventional (TMNC- CFAR detector and the TM Binary (TMB-) CFAR detector. In doing this, we evaluate and compare the detection performances of these techniques through Monte Carlo simulations for Swerling I (SWI) and II (SWII) targets, in homogeneous clutter, clutter edge and/or multiple target situations. Due to its good regulation of the probability of false alarm, the TMC-CFAR detector shows the best performances.

Paper Reference: (CSP-16-6) 1570776017
Title: Elliptic Curve Cryptography for Medical Image Security
Author(s): Samira Dib; Amina Khaoula Amzert; Morad Grimes; Asma Benchiheb; Fadila Benmeddour (Algeria)

Abstract − To contribute to medical data security, we propose the application of a modified algorithm on elliptical curves (ECC), initially proposed for text encryption. We implement this algorithm by eliminating the sender-receiver lookup table and grouping the pixel values into pairs to form points on a predefined elliptical curve. Simulation results show that the proposed algorithm offers the best compromise between the quality and the speed of cipher / decipher, especially for large images. A comparative study between ECC and AlGamel showed that the proposed algorithm offers better performance and its application, on medical images, is promising. Medical images contain many pieces of information and are often large. If the cryptographic operation is performed on every single pixel it will take more time. So, working on groups of pixels will be strongly recommended to save time and space.

Paper Reference: (CSP-17-1) 1570773853
Title: DCT-based compression algorithm using reduced adaptive block scanning for color image
Author(s): Abdelhamid Messaoudi (Algeria)

Abstract − This paper presents a lossy image compression algorithm dedicated to color still images. Based on DCT, the proposed method utilizes a simple technique to encode efficiently the DCT coefficients. After the step of the RGB to YCbCr transformation, the DCT transform is applied. The desired quality is assured by using the bisection method to threshold the quantized DCT coefficients. Two scan orders (zigzag and vertical) are used to read the DCT coefficients from the retained DCT block coefficients. Following a scan order, an index vector is formed by the length of the zero-run sequence that preceded a nonzero DCT coefficient. The lowest value of the two index vectors maximums determines the best scan. Finally, the nonzero DCT coefficients and the index vector for each block are encoded to form the compressed image. When compared with recent methods, the obtained results show that the proposed algorithm achieves high performance

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Paper Reference: (CSP-17-2) 1570776000
Title: Comparison and evaluation of IPPG methods for HR estimation under different face regions
Author(s): Wafa Mellouk; Wahida Handouzi (Algeria)

Abstract − Non-contact heart rate measurement reaches a higher level in scientific research; this field presents important advantages in our life, such as human-machine interaction, medical applications, especially in the current situation of the world suffering from COVID-19 pandemic. In recent years, several techniques of extracting the imaging photoplethysmography (ippg) signals from facial videos have been proposed and developed. Based on this, we performed a study and evaluation of the four most well known heart rate estimation methods such as Green, ICA, POS and CHROM in two accessible public datasets MAHNOB-HCI and UBFC-Phys under two different facial regions to enable researchers to develop and use them in real applications. The results show that the video imaging condition and the correct face region detection step play an important role in the accuracy of heart rate estimation.

Paper Reference: (CSP-17-3) 1570783983
Title: A Medical Image Encryption Scheme Based on a Modified CKBA
Author(s): Yousra Sadou; Samira Dib; Morad Grimes (Algeria)

Abstract − The rapid growth in Internet exchange traffic for medical images justifies the creation of appropriate tools to guarantee the quality and confidentiality. Cryptography is an effective solution that can be implemented routinely to encrypt those digital media. In last decades, the chaotic key-based algorithm (CKBA) is proposed, based on a one-dimensional logistic map. Nevertheless, it has been proved that the current model is extremely sensitive to several attacks, and the heightened security claims against these attacks have only been exaggerated by the authors. Moreover, the chaotic logistic map produces an unbalanced result. In this paper, we enhance the CKBA algorithm by changing the logistic map to a modified one. The performances of the presented encryption model remain very good. A series of security analyses are implemented to validate the proposed algorithm: the NPCR and UACI are improved over 99.61% and 33.46% respectively, and entropy is reported close to 7.9769. This makes the new cipher much stronger security.

Paper Reference: (CSP-17-4) 1570786276
Title: CNN-NoC: A Dynamic Hardware Architecture Of A CNN Using NoC For Deep Learning
Author(s): H. Alaeddine; Jihene Malek (Tunisia)

Abstract − Deep neural networks are often exploited in many applications as regards the field of artificial vision since they offer an acceptable capacity in this area and increasingly solve problems related to the field of computer vision such as classification. The execution of these networks leads to a large processing load, which provokes a need for a customized hardware support dedicated to these algorithms. In addition, The size of deep neural networks presents a significant challenge for construction due to the practical application requirements. In this paper, we develop a novel dynamic hardware architecture of a convolutional neural network (CNN) based on a Network on Chip (NoC) for a two-dimensional mesh topology using the FPGA as a hardware prototype. This architecture offers an advantage in terms of flexibility and scalability. This NoC ensures the communication between neurons, aiming to obtain a reconfigurable architecture that can

be adapted to a wide variety of applications. Moreover, the data movement of the whole system is optimized in order to minimize energy and provide a high parallelism so as to have a high throughput.

Paper Reference: (CSP-17-5) 1570788891
Title: Application of ARMA model optimized by the GA to detect broken rotor bars faults of induction motor
Author(s): Khadidja Boudraa (Algeria)

Abstract − the objective of this article is the study of conventional techniques, such as Burg algorithm, for parameter estimation of autoregressive moving average ARMA. Then, we introduce optimization techniques based on Genetic Algorithms to improve the parameters estimation of ARMA model. ARMA-Burg procedure was applied and tested on the stator current signatures MCSA in order to detect broken rotor bar of induction motor . It provides a good estimate of the power spectral density (PSD) and refines the parameters estimation of an ARMA model. The test results show the importance and value of the GA in improving performances of parameters estimation of an ARMA model by adjustment.

Paper Reference: (CSP-17-6) 1570790989
Title: Current Challenges of Facial Recognition using Deep Learning
Author(s): Marwa Kebir (Tunisia)

Abstract − For ages, biometrics identification has recognized a real growth. Especially, from the 60s, facial recognition advances by leaps and bounds. Nevertheless, this technique has suffered from several weaknesses, which researchers have a great interest in solving. Amongst these weaknesses, the most famous ones are variations in lighting and changes caused by emotional expressions. The problems of partial occultation are not really affected. But with the epidemic situation, and the compulsion to wear the medical mask which hides the lower part of the face, recognition of masked faces has become a current challenge. This study is divided into two axes. The first is implementing a convolutional neural network for facial recognition, then we compared the accuracy rate obtained with other techniques recognized in the field. In spite of being not bad, the implemented model still requires improvements. The other axe consists of evaluation of the robustness of the implemented method in the case of masked face in normal conditions and with several changes such bad illumination, variation of position, presence of expression.To perform these experiments, we used the famous database, Labeled Faces in the Wild(LFW). In this context, we carried out a little study of some databases used in the field to confirm our choice. Finally, we presented a recently proposed database to evaluate the effectiveness of facial recognition techniques for masked face.

Paper Reference: (CSP-18-1) 1570772515
Title: Analysis and Design of Printed Antenna based on Photonic Crystal Substrate for 5 GHz Applications
Author(s): Tarek Messatfa; Fouad Chebbara; Abderrahim Annou (Algeria)

Abstract − In this paper, a triangular patch antenna with a photonic-crystal substrate has been designed and simulated using Computer Simulation Technology (CST). A photonic crystal substrate can be used to achieve high gain, low return loss, and the elimination of back and side lobes by the suppression of surface waves. The main objective of this work is to improve the antenna performance in terms of the bandwidth and radiation pattern by using the PBG Structure of the photonic crystal as a substrate. A triangular patch antenna was chosen in this research work due to the characteristics of the low coverage area, which is similar to that of the rectangular patch. The total size of the antenna is 30×30 mm^2. This proposed antenna with PBG structure is extremely useful for 5 GHz-WLAN "IEEE802.11ac" applications in wireless systems (5.12-5.825 GHz).

Paper Reference: (CSP-18-2) 1570775107
Title: A Reconfigurable Multi-band Antenna with a High Selectivity in Frequency on the Basis of PIN Diodes
Author(s): Boualem Mekimah; Tarek Djerafi; Abderraouf Messai; Abdelkrim Belhedri (Algeria)

Abstract − A novel multi-band reconfigurable antenna with a high selectivity in frequency is proposed in this paper. The proposed geometry is composed of four square patches, fed through a T-junction on the basis of the Wilkinson power divider. Two PIN diodes are added at the end of the T-junction. By applying different combinations of diodes (ON/ON, ON/OFF, OFF/ON), resonant frequencies can be switched from four to two resonances and vice versa. The results show a high capability of the antenna to switch, in the first combination (ON/OFF), from 2.5 GHz/3.25 GHz/3.5 GHz/4 GHz to 2.45 GHz/3.25 GHz. In the second one (OFF/ON), 2.8 GHz/4.25 GHz resonances are achieved. The simple geometry and the high selectivity and repeatability in frequency make the proposed antenna one of the possible solutions in designing multi-band reconfigurable antennas.

Paper Reference: (CSP-18-3) 1570787887
Title: Efficient Quantized Soft Decision for Cooperative Sensing System in Cognitive Radio
Author(s): Younes Bouzegag; Djamel Teguig; Abdelmadjid Maali (Algeria)

Abstract − In order to reduce the bandwidth requirement for reporting channel, we investigated soft and hard data combining rules in cooperative sensing system. Motivated by the detection performance of soft schemes, we further propose an improved quantized soft scheme with two-bit. Simulation findings show that the proposed method outperforms hard decision rules and approaches the detection performance of square law combining rule with reduced cooperative overhead. As a result, the introduced quantized soft scheme can achieve approximately all the benefits of soft decision combining with low complexity and control channel cost.

Paper Reference: (CSP-18-4) 1570791199
Title: RSSI signal processing for short distances estimation: Case study hand movement detection
Author(s): Cherif Ouni; Dhouha El Houssaini; Bilel Ben Atitallah; Ahmed Fakhfakh; Salwa Sahnoun; Olfa Kanoun (Tunisia–Germany)

Abstract − Due to ongoing advancements in sensor and communication technology, wearable devices have been applied to various applications, including rehabilitation, health monitoring, and body poster supervision. With the help of signal transmission, wearable nodes can communicate and transmit data over wireless channels. In fact, when wireless signals are received or transmitted, they are used to generate the Received Signal Strength Indicator (RSSI), which helps evaluate the signal and estimate the distance between wearable nodes. Despite the advantages that RSSI can provide, it can still be inaccurate and unstable in certain situations, which makes it necessary to revise RSSI measurements before putting them into the application. In this paper, a calibrated Kalman filter is used, which provides better results than an average filter for short-distance measurement with real-time response. The Kalman filter offers a stable measurement with a low error rate when applied for hand movement detection at different positions, with an error rate of ±2.

Paper Reference: (CSP-18-5) 1570800107
Title: A Side-Edge Microstrip Antenna for 5G Applications
Author(s): Fatima AlHarazneh; Dia I. Abualnadi; Yanal S Faouri (Jordan)

Abstract − In this paper, an innovative miniaturized microstrip antenna installed on the side edge of a mobile smartphone is designed and investigated. The side-edge antenna operates at 3.71 GHz with a 10-dB covered bandwidth of 150 MHz, and it is intended for the applications located within the sub-6 GHz band of the fifth-generation wireless communication. In the operational frequency range, the planned antenna can attain a peak realized gain of 3.38 dB and 57.69 % radiation efficiency. The antenna exhibits a directional radiation pattern oriented to the outer side of the mobile terminal.

PSE Papers

Paper Reference: (PSE-1-1) 1570775943
Title: Remaining useful life of bearings based on temporal features and support vector regression
Author(s): Abdallah Faleh; Ammer Medoued; Noussaiba Mennai; Youcef Soufi (Algeria)

Abstract − Prognostics and health management (PHM) play a significant role in increasing system reliability, safety and reducing maintenance costs, particularly in critical sectors (aeronautical, military, nuclear, aerospace, etc.). In the present paper, a prognostic method for a bearing component is proposed based on temporal features and support vector regression which are extracted from vibration signals and reduced by principal component analysis (PCA) approach, by selecting the highest monotonicity level features. Then, support vector regression is presented to predict the remaining useful life of the considered component using the fusion health inductor. The obtained results are promising in terms of performance and the effectiveness of the proposed method through the use of two different experimental datasets.

Paper Reference: (PSE-1-2) 1570778451
Title: Detailed Analysis of Rotor Eccentricity Fault Signatures in Induction Motors using DWT-FFT Technique
Author(s): Noureddine Bessous; Radouane Bousseksou; Laid Zarour; Salim Sbaa; Remus Pusca; Romary Raphael; Mohamed Mounir Rezaoui; Imad Merzouk; Abdelhalim Borni (Algeria–France)

Abstract − Fault diagnosis in rotating electrical machines is an essential phase in order to maintain the good health of the entire system. Several techniques have been used in this field to have an adequate decision. Stator current analysis based on signal processing techniques has been widely explored to diagnose electrical machines. Motor Current Signature Analysis (MCSA) technique is the most widely used in recent years. However, the mains disadvantages are the problem of the resolution and the inherent constraint of not being applicable to analyze non-stationary signals. To overcome this drawback, a stator current analysis method based on DWT (Discrete Wavelet Transform) technique is proposed to detect the static eccentricity fault. The stator current signals were decomposed into several signals containing detail and approximation. So, the details containing much information about the static eccentricity fault. In addition, this study proposed the analysis of the energy values of some details. The results were obtained through the experimental test of induction motors (3kW) under different conditions.

Paper Reference: (PSE-1-3) 1570782855
Title: Study of the Best IMF Selection Methods using Kurtosis Parameter for Bearing Fault Diagnosis
Author(s): Yasser Damine; Ahmed Chaouki Megherbi; Salim Sbaa; Noureddine Bessous (Algeria)

Abstract − Fault diagnosis in induction machines is an essential phase to maintain good system health. Selecting effective and sensitive Intrinsic Mode Functions (IMFs) is one of the important steps for rolling bearing fault diagnosis. Kurtosis is the most commonly used parameter for the selection of these IMFs. Generally, two selection methods for IMFs based on the kurtosis criterion are used in the fault detection field. The first one is to select the IMFs with high kurtosis, and the second selection method is based on the best IMF with the highest kurtosis value (Max Kurtosis value). This paper pointed out the detailed study of the usual IMF selection methods based on kurtosis value to detect rolling element bearing faults. This study treated the experimental data (vibration signal) using Ensemble Empirical Mode Decomposition (EEMD). In addition, this work used two IMF selection methods carefully to find the best decision about bearing fault. The envelope spectrum of the selected IMFs is well analyzed to define the characteristic frequencies of the bearing fault. The results clearly showed what we could face using the IMF selection methods based on kurtosis criterion.

Paper Reference: (PSE-1-4) 1570783591
Title: Investigation of LVRT Capability of a DFIG Based WECS Under Different Grid Codes
Author(s): Brahim Djidel, Lakhdar Mokrani, Mohamed Mechmoum, Abdellah Kouzou (Algeria–France)

Abstract − During voltage drops, wind turbines must remain connected to the grid and contribute to the voltage stability. This requires that all modern installations must be equipped with Low-Voltage Ride-Through (LVRT) capability based on grid codes. In this paper a comparative study of LVRT capacity of a Doubly Fed Induction Generator (DFIG) based Wind Energy Conversion System (WECS) for different countries grid codes and different wind speeds is presented. Modeling and control strategy of the WECS are described. To improve the LVRT capacity of the WECS, a simple approach, based mainly on keeping the stator current close to its rated value by decreasing the active power proportionally to the voltage dips, has been used. The simulation results show the wind speed range over which the LVRT of the WECS is ensured.

Paper Reference: (PSE-1-5) 1570783681
Title: A technique for diagnosing short-circuit and open-circuit faults of the three-phase inverter
Author(s): Chakib Drif; Nouri Hamou; Abdenour Soualhi (Algeria)

Abstract − In a three-phase voltage inverter consist of semiconductor components such as insulated gate bipolar transistor (IGBT) that is sensitive and at any time can have a fault (short circuit or open circuit) that produces a system malfunction. This paper proposes a technique for the detection of faults in the voltage inverter (VSI), this technique can locate and determine the faulty semiconductors, one or more, it is based on the difference between the real voltage signal and its reference, that has a minimum inflection point that is the fault image, From the comparison signal we can read the necessary parameters (t1, t2, t3), at the end we compare this signal with the threshold to know where is the fault with positive or negative alternation, we used Simpowersystem/simulink, the obtained results show us the effectiveness of the technique to detect the faults of open circuit and short circuit in the three-phase voltage inverter.

Paper Reference: (PSE-1-6) 1570783720
Title: Fault Diagnosis of Power Transmission Line using Park's Method
Author(s): Khaled Omer; Mokhtar Touati; Mohamed Boudiaf; Lakhmissi Cherroun (Algeria)

Abstract − This paper proposes an efficient diagnosis technique by which the faults in the transmission lines of power systems can be detected and diagnosed effectively by monitoring the phases currents. The proposed diagnosis structure is based on the so-called Park's method. Park's transformation theory is applied to convert the three phase current signals into two signals of direct and quadrature components (d-q). Park's circles patterns are used to classify between 'healthy' and 'faulty' phase. The obtained simulation results show that current park's vector pattern of healthy system and symmetrical faults was perfect circle while current park's vector pattern under asymmetrical faults was elliptical in shape. Using the proposed strategy, the faults of transmission lines can be easily diagnosed by comparing the Park's circle representations. The analysis of the simulation results show that it is possible to detect, identify and locate all different types of short-circuit faults (40 faults) that may occur in the high voltage power transmission line.

Paper Reference: (PSE-2-1) 1570774027
Title: Direct Power Control of three-Level SAPF with Space Vector Modulation for Power Quality improvement
Author(s): Naamane Debdouche (Algeria)

Abstract − This work treats an improved direct power control strategy associated with the space vector modulation (DPC-SVM) applied to the three-level (NPC) shunt active power filter (SAPF), This is to ensure the following objectives: reduce the THD factor to a level in accordance with IEEE-519, eliminate harmonic currents created by non-linear loads, compensate the reactive power and improve performances

such as robustness, stabilization, trajectory pursuit, and reduce time response and active and reactive power ripples maintaining a fixed switching frequency. Lastly, the model developed and the control strategy are validated under the environment (MATLAB/SIMULINK).

Paper Reference: (PSE-2-2) 1570775829
Title: Off-grid Photovoltaic System Power Output Medium-Term Forecasting Using Artificial Neural Network
Author(s): Muhammad Risqi Risfianda; Desri Kristina Silalahi; Muhammad Dimas; Bandiyah Sri Aprillia; Azman Hanifan (Indonesia)

Abstract − The use of fossil energy which is always increasing from year to year makes it seem as if the world cannot be separated from these energy source. Therefore, it is necessary to find new energy sources where the energy can be renewable and available for a long time. In this research, a system is designed to predict the power output of PV. This system uses solar irradiation data and the power output of an off-grid solar power plant as the dataset. The dataset obtained from the PV output will be processed using an artificial neural network (ANN) with a backpropagation algorithm. The results of this study are able to predict the medium-term PV power output using the artificial neural network method by looking at the expected error values of Mean Absolute Percentage Error (MAPE), Mean Absolute Error (MAE), Mean Square Error (MSE), and Root Mean Square Error (RMSE). Tests are carried out to predict the PV power output for the next 11 days. The ANN model architecture uses 2 hidden layers with 3 neurons in the layer, 7 neurons in the second layer, and 190 epochs. This model has an error value of 25.837% for MAPE, 0.166 for MAE, 0.043 for MSE, and 0.209 for RMSE which categorizes the model as fairly feasible on predicting the next 11 days of PV power output.

Paper Reference: (PSE-2-3) 1570776022
Title: Investigation on low frequency parameter of WTGS buried in homogeneous and stratified soil
Author(s): Ines Chami, Chiheb Sofaine, Abdelhak Djellad, Nacer Bouderres (Algeria)

Abstract − This paper is devoted to study wind turbine grounding systems (WTGS) to evaluate the human and equipment protection performance. Two practical configurations have been simulated to determine grounding resistance, step and touch potentials, and this when the grounding system is buried in homogeneous and stratified soil. The paper highlights specific conditions to ensure human protection in the surroundings of WTGS.

Paper Reference: (PSE-2-4) 1570782845
Title: Reliability Enhancement of an Emergency Power Supply Benchmark based on Testing Optimization
Author(s): Rabah Benabid; Dallal Kemikem (Algeria)

Abstract − This paper deals with testing interval optimization of two Diesel Generators (DGs) of an Emergency Power Supply System (EPSS) Benchmark. The proposed methodology is based on the fault tree development of the system and identifying their Minimal Cut Sets (MCS) using the professional RiskSpectrum PSA software. The failure on demand events of two DGs are modeled as a function of Testing Interval (TI). The Genetic Algorithms (GA) is adapted to optimize the TI of the DGs in order to reduce the failure probability of EPSS. The obtained results show a remarkable reduction of the failure probability of the system.

Paper Reference: (PSE-2-5) 1570783861
Title: Model Predictive Control of Three-Level Shunt Active Power Filter Connected to a Photovoltaic System
Author(s): Nadhir Mesbahi (Algeria)

Abstract − This paper presents a model predictive control (MPC) for a three-level neutral-point clamped (NPC) inverter operating as a shunt active power filter (SAPF) with a photovoltaic (PV) system. In this proposal, the PV system is used to associate three-level NPC inverter for converting the dc voltage to three phase ac voltages by employing MPC. At the same time, The SAPF injects compensation current at the point of common coupling to cancel the current harmonics. In addition, this work introduces a fuzzy logic maximum power point tracking (MPPT) to the DC-DC boost converter for extracting maximum power from the photovoltaic array. The performance of the conventional perturbation and observation (P&O) and fuzzy logic MPPT algorithm is compared. The effectiveness of the proposed strategy has been verified in MATLAB/Simulink simulation platform. From the simulation results, it is found that the developed system provides excellent performance to achieve reference currents tracking, balance in the DC-link capacitor voltage, as consequence a reduction in the harmonics significantly.

Paper Reference: (PSE-2-6) 1570784215
Title: An APF for Enhancing the PF of an Arc Welding Power Supply using an Optimized FO-PID
Author(s): B. Badreddine; Hamouda Noureddine; Sami Kahla; Abdelmalek Reddaf (Algeria)

Abstract − This paper presents the analysis and design of a multifunctional system suitable to feed an arc welding machine. This system is able to ensure a good welding process without affecting the power supply quality of the grid, our study is focused on two side, on the grid side, an active power filter (APF) is coupled in parallel between the three phase full bridge diode rectifier and the grid. The utility of the APF to provide a unity power factor correction of arc welding power supply (AWPS). The predictive current control (PCC) and self tuning filter (STF) are used to control the APF. On the arc welding machine side, an optimized FO-PID controller is used to control the welding current and voltage, by controlling the full bridge buck circuit, it offers many exceptional features, like rapid response to load and grid voltage variations, and inherent short-circuit current limit which results in an improved welding performance and weld bead quality. the performance of the proposed configuration are examined in regards to its power quality given by reading the total harmonic distortion (THD) of the grid current is 3.47%, ensuring the best regulation of the DC-link voltage of APF, and providing a good tuning of the welding voltage and current. The parameters of the FO-PID controller are extracted by a Grey Wolf Optimization approach (GWO). Simulation results are noticed satisfactory and prove the stability, accuracy and dynamic response of the synthesized optimized regulating system.

Paper Reference: (PSE-3-1) 1570775970
Title: Backstepping Sliding mode control of DSIG driven by variable speed wind turbine
Author(s): Meryem Benakcha, Abdelhamid Benakcha, Abdelkarim Ammar (Algeria)

Abstract − Energy has a vital role in development of any country. Due to its several advantages, many conversion systems have been proposed to capture wind energy and to produce electrical power. This paper presents also the modeling and the control of a grid connected to wind turbine based on a dual stator induction generator (DSIG) which is a drive that increasingly used in high power systems. In order to increase the flow of the power to the grid and to ensure an optimum operating point, a maximum power point with super twisting speed controller (STSC) is used and a nonlinear hybrid backstepping-sliding mode control (HBSMC) based space vector modulation is proposed to control the generator side converters. The feasibility of the combined controls proposed (HBSMC-SVM) and a super twisting (STSC) scheme is validated through simulation studies on a 1.5 MW wind power generation system. The obtained results are very satisfactory and reveal the effectiveness of the proposed approach.

Paper Reference: (PSE-3-2) 1570776023
Title: Optimization of grounding conductor in WPP
Author(s): Chiheb Sofaine, Ines Chami, Abdelhak Djellad, Nacer Bouderres (Algeria)

Abstract − Nowadays the wind energy becomes more used in power systems. This requires an effective protection for Wind Power Plant (WPP). The present paper study wind turbine grounding system. The impact of the wind turbine foundation metals on grounding system parameters is evaluated. For WPP of 6 wind turbines, the impact of grounding interconnection configuration is studied. The interconnection reduces 80% of the resistance compared to the one obtained with simple wind turbine grounding system. Lastly, a proposed

global grounding system for the WPP is studied to economize 45.45% of copper quantity used in grounding conductor, and this without perturbs WPP protection.

Paper Reference: (PSE-3-3) 1570781445
Title: Synthesis and high-performance analysis of Synergetic control MPPT for PMSG
Author(s): Mohamed Seddik Mahgoun; Abdessalam Badoud (Algeria)

Abstract − The design of controllers for wind energy conversion systems presents interesting challenges. The wind system is composed by a three-blade horizontal wind turbine, a permanent magnet synchronous generator (PMSG). The aim of this paper is to optimize the extracted energy from the wind by using a New approach based on the theory of synergetic control in order to achieve a maximum power point tracking (MPPT) of a wind energy conversion system with variable speed and with fixed pitch angle. The closed-loop system stability is guaranteed using Lyapunov's method. Vector control is applied to the permanent magnet synchronous generator PMSG. Simulation results under Matlab-Simulink confirmed the performance of the Synergetic Control in dealing with nonlinear systems with attractive features such as simplicity and good performances

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Paper Reference: (PSE-3-4) 1570783935
Title: Investigation of Modeling and Control of a Grid Side System based DFIG for a Wind Turbine Machine
Author(s): Abdelmoumen Saci; Lakhmissi Cherroun; Mohamed Boudiaf (Algeria)

Abstract − This paper aims to deal with the problem of modeling and control of a Grid Side System based on Double Fed Induction Generator (DFIG) in a Wind Turbine System (WTS). After modeling the different parts of the power conversion system, the vector space parameters are used to express an efficient mathematical model on the dq scheme, in order to apply the grid voltage-oriented vector control method. The obtained results show that the used control strategy is able to manage effectively the transmission of the power between the DFIG rotor and the grid part in both directions as required by the machine. In addition, it keeps correctly the appropriate characteristics. Simulation results are explained and discussed. The obtained results demonstrate the efficiency of modeled system and the studied control strategy.

PSE-3-5 Paper Reference: (PSE-3-5) 1570784156
Title: Short Time Forecasting of Wind Power Generation Using Artificial Neural Network
Author(s): Jannet J. Jamii; Majdi Mansouri; Faouzi Mimouni (Tunisia)

Abstract − Due to the stochastic nature of wind, wind power generation present a significant issue in electric system stability. Thus wind power forecasting plays a key role in dealing with the challenges of power system stability. Accurate wind power forecasting reduces the need for reserve power for balancing energy to integrate wind power. Also, it enables to better dispatch and scheduling power. In this paper, we study a short term forecasting of wind power generation. An Artificial Neural Network (ANN) is proposed as predictor. A meteorological conditions wind speed, temperature and pression composes the predictor input. The ANN predictor's parameters are optimized to get its output approximate future of wind power generation. The normalized error quadrature (RMSE) and mean absolute error (NMAE) criterion are calculated to evaluate the ANN predictor.

Paper Reference: (PSE-4-1) 1570783339
Title: Power Quality Monitoring of Rooftop Photovoltaic Penetration Level on Low Voltage System
Author(s): Saliha Boulahchiche; Amar Hadj Arab; Salim Haddad; Salim Bouchakour; Saida Makhloufi; Ismail Bendaas; Abdelhak Razagui (Algeria)

Abstract − This article presents a harmonic analysis of the voltage and current signals to the PCC of a photovoltaic system connected to the first grid in Algeria. The analysis is carried out using Chauvin Arnoux C.A8336 device with current and voltage sensors connected to the output of an inverter, PCC, and unbalanced loads to the PCC for the extraction of harmonics. The results showed that the percentage of PV power penetration relative to the rated power of the inverter, and the type of load connected to the PCC affected the current and voltage harmonics

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Paper Reference: (PSE-4-2) 1570783457
Title: Neural Network controller for Three phase Shunt Active Power Filter using Self Tuning Filter
Author(s): Zakaria Laala; Amar Benaissa (Algeria)

Abstract − In this paper, two-level inverter is used as a shunt active power filter. This shunt APF is employed to compensate reactive power and eliminate harmonics drawn from a diode rectifier feeding a RL load. The active power filter control is based on the use of self tuning filters (STF) for the reference current generation and an artificial neural network (ANN) controller. The use of STF instead of classical extraction filters allows extracting directly the voltage and current fundamental components in the α-β axis without phase locked loop (PLL). The obtained results showed that, the proposed shunt active power filter controller have produced a sinusoidal supply current with low harmonic distortion and in phase with the line voltage.

Paper Reference: (PSE-4-3) 1570786293
Title: Power Quality Enhancement of PV System Based on Modified Three-Phase Cascaded Multilevel Inverter
Author(s): Ali Abedaljabar Al-Samawi; Hafedh Trabelsi (Iraq–Tunisia)

Abstract − To enhance the power quality system, this study provides a three-phase modified seven-level cascaded H-bridge converter for grid-connected photovoltaic (PV) applications. Due to dust and weather changes, there is a PV mismatch in the irradiation level. As a result, it is considered because each PV array may act as a distinct dc source for each h-bridge module, cascaded h-bridge multilevel inverters are better for solving this issue. A sequence of H-bridge cells, each coupled to a string of PV modules, make up the cascaded multilevel system. The selected control mechanism allows each dc-link voltage to be regulated individually, allowing each string of PV panels to follow the maximum power point. Low ripple sinusoidal-current waveforms with a power factor of approximately one are also produced. The topology offers several advantages over typical five-level topologies, such as decreased switching frequency and minor current ripple. Simulation results are shown for a variety of operational scenarios. The findings show that the recommended configuration delivers considerably improved power quality of PV system in terms of voltage and current rate compared with the traditional structure of cascaded H-bridge design.

Paper Reference: (PSE-4-4) 1570786642
Title: Energy management strategy based on fuzzy logic for electric vehicle with hybrid source
Author(s): Imen Jarraya; Jihed Hmad; Hafedh Trabelsi; Nassim Rizoug; Azeddine Houari (Tunisia)

Abstract − Managing energy flows in a hybrid storage source powering an electric car is always tricky because there are endless ways to do it. The main questions to ask are how to optimally manage these flows and what is the right compromise between advantages and disadvantages. The management strategy based on fuzzy logic is proposed in this study. The popular software "Matlab-Simulink" was used in our study to validate the feasibility and performance of this management proposal for three driving cycles which are the European NEDC standard, the real cycle carried out on the Twizy electric vehicle and finally for a WLTP class 3 cycles. The results obtained showed that this fuzzy logic strategy can play a key role in solving the problem of fluctuating range and power demand of an electric vehicle with battery and supercapacitor.

PSE-4-5 Paper Reference: (PSE-4-5) 1570788789
Title: Automatic Classification Mechanism for the Two Most Common Power Quality Disturbances: Sag and Swell
Author(s): Yamina Simhamed; Farid Ykhlef; Abdelhamid Iratni (Algeria)

Abstract – Extensive researches have been conducted in the field of power quality and many techniques for automatic classification of power quality disturbances (PQD) have been proposed. This paper carries out a brief summary on the main steps involved in the classification process in the field of power systems; highlight the aim of each step, advantages, disadvantages and effect on the classification performance. It also gives a simple illustrative example in which only the main classification steps are applied. This paper will provides a valuable reference for beginner researchers, interested to further improvement in the power quality disturbances classification process.

Paper Reference: (PSE-5-1) 1570782509
Title: The State of Charge estimating methods for rechargeable Lead-acid batteries
Author(s): Aicha Degla (Algeria)

Abstract – State of Charge (SOC) is a key element for battery energy assessment, performing the stored energy. An accurate estimation of the SOC is fundamental for the safe and reliable operation of photovoltaic systems. To this end, the scientific literature covers a broad range of methodologies with extensive accuracy and complexity. However, the accuracy of the SOC is highly dependent on the methodology adopted. This paper investigates four methods of estimating the SOC for lead-acid battery manufacturers. For this purpose, four methods were selected and then used in practice, including the Modified Coulomb Counting (MCC) method, the Neural Network (NN), and two other machine learning based techniques, namely the Support Vector Machines (SVM) and the Nearest Neighbours Algorithm (KNN), respectively. An experimental test is considered through a detailed analysis based on a statistical evaluation covering the real cycle of charge and discharge modes. It means that the NN algorithm has given more accuracy. The algorithm showed high prediction accuracy, the majority of predictions had a relative error close to zero, reaching a maximum error value of about 0.1%. Simulation results were performed in Matlab software. All of these results confirm the accuracy and efficiency of the chosen methodology.

Paper Reference: (PSE-5-2) 1570784681
Title: CFD analysis on baffle arrangement effect in hybrid solar collector design PVT/Bi-fluid
Author(s): Abdelkrim Khelifa (Algeria)

Abstract – The thermal photovoltaic hybrid solar collector is a useful device that can be used to increase the heat transfer fluid temperature by extracting the heat from the stored solar energy that is not converter by the solar cells in electricity. In this work, a Three-Dimensional numerical transient study of the turbulent mixed convection in the hybrid system PVT, which consists of photovoltaic mono-crystalline PV cells and an absorber plat of Aluminum in contact with the lower surface of the PV panel, for analyzed the effects of the Mass Flow Rate of the water (in range 0.01-0.02) and the fin form on flow structure and improvement of the heat transfer rate has been carried out. A comparison was made between four designs of the PVT bi fluid according to the fin conception (Concept -1-, Concept -2-, Concept -3- and Concept -4-). The results show that the optimum design for good cooling of the PV cells and for high performance of the system is concept -4-. These results can be used for efficient and optimal design of hybrid solar collectors Bi-Fluid PV/T with water and Air.

Paper Reference: (PSE-5-3) 1570788859
Title: Effect of factors influencing on the total electricity cost of hybrid energy system
Author(s): Abir Hasnaoui, Abdelhafid Omari, Zin-Eddine Azzouz (Algeria)

Abstract – This paper presents a power management of a hybrid system using a linear programming method. The hybrid system is based on photovoltaic panel, wind turbine and an energy storage system connected to the main grid through a bidirectional inverter in addition to the load. To achieve the objective which is investigating the effect of some factors on the total electricity cost of a hybrid system a mixed integer linear optimization method is applied. In that two scenarios are used, the first one is the variation of the initial nominal battery capacity and the variation of the minimum storage system state of charge is the second scenario. Numerical simulation of these two scenarios allowed determining which one offers optimal behavior, particularly from the cost of electricity bill.

Paper Reference: (PSE-5-4) 1570791898
Title: Wavelet-based control approach for hybrid energy storage system
Author(s): Malika Hasrouri; Omar Charrouf, Achour Betka; Sabrina Abdeddaim (Algeria)

Abstract – In order to moderate the usage of battery current and reduce the damages caused by the fast variations and peak power demand on batteries, a novel energy management strategy was developed for battery/ supercapacitor hybrid energy storage system (HESS) based on an online wavelet transform strategy. With the proposed energy management algorithm, the power demand is shared between the two energy sources according to their dynamic characteristics. The simulation is conducted using MATLAB/ Simulink software. Two test driving cycles have been experienced in this study to validate the proposed energy management strategy (EMS). The results show that the wavelet analysis can decompose the demand power in real-time, and can better increase system efficiency and battery lifetime.

Paper Reference: (PSE-5-5) 1570796638
Title: Sizing Stand-Alone "Photovoltaic/Battery" using PVSYST Software with Domestic Variable Demand
Author(s): Roua Toujani, Achraf Abdelkafi; Lotfi Krichen (Tunisia)

Abstract – Photovoltaic (PV) power systems are gradually evolving especially for stand-alone supplying. Isolated regions have found that the best solution to produce their own electricity is using PV installations associated with an energy storage system (ESS). The developed work relates to a PV installation optimal sizing according to a domestic power demand. The software input variables are the temperature, the irradiation and the loads demand. In order to obtain an adequate dimensioning additional load details are specified such as priority and time function. The aim of the study is to understand the fundamentals of the different components constituting the stand-alone photovoltaic (SAPV) installation.

Paper Reference: (PSE-5-6) 1570781828
Title: Prediction of energy consumption based on LSTM artificial neural network
Author(s): Sameh Mahjoub; Larbi Chrifi-Alaoui; Bruno Marhic; Laurent Delahoche; Jean-Baptiste Masson; Nabil Derbel (Tunisia–France)

Abstract – Short-term power consumption forecasting has recently gained increasing attention due to the increasing development of smart grids and the advent of advanced measuring infrastructure. In fact, prediction of future power loads turns out to be a key issue to avoid energy wastage and to build effective power management strategies. Energy consumption information can be considered as historical time-series data that are required to extract all meaningful knowledge and then forecast future consumption. This paper proposes a novel approach based on Long Short-Term Memory (LSTM) network for predicting the periodic energy consumption. The LSTM network has been favored in this work to predict future load consumption and prevent consumption peaks. This network is constructed to model and forecast sequential data. To provide a comprehensive evaluation of this method, we have performed several experiments using real measurement data power consumption in a French city. The experimental results on various time horizons demonstrate that the proposed method has a higher prediction performance compared to several traditional forecasting methods, such as the autoregressive moving average model (ARMA), Therefore, these predictions allow us to make decisions in advance and trigger load shedding in cases where consumption exceeds the authorized threshold in order to protect the electricity network.

Paper Reference: (PSE-5-7) 1570775896
Title: A SMC-Based MPPT Controller for Proton Exchange Membrane Fuel Cell System
Author(s): Badreddine Kanouni; Abdessalam Badoud; Saad Mekhilef (Algeria–Australia)

Abstract − fuel cells are the most promising technology due to their high power density, low operating temperature, rapid starting capabilities, and low weight. These benefits have led to the PEM fuel cell being used in a variety of applications, including automotive power sources, portable power, and backup power. However, the PEM fuel cell has various issues due to the output power's dependence on operational conditions such as cell temperature and membrane water content. Changes in operating conditions proton exchange membrane fuel cells (PEMFCs) must be kept running at a high enough power by using the MPPT. the goal of this work is to extract the maximum power point to this end a control technique of a maximum power point tracking (MPPT) controller was developed based on sliding mode. The suggested MPPT has been developed and validated on a PEMFC system that includes a boost that is controlled by the suggested MPPT and supplies a resistive load. The proposed MPPT controller was compared to the sliding mode controller in simulations using the Matlab/Simulink tool. Moreover, the MPPT efficiency during rapid temperature variations is calculated using a simple test with varied values. Here are some examples of findings that demonstrate the efficacy and robustness of the proposed controller under non-uniform conditions (temperatures). The designed controller, which is significantly superior than sliding mode controller, effectively achieves rapid response and precise tracking to the maximum power point (MPP) with a significant reduction in the time response and maximum power extracted.

Paper Reference: (PSE-6-1) 1570783023
Title: Experimental Measurement of Common and Differential Modes for Variable Speed Drive DC Motor
Author(s): Abdelhakim Zeghoudi, Bendaoud Abdelber, Helima Slimani, Houcine Miloudi, Mohamed Miloudi, Nawel Chikhi (Algeria)

Abstract − The evolution of technology leads to the use of machines which require precise and variable speed. DC motors provide an easy introduction to operation compared to other types of motors. Variable speed drives must comply with the standards for conducted and radiated disturbances. These standards guarantee the ability of a system to function satisfactorily in its environment without producing intolerable electromagnetic disturbances for neighboring equipment. In this paper, we will present the study of a variable speed drive of a DC motor. The variable speed drive is a DC/DC serial chopper, and the variation is done by the switching frequency of the MOSFET. The conducted disturbances in common mode (CM) and in differential mode (DM) generated and simulated with the LTspice software are presented. The simulation results are validated by experimental results.

Paper Reference: (PSE-6-2) 1570783265
Title: Predictive current control two-step of a single-phase inverter for grid-connected PEMFC system
Author(s): Badreddine Kanouni; Abdessalam Badoud; Saad Mekhilef (Algeria–Australia)

Abstract − This research presents the design and analysis of a single-phase grid-connected fuel cell system. As an energy generation unit, a proton exchange membrane fuel cell (PEMFC) is utilized, and the system is linked into the grid via a DC-DC converter and a DC-AC inverter using MATLAB-Simulink. In the beginning, the PEMFC connected the DC-DC boost converter, to extract the maximum power we use fuzzy logic (MPPT) under temperature oxygen and hydrogen pressures changes, the second part is the inverter connected to the grid controlled by the proposed FSC-MPC (finite set control model predictive control) two-step for single-phase grid-tied PEMFC system to assure high ac power quality on the grid side. It is important to provide great tracking effects and robustness. The simulation results demonstrate that the suggested approach can not only entirely remove or minimize the total harmonic distortion (THD) of alternating current on the grid side while maintaining its sinusoidal shape, but it can also improve the system's transient performance.

Paper Reference: (PSE-6-3) 1570783618
Title: Fabrication and characterization of ZnO/Al2O3 thin film transistors: channel length effect study
Author(s): Walid Filali; Fouaz Lekoui; Boumediene Zatout; Laaid Henni; Abdelmoumene Sidali; Elyes Garoudja; Rachid Amrani; Slimane Oussalah (Algeria)

Abstract − Zinc oxide thin films have gained important attention for several applications, especially thin film transistors. This is mainly due to the lower cost compared to other materials, also their attracted electrical properties, such as high charge mobility and transparency. In this work, the authors report an experimental analysis of ZnO/Al_2O_3 based thin film transistors with different channel lengths varying from 30 to 60μm. Both realization and electrical characterization of the elaborated samples were carried out. An apparent effect of channel length variation on the electrical parameters such as threshold voltage, high field-effect mobility, subthreshold swing and On-off current state ratio extracted from the transfer characteristics was investigated.

Paper Reference: (PSE-6-4) 1570783880
Title: Dynamic performance of parallel active filter control techniques
Author(s): Moufid Mohammedi (Algeria)

Abstract − The parallel active filter (PAF) will require an adequate and robust control system to have good harmonic compensation in the network due to the frequent use of certain so-called non-linear loads. For this, a comparative study was carried out with the implementation of the various control strategies, namely the instantaneous power PQ method, the instantaneous current DQ method and the direct power control DPC method. The comparative study between these command and control strategies is carried out by simulation tests under different conditions such as: the variation of the load and the variation of the reference voltage of the DC bus, in order to evaluate the dynamic performances of these strategies and indeed the overall behavior of the active filter.

PSE-6-5 Paper Reference: (PSE-6-5) 1570784012
Title: Comparative study of power converters topologies using wind energy conversion system based on DFIG
Author(s): Said Chikha, Kamel Barra, Nadhir Mesbahia (Algeria)

Abstract − This paper studies the performance of three power converters topologies: multi-levels back-to-back, direct and indirect matrix converter, where are tested in variable speed wind energy conversion system (WECS) based on doubly fed induction generator (DFIG) for purpose to ensure the control of active and reactive power transferred between the electric grid and DFIG. Predictive current control (PCC) presents a fast-dynamic response and accurate reference tracking, where is based on the discrete system model and on the fact that a finite number of possible switching states can be generated by power converter. The PCC applied all different voltages and selected the switching combinations that minimize the error between the predictions current and reference. The optimal voltage vector that minimizes the cost function is applied in the following sample time to correct the rotor current's dynamic response. Simulation results based on the electric behavior for the power and the current at the output of the converters are analyzed and discussed.

Paper Reference: (PSE-6-6) 1570788875
Title: Enhancing electrical and mechanical by Sn doping in BCZT for high performance nanogenerators
Author(s): Sarra Missaoui (Tunisia)

Abstract − Flexible and environment friendly piezoelectric nanogenerators are attracting substantial attention due to environmental constraints and ecological considerations of energy harvesting. In this paper, self-poled and bio-flexible piezoelectric nanogenerators (BF-PENG) were developed based on lead-free BCZT and BCZT-0.02Sn nanoparticles that were synthesized using sol-gel method and embedded with PDMS polymer. To investigate the impact of doping, electrical and mechanical characterizations were conducted as well piezoelectric measurements. The results illustrate that PENG containing BCZT doped with 0.02 Sn shows higher performance comparing to PENG with BCZT. It can generate open circuit voltage of 4V under vibration shaker and 30 V under gentle finger tapping. This good piezoelectric

performance is related to the enhanced mechanical behavior in addition to the enhanced conductivity with the integration of Sn within BCZT nanoparticle. Keywords- BCZT/PDMS, BCZT-0.02Sn/PDMS, flexible, piezoelectric nanogenerator, Young modulus, impedance measurement.

Paper Reference: (PSE-6-7) 1570788902
Title: Investigation of a new power junctionless MOSFET using 2-D numerical simulation
Author(s): Badreddine Zerroumda; Fayçal Djeffal; Said Benaggoune; Hichem Ferhati (Algeria)

Abstract − Despite the widespread use of power MOSFETs in numerous applications, their channel mobility has been a serious issue hindering the improvement of electrical performances. In this paper, a new power MOSFET established on junctionless design is presented. A numerical investigation is carried out using ATLAS 2-Dimensional device simulator in order to analyze the electrical performances of the proposed structure, namely the breakdown voltage, the output and the transfer characteristics. In this context, comparisons are conducted by considering the conventional structure as a benchmarking prototype. In addition, the drain current is investigated with respect to variable dimensions of the buried oxide. The obtained results show the superiority of this new design, and give more insights with regard to the use of junctionless concept in power MOSFET devices

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Paper Reference: (PSE-7-1) 1570775076
Title: Design of a Portable Solar PV System
Author(s): Munzer Ebaid (Jordan)

Abstract − Solar PV system in Jordan has a high potential and studies shows that solar radiation is in range (5 to 7) kWh/m2 and enjoys a high potential for about 330 sunny days per year. One of the modified designs on photovoltaic systems that are not connected to the electrical grid is the off-grid mobile PV generator. It contains an integrated system capable of producing electric power up to 2kWh/day with storage batteries as a backup. These systems are compact, small and can be transferred to any location easily by being hooked to a truck or any other vehicle. PV arrays mounted on the main body are able to be closed and opened in order to save space and make it easy for the system to be transported. Also, it can be set so quickly, therefore they can be considered an extremely smart solution to many situations involved in producing electricity. For example, disaster areas such as flooding and earthquakes, dispersed population and camping place. The research work in this paper will cover the design to manufacture stage of 1kW PV mobile system, while building the prototype and testing the complete system will be the next stage of the proposed work.

Paper Reference: (PSE-7-2) 1570775436
Title: FFT analysis-based P&O with IC for 100 kW two stage grid-connected PV system: Comparative study
Author(s): Hicham Bouregba; Madjid Hachemi; Saad Mekhilef; Azeddine Ratni (Algeria–Australia)

Abstract − Due to dynamic interactions between PV systems and the grid, the development of large-scale solar systems distributed via a low-voltage distribution grid (LVDG) presents substantial problems to network operators. In order to address these problems and provide grid support services (GSS). To allow for the simulation of large-scale, interconnected PV systems in a reasonable amount of time, precise and effective PV system models are required. This article provided a method of control for adjusting the CC's tension as well as the CC's rate of change in energy. A two-stage conversion system is employed. A comparison of control strategies for photovoltaic systems connected to the grid is proposed. The Boost DC-DC converters in charge of connecting and extracting the maximum power from the solar panel and transferring it to the DC connection are controlled using the maximum power point extraction method with perturb and observe and incremental inductance. Finally, the frequency analysis of the energy transmitted is visualized. The model and simulation system were created using MATLAB/Simulink.

Paper Reference: (PSE-7-3) 1570775691
Title: Fuzzy Logic Based MPPT for PV System Connected to Shunt Active Power Filter
Author(s): Sohaib Abdeslam Boulanouar; Amar Benaissa; Abdellah Kouzou; Ali Teta (Algeria)

Abstract − Recently, photovoltaic sources have emerged as one of the most important and rapidly increasing renewable energy sources. Especially in Grid-Connected applications, which mostly consist of power converters based on power electronics and connected to polluting distribution sectors due to the nonlinear loads. Which eventually leads to the (PQ) power quality degradation. To solve such problem shunt active filters SAPFs are considered as an effective solution. A system consists of Photovoltaic array connected to a boost converter connected to the grid through a three-phase three-wire shunt active power filter. The maximum power point tracking (MPPT) is achieved using Fuzzy logic tracker (FLC). The presented multitask system is verified through extensive simulation analysis carried out using Matlab/Simulink environment.

Paper Reference: (PSE-7-4) 1570775945
Title: Optimal Sizing and Placement of Photovoltaic Generators to Mitigate Unbalanced Factor
Author(s): Slimane Sadoudi; Mohamed Boudour; Nour El Yakine Kouba (Algeria)

Abstract − This paper deals with an advanced strategy that aims to mitigate both power losses and unbalanced voltage factor (VUF) of radial distribution power system integrated photovoltaic generators. The optimal placement of photovoltaic DG units and their optimal sizing have been envisaged to mitigate both objectives. A power flow analysis has been investigated based on three phases Backward-Forward Sweep (BFS) using MATLAB software. The best location of the photovoltaic DG was used to reduce the unbalanced factor and losses of the whole grid thanks to a statistical method that also indicates the optimal penetration of the DG. An enhanced method has been investigated, it consists to add a secondary search of common coupled point (PCC) in order to improve the VUF level and power losses. Also, to maximize the integration of solar photovoltaic DG. To prove the effectiveness of the developed strategy, a comparative study has been performed. The obtained results confirm the validity and superiority of the proposed method to mitigate voltage unbalance factor, active and reactive power losses.

Paper Reference: (PSE-7-5) 1570776030
Title: Forecasting of PV generation for Energy Management System in microgrid using LSTM
Author(s): Abderrahman Bensalem; Belgacem Toual; Abdellah Kouzou; Zakaria Belboul (Algeria)

Abstract − The microgrid is a promote solution for renewable energy systems integration in the grid; it can reduce the penetration limits in the electrical grid due to the intermittency nature of such systems like photovoltaic (PV) power. The ability to forecast the PV power availability for a short-term horizon affects the reliability of the microgrid. Proper forecasting significantly helps to improve the operation of the microgrid. In this work, short-term PV power generation forecasting using long short-term memory (LSTM) recurrent neural network is developed. The impact of changing the LSTM model on forecasting performance was studied. Analysis of forecasting results indicates that when the variation of PV power is higher, it is more complex to deal with the nonlinearity of the forecasting model to provide accurate forecasting.

Paper Reference: (PSE-7-6) 1570788892
Title: Maximum Power Point Tracking Dual Integral Sliding Mode Control for a Pumping System
Author(s): Amira Lakhdara; Tahar Bahi; Abdelkarim Moussaoui (Algeria)

Abstract − The solar panel exhibits non-linear behavior under real climatic conditions and the output power fluctuates with the variation of solar irradiance and temperature. Therefore, a control strategy is needed to extract the maximum power from the solar panels under

all operating conditions. The objective of this work is to classify, review the maximum power point tracking techniques used to extract maximum power from photovoltaic systems in off-grid applications. Namely an integrated dual sliding mode controller to improve the performances of maximum power point tracking and stabilize the power output of the solar system. The presented Dual Integral Sliding Mode Control maximum power point tracking method is robust, provides faster and stable maximum tracking power compared to other discussed methods and also performs well during any change in weather conditions. To validate the efficiency, mathematical modeling of all above mentioned MPPT nonlinear controller methods and their simulations are performed on Matlab/SIMULINK.

Paper Reference: (PSE-8-1) 1570773584
Title: MPC and MPPT Control of Fuel Cell/ Photovoltaic/ Supercapacitor Hybrid Grid-Connected System
Author(s): Fatima Toureche; Djaafer Lalili; Hamza Bouaouaou (Algeria)

Abstract – In this paper, we present the control of a hybrid renewable energy system, based on a proton exchange membrane fuel cell stack, a photovoltaic energy subsystem and a supercapacitor storage subsystem. These three subsystems are connected to electrical grid through dc-ac converter. Fuel cell-based systems allow avoiding the intermittence and discontinuous character of several renewable energy resources, such as photovoltaic energy and wind energy. The main drawback of fuel cell stack is its slow dynamics. To overcome this drawback, supercapacitor is used to supply or absorb the power during transient and fault conditions. A model predictive controller is designed in order to achieve the following purposes: extracting maximum power from the fuel cell stack, regulating the dc bus voltage and controlling the active and reactive power of the grid. The control of the hybrid system is simulated using Matlab/Simulink.

Paper Reference: (PSE-8-2) 1570776035
Title: Control of PV based Standalone DC Microgrid Using HESS
Author(s): Mohammed Abdulelah Albasheri (Algeria)

Abstract – Hybrid Energy Storage System are required for DC micro grid operation of a photovoltaic generating system under fluctuation solar irradiance and varying load demands. The combination of the battery and a supercapacitor for energy storage is an exciting concept. Batteries have a high energy storage ratio but also are power limited, on the other side, supercapacitors can deliver high levels of power while having a significantly lower energy storage ratio. Furthermore, the SC can operate as a power buffer against high magnitudes and quick power fluctuations, supercapacitors are used to reduce battery stress and extend battery life. Control and power management for a hybrid autonomous system are presented in this work. To keep the dc bus voltage constant, the controller have two inners battery and SC currents control loop and an exterior voltage controller. This method of average current control is used to regulate power between PV system generation, HESS and the dc load. In MATLAB/SIMULINK, the entire hybrid system is simulated, and the results show the effective power balance for all modes of operation.

Paper Reference: (PSE-8-3) 1570783516
Title: Adaptive Resonant Controller Based SOGI-FLL for Three-Phase Voltage Source Inverters
Author(s): Ilyas Bennia; Abdelghani Harrag; Yacine Daili (Algeria)

Abstract – Used in level zero of the hierarchical control for microgrids with the aim of voltage and current regulation, the Proportional Resonant (PR) controller is a real alternative to the standard Proportional Integral (PI) controller referring to its effectiveness and superior performance when controlling sinusoidal waveforms and its capacity to compensate for low order harmonics using the Harmonic Compensator (HC). The resonant frequency value is required for both PR and HC's internal models. The nominal value of the grid frequency and its multiples are employed in most cases, however, when the grid frequency fluctuates, the performance of both PR and HC suffers. This work proposes an adaptive proportional resonant (PR) controller for a three-phase grid-connected inverter this controller can adapt its control parameters during the grid frequency fluctuations based on the information issued by the SOGI-FLL, this concept helps to enhance the behavior of resonant controller and harmonic compensator in the case of grid frequency deviations. Further, the effectiveness and robustness of the suggested adaptive resonant controller for grid-tied inverters are clearly demonstrated by simulation results using the MATLAB environment

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Paper Reference: (PSE-8-4) 1570783730
Title: An Economic Strategy for Energy Management of a Residential Grid-Connected PV-Battery System
Author(s): Yehya Houam; Si Tayeb Abdelkader; Abdelkrim Khelifa (Algeria)

Abstract – The gird connected renewable energy system improve the reliability and energy sustainability to the maximum extent possible. This paper proposes the study of three different energy management strategies for a grid connected energy systems. The first strategy use the grid only, while the second employ the grid with photovoltaic (PV) energy source, and the third utilizes the grid connected PV-battery system, which it based on the strategy of buying the electricity at night only from the public grid company. The results deal that the proposed night buy strategy for grid-connected PV-Battery system offers the best performance with the highest benefits during the whole year, compared to other two strategies (only grid and only PV-grid).

Paper Reference: (PSE-8-5) 1570789357
Title: FSC-MPC for single-stage grid connected PV system
Author(s): Abdessalam Badoud (Algeria)

Abstract – The single-stage grid-connected photovoltaic (PV) design has lately gained popularity due to its ability to minimize total losses and installation costs. This research describes an unique control strategy for single-stage grid-connected PV systems. The control scheme combines (FCS-MPC) with (P&O) technique to ensure maximum power collection from PV panels. as well as excellent transient performance for output current. The suggested scheme removes the usage of the DC/DC stage, which reduces the losses associated with the inclusion of the boost stage. To estimate the currents under different voltage vectors, an FCS-MPC method is devised; the ideal voltage vector is determined based on the optimal cost function, and the corresponding optimal switching mode being applied to semiconductor switches in the inverter. Further, the controller was tested in the variation of irradiation. The proposed control system was simulated using MATLAB/SIMULINK environment. The collected findings show that the suggested control strategy ensures MPP tracking and the injecting of extracted PV power into the grid with excellent current quality despite variation in irradiation.

Paper Reference: (PSE-8-6) 1570790084
Title: MPPT techniques for PV applications in radial distribution grid at various load levels using FFA
Author(s): Souhil Mouassa; Djabali Chabane; Hamou Nouri (Algeria)

Abstract – The optimal integration of distributed generation (DG) in the distribution electrical network is one of the most attractive optimization issues. In the past two decades, more attention has been given to Solar Photovoltaic (PV) energy due to its valuable benefits, in which is considered as the most direct way to convert solar energy into electrical energy with zero emissions, or greenhouse effects. In addition, the location, size and number of PV installed have a big influence on the overall efficiency of the whole of distribution system to the objective of reducing the active power losses while improving the voltage profile. The maximum power point tracking (MPPT) is the automatic control algorithm to adjust the power interfaces and achieve the greatest possible power harvest, during the moment variations of light level, shading, temperature, and photovoltaic module characteristics. In this paper, Firefly algorithm (FA) is used to find the optimal solutions of PV allocation and size, and then the Maximum Power Point Trackers (MPPT) technique based on Temperature Measurements is employed to maximize the power generated by photovoltaic in radial distribution network at various load levels: light, medium and peak. The simulation results demonstrate that the proposed FFA always gives better performance compared to all recently published solvers.

Paper Reference: (PSE-9-1) 1570794781
Title: Integrating SMES in Wind Farms for Improving Rotor Power Flow During GSC Disconnection
Author(s): Fatma Bouaziz; Achraf Abdelkafi; Abdelkarim Masmoudi; Lotfi Krichen (Tunisia)

Abstract – In this study, a novel structure for doubly fed induction generator (DFIG) wind farms with coordinated power management are presented for isolation grid side converter (GSC) converter. Unlike traditional designs, which have one GSC for each of the DFIGs, the suggested construction employs only one GSC and one energy storage system for the whole wind farm (WF). Under typical operating conditions, the proposed wind farm has advantages such as reduced converter loss and increased dependability. The superconducting magnetic energy storage (SMES) coupled with the novel structure of WF under disconnection of the converter GSC from the intermediate circuit capacitor. This improves the conservation of the active power flow exchanged with the rotor. The proposed WF structure was modeled using MATLAB/Simulink software.

Paper Reference: (PSE-9-2) 1570775901
Title: Performance Enhancement of Wind Turbine Systems using Type-2 Fuzzy Logic Control: comparative study
Author(s): Amal Dendouga; Abdelhakim Dendouga; Najib Essounbouli (Algeria)

Abstract – This paper focuses on the development and design of a type-2 fuzzy logic controller (T2-FLC) for the control of a variable-speed wind energy conversion system (WECS). In this context, the maximum power point tracking (MPPT) strategy has been used for extracting maximum available power from the wind system under varying wind conditions. Until now, the conventional type-1 fuzzy controller (T1-FLC) has been widely used in several applications, due to its high performance. However, in many modern applications, it is necessary to use controllers that have the ability to cope with wide amounts of uncertainties. Consequently, Type-2 FLCs will have the potential to overcome the limitations of Type-1 FLCs which can improve performance for systems that need handling high levels of uncertainty. To discover the strengths and weaknesses of the proposed controller over to T1-FLC and proportional-integral PI controller, a comparative study was executed. The results obtained confirm the efficiency and high performance obtained by T2-FLC compared to other types of controllers.

Paper Reference: (PSE-9-3) 1570779948
Title: Active and Reactive Power Control of the PMSG based on wind energy conversion system using STSMC
Author(s): Mohamed Seddik Mahgoun; Abdessalam Badoud (Algeria)

Abstract – This paper presents a new robust nonlinear control strategy based on second-order sliding mode control called Super Twisting Sliding Mode Control (ST-SMC) applied to control active and reactive power for permanent magnet synchronous generator (PMSG) integrated into a wind energy conversion system (WECS). The aim of this control is to obtain high dynamic performances in terms of reference tracking, sensitivity to perturbations, and robustness compared to the conventional sliding mode control strategy. The conventional sliding mode control strategy has a significant drawback, which is the chattering phenomenon caused by the discontinuous control signal, which can damage the system. For this, it is relevant to use the second-order sliding mode algorithms to avoid this chattering. The proposed ST-SMC technique based on second-order sliding mode control reduces powers, currents, and torque ripples, while maintaining the advantages of the conventional method (C-SMC) such as the robustness against parametric variations of the PMSG. Simulation results show the effectiveness of the proposed ST-SMC strategy in reducing the chattering effect comparatively to the C-SMC one

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Paper Reference: (PSE-9-4) 1570794845
Title: Controlling a DFIG Wind Farm Equipped by SMES for an Absolute Power Constraint and Voltage Sag
Author(s): Fatma Bouaziz; Achraf Abdelkafi; Abdelkarim Masmoudi; Lotfi Krichen (Tunisia)

Abstract – Wind power becomes more prominent in the production of energy into the grid. Thus, there is a persistent need to integrate energy storage devices to deal with the intermittent nature of this source. This study proposes a novel structure of wind farms (WF) that is equipped with three doubly fed induction generator (DFIG) and one superconducting magnetic energy storage (SMES). The SMES is coordinated with the WF to ensure the absolute power limitation required by the grid and to enhance the low voltage ride through (LVRT) capability under voltage sag conditions. Simulation results obtained by MATLAB Simulink are presented to validate the efficiency of the suggested wind farms.

Paper Reference: (PSE-9-5) 1570775703
Title: Economic Feasibility Study on Solar PV-Wind Hybrid Power System in Telkom University
Author(s): Indra Padmajaya; Bandiyah Sri Aprillia; Jangkung Raharjo; Kharisma Bani Adam; Dea Ashari Oktavia; Basuki Rahmat (Indonesia)

Abstract – The solar PV-Wind power plant installation is technically able to supply 64.87% of the power requirement of the load in room P402 Deli Building, Faculty of Electrical Engineering, Telkom University for 25 years of the project. The LCOE obtained for the PV-wind solar hybrid power system reaches IDR 2,073.56 /kWh. The use of the PV-Wind solar hybrid system can save electricity costs reaching IDR 1,270,714.20 per year. Meanwhile, the payback period on investment only takes up to 15 years. The results show that the Solar PV-Wind system hybrid power plant in Tel U has good potential from a technical-economic point of view.

Paper Reference: (PSE-10-1) 1570775446
Title: Optimal Coordination Of Directional Overcurrent Relays Using Various Metaheuristic Methods
Author(s): Nabil Mancer (Algeria)

Abstract – In this paper, various metaheuristic optimization algorithms are proposed and successfully adapted to solve the coordination problem of directional overcurrent relays (DOCRs). The proposed algorithms are artificial bee algorithm (ABC), biogeography-based optimization (BBO), firefly algorithm (FA), and bee algorithm (BA). The main object of coordination of DOCRs is to minimize the total operating time of all primary relays without violation of security constraints to main security and service continuity of the practical power systems. The particularity and robustness of various metaheuristic algorithms have been validated on 8 bus interconnected electric systems. The results prove the viability of the metaheuristic methods in particular the BBO and FA in solving such non-linear problems related to power system protection coordination.

Paper Reference: (PSE-10-2) 1570775905
Title: Grid Synchronization Techniques Analysis of DG Systems Under Grid Fault Conditions
Author(s): Noussaiba Mennai; Youcef Soufi; Ammer Medoued; Abdallah Faleh (Algeria)

Abstract – The integration of renewable energy sources (RES) and their connection to actual transmission power grids around the world at a range of voltage levels has recently gained a significant penetration level. The changes brought by these alternative power sources have an important impact on system performance and efficiency in terms of the quality and the stability of the existing grid, which is not yet dedicated to meet the modern grid code requirements. One of these vital requirements is synchronization with the grid voltage which is achieved by the synchronization unit of the grid side converter (GSC) controller. The synchronization unit usually consists of a phase-locked loop (PLL) algorithm to track the phase angle and amplitude of the grid voltage at the point of common coupling (PCC). This paper analyzes respectively the synchronization capability of four PLL techniques for distributed generation system (DGS) during balanced and unbalanced faults: the synchronous reference frame PLL (SRF-PLL), stationary reference frame PLL ($\alpha\beta$-PLL), decoupled synchronous reference frame PLL (DSRF-PLL), and the recent decoupled stationary reference frame PLL (D$\alpha\beta$-PLL). The different considered algorithms are presented, analyzed, compared, and their performance is simulated and carried out using MATLAB/SIMULINK.

Paper Reference: (PSE-10-3) 1570776037
Title: Backup Overcurrent Relays Coordination with First and Second Zones Distance Relays in Power Systems
Author(s): Asma Assouak; Rabah Benabid (Algeria)

Abstract – To ensure the reliability of the protection system, the combination of distance and directional overcurrent protection is an indispensable task, especially in interconnected power systems. This paper deals with setting and coordination of distance and directional overcurrent relays in interconnected power systems. As a backup to the main distance protection system, directional overcurrent relays are ensured. The problem is formulated as a mixed nonlinear optimization problem subject to coordination constraints. A Hybrid Particle Swarm Optimization with Gravitational Search Algorithm (PSO-GSA) is proposed and improved to solve the problem. The efficiency of the proposed approach is tested on the 9-bus considering two critical fault locations. For comparison purposes, three cases studies are proposed. The obtained results show good coordination of distance and overcurrent relays especially for the case where the relays characteristics and the time zone 2 are optimized with the classical relays parameters.

Paper Reference: (PSE-10-4) 1570783469
Title: Placement of DFIG power plants for Improving Static Voltage Stability
Author(s): Ghada Machane; Ahmed Gherbi (Algeria)

Abstract – Renewable energies have seen a high penetration in the power system overall the world, in order to meet the growing needs for energy. This paper investigates the impact of increased penetration of wind farms on voltage stability and power losses in the power system. The optimal placement with different penetration rates of doubly fed Induction generator (DFIG) wind farms for improving voltage stability is studied using the continuation power flow technique. The proposed study is performed on IEEE 24-bus test system under Matlab Simulink Power System Analysis Toolbox (PSAT). The simulation results show that the integration of wind generation plants improves the power-system static voltage stability.

Paper Reference: (PSE-10-5) 1570783527
Title: Impact of High Renewable Integration on Inter-area Oscillations. Koopman Modal Analysis
Author(s): Yassine Boussaâ; Mabrouka Ghiloufi; Zahra Jlassi; Khadija Ben Kilani; Mohamed Elleuch (Tunisia)

Abstract – This paper investigates the impact of high renewable penetration on inter-area oscillations, using the nonlinear modal analysis technique of Koopman. The Koopman operator transforms a nonlinear state space of finite dimension to an infinite dimensional linear space of observables. The transformed system of observables provides a linear workspace which captures the nonlinear dynamics of the original system. The study focuses on photovoltaic and wind power generation using appropriate observables. Various operating scenarios are examined: the power converter control strategies, renewable penetration ratios, the impact of inertia and its enhancement by means of synchronous condensers. The spectral properties of Koopman modes revealed the hidden nonlinear inter area oscillations. Linear and nonlinear modes damping and stability properties are affected by the penetration ratio, loading level and the converters control strategies.

Paper Reference: (PSE-11-1) 1570775588
Title: Simulation of Different Faults in Photovoltaic Installation
Author(s): F. Bait; S. Latreche; M. Khemliche (Algeria)

Abstract – Solar energy is one of the most important renewable energy sources to replace the use of fossil fuels and generate electricity. Like other systems, it is exposed a degradation of system performance and this increases productivity. This article presents the results and causes of different degradation produced in these installations, also a study and site defects and abnormalities frequent rains in these installations, and classifies their impact on the photovoltaic installation.

Paper Reference: (PSE-11-2) 1570784010
Title: On line inter-turn short-circuit fault diagnosis and nonlinear control of PMSM
Author(s): Samir Bouslimani; Said Drid; Larbi Chrifi-Alaoui; Laurent Delahoche (Algeria–France)

Abstract – This paper deals with the detection of inter turn fault in the stator winding of a permanent magnet synchronous motor (PMSM) in closed-loop. The technique proposed to detect the turn-to-turn short circuit faults is based on the parametric estimation and therefore the analysis of the two voltage signals over the resistance Rd and Rq. The proposed approach is tested and the simulation results confirm the effectiveness of the proposed method to detect the turn-to-turn short circuit fault. As it provides the information essential for the fault isolation.

Paper Reference: (PSE-11-3) 1570784021
Title: Application of Support Vector Machine Classifier For Transformer Winding Faults Diagnosis
Author(s): Ezziane Hassane; Hamza Houassine; Samir Moulahoum (Algeria)

Abstract – Diagnosing faults based on artificial intelligence is one of the modern and effective methods, so it has become necessary to apply it to power transformers. This paper proposes a new methodology for detecting the type, location, and severity of power transformer faults, based on the analysis of frequency responses (FRA) and support vector machines (SVM). The method was tested on two faults that were simulated on a transformer winding model, where databases were formed to train the support vector machine (SVM) by collecting (FRA) signals in defective and healthy conditions and analyzing them by statistical indicators. The obtained results confirm the effectiveness of the proposed method on determining the type, location, and extent of faults with high accuracy, and its ability to contribute to the development of the application of machine learning in power transformers.

Paper Reference: (PSE-11-4) 1570784148
Title: Deep Learning based Fault diagnosis in Grid-Connected Photovoltaic Systems
Author(s): Amal Hichri; Mansour Hajji; Majdi Mansouri; Kais Bouzrara; Hazem N. Nounou; Mohamed Nounou (Tunisia–Qatar) Nounou, H. N. Nounou, M.

Abstract – PV systems are prone to failure owing to aging and external/environmental factors. These faults can affect a variety of system components, including PV modules, connecting lines, and converters/inverters, resulting in a reduction in efficiency, performance, and even system collapse. As a result, problem detection and diagnosis (FDD) is an important issue in high-efficiency grid-connected PV systems. The most well-known data-driven methods are deep learning approaches. The biggest advantage of deep learning algorithms, in diagnosis, are learning effectiveness, intelligent FDD becomes more effective. This paper therefore presents a comparative study of FDD based deep learning. The techniques include the Convolutional Neural Network (CNN) and Long Short Time Memory (LSTM). Finally, the FDD based frameworks are implemented using both simulated data (for theoretical assessments) and real data. The diagnosis results show that the CNN and LSTM-based fault diagnosis methods are able to detect and diagnose faults under different operating modes.

Paper Reference: (PSE-11-5) 1570788360
Title: Reliability Evaluation of GSR Prediction Using Neural Networks with Variant Atmospheric Parameters
Author(s): Murad Al-Omary, Aiman Albatayneh, Rafat Aljarrah and Khaled Alzaareer (Jordan)

Abstract – Global Solar Radiation (GSR) has fluctuations in its measured values. This occurs by actions of several factors including clouds, dust, reflections, and others. The ambiguity associated with its prospective values forms a challenge for many engineering applications and manufacturers of solar-based systems. The intermittent nature of global solar radiation conflicts with the necessity to find correct and reliable values in advance. The neural network-based prediction has been adopted to fulfill a prior knowledge about these values for

being highly efficient compared to the stochastic and statistic approaches. Despite that, the reliability of those networks is considered variant for being largely dependent on different inputs. This work evaluates the reliability of different neural networks that specifically use atmospheric parameters, considering them as single inputs and combinations of two and three parameters. The results appeared that the network that uses (Zenith Angle, Air Temperature, and Relative Humidity) is the most reliable one with 0.997 recorded for the correlation coefficient. Oppositely, the network of only (Air Temperature) is the network of the lowest reliability according to the 0.603 that is found for the correlation coefficient.

Paper Reference: (PSE-11-6) 1570789073
Title: Open circuit fault diagnosis of NPC inverter in grid connected photovoltaic system
Author(s): Amina Mimouni; Souad Laribi; Morsli Sebaa; Taieb Allaoui, Abdelkader Azzeddine Ben Gharbi (Algeria)

Abstract – Safety, reliability, performance and continuity of photovoltaic (PV) system are major concerns today. The DC/AC converter is the most critical element in the PV system and can be exposed to failures during the operation, this converter incorporates semiconductor power switches which are the most fragile components and which are subjected to severe faults such as open circuit fault (OCF). This paper presents an open circuit fault diagnosis and identification of three phase Neutral Point Clamped (NPC) inverter in a grid connected PV system, the diagnosis method is based on the generation of diagnostic variables, which are calculated from the average values of the positive and negative parts of normalized output currents. Numerous simulations are carried out to demonstrate and validate the performance of the diagnostic method.

Paper Reference: (PSE-11-7) 1570789129
Title: Rolling Bearing Fault diagnosis Using an Enhanced CEEMDAN Algorithm and a Modified Soft Thresholding
Author(s): Rabah Abdelkader (Algeria)

Abstract – Vibration analysis is an important tool for rolling Bearing faults diagnosis. These vibrations are generally noisy, therefore; it is difficult to extract the fault information from them. This paper proposes an approach using an enhanced Complementary Ensemble Empirical Mode Decomposition with adaptive noise (ECEEMDAN) and modified soft thresholding. The vibration signal is decomposed by ECEEMDAN into several Functions. The modified soft thresholding is applied to these functions to reduce the noise and enhance the sensitivity of scalar indicators of fault detection and envelope analysis. The experimental results show that this method can detect effectively the rolling bearing fault.

Paper Reference: (PSE-12-1) 1570775969
Title: PV system optimization in shading conditions using MPPT control with PSO and IncCond algorithms
Author(s): Nacer Bouderres; Djallel Kerdoun; Chiheb Sofaine; Abdelhak Djellad; Azzeddine Dekhane; Tarek Kebabsa (Algeria)

Abstract – The presented paper is devoted to study partial shaded panel in photovoltaic array connected to DC load through MPPT. This MPPT is controlled by Incremental conductance algorithm (IncCond classical) and Particle Swarm Optimization (PSO genetic algorithm). A comparison between generated power from both MPPT has been effectuated to determine the most efficient algorithm under partial shading condition. The results obtained using MATLAB/Simulink environment show different behavior of MPPT controller according to the used algorithm

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Paper Reference: (PSE-12-2) 1570782324
Title: Dynamic Surface Controller for a Three-Phase Grid-Connected Photovoltaic System
Author(s): Imene Boukerroume; Ahsene Boubakir; Nabil Oucief (Algeria)

Abstract – In this paper, a dynamic surface control is designed for a grid-connected photovoltaic (PV) system. The latter consists of a PV generator connected to a three phase grid through a DC/AC converter. The purpose is to extract maximum power from the PV generator with control of the power exchange and improvement of the current injected into the grid. With the proposed controller, the power factor and the dc-link voltage can both be controlled using the same control algorithm in contrast to the existing backstepping or DSC-based control methods. Besides, the presented control method helps avoid the problem of explosion of complexity and can ensures the stability of the closed-loop system. Finally, the performance of the controller is examined using a numerical simulation.

Paper Reference: (PSE-12-3) 1570784052
Title: An Enhanced Primary Control Level for a DC Microgrid Systems
Author(s): Khalil Louassaa; Aissa Chouder; Mahdi Boukerdja; Abdelhafid Cherifi; Ali Aillane (Algeria)

Abstract – in the last few years, DC Microgrid is gained more attention than AC Microgrid due to its advantage associated with high efficiency, more reliability, and control simplicity. Despite the benefits of the DC Microgrid, power sharing is concerned as the major constraint in DC Microgrid. In this work, a parallel circuit including two DC-DC Buck converters, which are connected with a single resistive load, was designed. A basic droop control strategy is suggested to realize the power sharing between the converters, which is tested under different disturbances. The proposed method is characterized by enhanced power-sharing and better voltage regulation. The effectiveness and the robustness are confirmed using an experimental setup.

Paper Reference: (PSE-12-4) 1570788870
Title: Control of a Three-Phase Grid-Connected Inverter based on Super-Twisting Sliding mode Algorithm
Author(s): Ali Aillane; Karim Dahech; Aissa Chouder; Tarak Damak; Abdelhafid Cherifi; Jihed Hmad (Tunisia–Algeria)

Abstract – This paper deals with the robust current control for three-phase Grid-Connected Inverters (GCI) of distributed generation (DG) systems based on a Super-Twisting Sliding mode controller (ST-SMC) during injecting active and reactive power into the grid. This approach is capable of decreasing the chattering phenomena and improving the system's accuracy. The proposed controller is realized for the inner current controller to guarantee proper regulation, such as short-time response, small steady-state error, and so on. To achieve the appropriate synchronization desired between current injected and grid voltage, a phase locked loop (PLL) based on a synchronous reference frame (SRF) is applied. Finally, simulation results are examined by Powersim (PSIM) software and are compared with those of a conventional controller to validate the proposed controller's effectiveness

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Paper Reference: (PSE-12-5) 1570789144
Title: An Overview of Photovoltaic Power Plant (PV) Connection to HVDC Grid
Author(s): Abdelghani Guechi; Mohammed Saaidia; Nedjem-Eddine Benchouia (Algeria)

Abstract – Solar energy is considered one of the most important alternatives and renewable energies for the production of electricity so solar power plants work to produce direct current, which is then converted into alternating current through DC-AC converters and linked to power transmission networks of alternating current. But since most of the large solar PV plants are built in areas far from the load, the world is moving today to transfer power directly from solar panels to high voltage HVDC grid, due to the advantages that HVDC provides such as lower transmission loss, low cost and higher efficiency compared to HVAC. In this paper, we present an overview of recent studies dealing with Photovoltaic Power Plant Connection to HVDC Grid and the comparison between these systems.

Paper Reference: (PSE-12-6) 1570789415
Title: Twisting Sliding Mode Based Control of Grid Following Inverter
Author(s): Mohammed Benzoubir; Mohammed Benmiloud; Mohamed Bougrine; Noureddine Gazzam; Benalia Atallah (Algeria)

Abstract – Integration of renewable energy to support the grid requires power inverters. The purpose of this paper is to control a voltage source inverter in a grid-connected mode to supply high-quality power to the main grid. To achieve this goal, a Twisting Sliding Mode controller is proposed, which controls the output currents to follow their references derived from active and reactive power references while rejecting disturbances caused by the main grid voltage. A novel strategy is proposed to decouple and reduce the order of the grid-connected inverter model in the natural reference frame. Simulation results are provided to prove the performance of the proposed solution.

Paper Reference: (PSE-13-1) 1570771995
Title: Pitch Angle Control of Wind Turbine Based on Fractional Order PI and Integer Order PID Controllers
Author(s): Mohamed lamine Frikh (Algeria)

Abstract – Pitch angle controller used in wind turbine to keeps its rated speed and aerodynamic output power in the high-wind-speed regions and release the mechanical tension of the drive train. Usually to control pitch angle an integer order proportional integral IOPI controller is used. In this paper an integer order proportional, integral and derivative IOPID and fractional order proportional integral controllers are utilized and designed with the same imposed tuning constraints which ensure a fair comparison. The aim of this work is to maintain the output mechanical power and rotational speed of the wind turbine at its rated values without variation and reduce the drive train stress caused by torsional torque. From the results of simulation, both of controllers give a satisfactory, but the FOPI controller perform better than the IOPID controller.

Paper Reference: (PSE-13-2) 1570776046
Title: Numerical modelling of the coupling electromagnetic-thermic equations of an annular induction MHD pump
Author(s): Nassima Bergoug; Fatima Zohra Kadid; Rachid Abdessemed (Algeria)

Abstract – this paper presents numerical analysis of the thermal and electromagnetic induction distribution in the channel of the MHD pump; Maxwell's equations are coupled with energy equations using the finite volume method (FVM) in cylindrical coordinate. The magnetic induction and the electromagnetic potential in MHD pump are presented. The variation of the temperature in harmonic mode is studied. Results obtained in the MHD pump show that the maximum temperature occurs at the medium of the channel. In this region, the temperature reaches about 430Â° K.

Paper Reference: (PSE-13-3) 1570778959
Title: Power control strategy for a SCIG Wind turbine generator
Author(s): Achwak Alazrag; Lassaad Sbita (Tunisia)

Abstract – This paper presents a new model for steady- state and dynamic-study of a grid connected SCIG. The system consisting of Squirrel Cage Induction Generators (SCIG); the generator is driven by wind turbine through a gearbox. The studied wind turbine is connected to distribution system through Power Electronics Converters (PECs), filters and step-up transformers. The mathematical models of the studied SCIG generation system including wind speed, filter, turbine system, gearbox, SCIG, PECs, DC-link, step-up transformer, etc, are established and implemented using MATLAB/SIMULINK software. The paper presents the vector control strategy of SCIG that allows the independent control of flux and electromagnetic torque on the PWM converter, and extracting maximum power (MPPT). On the PWM inverter, the vector control strategy is implemented to regulate the DC-voltage and the reactive power from the grid. Induction generator speed is controlled by tip speed ratio upon the wind speed variations in order to generate the maximum output power. Grid side converter regulates the DC link voltage and injective active power by d-axis current and regulates the injective reactive power by q-axis current using simple control method P-Q. Simulation results show that the proposed method operates correctly. The obtained simulation results upon simulation tests of the global system are developed under the MATLAB / Simulink environment and are satisfactory.

Paper Reference: (PSE-13-4) 1570782983
Title: Optimal Torque Control for Power Optimization in PMSG Based Wind Energy Conversion System
Author(s): Farid Merahi; Hamza Mernache (Algeria)

Abstract – The integration of large-scale renewable energy resources has increased significantly in the last decade. Wind energy is one of the most promising renewable energy sources due to its availability and climate-friendly, it attributes either the connection to the grid or used in autonomous mode operation. In this work, we are interested to the study and the modeling of a complete small chain of autonomous Wind Energy Conversion System (WECS) based on a permanent magnets synchronous generator (PMSG). The different control strategies applied on different components of the wind chain are also presented. We use the optimal torque control strategy (OTC) to optimize the extracted power from wind. Vector control strategy is applied to the permanent magnet synchronous generator and associated to the DC voltage closed loop to maintain its real value almost equal to its reference. The simulation results obtained under Matlab/Simulink environment of the whole wind system, made it possible to evaluate the effectiveness and the performances of the studied system.

Paper Reference: (PSE-13-5) 1570789121
Title: A Comparative study between MPPT using PI and Fuzzy Logic Control for Wind Turbine system
Author(s): Abdeldjalil Dahbi; Miloud Benmedjahed, Abderrahman Khelfaoui and Nouar Aoun; Abdelghani Harrag; Ahmed Bouraiou; Boualam Benlahbib; Sara Kadi; Abdeldjalil Slimani; Ammar Necaibia; Djilali Chogueur; Samir Mouhadjer; Messaoud Hamouda; Boudjema Tidjar; Abdellatif Oudran; Ahmed Yassine Kadri; Zahra Belhadj (Algeria)

Abstract – This paper studies the modeling and control of a variable speed wind energy conversion system (WECS) based on Permanent Magnet Synchronous Generator (PMSG). In order to enhance the efficiency of the wind turbine system, the maximum power point tracking (MPPT) control is integrated for exploiting the maximum available power from the wind. Two types of controllers have been proposed and developed, PI and Fuzzy Logic Control (FLC). Simulations results using Matlab Simulink show the performances of each one with a comparison of results.

Paper Reference: (PSE-13-6) 1570794177
Title: Design and analysis of pseudo direct drive generator used in a large wind turbine
Author(s): Dorra Abdeljalil; Naourez Benhadj; Mohamed Chaieb; Manel Krichen; Mohamed Benbouzid; Rafik Neji (Tunisia–France)

Abstract – This paper presents a design of an integrated magnetically geared brushless permanent magnet machine dedicated to wind power applications. Magnetically geared machines (MGMs) are a new class of electrical machine. The idea is to integrate a conventional permanent magnet machine with a magnetic gear (MG). This topologies is called pseudo direct drive generator PDDG. MG gave great success better than the mechanical gear especially in the low speed applications that require a high torque density. The finite element method FEM is used in the analysis of this PDDG. The FEM is a good choice for analyzing problems over complicated domains. The flux, the electromotive force and the torque are calculated using analytical equations. Then, these parameters are founded from FEM using the software MATLAB-Femm and then compared with analytical results in order to validate our study..

Paper Reference: (PSE-14-1) 1570784115
Title: Comparative Study MPPT between FLC and Incremental Conductance Applied on PV Water Pumping System
Author(s): Ahmed Mesai Belgacem (Algeria)

Abstract – Photovoltaic water pumping application is important field of interest for sustainable development. The maximum power point (MPP) at which PV system is to be operated is tracked by peak tracker to utilize solar power. Performance of any MPPT can be evaluated based on tracking speed, accuracy and stability. This paper deals with the application of the incremental conductance and fuzzy logic

controller to extract the maximum power point in a PV water system with field oriented control of a permanent magnet synchronous motor (PMSM). The proposed MPPT techniques were developed and tested successfully on the PV water pumping system. A comparative study between the proposed methods under similar operating conditions is presented. The performances in terms of voltage and power ripples show the effectiveness of the fuzzy logic MPPT technique.

Paper Reference: (PSE-14-2) 1570788856
Title: Hybrid MPPT method based on Neural Network and Perturb & Observe for PV systems
Author(s): Wafa Hayder; Dezso Sera; Emanuele G.C. Ogliari; Aicha Abid (Tunisia–Australia–Italy)

Abstract – To track accurately and fast the Maximum Power Point (MPP), a hybrid technique NN-P&O switched between Neural Network (NN) and Perturb and Observe method (P&O) according to the variation of irradiation was proposed. The considered methodology is based on voltage reference estimated by NN and achieved using proportional-integral controller (PI). The error between the actual power and the optimal power was minimized using a small duty cycle steps generated by P&O method, which initial duty cycle value was updated adaptively. To approve the efficiency of the proposed control algorithms, simulations have been performed considering different system responses as the current, voltage and essentially the power under changing weather conditions (irradiance or temperature values).

Paper Reference: (PSE-14-3) 1570789458
Title: Real-Time Wireless Monitoring System of Photovoltaic Power Plants with Different Technologies
Author(s): Houria Assem (Algeria)

Abstract – This paper describes a design and realization of a low cost wireless real-time monitoring applied to small scale based on PV systems of tow PV power plants with different technologies of PV panels. Internet of Things (IoT) embedded into cloud-based server and user interfaces enables the remote monitoring of distributed and centralized PV installations. The supervising and data acquisition system have been designed using an embedded the IEEE 802.11 standard (WiFi) combined to a microcontroller board the ATMega 328 ATMEL based on the free programming tools. The WiFi data acquisition and the open-source software allow the online real-time PV monitoring which involves the analysis of the stored data and graphics via mobile devices such as laptop, tablets and smartphones. The main elements for the development of the PV monitoring system examined in this paper are: sensors and their conditioning, including wireless sensors located in the PV power plants, the controller utilized for data acquisition board, data transmission technique, data storage and data analysis. In addition to monitor the efficiency of PV installations and to detect any faults or anomalies, this system allows users to verify in the power quality injected and the impact of the installation.

Paper Reference: (PSE-14-4) 1570782746
Title: Fuzzy Logic Algorithm Based on PSO Technique Dedicated to Improve Photovoltaic Water Pumping Systems
Author(s): Abdelhak Bouchakour (Algeria)

Abstract – A photovoltaic generator is a generator whose characteristic (I-V) is strongly nonlinear and vitally affected by weather conditions (temperature, irradiation, dust and shading) which can affect the production and efficiency of the system energy. These variables influencing the behavior of the system exhibit daily and seasonal fluctuations. So, to ensure that the photovoltaic generator produces its maximum power possible at any time and under different operating conditions, a maximum power point tracking (MPPT) method should be used as control strategy. In this paper, P&O-PI-PSO, FL-PI-PSO MPPT controllers have been proposed and investigated using the Matlab/Simulink models. The proposed MPPT controllers have been tested and validated under different scenario tests. Results are presented and discussed to show the effectiveness of the FL-PI controller optimized by PSO, in terms of efficiency, stability and productivity in the steady-state operation

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Paper Reference: (PSE-14-5) 1570783249
Title: Real-Time Experimental Analysis of Hybrid BG-FL Based MPPT Controller for a Photovoltaic
Author(s): Abdessalam Badoud (Algeria)

Abstract – In most circumstances, traditional MPPT strategies like perturb and observe and incremental conductance fail to track the GMPP and settle at one of the LMPPs, decreasing PV system MPPT effectiveness. This work presents a new MPPT technique based on a hybrid algorithm of the bond graph and fuzzy logic, which combines the exploration ability of bond graph with the exploitation capacity of fuzzy logic to develop and improve the strength of both types. Moreover, the developed MPPT technique not only avoids the popular drawbacks of traditional MPPT techniques but also provides a simple and robust MPPT strategy for efficiently managing partial shading in PV systems, as it only requires two control parameters to achieve high efficiency and its convergence is independent of the initial conditions. The suggested MPPT method's feasibility and effectiveness are evaluated through simulation and experimental verification, and its performance is compared to those of FLC, GWO, and CSA-based MPPT methods. When compared to FLC, GWO, and CSA-based MPPT techniques, the experimental and simulation results under variable environmental conditions showed that the suggested MPPT method is better in terms of tracking accuracy, convergence speed to GMPP, and efficiency.

Paper Reference: (PSE-14-6) 1570788520
Title: Four leg Interleaved DC/DC boost Converter based PV system using PSO Algorithm based PI controller
Author(s): Mohamed Cherif O. Daia Eddine; Ali Chebabhi; Abdelhalim Kessal (Algeria)

Abstract – In this paper, a proportional integral (PI) controller tuned with particle swarm optimization (PSO) is proposed for a four-leg interleaved boost converter (FLIBC) connected to photovoltaic panels (PV). A dual closed-loop control based on a PI controller has been designed to control the PV voltage and inductors currents of the FLIBC to ensure the maximum benefit from PV and an equal share of the current between the inductors. The controller gains have been optimized using the PSO algorithm to enhance the performance of the proposed converter. The proposed work is simulated using the Matlab/Simulink environment. The FLIBC based on the PI controller optimized using the PSO algorithm shows excellent performance, such as fast response, low overshoot, and low current and voltage ripple, which is better than the classical boost converter (CBC).

Paper Reference: (PSE-15-1) 1570771532
Title: Reduced Rules Neuro-Fuzzy based MPPT Controller in Photovoltaic Array Connected to Grid
Author(s): Lotfi Farah; Nadir Farah; Kamar Zaeim (Algeria)

Abstract – This paper achieves a Maximum Power Point Tracking (MPPT) controller using a High Efficiency Reduced Rules Neuro-Fuzzy Inference System (HE2RNF); for a 100 kW stand-alone photovoltaic (PV) system connected to grid. The suggested HE2RNF based MPPT seeks the optimal duty cycle for the boost DC-DC converter, making the designed PV system working at the Maximum Power Point (MPP), then transferring this Power to the grid via a three levels Voltage Source Converter (VSC). PV Current variation and voltage variation are chosen as HE2RNF-based MPPT controller inputs. By using these inputs with the duty cycle as the only single output a six rules ANFIS is generated. A high performance of the proposed HE2RNF numerically in the MATLAB/Simulink environment is shown. The 0.006% steady state error, 0.006s of tracking time and 0.088s of starting time prove the robustness of this six reduced rules against the widely used twenty five ones.

Paper Reference: (PSE-15-2) 1570773223
Title: Sliding Mode Control of a Shunt Active Filter-Comparative analysis with conventional PI control
Author(s): Brahim Deffaf (Algeria)

Abstract − The present paper deals with the sliding mode control of a three-phase shunt active filter SAPF. This one has to improve power quality by compensation for harmonics of non-linear load in power distribution systems. The sliding mode control is among the effective techniques in transient and steady-state regimes. Usually, the sliding mode control uses hysteresis a regulator resulting in variable switching frequency, however, in this paper, this frequency is kept constant by modulating the output control signal. The nonlinear load harmonics and reactive power are identified using the well-known p-q theory. To measure the performances of the proposed control, a comparative analysis is given using conventional PI control. As expected, the obtained results, using simulation tests, have confirmed the performances of the sliding mode control, and its superiority to the conventional PI control.

Paper Reference: (PSE-15-3) 1570775879
Title: Experimental and Digital Simulation Investigations of Harmonics Injection By CFLs Into a LV Network
Author(s): Mohamed Hajjej; Khalil Elkssayer Mohamed; Mohamed Naoui ; Lassaad Sbita (Tunisia)

Abstract − Today, the demand on electrical devices, such as power converters, economic and LEDs lamps, speed variators and regulator, ect, is increasing more and more in recent years, but these loads despite their robustness and good dynamic responses, They inject harmonic currents into the network. This paper presents in-depth studies on the use effect of fluorescent compact lamps (CFLs) on a low Voltage LV based local area network, as well as an interest in modeling of this type of non-linear load under PSIM, and Matlab Softwares.

Paper Reference: (PSE-15-4) 1570783110
Title: A robust PWM control for a three leg shunt active power filter
Author(s): Abdelkarim Chemidi; Mohamed Choukri Benhabib (Algeria)

Abstract − The parallel active power filters are more and more used these last years because of their importance to compensate the current harmonics and the reactive power. However, the classical control strategies use for PWM regulation of a shunt active power filter is a classical PI regulator. The problem with this controller is that its operation is affected if the parameters of the shunt active power filter change. To solve this problem, a robust PWM controller to improve its performance will be used in this paper. Simulation results will show its efficiency when the parameters change

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Paper Reference: (PSE-15-5) 1570783362
Title: Boost converter sizing and its impact on photovoltaic system yield
Author(s): Hamiche Ait Mimoune; Amine Boudghene Stambouli (Algeria)

Abstract − As solar and other renewable energy sources set to dominate the market in the coming years, maximum power point tracking (MPPT) will be essential to optimise power generation. The impact of current ripple on the performance of (MPPT) maximum power point tracking algorithms is a neglected research topic. Many new topologies focus on reducing PV source ripple to increase efficiency and power output. Nevertheless, little work has been done to illustrate the yield degradation of MPPT algorithms by current ripple. This study adopts a boost converter topology to assess the efficiency of Perturb and Observe (P&O), incremental Conductance (IC), and Constant Voltage (CV) PID over a range of inductor current ripple factors. The inductor current ripple is controlled only by changing the inductance. This study concluded that all three algorithms were quite robust and had very little influence over a range of inductor current ripple factors of 20-40%. A new finding was the increase in duty cycle oscillation when the MPPT update and sampling rate were faster than the boost converter response.

Paper Reference: (PSE-15-6) 1570788824
Title: Performance Analysis of Four Level NPC Inverters using FCS-MPC Voltage Balancing Method
Author(s): Nadjah Attik; Abdessalam Badoud (Algeria)

Abstract − The capacity of distributed power generation systems to produce electricity seems to increaseMultilevel converters approach is used to control a grid-tied threephase four-level neutral point clamped (NPC) inverter in this work. The suggested method's primary goals are to: achieve flawless power control with grid active and reactive powers in steady-state operation.The results have been simulated using MATLAB are now widely regarded as one of the best topologies for power production systems that are connected to medium-voltage grid. On the other hand, Finite-Control-Set Model Predictive Control (FSC-MPC) has emerged as a promising control system in the previous decade due to its fast dynaic response and resilience. This control /SIMULINK software.

Paper Reference: (PSE-16-1) 1570776009
Title: Modeling of an Efficient Solar Absorption Cooling System for a Building in Souk Ahras City, Algeria
Author(s): Brahim Bacha; Nor Rebah; Salah Eddine Hachani (Algeria)

Abstract − this research aims to model and simulate a novel solar absorption cooling system working in a building located in Algeria using TRNSYS program package. Weather conditions for Souk Ahras city have been selected. The temperature as well as the rate of heat transfer have been simulated and discussed. The obtained theoretical outcomes confirm that the suggested solar absorption cooling system is efficient and effective for the studied region and it could maintain at a temperature not exceeding 25 Â°C in the summer season.

Paper Reference: (PSE-16-2) 1570783179
Title: Techno-economic feasibility of a new combined CSP-geothermal power plant
Author(s): Taqiy Eddine Boukelia; Oguz Arslan (Algeria–Turkey)

Abstract − Due to vast geographical coincidence of geothermal resources with abundant sunshine areas from a side, and the possibility of integrating geothermal plants with solar power systems on the other side, hybridization of these two technologies is an attractive solution to enhance the dispatchability of thermal power plants. Hence, the design and techno-economic performances of a new combined solar-geothermal power plant have been presented. This configuration generates electricity at two levels; at a topping parabolic trough solar power plant, and at a bottoming binary geothermal plant. On the other side, this topping plant is equipped with energy storage and fuel backup systems at the same time, to maximize the dispatch capacity. The obtained results show that the dispatch capacity of this configuration has been raised up to 12.4%, while its levelized cost of electricity has been decreased by more than 33% at the nominal conditions compared to the conventional solar power plant. This paper presents a new solution to raise the dispatch capacity and power generation of hybrid thermal power plants and decrease their economic risks, either by hybridization or by waste heat recovery.

Paper Reference: (PSE-16-3) 1570783687
Title: A comparative study of a new PSO and P&O of the MPPT algorithm under partial Shading Conditions
Author(s): Abdelouadoud Bendaoud; Houssem Saber; Radjeai Hammoud; Lazhar Rahmani (Algeria)

Abstract − Most often the PV panels are exposed to partial shading due to cloud, buildings and trees causing multiple peaks on the power-voltage (P-V) characteristic curve. Under these conditions the conventional Maximum Power Point Tracking methods cannot track the global maximum power point GMPP, where it is trapped at the first local maximum power point. That is why this paper proposes a particle swarm optimization (PSO) method based on maximum power point tracking (MPPT) algorithm to track global maximum power point (MPP) of photovoltaic (PV) generation under partial shading conditions. To show his efficiency and its advantages, it has been compared with P&O algorithms. Experimental results show that the PSO method is effective in terms of high reliability and high accuracy in tracking the global MPP.

Paper Reference: (PSE-16-4) 1570788606
Title: Energy analysis of integrating a waste heat recovery system to a DSG Central Tower Power Plant
Author(s): Taqiy Eddine Boukelia; Oguz Arslan; Abderrezak Laouafi (Algeria–Turkey)

Abstract − Concentrating Solar Power (CSP) technology is one of the most mature alternatives to generate power from clean energy. Nevertheless, power plants based on this technology have low dispatch capacities, and moderate yields compared to conventional power plant. In this work, a new design of a CSP thermal power plant based on waste heat recovery is proposed to raise the generated power. Thus, an Organic Rankine cycle is incorporated to a direct steam generation central tower power plant to use the wasted heat in the whole system. The obtained results show that by using this proposed solution, energy efficiency, capacity factor and annual generated power of the system has been enhanced by more than 6.41%, 6.44%, and 6.43% respectively, compared to the conventional direct steam generation PS20 power plant (12%).

Paper Reference: (PSE-16-5) 1570784032
Title: Improved Particle Swarm Optimizer-Based MPPT Control of PV Systems Under Dynamic Partial Shading
Author(s): Samia Dziri; Mohammed Alhato; Soufiene Bouallegue; Patrick Siarry (Tunisia–France)

Abstract − n this research paper, an Improved Particle Swarm Optimization (IPSO) algorithm is proposed and successfully applied to design an efficient Maximum Power Point Tracking (MPPT) controller for Photovoltaic (PV) systems under Partial Shaded Conditions (PSCs). Since the traditional MPPT methods are unable and time-consuming to track the Global Maximum Power Point (GMPP) under PSCs, the proposed MPPT algorithm is improved thanks to a mechanism for an efficient dispersing of the PSO particles based on a re-initialization methodology for searching for global solutions. Demonstrative results and comparative studies with other common MPPT techniques, i.e. Perturb & Observe (P&O) and Incremental Conductance (INC), are carried out under PSCs and show the effectiveness and superiority of the proposed IPSO-based MPPT approach in terms of power production's efficiency, oscillations' damping and GMPP tracking fastness.

Paper Reference: (PSE-17-1) 1570773443
Title: Model Predictive Control and MPPT of Fuel Cell/Supercapacitor Hybrid Grid-Connected System
Author(s): Fatima Toureche; Djaafer Lalili; Hamza Bouaouaou (Algeria)

Abstract − In this paper, we present the control of a hybrid renewable energy system, based on a proton exchange membrane fuel cell stack and a super capacitor storage subsystem. These two subsystems are connected to electrical grid through dc-ac converter. Fuel cell-based systems allow avoiding the intermittence and discontinuous character of several renewable energy resources, such as photovoltaic energy and wind energy. The main drawback of fuel cell stack is its slow dynamics. To overcome this drawback, supercapacitor is used to supply or absorb the power during transient conditions. A model predictive controller is designed in order to achieve the following purposes: extracting maximum power from the fuel cell stack, regulating the dc bus voltage and controlling the active and reactive power of the grid. The control method is simulated using Matlab/Simulink tools.

Paper Reference: (PSE-17-2) 1570775227
Title: Optimization of Hybrid PV/Wind/Battery/DG Microgrid Using MOALO: A Case Study in Djelfa, Algeria
Author(s): Zakaria Belboul; Belgacem Toual; Abdellah Kouzou; Abderrahman Bensalem (Algeria)

Abstract − Hybrid Renewable Energy Sources (HRES) integrated into microgrid (MG) are promising in providing energy supply and economically viable for current and future use. This paper proposes the optimal sizing of an HRES connected to the autonomous microgrid system consists of Photovoltaic (PV), Wind Turbine (WT), Battery (BT), Diesel Generator (DG), and Inverter, meant to meet the energy demand of five residential housing units. The cost of energy (COE) and Loss of power supply probability (LPSP) are proposed as objective functions. The objective of the proposed Multi-Objective Ant Lion Optimizer (MOALO), to determine the optimal system configuration that includes design variables such as the number of PV panels WT and battery autonomy days in order to maintain high reliability and the lowest cost. MOALO is the latest nature-inspired metaheuristic optimization algorithm chosen because it is simple to construct and requires fewer control parameters. The MATLAB environment was used to program, simulate and optimize the HRES. Experiments demonstrated the proposed approach's superiority in creating a reliable and costeffective microgrid.

Paper Reference: (PSE-17-3) 1570788029
Title: Planning of domestic electricity consumption using storage element and photovoltaic production
Author(s): Majdi Frikha, Faouzi Derbel; Ahmed Fakhfakh (Germany)

Abstract − Interest in the installation of photovoltaic systems has increased considerably in recent years due to the urgent need to reduce gas emissions and improve the reliability and the quality of electricity supply. Since the production of Photovoltaic systems are not constant due to temperature variations and solar irradiation, autonomous photovoltaic systems are usually equipped with energy storage systems, mainly battery Storage systems (BSS).The battery supplies energy when the photovoltaic system produces low energy compared to power consumption in a household. The lithium-titanium-oxide (LTO) battery is one of the rechargeable batteries capable of being faster to charge compared to other types of lithium-ion batteries. In this paper, we propose a model using a photovoltaic system with (LTO) battery in the household area to show flexibility and reliability of our model.

Paper Reference: (PSE-17-4) 1570788798
Title: Survey a Superconducting Magnetic Energy Storage SMES with PV System to Enhance the Microgrid
Author(s): Ahmed Samawi Alkhafaji; Hafedh Trabelsi (Iraq–Tunisia)

Abstract − The utilization of renewable energy sources (RESs) is one of the most notable solutions for reducing reliance on fossil fuels, as a result, reducing pollution consequences. wind power generation (WPG) or solar photovoltaic (PV) or both technologies used to solve a number of issues in electric power grid. However, Wind speed is constantly changing, increasing and decreasing around the average wind speed, the result is varied WPG output power. Furthermore, the PV output power was impacted by the intermittent nature of solar irradiation. These circumstances will have an influence on the stability and reliability of the power grid. energy storage systems (ESSs) play a crucial role to aid in the resolution of the challenges that mentioned, as well as, minimizing the fluctuating character of the electrical power system. This paper presents a review study for superconducting magnetic energy storage (SMES). Mainly aims for used it as a storage system to improve the power quality and increase the opportunity of power availability therefore, mitigate the voltage and frequency fluctuations. The model designed include PV system and a hybrid ESSs (SMES, and Battery). The results obtained were tested for several cases and different real loads such as (fixed, intermittent, changing, and P-Q loads), the model was simulated by using MATLAB/Simulink.

Paper Reference: (PSE-17-5) 1570791891
Title: Intelligent Contingencgy Overload-Avoiding Control of BESS for Renewable-Rich Local Area
Author(s): Francisco Gonzalez-Longatt; Peter Palensky; Kouzou Abdellah; Harold Chamorro (Norway–Netherlans–Algeria–Sweeden)

Abstract − An N-1 contingency can negatively affect the reliability and security of electrical power systems. A single transmission line outage can cause overload on the local healthy transmission systems, and actions are required to alleviate the overload. Traditionally the system operator uses two actions depending on the operating local area power balance: load shedding or power plant curtailment; both have consequences. This paper proposes the use of a Battery Energy Storage System (BESS) enabled with an intelligent overload avoiding control. The control is illustrated in a test system, and numerical simulations has demonstrated the suitability of the proposed approach.

Paper Reference: (PSE-18-1) 1570775517
Title: Supervision and Speed Vector Control of Photovoltaic/Single-Phase Induction Machine System
Author(s): Daoud Rezzak (Algeria)

Abstract – This work explores the vector control of a single-phase induction motor drive powered by photovoltaic system. The static power converter side is implemented using a Boost Direct Current (DC) converter associated with an H-Bridge IGBT inverter. The supervision of the boost converter is ensured by the "perturb & observe" algorithm coupled with a DC-Bus control. The speed vector control is based in the field orientation ideas adapted for this type of machine. Simulation results are extracted to clarify the operation of the global system.

Paper Reference: (PSE-18-2) 1570782519
Title: Advanced control for DFIG with MPPT Based on Artificial Neural Network
Author(s): Hamid Chojaa; Aziz Derouich; Fayssal Amrane; Othmane Zamzoum; Mohammed Taoussi; Mourad Yessef (Morocco)

Abstract – Renewable energy systems, such as wind power, are providing an increasing share of power generation. Variable speed wind turbines with Doubly Fed Induction Generators (DFIGs) are widely used for this purpose due to their various advantages. This paper is divided into two parts. In the first one, an intelligent control based on the neural network is presented to track the maximum peak and capture a wide range of wind speeds to allow the DFIG to operate at the optimal speed to extract maximum power. In the second part, two techniques are developed to control the active and reactive powers of the DFIG based wind turbine, the integrated sliding mode control (ISMC) and the Field Oriented Control (FOC_PI). Finally, the performance analysis of the two controllers that are used to control a DFIG of 1.5 MW connected to the grid with is realized by using Matlab Simulink.

Paper Reference: (PSE-18-3) 1570782816
Title: Improved Performance for the PMSM Control Based on PCH Controller and Computational Intelligence
Author(s): Marcel Nicola; Claudiu Nicola (Romania)

Abstract – Based on the classic Field Oriented Control (FOC) structure of the Permanent Magnet Synchronous Motor (PMSM), the paper presents a control structure based on the Port Controlled Hamiltonian (PCH) type controller for the inner current control loop, in which the parameters of the control laws are optimized using computational intelligence algorithms: Particle Swarm Optimization (PSO) algorithm, Simulated Annealing (SA) algorithm, Genetic Algorithm (GA), Gray Wolf Optimization (GWO) algorithm, and Reinforcement Learning - Twin Delayed Deep Deterministic Policy Gradient (RL-TD3) agent algorithm. The paper also presents the control structures and the main stages regarding the synthesis of the control laws, the training, and the performance evaluation. The numerical simulations performed in the Matlab/Simulink programming environment attest to the superior performance of the PMSM control system in the case of optimizing the PCH-type controller parameters using computational intelligence algorithms.

Paper Reference: (PSE-18-4) 1570783853
Title: Real-time control of PMSM motor drive based MRAS-STC technique
Author(s): Meryem Benakcha; Abdelhamid Benakcha; Abdelkarim Ammar; Salah Eddine Zouzou (Algeria)

Abstract – This paper deals with a real-time evaluation of a sensorless model reference adaptive system- supertwisting control (MRAS-STC) applied to the Permanent magnet synchronous machine (PMSM). The proposed topology diagram is divided into two parts. First, a STC approach is applied to operate the system in safe mode by minimizing the number of gains which are strongly dependent on machine parameters which change with temperature compared to first order sliding mode. The STC technique lends itself well to the control of an uncertain system and in the presence of external disturbances which may affect it. This technique is developed to achieve a desired speed in the presence of parametric uncertainties and load disturbance. Its formulation reduces chattering. The second part proposes a model of MRAS to estimate the speed of the rotor and eliminate the sensor which is the weakest link in the system. The evaluation of the proposed control process is carried out using a dSPACE1104 card. The experimental results obtained give a good functioning of the whole system, where the proposed MRAS-STC provides fast and high performance, while the system manages to perfectly follow the speed profile, under load disturbances and tolerable uncertainties, while respecting its dynamics under load.

Paper Reference: (PSE-18-5) 1570784081
Title: Efficient Model Predictive Control for Induction Machine with SOGI-FLL Based Flux Estimator
Author(s): Abdelkarim Ammar; Aissa Kheldoun; Brahim Metidji; Meryem Benakcha; Tarek Ameid (Algeria)

Abstract – Predictive torque control (PTC) has a similar design to direct torque control (DTC) (DTC). Instead of using a look-up switching table and hysteresis comparators, this approach evaluates the torque and stator flux errors as a cost function. It includes the inverter model into the control system and avoids the need for any modulation bloc. Besides, this control technique can handle numerous system constraints in a single control law with weighting variables. However, these coefficients are computed manually. The purpose of this study is to present a simple strategy that makes the tuning of weighting factors unnecessary. This technique uses load angle control to drive the torque. Then, only the flux reference and its predicted quantity will be evaluated by the cost function optimization. Since the control variables have the same type, no weighting factors are required. Moreover, the suggested control method utilizes a second-order generalized integrator (SOGI) as a flux estimator in order to solve the related problems of using a pure integrator or low-pass filters. A simulation with MATLAB/Simulink software is utilized to validate the effectiveness of the proposed strategies.

Paper Reference: (PSE-19-1) 1570756325
Title: Fixed Switching Frequency Predictive Direct Power Control with Three Vectors Voltage
Author(s): Zakaria El Zair Laggoun (Algeria)

Abstract – This article presents a Predictive Direct Power Control (PDPC) algorithm for AC three-phase voltage source converters, with AC side voltage sensors. The main advantage of this proposed method, which works with a constant switching frequency. The predictive controller selects the appropriate voltage vector sequence in each sampling period and calculates the duty cycles to minimize errors. Theoretical principles of this algorithm are introduced and the obtained results using MATLAB software are discussed.

Paper Reference: (PSE-19-2) 1570775932
Title: Robust Control of a PV-Wind Hybrid System Using DISO DC/DC Converter
Author(s): Farouk Mechnane; Said Drid; Boutheyna Hadmer; Nasreddine Nait-Said; Larbi Chrifi-Alaoui; Laurent Delahoche (Algeria–France)

Abstract – This study developed a hybrid renewable energy resource based on photovoltaic and wind systems. The purpose of this study is to address a control issue with an SMC of a DC DC Dual Input Single Output (MISO) converter that combines the power of two wind and photovoltaic generators to produce a constant power load. The SMC is proposed to overcome the unstable behavior of the MISO converter in parallel in order to provide a very high level of voltage regulation of the output DC bus. Discussion of the simulation MISO converter results for intermittent renewable energy (PV-Wind) applications. Line regulations demonstrate the SMC's effectiveness and robustness in mastering the integration of various types of renewable energy sources.

Paper Reference: (PSE-19-3) 1570781298
Title: Modified 3LSVPWM for Circulating Currents Control in Paralleled 3Level T-type Inverters
Author(s): Abdelmalik Zorig; Barkat Said; Abdelhamid Rabhi (Algeria)

Abstract − This paper proposes a new circulating current control method for parallel three-level T-type inverters. The suggested circulating current control strategy is realized by introducing a control variable adjusting the duty cycles of the redundant vectors of three-level space-vector pulse width modulation. The method is easy to implement for modular design, and can effectively eliminate the circulating current even with large mismatch between the parallel inverters. The effectiveness of the proposed circulating current control is validated under different operating conditions through Processes-in-the Loop simulation (PIL) using TMS320F28335 DSP board.

Paper Reference: (PSE-19-4) 1570783359
Title: Design and Simulation of Closed Loop DC-DC Cuk Converter for Photovoltaic Systems
Author(s): Mohamed Kaouane (Algeria)

Abstract − This paper presents design and simulation of a DC-DC power converter to be used with photovoltaic energy conversion systems. Since the instability of the generated parameters of photovoltaic modules and their dependence to atmospheric conditions, we propose in this work a technique to transfer the power to the loads that can help to avoid the risks of overvoltage and failures of conversion. The proposed model is a closed loop Cuk converter designed and controlled in order to have fast system responses to the input changes, and to improve the operating of power conversion. The main function of this converter is to maintain its output voltage at a chosen constant value while operating in high efficiency of energy transfer. The converter is studied in both configurations, open and closed loop modes, with irregulated input source, to make comparisons and verify the utility of the converter in the discussed situation. Simulation results with MATLAB/Simulink provide evidence of the performance of the converter's control in photovoltaic systems applications, it is able to make the output voltage stable when rapid changes occur in the input parameters.

Paper Reference: (PSE-19-5) 1570783363
Title: Experimental Study of PWM Based Hysteresis Controller and Amplifier Regulator for a DC/DC Converter
Author(s): Rabia Behloul; Mohamed Boudiaf; Kamel Guesmi; Lakhdar Mazouz (Algeria–France)

Abstract − This paper deals with a simulation and practical implementation of a PWM based hysteresis controller for a DC/DC boost converter operating in continuous conduction mode (CCM). Performances and properties of this controller are compared with those of amplifier regulator. Simulation results showed that the hysteresis control scheme provides better performances in the case for set-up DC/DC conversion purposes. Practical results are carried out to show the efficiency of the approach in terms of output voltage regulation and robustness against on line voltage and load disturbances.

Paper Reference: (PSE-19-6) 1570789390
Title: Hybrid PV-battery pumping system based on quasi Z source boost and bidirectional DC-DC converters
Author(s): Seifeddine Boukebbous (Algeria)

Abstract − in this work, a Hybrid PV-battery pumping system based on quasi Z source boost and bidirectional DC-DC converters is presented. To resolve the problem of low voltage produced by many renewable energy sources, the addition of a reliable power electronics interface is inevitable. For that, two innovative quasi Z source DC-DC converters are integrated. The first is associated to the PV panels to elevate the produced voltage and follows the maximum power point tracking MPPT. The second one is connected to the battery storage system to ensure the charge and discharge of the batteries. The objective of this present study is the control of hybrid PV-battery pumping system with quasi Z source DC-DC converters. For that, the system is modeled and controlled by Perturb & Observe MPPT algorithm to generate the duty cycle of the quasi Z source boost DC-DC converter and by regulating the DC output voltage (DC pump) of the quasi Z source bidirectional DC-DC converter. The results obtained in Matlab/Simulink environment show clearly the viability, performance, and the robustness of the system and its control strategy.

Paper Reference: (PSE-20-1) 1570775761
Title: Modeling of inductive coupling on aerial metallic Pipeline from HV overhead power line
Author(s): Rabah Djekidel; Nourredine Tadj; Abde-Chafik Hadjadj (Algeria)

Abstract − High voltage power transmission lines are often share the same corridor with the hydrocarbon transport metallic pipelines, which lead to the mutual interferences due to electric and magnetic fields resulting from these power lines. The main aim of this paper is to analyze the inductive coupling between a HV power line of 220 kV and an aerial metallic pipeline, based on the fundamental relation of the magnetostatic represented by the law of Biot-Savart. Typically, this is done for safety reasons concerning the maintenance operators and the pipeline integrity. The results achieved show that the presence of metallic pipeline near these power lines disrupts the magnetic induction distribution, the values of the induced voltage and the discharge current through the human body according to the location of the pipeline exceed the safety margin and may be a major source of risk and damage for personnel coming into contact with the pipeline and for equipments connected to the metallic pipeline, therefore, in order to eliminate these risks, the mitigation measure is highly recommended, it is enough simply to connect the both ends of the pipeline to earth with appropriate resistances. The obtained simulation results were compared with those obtained by Carson approach, a good agreement was obtained.

Paper Reference: (PSE-20-2) 1570783104
Title: Lightning Return Stroke Current Above Tower Analysis Using EM Models and the 3D FDTD Method
Author(s): Mohamed Abdelghani Talbi; Kaddour Arzag; Zin-Eddine Azzouz (Algeria)

Abstract − The three dimensions finite difference time domain method (3D-FDTD) and electromagnetic models are employed to calculate lightning return stoke current distributions in a vertical lightning channel above the Peissenberg tower. The latter is excited at its top by a lumped current source above a flat perfectly conducting ground. The calculating approach, which is based on Taflove formulation of the 3D-FDTD method combined to the UPML boundary conditions, is implemented on Matlab environment. For validation needs, the obtained lightning return stroke space and time distributions are compared with others taken from specialized literature. From this comparison, it appears that, the approach proposed and tested in this work yields reasonably accurate results in terms of lightning currents.

Paper Reference: (PSE-20-3) 1570783481
Title: Calculation and Mitigation of the Magnetic Field Under High Voltage Overhead Transmission Line
Author(s): Salah-Eddine Houicher (Algeria)

Abstract − The development of electric energy systems, than it requires the construction of many power transmission networks, which leads to increase and continuous consumption of various energy sources, the accurate evaluation of basse frequency electromagnetique fields generated in the vicinity of high voltage overhead transmission lines are caused perspective impacts in the environment and human health. This article present a simulation methodology for examine and plot the lateral profile of magnetic fields distribution under three-phase overhead power line in single circuit horizontal configuration at 1m above the ground level, and show the factors affecting the magnetic induction values, in order study the means principle of reducing and attenuating the magnetic field intensity underneath high voltage overhead line by using the passive loop method. The analytique calculation results are based in image method and the superposition theorem, are obtained by MATLAB software which makes it possible to better analyze and represent the transverse profile of the magnetic flux density under electric power transmission lines.

Paper Reference: (PSE-20-4) 1570783714
Title: Study of the different parameter corona discharge in point-plane Electrostatic Separator
Author(s): Nacereddine Guettaf; Seif el islem Guettaf; Faouzi Hassaine; Zahira Anane; Hamou Nouri; (Algeria)

Abstract – Electrostatic separation is an increasingly used technology in the waste recycling industry. This paper aims to study the behavior of dc corona discharge in point-to-plane electrostatic separator depending bias voltage. Physically the corona discharge has been studied by solving partial differential equations represented by Poisson's equation. The various corona discharge parameter is obtained and analyzed by the finite element method (FEM) computation for this simulation model developed by COMSOL - Multiphysics Software and determine the effect of the applied voltage on the important corona discharge parameters which are electric potential, electric field, electric displacement, current density and space charge density. Clearly, with increasing the applied voltage, the electric field magnitude, current density and space charge density increases.

Paper Reference: (PSE-20-5) 1570783938
Title: Modeling Effects of Partial Discharge Void Geometry on Various Dielectrics
Author(s): Mohamed Ayoub Sahnoune; Boubakeur Zegnini; Tahar Seghier (Algeria)

Abstract – Numerous solid, liquid and gaseous materials are used as insulations to protect power equipment. Most materials are not perfect and contain some impurities that could lead to internal failures over time, called partial discharge. Detection and measurement of partial discharge is very important to spot these failures early on inside the material. In order to study the PD characteristics we use MATLAB SIMULINK to simulate a developed model, the model is used to study the effects of void's geometry caused by the PD inside multiple dielectrics, the work is focused on the results of partial discharge in 6 dielectrics (air, rubber, epoxy resin, XLPE, paper-insulation oil-filled, teflon) with a single cavity as defect, we study 5 void shapes for each material (cylinder, cube, cuboid, sphere, ellipsoid).

Paper Reference: (PSE-20-6) 1570786873
Title: An Approach To Predict Flashover Voltage on Polluted Outdoor Insulators Using ANN
Author(s): Lazreg Taibaoui; Boubakeur Zegnini; Abdelhalim Mahdjoubi (Algeria)

Abstract – This paper aims to determine the critical flashover voltage on contaminated insulators using an artificial neural network. The artificial neural network determines the critical flashover voltage by using the insulator's diameter, height, creepage distance, form factor, and ESDD..data from experimental efforts are merged with theoretical conclusions from well-known theoretical modeling to build an algorithm for an Artificial Neural Network (ANN) model. The Matlab software suite was used to create the ANN model and algorithm. The acquired findings are encouraging, indicating that artificial intelligence technology can predict the crucial flashover voltage of the new design. Insulators under varied operating circumstances provide an important model that may be utilized for on-site modeling of various pollutant insulator characteristics. Comparative investigations have demonstrated that the suggested (AI) approach produces good results when compared to the analytical model and test data, with a Coefficient of determination (R^2) value of greater than 97%.

Paper Reference: (PSE-21-1) 1570783594
Title: Adapted Amperian Approach for 3D Magnetic Quantities Calculations Generated by Particular PM Shapes
Author(s): Ahmed Hamane; Hicham Allag; Abdelmalek Saoudel (Algeria)

Abstract – In this work, three-dimensional calculations of magnetic flux densities were developed from regular polygonal shaped permanent magnets. The principal hypothesis is that their magnetizations vectors are constants and collinearly oriented with the normal vectors of their base surfaces. In these situations, and by the integral approach considerations, the Amperian calculations were preferred to the Coulombian ones. The reason is that the rectangular forms of side's surfaces are parts of the equivalent thin coil of permanent magnet in which the analytical calculations are possible. The difficulties, concern only the inclinations, which were be resolved in this paper by Euler's transformations matrix. The results were demonstrated for triangular, square, pentagonal and polygonal regular prism permanent magnets.

Paper Reference: (PSE-21-2) 1570783607
Title: Parameter Tuning of Power Systems Stabilizer Using Stochastic Fractal Search Optimisation
Author(s): Elrachid Bendaoud; Radjeai Hammoud; Oussama Boutalbi; Meriem Harbadji (Algeria)

Abstract – This paper develops an optimal tuning of Dualinput power system stabilizer using a powerful meta-heuristic method named as stochastic fractal search algorithm (SFS). In the presented work, we consider a nonlinear model of a single machine connected to an infinite bus (SMIB), the excitation system is a static exciter with automatic voltage regulator (AVR) and power system stabilizer (PSS). After optimizing the stabilizer parameters, its performance is checked by using three-phase fault to ground as disturbances in different operating conditions. The obtained results affirm the performance of the optimized stabilizer and their ability to improve the system stability.

Paper Reference: (PSE-21-3) 1570783621
Title: Implemented Frequency Tracking Technique for Resonant Wireless Power Transfer System
Author(s): Imene Drici; Hicham Allag; Mohamed Chebout (Algeria)

Abstract – Resonant inductive coupling is a promising response to the defaults related to traditional inductive coupling and electromagnetic radiation: distance and efficiency. This paper establishes the frequency tracking technique, which is implemented in a wireless power transfer system for determining the optimal power transfer by controlling the active power produced by this system. In this concept, our work will take as the main idea the famous technique of maximum power point tracking (MPPT). The difference between the algorithms resulting from the MPPT and ours is that they relied on the voltage or current variation; however, the one we adopt acts directly on the switching frequency of the converter used. The process is described using a simulation of a parallel resonant circuit. The influence of mutual inductance on the resonant frequency is performed. Both simulation and theoretical results show a good agreement.

Paper Reference: (PSE-21-4) 1570783680
Title: Non-conventional implementation of a speed controller applied to a brushless DC motor
Author(s): Fouad Zebiri; Adel Choudar; Abedelhalim Kessal; Lazhar Rahmani (Algeria)

Abstract – Intelligent control such as fuzzy logic controller (FLC) is one of non conventionnel controller due to the non-linearity features. FLC is high performance control of Permanent magnet brushless DC motor (BLDCM) in the industry. It has excellent transient and steady-state response and relatively simple structure. This paper focus to design these controller in Simulink and implemented in real time using the DS1104 DSP of dSPACE ; As well, the 600 W inverter and our drive board are designed for driving the motor. The experimental results show that the FLC performs well in controlling the speed of the Permanent magnet brushless DC motor with satisfactory result

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Paper Reference: (PSE-21-5) 1570784019
Title: Inrush current influence on the hysteresis loop of a Single-Phase Transformer
Author(s): Abdelghani Yahiou; Abdelhafid Bayadi; Hassene Mellah; Mokhtar Abid; Mohamed Salem Rgueyeg; Abderaouf Ouadi Mrabet (Algeria)

Abstract – The inrush currents which generated at the energization moment of an electric transformer can reach high values and cause some abnormal problems in the power system. The idea of this article is original, and represents an initiation to a research project to visualize the effect of transient regimes on the characteristics of the iron core. The main purpose of this paper is to treat the influence of this transient phenomenon, i.e. inrush current, on the hysteresis loop of single-phase transformer, either in terms of its size, area, or position. First, a general study of the electromagnetic characteristics of the transformer iron core will be presented. Then, using the ATP_EMTP program, the simulation is realized to visualize the relationship between the hysteresis loop and the magnetizing inrush current in the

transient state. Finally, the results show the decrease of the hysteresis loop area and their shift with respect to the origin of the axes following the increase in the transient inrush current peak.

Paper Reference: (PSE-22-1) 1570769954
Title: Electrical behavior of a photovoltaic-thermoelectric hybrid system
Author(s): Salah-Eddine Bensalem; Nasreddine Belhaouas; Amar Hadj Arab; Mohamed Chegaar (Algeria)

Abstract – In this work, we investigate the electrical behavior of a photovoltaic-thermoelectric generator (PV-TEG) hybrid system. Relying on the corresponding equivalent electric circuit of the PV-TEG device, a simple mathematical model is established. The effect of the temperature difference (ΔT) on the J-V and P-V characteristics of the system is probed. The obtained results show that the PV-TEG coupling increases significantly the maximum power point (MPP), for instance, about 180% increase of power output is recorded compared to that of a sole PV cell when ΔT reaches 25Â°C.

Paper Reference: (PSE-22-2) 1570775769
Title: Fuzzy Logic Controller based Maximum Power Point Tracking Using DC/DC Boost Converter for PV System
Author(s): Cherif Kellal; Lakhdar Mazouz; Abdellah Kouzou; Ahmed Elotttri; Djaloul Karboua (Algeria)

Abstract – Solar energy efficiency is mainly related to changes in weather such as temperature and irradiation conditions, in light of these changes and non-linearity of the I-V characteristic, techniques and algorithms are relied on to increase efficiency and rapid response in all conditions by tracking the maximum power point of the solar energy system. This paper proposes an MPPT based on a fuzzy logic controller (FLC) using a boost converter for a photovoltaic system under variable conditions and Compares the results using the P&O method. The study was carried out by MATLAB/Simulink. Simulation results demonstrate that of FLC-based MPPT delicate tracking of MPP at different climatic conditions.'

Paper Reference: (PSE-22-3) 1570783379
Title: Boost Converter Control using LQR and P&O Technique for Maximum Power Point Tracking
Author(s): Aboubakr Brahimi; Djallel Kerdoun; Abderraouf Boumassata (Algeria)

Abstract – Extracting the maximum power out of the photovoltaic system is essential to enhance its efficiency and performance, in this paper a maximum power point tracking technique based on the perturb and observe algorithm (P&O) and the linear quadratic regulator (LQR) is proposed, the LQR controller is designed based on the linear state-space model of the boost converter and it was extended by an integrator to ensure zero steady-state error, the P&O algorithm is used as an outer loop controller to generate a reference voltage required for the LQR, the proposed controller shows excellent performance and robustness when compared to PI controller and the overall system tracks the MPP with satisfactory results.

Paper Reference: (PSE-22-4) 1570783401
Title: GWO parameter enhancement for the MPPT of PV system under multiple CPS
Author(s): Djallal Eddine Zabia; Okba Kraa; Hamza Afghoul (Algeria)

Abstract – Maximum power point tracking (MPPT) is a requirement for all photovoltaic systems. It has the potential to greatly increase the performance of PV arrays. In this paper, we investigate one of the parameters that have been proposed in the original paper of Grey Wolf Optimizer for better enhancement of the MPPT. The parameters are important in the algorithms to ensure the trade-off between exploration and exploitation. The proposed MPPT has been tested under the Multiple Cluster Complex Partial Shading condition (CPSC). The CPSC has one or more complex multiple peak clusters, the MPP in each cluster called the cluster head maximum. GWO technique is compared to Particle swarm optimization with Constriction Coefficient (PSO-CC) under CPSC. According to simulation results using Matlab/Simulink, the GWO method outperforms the other technique in terms of tracking efficiency to the global MPP (GMPP), and it was also reached that the selection of the values of the parameters depends on making a balance between exploration and exploitation in order to reach the highest possible point of the power of the PV curve in the shortest amount of time.

Paper Reference: (PSE-22-5) 1570783562
Title: Simulation and Experimental Study of MPPT Control for PV System using Perturb and Observe Algorithm
Author(s): Abdelhalim Borni; Abdelhak Bouchakour; Laid Zarour; Noureddine Bessous; Mohcene Bechouat; Layachi Zaghba (Algeria–Tunisia)

Abstract – A Photovoltaic Generator (PVG) exhibits non-linear $I = f(V)$ characteristics with Maximum Power Point Tracking (MPPT). In direct connection mode, a large difference can be found between the power delivered by the PVG and the actually that transferred to the load. In order to extract at any time, the maximum power is available at the terminals of the PVG to transfer it with the load part. Most usual techniques aim to use an adaptation stage between the PVG and the load part. This adaptation stage is adopted with MPPT chopper bloc. The objective of this paper is to realize the MPPT chopper controlled using Arduino-Uno. This paper applied the Perturbation and Observation (P&O) tracking method to achieve good results. The simulation results obtained from the chopper under the MATLAB / Simulink environment are validated experimentally.

Paper Reference: (PSE-22-6) 1570783651
Title: A comparative study of the FLC, INC and P&O methods of the MPPT algorithm for a PV system
Author(s): Houssem Saber; Abdelouadoud Bendaoud; Lazhar Rahmani; Radjeai Hammoud (Algeria)

Abstract – A photovoltaic generator's output power depends on a variety of parameters including solar radiation intensity and cell temperature. Thus, Maximum Power Point Tracking Controllers (MPPT) should be applied to achieve the maximum PV system power, irrespective of environment variations. The performance of these approaches differs in terms of energy recovery, conversion efficiency, response time and reliability, under various environmental conditions. This paper explores a comparative analysis between different MPPT, that are perturb-and-observe (P&O), incremental conductance (INC), and fuzzy logic controller (FLC). Using MATLAB / Simulink environment, a model of the PV module and the DC / DC boost converter was simulated using the various MPPT techniques. The simulation results demonstrated the advantage of the fuzzy controller at the operating point in terms of settling time, power loss, and oscillations compared with other techniques.

Paper Reference: (PSE-23-1) 1570783099
Title: Optimization of distributed generators to improve the performance of power system
Author(s): Houria Salhi; Sabah Louarem; Hamou Nouri; Sebaa Haddi (Algeria)

Abstract – The integration of distributed generation DG in the distribution network is considered one of the best solutions to resolve power loss, sustain balance between production and consumption and reduce greenhouse gas emissions. It is known that the non-optimal sizing and non-optimal location of DGs, can lead to increased power loss, and may impact the voltage profile, which can exceed the permitted limits. In this paper the proposed methodology uses Particle Swarm Optimization (PSO) algorithm to distinguish the optimal location and impact of DG in radial distribution network to reduce total active power loss and improve the voltage profile and hence reliability assessment of the system. The effectiveness of the proposed method is demonstrated by the application on IEEE 33-bus radial standard distribution test system.

Paper Reference: (PSE-23-2) 1570783215
Title: Africa vultures optimization algorithm for optimal power flow solution including SVC devices
Author(s): Houssam Alouache; Samir Sayah; Abdelatif Hamouda (Algeria)

Abstract − Optimal power flow (OPF) is an important tool for optimal operation and planning of modern power systems. Nowadays flexible AC transmission systems (FACTS) devices such as static var compensator (SVC), are widely used to control and enhance operation of power systems. This paper presents the application of the African Vultures optimization algorithm for solving the OPF problem. Three single objective functions to be minimized are considered i.e., fuel cost, active power loss and voltage deviation including SVC device. The IEEE 30-bus benchmark power system without and with SVC was used for testing and validation purposes. The obtained results demonstrate the effectiveness of the proposed method for solving the OPF problem.

Paper Reference: (PSE-23-3) 1570783665
Title: Solving Various Energy Management Optimization Using Global Metaheuristics Methods
Author(s): Zahia Djeblahi (Algeria)

Abstract − Energy Management Optimization is one of the most interesting problems of a modern energy systems operation that includes multi-modal, large-scale, non-convex and non-linear constrained optimization problems. Due to these features, solving this problem is becoming an active topic for power engineers and researchers. This paper proposes a new planning strategy based on a stochastic optimization method namely the Arithmetic optimization Algorithm (AOA), to solve various power optimization problem viz. Cost minimization of the power generation that consists of thermal, power loss minimization, reducing gas emission of power generations and voltage deviation. A comparative study between the AOA and moth flame optimizer (MFO), the particle swarm optimization (PSO) and the genetic algorithm (GA) is elaborated. The particularity and efficiency of these selected metaheuristic algorithms in terms of solution quality and convergence characteristics have been validated on the practical IEEE 30-bus test system. The Test results obtained compared to other algorithms demonstrates that the proposed AOA is an effective algorithm and may be considered as an alternative tool for solving various practical optimization problems related.to power system operation and planning.

Paper Reference: (PSE-23-4) 1570783833
Title: Optimal Capacitor Allocation Based On Hourly Load Variation Via New Optimization Algorithms
Author(s): Anes Bouhanik; Ahmed Salhi; Djemai Naimi (Algeria)

Abstract − this paper proposes the use of Equilibrium Optimizer (EO), African Vultures (AVOA) and Gorilla Troops (GTO) recently developed optimization techniques to solve the problem of finding optimal placement and sizing of shunt capacitor banks in radial distribution system. The objective is to meet hourly load variations within specified cost, equality and inequality constraints. IEEE 33-bus and 69-bus standard radial distribution networks are used to test the robustness of the proposed algorithms. As first step, these methods are applied to the most candidate buses, which are selected based on the voltage profile of the test system. Then, obtained results are compared with each other to identify the best tool in terms of solution quality and convergence features. Test results show that EO algorithm supplies higher quality solutions.

Paper Reference: (PSE-23-5) 1570784073
Title: Optimal power flow incorporating stochastic wind power using Artificial gorilla troops optimizer
Author(s): Ramzi Kouadri (Algeria)

Abstract − This paper presents the application of a new nature-inspired metaheuristic algorithm to solve optimal power flow (OPF) problems considering stochastic wind power. This algorithm is called the Artificial gorilla troops optimizer (GTO) which is inspired by the behaviors of gorillas. In this context, the main objective is to minimize the total generation cost (TGC) according to the optimal scheduling of thermal and wind units, satisfying the power system constraints. The function of wind power cost includes the direct cost, the penalty cost due to the underestimation and the reserve cost due to the overestimation of available wind power. The simulation studies are carried out on the standard IEEE-30 bus system under nominal and heavy loading. A comparative study demonstrates that GTO produces very competitive performance and outperformed the Artificial hummingbird algorithm (AHA) in terms of convergence rate towards the global optimum solution.

Paper Reference: (PSE-24-1) 1570775784
Title: Speed Control of Induction Motor Using Three Fuzzy-Logic-Based Controllers
Author(s): Saliha Boutora; Amina Yahia; Hadjer Bouyahia; Razika Boushaki Zamoum; Abdellah Kouzou (Algeria)

Abstract − This paper portrays the methods for controlling an induction motor using three different types of fuzzy controllers: single-stage fuzzy controller; fuzzy-PID controller and adaptive-fuzzy-PID controller. The comparative performance of these three techniques has been presented and analyzed in this work. Indirect field oriented control is used in the proposed scheme and a Matlab simulation is performed.

Paper Reference: (PSE-24-2) 1570775923
Title: Comparing performances of three CFNN used for DC machine combined parameter and states estimation
Author(s): Hacene Mellah; Abdelghani Yahiou; Kamel Eddine Hemsas; Carlo Cecati; Hamza Sahraoui; Rachid Taleb (Algeria–Italy)

Abstract − The main idea of this paper is for evaluation and make a performance comparison between three types of learning algorithms in the case of simultaneous estimation of parameter and states of a brushed DC machine. Three Cascade Forward Neural Network (CFNN) estimators have been designed, the first one is based on Quasi-Newton BFGS backpropagation (BFGSBP), the second one is based on Resilient backpropagation (RBP) and the last one is based on Bayesian Regularization backpropagation (BRBP). All this neural network use just voltage and current as imputes and estimates simultaneously speed, temperature and armature resistance. A series of simulation have been carried out for three algorithms and the results were compared between them for each Artificial Neural Network (ANN) output's. The comparative study of the time required to converge for each supposed MSE, present the trade-off between fastness and convergence of three algorithms in order to develop the best NN

Paper Reference: (PSE-24-3) 1570778178
Title: On-Chip Micro-Transformer Modeling For Power ICs Applications
Author(s): Mokhtaria Derkaoui (Algeria)

Abstract − This paper focuses on the modelling of on-chip integrated micro-transformer especially at high frequencies. The coils are of octagonal spiral planar topology. The equivalent electrical circuit summarizes all parasitic effects created by stacking of different layers. On-chip micro-transformer is characterized by scattering parameters extraction. The electromagnetic and thermal effects are illustrated in the micro-transformer operating at high frequencies by COMSOL Multiphysics 5.0 Software.

Paper Reference: (PSE-24-4) 1570783192
Title: Sliding Mode Control of PMSM Drive for Lightweight Electric Vehicles
Author(s): Bachir Bendjedia (Algeria)

Abstract − This paper deals with comparative study between PI and sliding mode controllers of PMSM drive for electric vehicles. The PMSM drive is composed by Permanent Magnetic Synchronous Motor (PMSM) with three phase two level inverter and Field Oriented Control (FOC). Firstly, a comparative study between PI and sliding mode controllers is carried out in terms of robustness and dynamic performances using different reference speeds. Finally, to confirm and test the effectiveness of both control approaches, a comparative study

is carried out using a dynamic model of vehicle under NEDC driving cycle. Simulation results confirm the best performances of the traction chain using sliding mode controllers in terms of speed response, torque ripple and robustness.

Paper Reference: (PSE-24-5) 1570784054
Title: Modeling of the innovative magnetic pulse joining technology
Author(s): Ilhem Boutana; Salah Eddine Bouferroum; Ahmed Laouira (Algeria)

Abstract – Magnetic pulse joining, a technique increasingly used in industry, is a process that enables the rapid assembly of similar or dissimilar materials in the solid state. This process is based on the generation of electromagnetic forces in a conductive part by means of an inductor carrying a variable and intense current, of pulse form. The numerical models developed under COMSOL environment are intended to study, analyze and predict the behavior of flat or tubular parts, assembled by magnetic pulse. The applications of this work are related to innovative industrial systems, particularly used in the automotive industry. The numerical results obtained are compared and validated by previous experimental works.

Paper Reference: (PSE-24-6) 1570784109
Title: Sensorless Scalar Control Based On SOGI-FLL for an Induction Motor Used in Electric Vehicle
Author(s): Mohammed Boukhari; Ismail Ghadbane; Riad Bouzidi (Algeria)

Abstract – This paper, present a sensorless scalar control for its application to an induction motor used in electric vehicle. as it is based on indirect motor speed estimation by using second order generalized integrator-frequency locked loop method Which in turn requires only one current sensor, Thus, the cost is can be reduced. The simulation results are presented to demonstrate the effectiveness of the proposed method.

Paper Reference: (PSE-25-1) 1570775551
Title: Energy Management of Fuel Cell-Battery-Super capacitor Hybrid power source for Tramway applications
Author(s): Faiçal Briber; Nasserdine Boudjerda; Rezzak Daoud (Algeria)

Abstract – This paper deals with energy management of tramway powered by Fuel Cell/Battery/Super-capacitor. The fuel cell is the main source, it is connected to the direct current (DC) Bus via a boost converter to supply energy to battery and the load power requirements. The super capacitor is linked to the DC Bus through a buck-boost converter and ensures the transient power requirements. The battery is also linked to the DC Bus through a buck-boost converter responsible for supplying both the traction load and the super capacitor in addition to recovering part of the braking energy of the traction motor. We propose an energy management technique, based on the most used tramway drive cycle, namely the Turkey drive cycle, with the use of conventional proportional-integral (PI) controllers. The aim of the study is to satisfy the dynamic of the DC bus, to provide the energy required by the tramway and t recover the energy of braking of the traction motor. The suggested strategy is tested throw some simulations under Matlab-Simulink and the results are discussed.

Paper Reference: (PSE-25-2) 1570776032
Title: Integral Sliding Mode Control of Synchronous Reluctance Machine based Electric Vehicle
Author(s): Ghadbane Houssam Eddine; Said Barkat; Azeddine Houari; Ali Djerioui; Tedjani Mesbahi (Algeria–France)

Abstract – This paper presents an integral sliding mode control of a synchronous reluctance motor (SynRM) operating as part of an urban electric vehicle. On the sources side of the electric vehicle, an energy management strategy (EMS) based on a frequency decoupling strategy is applied to supervise a battery-super-capacitor hybrid power system (HPS). These two sources are linked in parallel to the DC bus through two bidirectional DC-DC converters, allowing for independent control of each source's power flow. On the traction side, an integral sliding mode control is design for robust stabilization and disturbance rejection of the synchronous reluctance motor (SynRM) drive system. In order to verify the efficiency of the proposed control technique and evaluate the performance of the sources energy management strategy, a comprehensive simulation of electric vehicle was carried out using Matlab/Simulink software.

Paper Reference: (PSE-25-3) 1570778448
Title: A Review of Factors Influencing the Adoption of Electric Vehicles in the World
Author(s): Marwa Ben Ali; Ghada Boukettaya (Tunisia)

Abstract – The road transport sector has a direct effect on fossil energy sources, cost, and consumption. Indeed, it has affected the environmental situation reversely with high carbon dioxide emissions. Due to this negative impact, the transition to electric vehicle (EV) technology must be a mandatory target for governments worldwide. To achieve this objective, many countries have developed various policies to promote EV technology buying or retrofitting. Thanks to the adopted policies, the electric technology market share has been growing. Meanwhile, research studies are involved also in this project by studying the benefit of EV technology low total cost of ownership (TCO) to motivate consumers of its utilization. For that purpose, the present paper aims to review the discussed policies, and methods to boost the diffusion of electric technology as a sustainable and reliable solution to overcome the global energy situation despite the different obstacles, barriers, and the pandemic situation (COVID-19), which has affected the consumer economic and social behavior.

Paper Reference: (PSE-25-4) 1570783320
Title: Motor and Regenerative Braking Operations for an Electric Vehicle using Field Oriented Control
Author(s): Idris Azizi (Algeria)

Abstract – Regenerative Braking is one of the solutions to the problems linked to energy storage in Electric Vehicle, as it helps to boost its autonomy. In this work we present analysis, modelling and simulation of indirect field orientation control of Permanent Magnet Synchronous Machine, considering the two operation modes; the motor mode and regenerative braking mode. A bidirectional DC-DC converter controls the DC bus which supplies the PMSM via the three phase inverter and allows power flow in the opposite direction. Vehicle dynamics with the load torque applied on the shaft of a motor is to be examined. The energy generated during the braking phase is stored in the battery. The Matlab/Simulink software will be used to simulate an urban Electric Vehicle movement in order to test the effectiveness of the regenerative braking on the electric vehicle autonomy.

Paper Reference: (PSE-25-5) 1570783688
Title: Robust Sensorless Synergetic Control of Electric Vehicle Using Algebraic Observer
Author(s): Mohammed Kabir Billal Boumegouas; Katia Kouzi; M'hamed Birame (Algeria)

Abstract – The choice of sensorless control of Electric Vehicle drives has a favorable effect to improve the traction chain system reliability, distribution rejection, and to reduce the component cost. In this paper, an original Algebraic Observer (AO) was developed to estimate the speed of an Electric Vehicle (EV) propelled by six-Phase Permanent Magnet Synchronous Motor PMSM. The suggested AO has shown a suitable solution for multi-phase machines assortment, because it does not depend on the model of the drive system, and provides satisfaction estimates even in the presence of significant noise levels. Moreover, in order to enhance the dynamic and static performance of EV, a robust nonlinear control approach based on synergetic theory was developed. Synergetic control is presented due to its robustness and high dynamic performances and reducing the chattering phenomenon. To check the effectiveness of the submitted control approach and the algebraic observer. A real model of Electric vehicles was implemented under the NEDC driving cycle. The simulation results confirm the robustness and high performances of nonlinear synergetic control and the sensorless control using algebraic observers even in the presence of high-level noises.

Paper Reference: (PSE-25-6) 1570789100
Title: Modeling of Lithium-ion battery open-circuit voltage using incremental and low current test
Author(s): Djamila Abbas; Mohamed Mourad Lafifi; Brahim Boulebtateche (Algeria)

Abstract − Accurate estimation state of charge (SOC) of a lithium-ion cell is of paramount importance for battery management systems (BMS) in electric vehicles (EV). The SOC of a lithium-ion cell is related to the open-circuit voltage (OCV) by a non-linear relationship; finding relationship between OCV and SOC that can translate the cell's behavior will increase the accuracy of the SOC estimation. This paper studies the static behavior of a lithium-ion cell, the nonlinear relationship between OCV and SOC is described by polynomial and Fourier functions for two cells subjected to two types of OCV test low current and incremental test, the goal is to find the common function that best fits for both test and over the largest range of SOC.

SAC Papers

Paper Reference: (SAC-1-1) 1570775549
Title: Fuzzy PI Gains Tuning By PSO And Genetic Algorithms Controls A Hybrid Indirect Matrix Converter
Author(s): Taki Eddine Ameur; Aissa Ameur and Atallah Benalia (Algeria)

Abstract − In this paper, we study the performance of a power active filtering of the current perturbation using a hybrid indirect matrix with a three cell flying capacitance; this hybrid structure is controlled by a fuzzy PI controller in which it gains are tuned with the PSO algorithm and genetic algorithm (GA). In the first part, we present the full grid model with the perturbation source, as well as a detail of the hybrid structure. In the second part, we explain the current perturbation identification technique, and then we passed to gains tuning used algorithms.The simulation results by MATLAB, Simscap/sim power system code shows a good performance of the fuzzy PI gains tuning by obtaining a low THD value in the filtration process.

Paper Reference: (SAC-1-2) 1570782617
Title: Processor-In-the-Loop Simulation of a Neuro-Fuzzy Controller on Raspberry Pi 3 board
Author(s): Hocine Khati; Hand Talem; Rabah Mellah; Mohand Achour Touat and Mohamed Amine Nehmar (Algeria)

Abstract − In this paper, the study of the ANFIS (Adaptive Neuro-Fuzzy Inference System) controller and its implementation on a Raspberry Pi 3 board were discussed. The objective is to study the behavior of the ANFIS regulator on the hardware target (Raspberry Pi 3 board) in the case of the control in position of an inverted pendulum, using the Processor-In-the-Loop (PIL) technique from MATLAB-Simulink. The proposed approach consists of two stages. The first step concerns the synthesis of the fuzzy neural controller, and in the second step, we present the control scheme synthesized on the Simulink environment, in order to control the position of the inverted pendulum. Finally, the simulation results in PIL mode show the efficiency of the proposed controller in terms of tracking and robustness against disturbances.

Paper Reference: (SAC-1-3) 1570783247
Title: Fuzzy reference model H_∞ integral fuzzy maximum power tracking of WECS based on DFIG
Author(s): Keltoum Houda; Dounia Saifia; Mohammed Chadli and Mohamed Nasri (Algeria–France)

Abstract − This paper presents a new fuzzy control design for maximum power tracking (MPPT) of wind energy conversion systems (WECS) using a doubly fed induction generator (DFIG) based on H_∞ optimal control. In the first place, a new nonlinear reference model is developed for describing the optimal dynamic of the doubly fed induction generator (DFIG). In the second place, the nonlinear dynamic behaviour of the real system and its reference model are described by a Takagi-Sugeno (TS) fuzzy model. Then, using a fuzzy proportional integral state feedback controller, a novel MPPT strategy for DFIG-based wind energy conversion systems is investigated. The H_∞ criteria performance are used to design a robust fuzzy proportional integral state controller under varying wind speed. The H_∞ stabilisation conditions are generated and given in terms of linear matrix inequalities (LMI). The estimation of the largest set invariance condition is proposed as a LMI convex optimization problem. Finally, simulation results show that the proposed fuzzy integral state controller gives a good disturbance rejection and MPPT rapid convergence in the presence of wind's gusts.

Paper Reference: (SAC-1-4) 1570783322
Title: Adaptive Fuzzy Control for State Constrained Pure-Feedback Nonlinear Systems with Input nonlinearity
Author(s): Mohammed Haddad and Abdesselem Boulkroune (Algeria)

Abstract − This paper focuses on the problem of adaptive fuzzy backstepping control for a class of pure-feedback nonlinear systems with time-varying state constraints, input saturation and dead-zone, and unmatched external disturbances. The adaptive fuzzy models are employed to online approximate some uncertain smooth functions. Unlike many neighboring works, this paper carefully solves the open problem of the feasibility of the virtual control laws in the barrier Lyapunov function-based control design framework. By using disturbance observers in a backstepping framework, the estimation errors due to the use of a priori bounded virtual control law are appropriately compensated and the "explosion of complexity" is practically avoided. The proposed controller ensures the convergence of the output tracking error to an arbitrarily tiny neighborhood of the origin, boundedness of all closed-loop signals and no-violation of the predefined state constraints. A numerical example is provided to validate the effectiveness of the proposed method.

Paper Reference: (SAC-1-5) 1570783366
Title: Modeling and Simulation of 10 MW PV array with ARV MPPT based on ANN model
Author(s): Chaouki Messasma; Seif Eddine Chouaba; Bilal Sari and Abdallah Barakat (Algeria–France)

Abstract − The increasing integration of photovoltaic (PV) systems into electrical power grids to ensure greater energy and environmental security has affected the stability and quality of these grids. To overcome these impacts, it is essential to model and simulate a PV system connected to the grid. This article proposes modeling and simulation of a proposed PV array of 10 MW on Matlab Simulink, this model is tested under different scenarios of climate change. Moreover, it is simulated by variations of temperature (T) and irradiation (G). Adaptive reference voltage Maximum Power Point Tracker (MPPT) based on artificial neural networks (ANN) model is implanted to keep the output of PV power generation system at the maximum possible power output level. All curves and graphs illustrating these steps are presented in order to demonstrate the effectiveness of the proposed approach.

Paper Reference: (SAC-1-6) 1570783437
Title: Finite-Time Adaptive Fuzzy Control of Output Constrained Nonlinear Systems with Disturbance Observer
Author(s): Mohammed Haddad and Abdesselem Boulkroune (Algeria)

Abstract − We, in this paper, investigate to design a finite-time fuzzy adaptive control based on disturbance observer for unknown nonstrict-feedback nonlinear systems simultaneously subject to output constraints, actuator' saturation, and bounded mismatched external disturbances. A barrier Lyapunov function is used for dealing with output time-varying constraints. Suitable fuzzy systems and nonlinear disturbance observers are respectively introduced to online estimate uncertain nonlinear functions and to robustly deal with external disturbances. Via both Lyapunov stability analysis and numerical simulation studies, it is shown that the proposed controller can achieve the practical finite-time output-tracking, the uniform ultimate boundedness of all the signals in the closed-loop system, and the non-violation of imposed output constraints.

Paper Reference: (SAC-2-1) 1570774297
Title: Interval Observers Fault Detection for Linear Parameter Varying Systems with H- Fault Sensitivity
Author(s): Rihab Lamouchi; Tarek Raissi; Messaoud Amairi and Mohamed Aoun (Tunisia–France)

Abstract − This paper proposes novel robust fault detection (FD) method for a class of discrete-time Linear Parameter Varying (LPV) systems with sensor faults. The disturbances and measurement noise are considered unknown but bounded. Then,an interval FD observer is developed using L_∞ performance to attenuate the effects of the uncertainties and to improve the accuracy of the estimation. Furthermore, H– performance is used to make the residual as sensitive as possible to faults and a FD decision is set to indicate their presence. A numerical example is presented to illustrate the effectiveness of the proposed method.

Paper Reference: (SAC-2-2) 1570775230
Title: Interval Valued PCA-Based Approach For Fault Detection In Complex Systems
Author(s): Abdelhalim Louifi; Salah Eddine Louhab; Abdelmalek Kouadri; Lahcene Rouani; Abderazak Bensmail and Mohamed Faouzi Harkat (Algeria–USA)

Abstract – The purpose of this article is to emphasize the importance of detecting process sensor faults using PrincipalComponent Analysis (PCA). In practice, the uncertainties insensor data influence the system and introduce some problemsinto the control decision-making process, which results in anincreased frequency of false alarms and inaccurate choices. Asa consequence, a current method for expressing the influenceof these uncertainties on sensors has been adopted, namelyan interval-valued data representation. Process modelling wascarried out using PCA for interval-valued data, with four ofthe most well-known techniques being evaluated. To reduce falsealarms, a threshold with a specified degree of confidence has been created for both Hotelling's T2 and Q-statistics, and a novelstatistic ϕ for detecting process problems. Finally, to verify the suggested approach's capacity to reduce false alarms and misseddetection rates, cement rotary kiln data, were tested.

Paper Reference: (SAC-2-3) 1570775550
Title: Gear Features Extraction And Classification Using MODWPT and Neural Network
Author(s): Adel Afia; Hand Ouelmokhtar; Fawzi Gougam; Walid Touzout; Chemseddine Rahmoune and Djamel Benazzouz (Algeria)

Abstract – As the ever-advancing modern industry, advanced solutions to problems are constantly in the making in the field of maintenance engineering. One of the key pieces of any rotating machine are definitely gears. These represent essential parts that if by any chance fail, could result in a complete or a catastrophic failure. Thus, condition monitoring is of paramount importance to assuring the proper functioning of any system. Artificial intelligence is a novel approach to optimise the maintenance of machines by allowing the creation of self-taught models that adapt easily to different circumstances through constant training, hence, the method called deep learning. This paper lies in its methodological approach that deals also with this issue by developing a new automatic approach to detect, identify and classify several gear defects. The intelligent method is a combination of Maximal Overlap Discrete Wavelet Packet Transform (MODWPT), Entropy and Multilayer Perceptron (MLP) neural network. MODWPT is an alternative decomposition technique with a uniform frequency bandwidth to avoid any difficulties with detection. Entropy is used to build feature matrix in the feature extraction step. Additionally, MLP provides a powerful automatic feature classification tool. Experiment has been conducted on the data sets collected from a gearbox test rig with healthy state and five different gear defects under varied speed and load conditions to show that the novel approach can successfully detect and identify gear defects in all cases.

Paper Reference: (SAC-2-4) 1570775964
Title: Set-Membership Fault Detection for Discrete-time Switched Linear Systems
Author(s): Leila Dadi (Tunisia)

Abstract – The problem of Fault Detection (FD) for continuous-time switched linear systems subject to bounded disturbances is investigated in this paper. Based on cooperativity and stability properties, and fulfillment of an Average Dwell Time (ADT)constraint, guaranteed upper and lower bounds of the state are calculated using an interval observer. Under the assumption that disturbances and measurement noise are unknown but bounded with a priori known bounds, stability criteria is expressed in terms of Linear Matrix Inequalities (LMIs). Then, a fault detection methodology is developed to indicate the presence of faults. Finally, we demonstrate the proposed fault detection approach via an illustrative example

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Paper Reference: (SAC-2-5) 1570776021
Title: Bearing Fault Diagnosis Method Based on VMD-DWT and CMWPE
Author(s): Ahmed Taibi (Algeria)

Abstract – The bearings are the most important components in rotating electrical machines. Failure of these bearings can result in direct economic loss and heavy casualties. Therefore, to solve this problem and improve the accuracy of bearings fault diagnosis, a new approach based on variational mode decomposition (VMD), discrete wavelet transform (DWT) and composite multiscale weighted permutation entropy is proposed in this paper. Firstly, the VMD is utilized to decompose the vibration signal of the rolling bearing into several intrinsic mode functions (IMFs), then, the Pearson correlation coefficient is used to screen the IMFs, which contain more noise information. Next, the DWT is applied for filtering the noisy IMFs. Secondly, the CMWPE of each components is calculated to form the features vector. Subsequently, the features containing the most information is selected by LSDA algorithm, Finally, the feature vectors obtained are fed into SVM model for training and classification. The effectiveness and superiority of the proposed method is verified compared to other methods.

Paper Reference: (SAC-2-6) 1570776031
Title: Adaptive observer design for unmatched faults estimation: An LMI-based parameterization method
Author(s): Nabil Oucief; Sofiane Doudou; Ahsene Boubakir and Salim Labiod (Algeria)

Abstract – In this paper, we address the problem of adaptive observer design for multiplicative fault estimation. The concerned faulty plants are nonlinear and characterized by a structure that does not meet the well-known observer matching condition. A simple two-stage adaptive law, which does not require putting the system into any canonical form, is given to estimate the fault vector. Moreover, for efficient computation of the observer gains, a matrix parameterization approach is proposed to turn the stability sufficient conditions into a single linear matrix inequality. Finally, the model of a mechanical system is used to test the applicability and effectiveness of the presented scheme.

Paper Reference: (SAC-2-7) 1570782846
Title: A signal processing approach to modeled bearing faults detection in electric system
Author(s): Azeddine Ratni; Djamel Benazzouz and Hicham Bouregba (Algeria)

Abstract – The consequences of mechanical defects are generally manifested at the level of the air gap by the displacement of the center of the rotor with respect to the stator, thus a defect of eccentricity or the length of the air gap is uniform which has an effect on the distribution of the flux density of the air gap and thus influences the parameters which depend on it. This paper presents the study of the frequency distortion of the electromagnetic torque of an electrical system in the presence of bearing defects. A brief explanation of the modeling of the system will be made. The influence of defect withe low energy on the electromagnetic torque is analyzed and its oscillations are explained considering the interaction between the stator and the rotor fundamental and harmonic currents.

Paper Reference: (SAC-3-1) 1570787532
Title: New Financial Distress Prediction Technique based on Genetic Algorithm and Multi-Layer Perceptron
Author(s): Ahmed Khedr and Abdulwahid A. Saif (UAE Saudi–Arabia)

Abstract – The ability to foresee financial distress has become an important subject of research as it can provide the organization with early warning. Furthermore, predicting financial distress is also of benefit to investors and creditors. In this paper, a hybrid approach of Genetic Algorithm (GA) and Multi-Layer Perceptron (MLP) for Financial Distress Prediction (FDP) (FDP-GAMLP) is proposed. FDP-GAMLP focus on GA-based tuning of the main four hyper-parameters namely network width, network depth, network optimizer, and dense layer activation function, which can make a difference in the algorithm exploding or converging. The main objective of this study is to tune the hyper-parameters of the MLP model using an improved GA. The prediction performance is evaluated using real data set with samples of companies from countries in Middle East region. The resampling technique using k-fold evaluation metrics, to get unbiased and most

accurate results is used. The simulation results show that the proposed FDP-GAMLP outperforms the classical machine learning models in terms of predictive accuracy.

Paper Reference: (SAC-3-2) 1570780308
Title: Identification of the AM2HN Model Parameters in the Context of Organic matter Recycling
Author(s): Abdelhani Chaabna and Samia Semcheddine (Algeria)

Abstract − The increasing interest in the anaerobic digestion process is due to its successful implementation worldwide. The bioreactor could be distinguished by two main advantages: the recycling of the organic wastes and environmental clean-up, as well as it produces biogas which is considered as renewable energy. Anaerobic digestion is a nonlinear and complex process, many bacterial populations are involved. Because of its advantages, it was needed to develop models that predict the process behavior. For such purposes, models developed are used to concept control laws in biogas production. However, before designing a control law in anaerobic digestion processes, it is first necessary to identify used model parameters.In this paper, we will identify the modified version of the two stage anaerobic digestion model (AM2HN) proposed by HASSAM et al, which is a reduced model of the Anaerobic Digestion Model nÂ°1, via a set of experimental steady-state data using the multiple linear regression method represented in the ordinary linear least squares estimator.In order to use such linear estimators for the identification of parameters of anaerobic digestion models, we chose to work at the equilibrium point.The identification algorithm was executed using MATLAB 2016. The parameters of the model that we wanted to calculate were successfully calculated. The values found for the different coefficients with the regression method have proven the significant effect of the proposed method despite some drawbacks. Interpretations and results have been presented in this paper which show that a least-squares estimator is a powerful tool for parameter estimation.

Paper Reference: (SAC-3-3) 1570783696
Title: Reduction method for parameters calculation of the characteristic equation of a photovoltaic module
Author(s): Abdelhamid Mraoui (Algeria)

Abstract − In order to calculate the electrical energy that can be supplied by a photovoltaic module, the most commonly used model is the one-diode, five-parameter model. In this work we propose a method to calculate the five parameters of the model. Our method is simpler since it reduces the system of equations to only two easy to solve. From the information provided in the manufacturer datasheet, it is thus possible to calculate the five parameters of the one-diode model. However, it has been noticed that for a module that has already been operated the method is not applicable. We have developed another method using experimental tests to calculate the model parameters. The second method is simplified by using reduced equations to determine precisely the necessary constants. The results show a very small difference between the measured data and the computational estimations.

Paper Reference: (SAC-3-4) 1570783967
Title: Optimal Informative Data Selection for Historical Data Driven Process Identification
Author(s): Ridouane Oulhiq; Khalid Benjelloun; Yassine Kali and Maarouf Saad (Morocco–Canada)

Abstract − In process identification, data used for modeling must be informative enough over the set of the used model structures. However, when using historical data for process identification, data informativity is not always guaranteed. Thus, in this paper, an optimal method for selecting an informative subset from a non-informative historical dataset is developed. Given a model structure, the proposed method maximizes the number of extracted data rows while considering the extracted subset informativity as a constraint. Accordingly, a cost function is constructed and a binary genetic algorithm is used for its optimization. In a case study, the proposed method is used to extract informative data from a database of an industrial thickener. The obtained results show the capability of the proposed approach to extract a maximum volume of informative data from a non-informative dataset.

Paper Reference: (SAC-4-1) 1570775709
Title: Comparison between the additive tolerant control and PID control for nonlinear delayed system
Author(s): Tayssir Abdelkrim (Tunisia)

Abstract − This work studies the problem of state and fault estimation and control for Non-Linear (NL) systems with time delay subject to sensor fault.Additive fault tolerant control (FTC) is proposed to achieve the stability of system. When a sensor fault affects the system, the tracking error between the reference input and the measurement deviates from zero. The nominal control then changes in order to eliminate the error and the real output therefore become different from its reference value. In the presence of a sensor defect, the objective of the accommodation is to prevent the control to evolve. This task can be accomplished by analyzing and canceling the effect of the sensor fault on the control. After determining the amplitude of the fault, we move on to its compensation step, this step is done by adding the additive control law to the determined nominal control law.The generation of nominal control law consists to determinate the state feedback gain by using the pole placement technique.

Paper Reference: (SAC-4-2) 1570776016
Title: Fault Tolerance Control and Diagnosis of Induction Machine Under Stator Fault Conditions
Author(s): Fatima Babaa and Abderrahim Touil (Algeria)

Abstract − Study fault-tolerant control (FTC) systems it's a new area of research devoted to controlling and detecting incipient faults. It is important to study the adaptation of the control law to preserve pre-specified performances in terms of quality of the production and even safety. Fault-tolerant control consists of fault diagnosis and re-design of the controller during operation. The induction motor is an important part of industrial systems. Then, the robustness and the performance control have to be taken into account in the design of the machine. This paper proposes an optimal vector control under inter-turn stator fault. We apply a technique for a control-tolerant to inter-turn short-circuit faults, allowing to achieve the machine's performances while keeping the control's robustness. The design of the controller works in such a way that the control of the feedback speed of the induction motor will only be controlled by the proportional-integral PI performance controller for a nominal model without disturbance and with disturbance. Finally, using Simulink of MATLAB, the simulation results demonstrate the proposed model's effectiveness and good performance.

Paper Reference: (SAC-4-3) 1570783867
Title: Emergency Control Strategy of a Reconfigurable Quadrotor with Total Loss of One Rotor
Author(s): Abdenour Salmi; Mohamed Guiatni; Yasser Bouzid and Saddam Hocine Derrouaoui (Algeria–France)

Abstract − In this paper, an emergency control strategy is developed for a new reconfigurable quadrotor with foldable rotor arms to deal with a total loss of one of its rotors. The proposed strategy allows to adapt the configuration of the quadrotor when severe fault is occured in one rotor. The reconfigurable quadrotor changes it's shape by folding the two adjacent rotor arms to the damaged one and performs as a trirotor. Since the shape transformation induces a variation of the inertia and the control matrix, an emergency sliding mode controller is designed based on control allocation matrix, where the control efforts are redistributed among healthy actuators in the resulting configuration of the quadrotor. Simulation results show that the proposed strategy is successful in controlling the damaged quadrotor until achieving its trajectory.

Paper Reference: (SAC-4-4) 1570788330
Title: Fault tolerant control for neutral systems with delayed inputs
Author(s): Rabeb Benjemaa (Tunisia)

Abstract − In the present paper, the design problem of fault tolerant control for neutral time delay systems with delayed inputs is studied. The proposed control law is composed into two terms, a nominal control and an additive control. The first term presents the designed state feedback proposed to develop a control strategy which maintains the stability and the desired performance in closed loop system, even in presence of faults. In this case, the Linear Matrix Inequality (LMI) resolution method is applied to determine the feedback gain of the controller. The second one is based on adding an additive fault corrective term to the nominal law. Therefore, the use of unknown inputs observers(UIO) presents an efficient solution for the fault detection and estimation. Finally, the effectiveness of the proposed strategy is proven through a numerical example by the application of the theoretical results to a neutral time delay system with delayed inputs.

Paper Reference: (SAC-5-1) 1570737531
Title: Modeling and Computed torque control for lower limb exoskeleton contacting with ground
Author(s): Mohammad A. Faraj; Boutheina Maalej; Nabil Derbel and Mohamed Deriche (Iraq–Tunisia–UAE)

Abstract − Rehabilitation devices perform nowadays efficient and suitable therapy for persons suffering from movement disorders because of stroke. Lower limb exoskeleton as a type of Rehabilitation devices has become the most known solution for lower limb rehabilitation of stroke patients by helping stroke patients to overcome their walking disability by gait training. The essential part on lower limb exoskeleton work is to model and control it using a suitable modeling method and an efficient controller. In this paper, a comparative study between a PD controller and computed torque controller is established in order to control three degrees of freedom lower limb exoskeleton in case of contacting with ground. Simulation results has performed by comparing both controllers in the same conditions. The results show the better performances achieved by the computed torque controller as compared with PD controller.

Paper Reference: (SAC-5-2) 1570775532
Title: Adaptive Regulation of the Position and Yaw angle of an UAV
Author(s): Asma Dob; Kelttoum Ghedjati and Abdelaziz Mourad (Algeria)

Abstract − In this paper, a feedback linearization concept is used to regulate the altitude and the attitude of a quadrotor or UAV type. This UAV is modeled by a strongly nonlinear system and one use the feedback linearization in order to render the input output behaves as a linear and by pole placement technique, a command is developed in order that the position and the orientation follow a prescribed trajectory. In order to testify the robustness of the developed command, Simulations are carried out using Matlab software .

Paper Reference: (SAC-5-3) 1570775775
Title: Simulation of Robust Controllers for Disturbance Rejection in Quad-copter
Author(s): Imane Bourouis; Razika Boushaki; Rabia Belkheir; Moussa Haddad and Abdellah Kouzou (Algeria)

Abstract − The aim of this work is to provide a comparison between three methods to control a quad-copter. Simulation results show that PID is more suitable for linear plans, where it gave satisfactory outcome near equilibrium, but it wasn't able to control the quad-copter for all state values. To suit the nonlinear nature of the PID, we used Gain-scheduling method, based on multiple controllers, each one for a specific operation point. However, this method had spikes in the control inputs. Finally, simulation results show that Backstepping controller is the more suitable to handle nonlinearities plans.

Paper Reference: (SAC-5-4) 1570775844
Title: Control of the Lateral and Longitudinal Dynamics of Autonomous Drone
Author(s): Yasmine Zamoum; Karim Baiche; Khaled Mohammed Benkada; Mohammed Rahou; Razika Boushaki Zamoum and Kouzou Abdellah (Algeria)

Abstract − The research Unmanned Aerial Vehicles (UAV)has been considerably advanced. This work is interested principally in dynamic modeling of the four rotor miniaircraft named as a quadrotor. The dynamical model is obtained by Newton-Euler methodology. Based on the mathematical model, linear and nonlinear control techniques are used to design and simulate robust controllers. Proportional Derivative Control and the Backstepping algorithm methods have been implemented inMATLAB/SIMULINK.

Paper Reference: (SAC-5-5) 1570775939
Title: Adaptive Backstepping Control for Upper Limb Rehabilitation Robot using PSO Tuning
Author(s): Mawloud Aichaoui and Ameur Ikhlef (Algeria)

Abstract − This paper presents adaptive backstepping control for two degrees of freedom upper limb exoskeleton rehabilitation robot for passive rehabilitation therapy. The optimal backstepping controller parameters and adaptation law parameter are determined by minimizing a cost function using the particle swarm optimization algorithm. The optimization process is performed offline to determine the optimal parameters once and then implement them in the controller. The cost function is designed to improve the tracking performance and dynamic characteristics.

Paper Reference: (SAC-5-6) 1570775996
Title: Advanced Backstepping Control: Application on a Foldable Quadrotor
Author(s): Amina Belmouhoub; Yasser Bouzid; Medjmadj Slimane; Saddam Hocine Derrouaoui and Mohamed Guiatni (Algeria)

Abstract − This paper deals with the implementation of robust control, based on the finite time Lyapunov stability theory, to solve the trajectory tracking problem of an unconventional quadrotor with rotating arms (also known as foldable drone). First, the model of this Unmanned Aerial Vehicle (UAV) taking into consideration the variation of the inertia, the Center of Gravity (CoG) and the control matrix is presented. The theoretical foundations of backstepping control enhanced by a Super-Twisting (ST) algorithm are then discussed. Numerical simulations are performed to demonstrate the effectiveness of the proposed control strategy. Finally, a qualitative and quantitative comparative study is made between the proposed controller and the classical backstepping controller. Globally, the results obtained show that the proposed control approach provides better performance in terms of accuracy and robustness.

Paper Reference: (SAC-5-7) 1570776028
Title: UAV Autonomous Flight for crop Monitoring based on NDVI and VARI Maps Generation
Author(s): Ismat Meslouli; Chihab Brahim; Mouaad Dali Yahia; Amal Choukchou Braham and Brahim Cherki (Algeria–France)

Abstract − The main objective of this paper is to design and develop an aerial imaging system for crop monitoring. It consists of an RGB camera controlled by an embedded system mounted on a quadrotor. The image sequences of the agricultural field are generated by taken photos while the UAV is scanning the surface of interest following a previously generated trajectory. The parcel is reconstructed based on an offline image processing of the stored photos. Crop health and water stress can be analyzed by calculating the Normalized Difference Vegetation index (NDVI) and/or the Visual Atmospheric Resistance index (VARI) from the images which capture the sunlight reflected from the vegetation. Firstly, a software removes distortions from the images and inserts the necessary meta-data, like GPS and IMU data, to generate an orthomosaic containing vegetation health information. Then, the vegetation index is calculated from the visible orthomosaics and RGB color bands. Finally, a map based on this index is generated for better interpretation by the user.

Paper Reference: (SAC-6-1) 1570775735
Title: PID controller optimized by using Genetic Algorithm for Active Suspension System of a Quarter car
Author(s): Zineb Boulaaras; Abdelaziz Aouiche and Kheireddine Chafaa (Algeria)

Abstract − This paper discusses the active suspension system of a quarter car model, which is modeled mathematically as two degrees of freedom, a combination of components and mechanisms ensure the comfort and safety of the driver and passengers in the car, the management and stability of the car depends generally to a large extent on the quality of the suspension, and this is why car manufacturers are turning to an adjustable suspension that can be adapted to any type of road surface as it controls vertical movement for car wheels. In this work we show how the active suspension can be improved using a classical proportional integral differential (PID) controller, tuning two methods, Ziegler Nichols and genetic algorithms (GA), the simulation results were in accepted range using the genetic algorithm (GA) compared to Ziegler Nichols (ZN) approach, it presented a good compromising between the car ride comforts and handling performance.

Paper Reference: (SAC-6-2) 1570775772
Title: ADRC control of an induction motor with varying parameters
Author(s): Anwar Zorig; Ahmed Belkheiri; Mohammed Belkheiri and Katia Kouzi (Algeria)

Abstract − The vector control of an induction machine has a strong link to the motor parameter, resulting in a loss of robustness when the machine's parameters change during operation; this variation plays a significant role in the loss of dynamic performance in an undesirable coupling between flux and torque of the machine. The vector control system was used in this paper to implement active disturbance rejection control (ADRC). ADRC proposed that the system's robustness against motor parameter variations be improved, as well as the speed loop controller's performance be improved.

Paper Reference: (SAC-6-3) 1570776033
Title: Controlling chaos in the new 4-D hyper chaotic system using evolutionary algorithms
Author(s): Guessas Laarem and Yacine Slimani (Algeria)

Abstract − In this article, we apply two meta-heuristic methods for system's parameter optimization values for the chaos control of the new 4-D hyper chaotic generated from the classical 3DRösslor chaotic system, using genetic algorithms (GAs) and particle swarm optimization (PSO), showing that evolutionary algorithms are capable of the optimization of chaos control and solving this problem without previous exact mathematical analysis of the system, thus without knowledge of stabilizing target state. The new 4D hyper chaotic system is characterized by five control parameters, one or more of them will betaken constants and the rest will be optimized by the Gas,in comparative method we use the PSO method. Numerical simulations are obtained and results effectively illustrate the advantages of these optimization methods.

Paper Reference: (SAC-6-4) 1570777321
Title: Real Time Tuneable Analogue PID Controller Realization
Author(s): Walid Ounis; Mohamed Aoun and Slahedine Najjar (Tunisia)

Abstract − This paper proposes a real time tunable analogue PID controller realisation witch can be used as a conventional PID or an adaptative PID or an intelligent PID "iPID". The integral and derivative of the PID input signal are continuous time signals and never sampled. This avoid discretization issues such as aliasing phenomena and the critical sampling period choice. The operative PID circuit part is totally analogue. Few digital potentiometers and digital switches are used. This allows to tune the parameters values of the controller and select PI, PD, PID configuration. The analogue circuit part is designed with a new original circuit architecture avoiding impedance problems and frequency distortions. A prototype of the circuit is implemented. Experimentation results show good similarity to the theoretical simulations.

SAC-6-5 Paper Reference: (SAC-6-5) 1570782675
Title: Modelling and control of a gas blending station: A real industrial case study
Author(s): Ahmed Anes Azouz Reguig; Bilal Sari and Saad Berber (Algeria)

Abstract − The purpose of this study is to develop an automatic blending system of the gas coming from many sources in the Algerian desert. This system should ensure flexibility at the Algerian National Center of Dispatching GAS (CNDG) of Sonatrach in terms of the management of the qualities and quantities of the gases to be transported via the pipeline network (known as TRC). Furthermore, the proposed automatic blending system must satisfy the requirements of Sonatrach's clients. The modelling of the system is carried out by using Aspen HYSYS software where a model of the station is built according to the project technical specifications and tested in various realistic scenarios. Moreover, the simulation is based on conditions and parameters (mass flow rates, temperature and pressure readings, gas compositions, flow coefficients of the valves, etc.) obtained from the CNDG. Finally, by using real data, HYSYS simulation results demonstrate the effectiveness of the proposed control strategy.

Paper Reference: (SAC-6-6) 1570783334
Title: An improved DC-link control for dual-stage grid connected PV system using three-level NPC inverter
Author(s): Nadjah Attik and Abdessalam Badoud (Algeria)

Abstract − In this paper, we provide two options for the intention of new control strategies. The first is novel adaptive DC-link voltage control approach based on the feedforward and PI regulator (FF-PI). The second is a finite set model predictive current control (FS-MPC). We address the problem of switching power losses and the harmonic current problem consequently degraded power quality and negatively affected the power factor. This paper proposes two robust control strategies for reducing this drawback. In these strategies, the DC-link voltage is regulated by a hybrid control technique combining a PV feedforward term and a standard PI controller DC link voltage error, which have been proposed by setting DC-link voltage reference according to CPI (common point of interconnection) voltage for control of grid tied voltage source converter. In addition, the natural voltage balancing capability of the three-level and three-phase neutral-point-clamped (NPC) using the predictive control (FS-MPC) to generate PWM signal for the inverter. The unit vectors are estimated from grid voltages to synchronize output currents of the voltage source using a PLL. Finally, Several Matlab simulation results have verified the operational performance of the proposed control strategies. In this paper, we argue that the total harmonic distortion THD of grid current has been found well under the limit of an IEEE standard, improving power quality and good disturbance rejection after sudden changes of the active power.

Paper Reference: (SAC-6-7) 1570776016
Title: Fault Tolerance Control and Diagnosis of Induction Machine Under Stator Fault Conditions
Author(s): Fatima Babaa and Abderrahim Touil (Algeria)

Abstract − Study fault-tolerant control (FTC) systems it's a new area of research devoted to controlling and detecting incipient faults. It is important to study the adaptation of the control law to preserve pre-specified performances in terms of quality of the production and even safety. Fault-tolerant control consists of fault diagnosis and re-design of the controller during operation. The induction motor is an important part of industrial systems. Then, the robustness and the performance control have to be taken into account in the design of the machine. This paper proposes an optimal vector control under inter-turn stator fault. We apply a technique for a control-tolerant to inter-turn short-circuit faults, allowing to achieve the machine's performances while keeping the control's robustness. The design of the controller works in such a way that the control of the feedback speed of the induction motor will only be controlled by the proportional-integral PI performance controller for a nominal model without disturbance and with disturbance. Finally, using Simulink of MATLAB, the simulation results demonstrate the proposed model's effectiveness and good performance.

Paper Reference: (SAC-7-1) 1570775708
Title: Diagnosis of Nonlinear Delay Systems
Author(s): Walid Ben Hassen (Tunisia)

Abstract – Parity space and observers approaches are used to generate residuals. To accomplish fault isolation, we use a bank of observers for all possible faulty models. The paper considers constant actuator faults, that is,the outputs of some actuators are stuck at fixed undesirable constant values. The fault isolation strategy is based on combining the conventional observer design techniques with adaptation techniques. Based on the designed observers, a bank of residuals are defined correspondingly. The actuator faults can be isolated if only one residual goes to zero while the others do not.The faulty model with residual approaching zero identifies the faulty actuators. For linear and nonlinear systems with all states available, new sufficient conditions for fault isolation are derived,which require only that the distribution matrices of the actuators are of full column rank.

Paper Reference: (SAC-7-2) 1570784151
Title: Deep Learning for Fault Detection and Diagnosis: Application to Photovoltaic System
Author(s): Manel Marweni; Radhia Fezai; Mansour Hajji and Majdi Mansouri (Qatar–Tunisia)

Abstract – The installation of photovoltaic (PV) system,as a renewable energy source, has significantly increased. However, PV systems are subject to failures during their operation due to the aging effects andexternal/environmental conditions. These faults may affect the different system components such as PV modules, connection lines, converters/inverters, which can lead to a decrease in the efficiency, performance, and further system collapse. Thus, a key factor to be taken into consideration in high-efficiency grid-connected PV systems is the fault detection and diagnosis (FDD). The most well-known data-driven methods are deep learning(DL) approaches. The biggest advantage of DLalgorithms, in diagnosis, are that they try to learn high level features from PV data in a high-order, non-linear and adaptive manners. Then, the fault is classified using softmax activation function. This work therefore presents a comparative study of FDD based DL techniques. These techniques include neural network (NN), recurrent neural network (RNN) and Long-Short Term Memory(LSTM). The DL techniques-based fault diagnosis are implemented using an emulated Grid-Connected PV(GCPV) system. The classification results for the pretrained DL models is exhibited and performance of the models are evaluated.

Paper Reference: (SAC-7-3) 1570784152
Title: Uncertain Fault Diagnosis of Grid-Connected PV Systems based Improved Data-Driven Paradigms
Author(s): Khaled Dhibi; Majdi Mansouri; Kais Bouzrara; Hazem N. Nounou and Mohamed Nounou (Qatar–Tunisia)

Abstract – In this paper, new fault detection and diagnosis (FDD) techniques dealing with uncertainties in Grid-Connected Photovoltaic (PV) systems have been proposed. The uncertainty was addressed by using the interval-valued data representation. The main contributions are threefold: first, two interval-valued ensemble learning techniques based on the combination of several models (SVM, KNN, and tree) into one optimal model are developed in order to distinguish between the different PV systems operating modes using the extracted interval raw data. Then, in order to further enhance the diagnosis results, intelligent FDD techniques are proposed, where the main steps are: feature extraction, features selection, and fault classification. For the features extraction and selection steps, interval KPCA (IKPCA) and interval reduced KPCA (IRKPCA) methods are performed in order to extract and select the most significant features. The developed approaches were developed to monitor a grid-connected PV system under healthy and faulty conditions. The experimental results demonstrated the feasibility and effectiveness of the proposed FDD techniques.

Paper Reference: (SAC-7-4) 1570784153
Title: Reduced KPCA based Ensemble Learning Approach for Fault Diagnosis of Grid-Connected PV Systems
Author(s): Khaled Dhibi; Majdi Mansouri; Kais Bouzrara; Hazem N. Nounou and Mohamed Nounou (Qatar–Tunisia)

Abstract – The objective of this work is to develop intelligentfault detection and diagnosis (FDD) frameworks to ensure high-performance operation of Grid-Connected Photovoltaic (PV) systems. In order to improve the classification results, three ensemble learning-based fault detection and diagnosis techniques for Grid-Connected PV systems are proposed. First, an ensemble learning(EL) technique that combines multiple learning models instead of using a single learning model is presented.Next, in order to further enhance the diagnosis abilities,kernel PCA (KPCA)-based EL and reduced KPCA(RKPCA)-based EL classifiers are developed. The two proposed techniques are addressed so that the features extraction and selection phases are performed using the KPCA and RKPCA models and the sensitive and significant characteristics are transmitted to the EL model for classification purposes. The presented results prove that the proposed methods offer enhanced diagnosis performances when applied to PV systems.

Paper Reference: (SAC-7-5) 1570784242
Title: Bearing Fault Detection and Classification Based on Vibration Signal Analysis and ANFIS Classifier
Author(s): Issam Attoui; Nadir Boutasseta; Nadir Fergani; Brahim Oudjani; Mohammed Salah Bouakkaz and Ahmed Bouraiou (Algeria)

Abstract – Bearing defects are able to lead to deterioration of the operating conditions of the rotating machine, how to extract the most informative characteristics of the fault from the vibration signals and classify the bearing fault have become a critical problem and addressing this problem is an imperative for ensuring the safe operation of the rotating machines. This paper proposes a hybrid method that uses the Empirical Mode Decomposition (EMD) technique for the extraction of the most informative characteristics of the bearing faults using calculated energy and entropy and the ANFIS algorithm as an intelligent classifier for rolling bearings fault classification. Firstly, the non-stationary features of the vibration signal are extracted by applying the EMD that is applied for decomposing the measured signal into a fixed amount of stationary intrinsic mode functions (IMFs), and then the energy and entropy of the IMFs are considered to form the parameters vector used in the classification stage of the proposed procedure. In fact, the parameters vector is first used as an input for the ANFIS classifier, but after choosing from it the best extracted features adapted to bearing fault diagnosis through a wrapper algorithm. The proposed method is tested on experiment using real bearing vibration signals for different health conditions (bearing with inner-race, out-race and ball faults) by considering 12 fault classes that are determined according to fault type and severity. The results approve that the proposed technique reached a good classification accuracy.

Paper Reference: (SAC-7-6) 1570788077
Title: Broken Rotor Bars Fault Detection in Induction Machine Using Machine Learning Algorithms
Author(s): Saddam Bensaoucha; Sandrine Moreau; Sid Ahmed Bessedik and Aissa Ameur (Algeria–France)

Abstract – The aim of this paper is to diagnose the Broken Rotor Bars (BRBs) fault in three phase induction machine using seven Machine Learning Algorithms (MLAs), which are respectively Support Vector Machine (SVM), and K-Nearest Neighbors (KNN), Naive Bayes algorithm (NB), Decision Tree (DT), Random Forest (RF), and Discriminant Analysis (DA) and Extreme Learning Machine (ELM).The extracted features by the application of the Fast Fourier transform (FFT) on Hilbert Modules (HM) are used as inputs to train the used MLAs.To evaluate the performance of these algorithms, we use several predefined models for each algorithm. The obtained results show that three algorithms, are: SVM, KNN and ELM gave high performance with an accuracy of 100%.

Paper Reference: (SAC-8-1) 1570775404
Title: A soft sensor of stator winding temperature prediction for PMSMs based on extreme learning machine
Author(s): Smail Dilmi; Farida Kebaili and Mohamed Ladjal (Algeria)

Abstract – Permanent magnet synchronous motor (PMSM) plays an effective role in electric vehicle applications. Monitoring PMSM's temperature in real-time is critical to its safety and reliability. The traditional method of PMSM temperature monitoring is to install

temperature sensors into the motor, and it is a very expensive method. Currently, the lumped-parameter thermal networks (LPTNs) are the appropriate alternative for determining PMSM components' temperatures. However, they lack physical interpretability once the degrees of freedom are reduced in order to meet real-time requirements. The approach based on soft sensors is an efficient and economical way to solve such problems. In this paper, a soft sensor is developed to predict the stator winding temperature using an extreme learning machine (ELM). Furthermore, the Principal Component Analysis (PCA) technique is used to select effective and relevant variables. The performance of the model is evaluated based on five statistical indicators: the correlation coefficient (R2), the root relative squared error (RRSE), the mean square error (MSE), the mean absolute error (MAE), and the root-mean-squared error (RMSE). The results showed that the PCA-ELM model has a high efficiency to predict the stator winding temperature with RMSE = 0.0622, MAE = 0.0480, MSE = 0.0039, RRSE = 6.73% and R2 = 0.9955. Moreover, it has low computational complexity. Due to its low computational complexity and high performance, this application could have a direct influence and economic savings on the development and design of PMSMs temperature monitoring systems.

Paper Reference: (SAC-8-2) 1570781294
Title: IMU Measurements-Based Attitude Estimation Using Extended Sliding Innovation Filter
Author(s): Djamel Dhahbane; Abdelkrim Nemra and Samir Sakhi (Algeria)

Abstract – Estimating a system state or a system parameter is a considerable challenge in engineering. Many sensors are used to extract information. However, measured signals from these seniors are corrupted by noise. Filters are used to estimate the crude data while minimizing the state error covariance. Sliding Innovation Filter (SIF) is a relatively new filter, it uses the Variable Structure Approach, which establishes a sliding surface and operates with a switching gain to ensure the estimation accuracy along the state trajectory. This paper addresses the attitude estimation of an UAV in a Three-Dimension space, using ESIF (Extended Sliding Innovation Filter), which takes a set of measurements coming from a gyroscope, an accelerometer, and a magnetometer of a MEMS-IMU (Micro Electro Mechanical System-Inertial Measurement Unit). To check the usefulness of the proposed filter, a comparison with EKF (Extended Kalman Filter) is carried out. Simulation results of attitude estimation (roll, pitch, yaw) and attitude RMSE (Root Mean Square Error) have shown the efficiency and the robustness of the ESIF.

Paper Reference: (SAC-8-3) 1570773320
Title: Functional Interval Observers Design for Multivariable Linear Discrete-time System
Author(s): Rihab Akremi; Rihab Lamouchi and Messaoud Amairi (Tunisia)

Abstract – This paper deals with functional interval observers design for discrete-time multivariable systems. Under the assumption that disturbances are unknown but bounded, functional interval observers are designed to estimate the system and the functional state. The design conditions of the existence of the proposed interval observer are explicitly mentioned and an effective algorithm for computing the matrices of unknown observers is provided. Finally, numerical example and simulation results are given to illustrate the effectiveness of the proposed method.

Paper Reference: (SAC-8-4) 1570789130
Title: Observer-based state feedback controller of PMSM using convex optimization via Feedforward Technique
Author(s): Khalida Mimoune (Algeria)

Abstract – This paper deals with the quadratic stabilization for a PMSM motor described by a polytopic combination with guaranteed model the controller tracking performance. Firstly, sector non-linearity transformation is applied to represent thenon linear model of the PMSM motor in synchronous reference frame as Takagi-Sugeno model with unmeasurable decision variables. Then, mean values theorem is used to design the non linear observer based state feedback controller. Convergence conditions are expressed under linear matrix inequality formulation using the second Lyapunov theorem. Observer and controller gains are obtained by solving a sum of linear matrix inequality constraints in a single step using MATLAB/YALMIPtoolbox.

Paper Reference: (SAC-8-5) 1570789159
Title: Estimation of speed, Stator and Rotor Winding Temperature of the Induction Machine using a CFNN
Author(s): Hacene Mellah; Kamel Eddine Hemsas; Hamza Sahraoui and Ismail Bouyakoub (Algeria)

Abstract – Because of the financial costs associated with delayed output, induction motor failures can be quite costly. According to studies conducted by the IEEE Industry Applications Society, the insulation of the stator winding is responsible for 30% of motor failures. Because of the financial costs associated with delayed output, induction motor failures can be quite costly. Based on a cascade-forward neural network with Bayesian Regulation back propagation, a sensorless speed, stator and rotor resistance, and temperature estimator for induction motors is proposed in this research. Because we don't want to employ a thermal sensor, we'll use a thermal model to estimate the temperature of the BDC machine. Previous research has suggested either non intelligent estimators that rely on the model, such as the extended Kalman filter and Luenberger's observer, or estimators that do not estimate the speed, temperature, and resistance all at the same time, such as the extended Kalman filter and Luenberger's observer. Simulation and comparison with simulation findings from the literature have both been used to verify the suggested method.

Paper Reference: (SAC-9-1) 1570780675
Title: Simulink Blocks Implementation for Fractional Order Models Simulation based On DAFI Filter
Author(s): Hemza Abdel Fettah Berkani; Abdelbaki Djouambi; Mohamed Lashab and Bouziane Keziz (Algeria)

Abstract – Numerical simulation and parameter identification of fractional order models are very important in system modelling and control domain. This paper, presents some useful and convenient blocks based on the so called Digital Adjustable Fractional Integrator (DAFI), implemented in Simulink MATLAB environment. Best performances (simulation run time, noise filtering) are obtained compared to the other existing block tools such as in FOMCOM toolbox. On the other hand, these block tools have a very important possibility of extension to online identification and control. Some numerical examples confirm the effectiveness of the designed blocks

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Paper Reference: (SAC-9-2) 1570782938
Title: Bias Recursive Least Squares Method for Fractional Order System Identification
Author(s): Zaineb Yakub; Messaoud Amairi; Manel Chetoui and Mohamed Aoun (Tunisia)

Abstract – This paper mainly studies the modeling and identification problems for fractional order systems. A novel modeling scheme based on an online identification technique is investigated. Firstly, the recursive least squares algorithm with forgetting factor is applied to identify the fractional order system. However, if the measurement of the output signal is affected by an additive noise this algorithm unable to give consistent estimates. Thus, this contribution implements a technique based on the bias compensation principle. The main idea is to eliminate the introduced bias by adding a correction term in the recursive least squares estimates.The results of the simulated example indicate that the proposed estimator provides good accuracy.

Paper Reference: (SAC-9-3) 1570784005
Title: State Space Fractional Order PI control for Cryptovirology Stabilization
Author(s): Mohsen Mohamed Hadji and Samir Ladaci (Algeria)

Abstract – This paper proposes a fractional-order control scheme design for the stabilization of the non-linear chaotic cryptovirology in blockchain systems. Particle swarm optimization algorithm (PSO) is used for solving the Fractional order PI parameter's tuning. We show

by numerical simulations that the fractional PI controller provides a good closed loop system performance for stabilizing the problem of unstable fixed point.

Paper Reference: (SAC-9-4) 1570784011
Title: MRAC with fractional order adaptation law design for a class of fractional order systems
Author(s): Mohammed Islam Leulmi and Samir Ladaci (Algeria)

Abstract − This papers presents a model reference adaptive control (MRAC) with fractional order reference model and fractional order adaptation law. Simulations show that the proposed adaptation law for the control action is able to stabilize the fractional order system, and guarantee the convergence of the output to the reference signal in relatively short time. The simulation results are compared to the results of MRAC with regular adaptation law.

Paper Reference: (SAC-9-5) 1570785230
Title: An Optimal FO-PID Controller of an Arc Welding Power Supply Incorporating a Novel PFC Converter
Author(s): Hamouda Noureddine; B. Badreddine; Sami Kahla and Abdelmalek Reddaf (Algeria)

Abstract − This article presents an intelligent optimization method using the particle swarm optimization (PSO) algorithm for fractional-order proportional, integral and derivative (FO-PID) controller design applicable to the active power factor corrector (PFC) circuit yield in arc welding power supply (AWPS). The role of the PSO algorithm is to determine the unknown parameters such as Kp, Ki, Kd, λ and μ of the FO-PID controller by minimizing an aggregated cost function based on the integral time absolute error (ITAE) between the welding voltage Vw and its reference, this proposed controller is used to regulate the welding voltage and current. Also, another control scheme uses a FO-PID controller to manage the DC-link capacitor voltage Vdc of a bridgeless PFC converter. The optimally designed controllers have operated cooperatively and offer many exceptional features, like rapid response to the welding load and grid voltage variations, and inherent short-circuit current limit which results in an improved welding performance and weld bead quality. The performance of the developed controllers with the PFC circuit and full bridge buck converter are validated at different working conditions through MATLAB simulations. It is also compared with the performance while using a traditional PID controller. The results show that the designed controllers give very good output voltage regulation under different operating conditions such as a varying input voltage, changes in the welding load and component variations.

Paper Reference: (SAC-10-1) 1570775758
Title: Global sliding mode control for teleportation systems with fixed-time delay
Author(s): Asma Ounissi; Neila Mezghani Ben Ramdhane and Mohamed Boukattaya (Tunisia)

Abstract − The work presented in this article focuses on a new bilateral and multilateral teleoperation framework that is proposed to perform tasks in a hazardous environment with an interconnection delay. First, a bilateral teleoperation system allows a master manipulator to remotely control a slave manipulator. A global sliding mode control GSMC on bilateral teleoperation system is used for this system based on the external disturbances. Despite of the presence of the external force and fixed-time delay, the controller is robust and present a finite-time convergence. Second, a multilateral teleoperation system allows a master manipulator to remotely control a manipulator that serves as the leader of a group of followers. A global sliding mode control on multilateral teleoperation is applied to master-slave-follower manipulators to avoid the external disturbances and fixed-time delay. This controller also presents good performance. The two controllers are evaluated in simulation.

Paper Reference: (SAC-10-2) 1570775771
Title: Modified Sliding Mode Control of Autonomous Quadrotor
Author(s): Fadhila Lachekhab; Razika Boushaki Zamoum; Ramzi Belatreche; Abdellah Kouzou and Dalila Acheli (Algeria)

Abstract − This work discusses the development of a detailed mathematical model for a specific type of UAV, which has Vertical Takeoff and Landing (VTOL) ability, known as a quadcopter. A mathematical model of the quadrotor in state-space form is derived; it utilizes Newton and Euler equations for three-dimensional motions. This mathematical model is nonlinear and accurate enough including the aerodynamic effects and rotor dynamics. Quadrotor dynamics can be divided into two subsystems; translational subsystem and rotational subsystem. The translational subsystem is an under-actuated system as it depends on the roll, pitch, yaw angles and translational state variables. The rotational subsystem is fully-actuated and only depends on the rotational states. Then the development of a nonlinear control approach to control the attitude and position of the quadrotor in space is discussed. A Sliding Mode Controller (SMC) is designed to control the roll angle, pitch angle, yaw angle, altitude, and positions. Simulation results after the implementation SMC controller on MATLAB/Simulink are presented.

Paper Reference: (SAC-10-3) 1570775918
Title: Adaptive Finite-Time Robust Sliding Mode Controller For Upper Limb Exoskeleton Robot
Author(s): Ratiba Fellag; Mohamed Guiatni; Mustapha Hamerlain and Nouara Achour (Algeria)

Abstract − An adaptive finite-time robust sliding mode controller is presented in this work to regulate the trajectories of an upper limb exoskeleton rehabilitation robot. The goal is to build a controller that can handle constraints that alter the achievement of the rehabilitation process using the robot such as parametric uncertainties and external disturbances. The proposed technique maintains the fundamental robustness of sliding mode control while also allowing for global finite-time convergence of the system's states. Moreover, the presented controller is homogeneous and uses adaptive gains to eliminate requirements of preliminary knowledge on uncertainties and external disturbances bounds. Stability analysis of the proposed controller is established based on Lyapunov theory. Simulations of passive trajectory tracking exercises are used to validate the efficacy of the suggested control approach.

Paper Reference: (SAC-10-4) 1570775998
Title: ACO Base Optimal MIMO Sliding Mode Controller for UAV Trajectory Tracking Under External Disturbance
Author(s): Khedidja Bouhabza; Mohamed Guiatni; Yasser Bouzid and Mustapha Hamerlain (Algeria–France)

Abstract − In this paper, an optimized nonlinear robust Multi-Input Multi-Output (MIMO) Sliding Mode Controller is designed to control and stabilize a Quadrotor Unmanned Aerial Vehicle (UAV) in the presence of sensor noises. To achieve asymptotic linearisation of the nonlinear differential input output model of the Quadrotor, the proposed method employs a novel sliding surface choice. The parameters of the proposed controller have been selected using the Ant Colony Optimization (ACO) algorithm while considering a performance criteria for optimizing the tracking error and the consumed energy. A generalized Lyapunov approach is used to evaluate the overall system's stability, which is a canonical state space with dynamic feedback. Simulation results are provided to validate the proposed controller andevaluate its performance.

Paper Reference: (SAC-10-5) 1570781640
Title: Adaptive Fuzzy Sliding Mode Control of TRMS
Author(s): Khadidja Saoudi; Kamel Guesmi; Khansa Bdirina and Mohammed Zinelaabidine Ghellab (Algeria)

Abstract − This paper presents the synthesis of a robust hybrid adaptive control of Twin Rotor MIMO System (TRMS). Based on the combination of fuzzy logic with sliding mode technique, the proposed approach has the advantages of both controllers. Furthermore, to enhance more the closed loop performance, the control action is adjusted online by a supervisory fuzzy system. Simulation results validate the proposed approach and show its efficiency in different scenarios of control.

Paper Reference: (SAC-10-6) 1570783378
Title: High Order Sliding Mode based Direct Power Control of Connected DFIG-Variable Speed Wind Turbine
Author(s): Sara Kadi; Khoukha Imarazene; El Madjid Berkouk; Mohamed Horch and Emad Abdelkarim (Algeria–Egypt)

Abstract – This work propose an efficient nonlinear control methods for a variable speed wind energy conversion system (WECS) based on doubly fed induction generator (DFIG), according to Scherbius configuration. An efficient high order sliding-mode control (HOSMC) is applied and compared to conventional sliding mode control (SMC), in order to fix its primary disadvantage which is the chattering phenomena.These two strategies are used as maximum power point tracking (MPPT) to extract the maximum of power from the wind. Those two strategies are combined to space vector modulation (SVM) as a direct power control(DPC). The proposed system is tested, in terms of reference-tracking, robustness against parameters variations and analytic performances.

Paper Reference: (SAC-10-7) 1570788657
Title: Discrete Adaptive second order sliding mode control for Uncertain Hammerstein Nonlinear systems
Author(s): Aicha Znidi; Khadija Dehri and Ahmed Said Nouri (Tunisia)

Abstract – This work propose an efficient nonlinear control methods for a variable speed wind energy conversion system (WECS) based on doubly fed induction generator (DFIG), according to Scherbius configuration. An efficient high order sliding-mode control (HOSMC) is applied and compared to conventional sliding mode control (SMC), in order to fix its primary disadvantage which is the chattering phenomena.These two strategies are used as maximum power point tracking (MPPT) to extract the maximum of power from the wind. Those two strategies are combined to space vector modulation (SVM) as a direct power control(DPC). The proposed system is tested, in terms of reference-tracking, robustness against parameters variations and analytic performances.

Paper Reference: (SAC-11-1) 1570783704
Title: Investigate the Performace of Torque Distribution Strategy in Dual Electric Vehicle
Author(s): Ismail Benmiloud; Katia Kouzi and Aissa Ameur (Algeria)

Abstract – This paper is concerned with the torque distribution strategy in dual electric vehicles (EV) for a front and rear motors. The studied EV has a permanent magnet synchronous motor (PMSM) for the front and the rear wheel drive. In first stage, the dynamic model of (EV) and the forces affecting it have presented. In second stage, the vector control of two permanent magnet synchronous motor (PMSM) has proposed. In last stage, several cases were performed by simulation results such as the model with one motor and two motors in this case the total torque required by the vehicle is shared equally between the two identical motors. The use of two motors is required for an important torque demand.

Paper Reference: (SAC-11-2) 1570783945
Title: DeadBeat Controller Based Luenberger Current Observer for Single-phase Islanded Inverter
Author(s): Abdelhak Hadjkaddour; Ouahid Bouchhida; Hani Benguesmia; Aissa Chouder; Abdelhafid Cherifi and Mohammed Saoudi (Algeria)

Abstract – The control of a DC/AC converter to provide a cost sinusoidal wave required in many application, is a challenging task. In the present paper, the deadbeat control algorithm has been proposed to generate a nearly sinusoidal waveform with zero steady-state error and low total harmonic distortion (THD). The controller is based on the output measurements to generate the required modulating signal (pulse-width), for controlling a single phase inverter. The derived deadbeat control algorithm requires the measurement of both capacitor current and output voltage which can be considered as a costly system. To tackle this disadvantage, we propose an estimation of the capacitor current based on Luenberger observer. The simulation results have confirmed the validity of the deadbeat control based current observer to enhance the output voltage, in the linear and nonlinear loads.

Paper Reference: (SAC-11-3) 1570784034
Title: Power reserve control (PRC) of PV systems techniques overview
Author(s): Chaouki Messasma; Seif Eddine Chouaba; Bilal Sari and Abdallah Barakat (Algeria–France)

Abstract – Photovoltaic systems have become a good alternative to clean and cheaper energy. However, these systems are characterized by the absence of virtual inertia that can contribute to frequency stability. Several techniques to overcome this disadvantage have been developed as deloading and energy storage. Deloading seems to be more suitable because of its low cost. In this work, three deloading known also as power reserve control (PRC) techniques were presented and a deep comparison was made to allow a correct and accurate choice of an optimal PRC technique.

Paper Reference: (SAC-11-4) 1570784037
Title: Control of a Voltage Source Inverter in a Microgrid Architecture using PI and PR Controllers
Author(s): Abdelhafid Cherifi; Aissa Chouder; Abdelhalim Kessal; Abdelhak Hadjkaddour; Khalil Louassaa and Ali Aillane (Algeria–Tunisia)

Abstract – This paper presents a voltage control of a three-phase inverter operating in stand-alone mode using proportional-integral (PI) and proportional-resonant (PR) controllers. The aim of this paper is to present a comparative study between these two controller types. The voltage and the current control loops, as well as the VSI's mathematical model, are presented on the dq and the $\alpha\beta$ frames. The evaluation of the PI and PR controllers is discussed. The simulations study is caring out using PSIM software. The simulation results have shown the advantages of the PR controller and PI controller based in terms of THD reduction.

Paper Reference: (SAC-11-5) 1570784078
Title: Power Factor Control for PWM Rectifier using Predictive Current Control and various DC-controllers
Author(s): Sarah Djabali; Abdelkarim Ammar and Aissa Kheldoun (Algeria)

Abstract – In this paper, model predictive current control strategy with precise power factor control is proposed for PWM rectifier. Most control strategies for PWM rectifiers were developed to operate at unity power factor. This work proposes a generalized power factor regulation method that is not strictly restricted to unity power factor. Model predictive current control is used in the inner loop to ensure an appropriate switching selection and low harmonics. Besides, several controllers have been proposed for the outer DC-link loop including PI, Sliding Mode and Fuzzy logic controllers in order to improve the overall controller scheme. Additionally, a comparison is made between the three DC-link controllers. Simulation results using MATLAB/SIMULINK prove the effectiveness of the proposed power factor regulation scheme. As for the DC-controllers, the fuzzy controller had the best performance and least sensitivity to parametric variations compared to PI and Sliding mode controllers.

Paper Reference: (SAC-12-1) 1570783462
Title: Optimal Fuzzy Logic Controller Using Teaching Learning Based Optimization for asynchronous motor
Author(s): Mohamed Benrabah and Kamel Kara (Algeria)

Abstract – In this work, a nonlinear control algorithm, based on two Fuzzy Logic Controllers (FLCs) and a meta-heuristic optimizer, is proposed. This strategy aims to control the mechanical speed of a three-phase asynchronous motor. Indeed, the control signal is generated based on two factors namely frequency and magnitude, which are calculated by the two FLCs. To obtain good control performance, the parameters of the FLCs are suitably tuned and optimized using the Teaching Learning Based Optimization (TLBO) algorithm. The TLBO

is a meta-heuristic algorithm that was implemented in many engineering application and gained wide acceptance among the optimization researchers community. Furthermore, except the common meta-heuristic parameters, the TLBO does not require any algorithm specific parameters. To assess the effectiveness of the proposed control algorithm, the control of a squirrel cage induction machine is considered. A comparative study with scalar control architecture using the Particle Swarm Optimization based PID controller, is carried out. The obtained results indicate that the proposed control algorithm gives better control performance than the other controllers.

Paper Reference: (SAC-12-2) 1570783501
Title: Control of Squirrel Cage Induction Motor using Conventional controllers and fuzzy logic
Author(s): Fadhila Lachekhab; Razika Boushaki Zamoum; Dhya Eddine Bougheloum; Sofiane Benyahia; Dalila Acheli and Abdellah Kouzou (Algeria)

Abstract − The main objective of this work is to design a control method to provide an optimal dynamic response of the squirrel cage induction motor. This will be achieved by incorporating fuzzy logic with conventional controllers and utilization of vector control techniques. Implementation and simulation results MATLAB/SIMULINK of various system controllers such as (PID, Fuzzy, and Fuzzy-PID) are analyzed and compared along with conventional PI controller in terms of several performance measurements such as rise time (tr), overshoot (Mp), settling time (ts) and steady-state error at various load conditions.

Paper Reference: (SAC-12-3) 1570783505
Title: An Optimal PSO-Based Fuzzy Controller for a Nonlinear System
Author(s): Khayreddine Saidi; Abdelmadjid Boumediene; Djamila Boubekeur and Sarra Massoum (Algeria)

Abstract − In this paper, an association between two artificial intelligence techniques is proposed for the control of an inverted pendulum, which is considered as a nonlinear system. The controller combines a particle swarm optimization technique (PSO) with fuzzy logic controller (FLC). PSO is used to search the optimal parameters (gains and membership) of fuzzy logic controller. Numerical simulations are given to verify the validity of the proposed control strategy.

Paper Reference: (SAC-12-4) 1570783915
Title: Comparative study of the intelligent techniques (fuzzy logic and neural network) of the ABS system
Author(s): Billel Naceri; Hamou Ait Abbas; Khaled Mouhab and Cylia Aliouat (Algeria)

Abstract − Antilock braking system improves vehicle stability and steering ability, allowing a vehicle wheel to stop without locking and reducing the stopping distance. A scientific model of a quarter auto model of electronically monitored slowing mechanism (ABS) has been created. The objective of a conventional ABS control system is to rapidly eliminate the error between the actual slip ratio and a set reference value in order to bring the vehicle to stop in the shortest time possible. Robust controllers such as fuzzy logic and neural network are proposed to solve the ABS problems. Then, the results of these intelligent commands are compared with the outcomes of the conventional linear controllers (BB and PI).

Paper Reference: (SAC-12-5) 1570784046
Title: Robust unified Observer-based Fuzzy Controller of Perturbed Uncertain Multivariable Systems
Author(s): Loubna Merazka; Abdesselem Boulkroune and Sami Labdai (Algeria)

Abstract − This paper aims to design an observer-based fuzzy adaptive tracking control for perturbed multivariable nonlinear systems having an uncertain model under the additional constraints that the state vector sensing not being available. In this output-feedback control scheme, to accurately and quickly construct the unmeasured states, a robust high-gain observer is constructed. The latter, which is characterized by a unified design function for the correction term, represents a large class of linear or nonlinear observers such that: high-gain observers, (non-smooth or smooth) sliding mode observers. To overcome uncertainties in the system' mathematical model, an adaptive fuzzy logic-based control approach is employed. Unknown fuzzy parameters are robustly updated via a new proportional-integral law improved by a σ-modification term. The corresponding stability analysis is performed via a Lyapunov type method. A simulation study is conducted on a nonlinear mechanical system to validate and illustrate the proposed control method.

Paper Reference: (SAC-12-6) 1570788624
Title: Switching Function Analysis of DC-DC Converters under Pontryagin's Maximum Principle
Author(s): Abdulwahid A. Saif; Ali Alameer; Mujahed Aldhaifallah; Hegazy Rezk and Ahmed Mohamed (Saudi Arabia–USA)

Abstract − This work derives the closed-form solution of the switching function for a DC-DC buck converters under Pontryagin's maximum principle to gain insights into the circuit parameters impact on the converters' dynamic performance. We also analyzed the boost converter switching function under the same principle. Using MATLAB/Simulink to simulate typical converters, the results matched our analysis while suggesting that boost converters could achieve time-optimal states transition within a single switching similar to the case of buck converters.

Paper Reference: (SAC-12-7) 1570789621
Title: On Smoothing the Duck Curve: A Control Perspective
Author(s): Maitham AL-Sunni; Turki Bin Muhaya; Khaled Alshehri; Haitham Saleh and Abdulwahid A. Saif (Saudi Arabia–USA)

Abstract − The increased adoption of small-scale solar photovoltaics (PVs) has led to drastic changes in the aggregate load profile in multiple locations, resulting in what is called the "Duck Curve". This adds a burden on system operators and might, in fact, jeopardize real-time operations and control. In this paper, we address these issues via learning-based control and develop an online method to flatten the duck curve by optimizing standardsized batteries. In particular, we use deep learning in conjunction with model predictive control (MPC), i.e., we forecast solar power and demand and then utilize these forecasts to optimize storage over a prediction horizon. In our approach, forecasts take into account behavioral aspects of load consumption, and we also propose an objective function that mimics the Peak-toAverage power ratio. We have conducted numerical experiments using real data, and the results are promising, demonstrating a reduction of about 67% of the Peak-to-Average power ratio.

Paper Reference: (SAC-13-1) 1570775637
Title: Robust Constrained Gain-Scheduled Static Output Feedback Controller for NLPV descriptor systems
Author(s): Ines Righi (Algeria)

Abstract − This paper presents a new approach to design Gain-Scheduled Static Output Feedback (SOF) controller for constrained Nonlinear Parameter Varying (NLPV) descriptor system, subject to input saturation and external disturbances. Moreover, we take into account both state and input constraints in the control design using set invariance arguments. For the control context, we provide an effective solutions with a new class of Parameter Dependent (PD) nonqudratic Lyapunov function to estimate the largest Domain of Attraction (DoA), wich can be nonconvex, it can be formulated and solved as an optimization problem under strit PD Linear Matrix Inequality constraints, the L_2 gain performance is used to attenuate the effect of the external disturbances. Controller design and stability analysis are provided with techniques in order to obtaining less conservative results. The theoretical developments are provided to demonstrate the effectiveness of the proposed approach in reducing the design conservatism through an illustrative example.

Paper Reference: (SAC-13-2) 1570783442
Title: Nonlinear optimal control for VSI-fed asynchronous motors

Author(s): Gerasimos Rigatos; Med. Assaad Hamida; Pierluigi Siano; Masoud Abbaszadeh; Godpromesse Kenné and Patrice Wira (France–Greece–Italy–USA)

Abstract − In the article's control approach the nonlinear dynamic model of VSI-IMs undergoes approximate linearization around a temporary operating point which is recomputed at each iteration of the control method. This temporary operating point is defined by the present value of the VSI-fed IM state vector and by the last sampled value of the system's control inputs vector. The linearization relies on Taylor series expansion and on the system's Jacobian matrices. For the approximately linearized model of the VSI-fed IM an H-infinity feedback controller is designed. This controller achieves the solution of the nonlinear optimal control problem for the VSI-fed IM under model uncertainty and external perturbations. For the computation of the controller's feedback gains an algebraic Riccati equation is iteratively solved at each time-step of the control method. The global asymptotic stability properties of the control method are proven through Lyapunov analysis. Finally, to implement state estimation-based control for this system the H-infinity Kalman Filter is proposed as a state observer.

Paper Reference: (SAC-13-3) 1570783447
Title: Nonlinear optimal control for electropneumatic actuators
Author(s): Gerasimos Rigatos; Med. Assaad Hamida; Masoud Abbaszadeh and Pierluigi Siano (France–Greece–Italy–USA)

Abstract − In the article's control approach, the dynamic model of the electropneumatic actuator undergoes approximate linearization with the use of first-order Taylor series expansion and through the computation of the associated Jacobian matrices. The linearization takes place at each sampling instance, around a temporary operating point which is defined by the present value of the actuator's state vector and by the last sampled value of the control inputs vector. For the approximately linearized model of the actuator an H-infinity stabilizing controller is designed. The feedback gains of the controller are computed through the solution of an algebraic Riccati equation, taking place at each time-step of the control method. The global stability properties of the control method are proven through Lyapunov analysis.

Paper Reference: (SAC-13-4) 1570783452
Title: H_∞ Static Output Feedback Control for Path Tracking of Autonomous Vehicles with input constraints
Author(s): Amine Kennouche; Dounia Saifia; Mohammed Chadli and Mohamed Nasri (Algeria–France)

Abstract − This paper presents a robust nonlinear H_∞ Static Output Feedback control (SOF) design for steering control of the autonomous vehicle with input constraint, external disturbances, and the unavailability of the sideslip angle. To deal with the actuator saturation, a polytopic representation has been used. Then, based on a Takagi-Sugeno (T-S) model of the vehicle lateral dynamics in its discrete-time form and using a nonquadratic fuzzy Lyapunov function, stabilization conditions have been derived in terms of Linear Matrix Inequalities (LMIs). Finally, the robustness and the advantages of the proposed approach are demonstrated through different tests.

Paper Reference: (SAC-13-5) 1570783454
Title: Crow Search Algorithm Based An Optimal Control for Switched Nonlinear Systems
Author(s): Marwen Kermani and Anis Sakly (Tunisia)

Abstract − This paper considers the optimal control of switched nonlinear systems. Ended, a novel metaheuristic optimizer, named crow search algorithm (CSA) is proposed. This algorithm allows to obtain the optimal switching instants that minimize a performance index over a finite time horizon. Finally, a switched nonlinear system that models a hydraulic system is given to illustrate the effectiveness of the proposed metaheuristic algorithm compared with d to the other algorithms

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Paper Reference: (SAC-14-1) 1570776764
Title: Robust Trajectory Tracking with Adaptive Non-singular Fast TSM Control of a Robot Manipulator
Author(s): Brahim Moudoud; Hicham Aissaoui and Mohammed Diany (Morocco)

Abstract − This work investigates a robust trajectory tracking with Adaptive Non-singular Fast TSM control (ANFTSMC) of a robot manipulator in the presence of disturbances and uncertainties. This method, based on the concept of fast terminal sliding mode, aims to ensure the finite-time convergence of the system states as fast as possible without singularity problems. Moreover, the effects of disturbances and uncertainties are overcome while avoiding the chatter problem thanks to the improved adaptive law. Using the Lyapunov theory, the semi-globally fixed-time stability of the whole closed-loop system is proved. Numerical simulations are carried out as an illustration of the efficiency of the proposed method.

Paper Reference: (SAC-14-2) 1570783109
Title: A Comparative Trajectory Tracking Controls of a Mobile Robot
Author(s): Salim Refoufi (Algeria)

Abstract − The work presented in this paper is focused on developing robust control laws to solve the problem of the trajectories tracking of differential wheeled mobile robots pioneer 3DX. The objective is to guarantee the correct behavior of the system and to ensure a good trajectory tracking even in the presence of parametric variations of the system. The function of the tracking is to force the robot to follow a certain path to reach the final destination, the robot must reach its goal in a predefined time by trying to minimize the error distance.

Paper Reference: (SAC-14-3) 1570783326
Title: Inverse Kinematic Model of Continuum Robots Using Artificial Neural Network
Author(s): Abdelhamid Ghoul; Kamel Kara; Selman Djeffal; Mohamed Benrabah and Mohamed Laid Hadjili (Algeria–Belgium)

Abstract − The problem of kinematics modeling, in particular inverse kinematic models of continuum robots is a currently posed problem which can be encountered when trying to understand its behavior. The considered issues about this robot are labelled to its redundant behavior, non-linear equations and the infinite degrees of freedom. These complexities make analytical solutions impossible in light of these constraints. To this end, in this paper, an artificial neural network is developed to solve the problem of inverse kinematic models of continuum robots with constant curvature, which describes the required cable lengths allowing the robot to follow the prescribed trajectory in its workspace. First, a continuum robot database is built by calculating the forward kinematic model. After that, the database is applied to the developed neural model without any assumptions. Then, the efficiency of the developed neural network is evaluated by giving the robot several trajectories to track. Based on the carried out simulations through MATLAB software, The proposed neural model provides with a high accuracy and efficiency especially when it comes to real-time application since the built-up data-base covers the entire workspace of the robot.

Paper Reference: (SAC-14-4) 1570783360
Title: Flatness Design Control for therapeutic Robot Based on Fuzzy Controller
Author(s): Brahim Brahmi; Mohammad Habibur Rahman and Soraya Bouden (Algeria–Canada)

Abstract − This study presents a flatness-based controller with fuzzy logic controller combined for controlling the artificial limb 2-DOF portable end-effector type therapeutic robot called iTbot (intelligent therapeutic robot). Compared with the most developed rehabilitation robots, this prototype has been operated at multiple manually selectable orientations to implement a wide range of robot-aided exercises for stroke survivors. To provide effective rehabilitation along with physical therapy activities, we present the differential geometry transformations of the system to obtain triangular canonical normal forms incorporated with fuzzy pre-compensator to achieve a high speed and high precision of specified trajectory. Simulations results show the efficiency of the suggested controller scheme.

Paper Reference: (SAC-14-5) 1570783453
Title: HPC Exploration for Mobile Robotics Under Energy Constraints
Author(s): Igor A. Silva and Omar Hammami (France)

Abstract − This paper aims to analyze the results of parallel algorithm implementations on mobile robots, in terms of execution time, resources used battery consumption. To do this, parallel region-growing image segmentation algorithms were implemented and executed in the Husky robot. It is concluded that the obtained speedups are not sufficient for a real-time application using the limited resources that the robot provides, and battery autonomy was decreased by up to 20% when executing a highly performant algorithm.

Paper Reference: (SAC-14-6) 1570783666
Title: Fuzzy-PID tracking control of a ball and plate system using a 6-Degrees-of-freedom parallel robot
Author(s): Oussama Hadoune and Mohamed Benouaret (Algeria)

Abstract − Three controllers are designed to stabilize a ball on plate using a 6-DOF parallel robot. The ball and plate is a nonlinear system and has an under-actuated feature increasing the difficulty of its control. Therefore, conventional controllers are not recommended to stabilize this kind of system, it requires, fast, precise and reliable controllers. The mathematical description of the ball and plate is derived and the simplified model is obtained. The inverse kinematics are performed to control the six servomotors angles which are tested on a designed Stewart platform in SolidWorks and implemented in Matlab software. A comparison between Fuzzy-PID, PID, and Fuzzy controller in a double loop feedback scheme is proposed to deal with this system. Simulation results show that the proposed Fuzzy-PID control design could control the ball on a 6-DOF Stewart platform with a small settling time and insignificant tracking error.

Paper Reference: (SAC-14-7) 1570783906
Title: Wheeled Mobile Robot Control Approaches: Comparative Analysis
Author(s): Marwa Manita; Boumedyen Boussaid and Mohamed Naceur Abdelkrim (Tunisia)

Abstract − Robotics has gained the attention of researchers nowadays in the fields, especially control and monitoring. This paper topic concerns comparison between different control laws of Wheeled Mobile Robots (WMR)for linear and circular trajectory tracking. We studied the kinematic and dynamic modeling of this robot, then the control study was carried out by four types of control, suchas the classic "PID", the "backstepping" using lyapunov,also "Feedback Linearization" and "Fuzzy Logic", basedon the unicycle mobile robot with a nonlinear model.Finally, the comparative study between these method susing Matlab simulink is given.

Paper Reference: (SAC-15-1) 1570784107
Title: Robust Control of an Induction Motor with Speed and Flux Estimator based on Synergetic approach
Author(s): Samira Benaicha (Algeria)

Abstract − This paper, describes a novel control strategy in variable speed drives for Induction Motor (IM) that aims to improve the Direct Rotor Field-oriented control (DFOC, which is well known to be sensitive to internal and external uncertainties. The control principle is based on Synergetic Control (SC) where SC contributes to the robustness and good dynamics of induction motor drives. To obtain precise velocity estimation and remove all mechanical sensors and to estimate the rotor flux, the method (SC) has been used. The proposed method is verified by simulation

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Paper Reference: (SAC-15-2) 1570785814
Title: Optimal control of three stages supply chain model with shortages
Author(s): Abdulwahid A. Saif and Sami El Ferik (Saudi Arabia)

Abstract − This paper considers an optimal control of a three stage supply chain model that consists of a manufacturer, a vendor and a retailer. The firm is developed under a continuous-time review policy where the deterioration rate is fixed, shortages are allowed and the demand is assumed to be a linear function of price. Optimal control theory for non-smooth dynamic system is applied in order to maximize the supply chain profit by optimizing both of the production rate and the dynamic price. To illustrate the result of the proposed model, a numerical example is presented.

Paper Reference: (SAC-15-3) 1570788876
Title: Tracking Power Photovoltaic System with Robust Polynomial Output Feedback Control Strategy
Author(s): Noureddine Boubekri; Dounia Saifia; Sofiane Doudou and Mohammed Chadli (Algeria–France)

Abstract − This paper proposes a new robust stabilization conditions for Maximum Power Point Tracking (MPPT) control of photovoltaic (PV) systems based on polynomial fuzzy systems. In this scheme, an output feedback controller is exploited to reduce the number of needed sensors. The stabilization conditions are formulated in terms of sum-of-squares (SOS) conditions, which can be solved efficiently by using semidefinite programming (SDP). The efficiency of the proposed controller is demonstrated through the simulation results.

Paper Reference: (SAC-15-4) 1570789113
Title: A robust linear feedback control of PEMFC's air feed system
Author(s): Asma Rahmani; Mohamed Bougrine; Mohammed Benzoubir and Atallah Benalia (Algeria)

Abstract − The compressor consumes the most energy in a polymer electrolyte membrane fuel cell (PEMFC). Therefore, managing the air supply system is critical for the whole system. This paper proposes the design of a linear feedback with integral action control for regulating the oxygen excess ratio to increase the FC efficiency. The dynamics of the fuel cell system is first modeled and linearized around its equilibrium point to design our linear feedback controller. According to the simulation result, the proposed controller performs well, it is robust and has good transient performance.

Paper Reference: (SAC-16-1) 1570775740
Title: Increasing workspace and trajectory planning of the parallel robot PAR4
Author(s): Ahlem Saidi; Neila Mezghani Ben Ramdhane and Tarak Damak (Tunisia)

Abstract − In this paper, Increasing workspace and trajectory planning of the parallel robot PAR4 are presented. First, the tracing of workspace is achieved by the inverse kinematic model, then increasing workspace is determined using the method optimization of parameters greatly improve the work volume of the parallel robot. Second, planning trajectory of the robot PAR4 is determined due to the methodS-curve and, optimization of the trajectory. Numerical results are presented showing increasing workspace and optimization of the trajectory.

Paper Reference: (SAC-16-2) 1570784088
Title: Design and Development of Controllers for a Modular Pipe Climbing Robot
Author(s): Aymen Ahmed; Ines Chihi and Mohamed Gharib (Luxembourg–Qatar–Tunisia)

Abstract − Climbing robots have become an essential tool in many applications. Developing an efficient control system is necessary to ensure accurate operation on these robots while they perform their tasks. This paper presents the design and implementation of several controllers for a modular pipe climbing robot. The propeller's driven robot is initially modeled using the architecture of the quadcopter system. Then, based on the cascade PID, Fuzzy Logic, and Artificial Neural Networks techniques, three controllers were implemented to

regulate the position and orientation of the robot considering two degrees of freedom. After that, several scenarios were implemented and tested to evaluate the performance of the different proposed control structures.

Paper Reference: (SAC-16-3) 1570789032
Title: Robust Hovering Control of a Quadrotor
Author(s): Muhammad Maaruf; Sami El Ferik and Abdulwahid A. Saif (Saudi Arabia)

Abstract – This paper investigates hovering control of a quadrotor with dynamic uncertainties. The quadrotor dynamic mode model is partitioned into three subsystems: attitude subsystem, altitude subsystem, and position subsystem. An adaptive fractional order sliding mode controller (AFSMC) is constructed for the vertical position to keep the quadrotor at the required height while the horizontal position is stabilized. Furthermore,in order to control the orientation of the quadrotor, a robust nonsingular fast terminal sliding mode controller is developed for the attitude subsystem. Finally, simulation results illustrate the effective performance of the proposed scheme.

Paper Reference: (SAC-16-4) 1570789090
Title: A Genetic Algorithm for tasks allocation and sequencing in a human robot assembly system
Author(s): Soraya Izghouti; Mehdi Gaham and Moufid Mansour (Algeria)

Abstract – Due to the increased productivity and flexibility requirements of production lines, research and industry are increasingly interested in the integration of collaborative human-robot systems (CHR) within flexible assembly lines; which will allow combining human and robotic capabilities. In this work, we focused on the design of a control system that enables the planning / coordination of human-robot collaboration (CHR) tasks. The system is based on an optimization process that resolves the affectation and the sequencing problem (permutation of tasks) between the robot and operator. Considering that Tree-based assembly tasks constraints must to be taken into account during the resolution, a novel encoding-based genetic algorithm is proposed for the resolution of the problem. In the proposed method, the genetic algorithm is implemented using an indirect (non-permutation) encoding scheme and a dedicated evaluation mechanism that avoid from any kind of solution repair after recombination operators. Preliminary results validate the approach on generated benchmarking instances

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Paper Reference: (SAC-16-5) 1570789135
Title: Enhanced Fast Vision-Based Obstacle Avoidance Algorithm
Author(s): Sid Mohamed Amine (Algeria)

Abstract – In this paper, we propose an extended object size detector to identify the frontal obstacle approaching during quadcopters navigation. This algorithm has a low computation complexity and robustness to the background noise. Experimental results, performed in the GAZEBO simulator, confirm the accuracy and the high performance of the proposed approach.

Paper Reference: (SAC-16-6) 1570802366
Title: Lateral and Longitudinal Tire Force Prediction Using Soft Computing
Author(s): Foudil Abdessemed (Algeria)

Abstract – In this paper, both the longitudinal force as a function of longitudinal slip, s, and the lateral force as a function of the lateral slip α. Both forces are estimated using tools from artificial intelligence, where fuzzy and neural network approaches are used, excluding the need to estimate them from empirical formula. To enhance the accuracy of the performance of the estimator, we present a method for optimizing membership functions using particle swarm optimization (PSO) algorithm, resulting in a fuzzy estimator that try to synthesize the magic formula for certain models of tires. A trained neural network is the other proposal in this paper, in which techniques from machine learning is used to realize an intelligent tire systems able to estimate these forces. Simulation results are reported, compared and discussed.

SCI Papers

Paper Reference: (SCI-1-1) 1570793544
Title: A Comparative Study of Simulation Methods for Patch Antenna Strain Sensor
Author(s): Dhivakar Rajendran; Olfa Kanoun (Germany)

Abstract − Passive wireless strain sensors based on microstrip patch antennas recently show significant promise for reliable health and performance monitoring in the aerospace and civil industries. Microstrip patch antenna consists of a metal patch, dielectric substrate, and metal grounding plate. When excited by the signal, an electromagnetic resonant cavity is formed between the conductor patch and the grounding plate and radiates outward through the gap between the patch and the grounding plate. These antennas radiate at their resonant frequency. When the antenna experiences deformation, the antenna shape changes, causing a shift in the electromagnetic resonance frequency of the antenna. For this purpose, the antenna design is critical to influencing both RF characteristics and strain sensing behavior. In this work, a passive wireless strain sensor using a microstrip patch antenna with feed-inset operating at 2.8 GHz was designed and simulated in different simulation methods using simulation software CST Microwave studio and COMSOL Multiphysics. The simulation results were compared regarding the patch antenna's processing time, linearity, and sensitivity for strain sensing. Among these methods, strain and RF simulation of patch antenna using COMSOL software show better accuracy and linear response towards strain.

Paper Reference: (SCI-1-2) 1570793539
Title: Transmissive Eddy Current Sensor for Gap Detection Between Sheet Metal Materials
Author(s): Zheng Hu; Frank Wendler; Olfa Kanoun (Germany)

Abstract − Path control is decisive for the quality of welding processes. In this work, an eddy current sensor system based on double coils is investigated for gap detection between two sheet metal materials. The coupling inductances of the sending and the receiving coils are collected in the frequency range from 10 kHz to 1 MHz, in cases of different gap widths and measurement distances. The experimental results show that the developed system is able to measure gaps with a width from 0 mm to 12 mm at various distances from 3 mm to 6 mm. This method is therefore suitable for precise location in welding processes, especially in the plasma welding process facing great noisy disruptions.

Paper Reference: (SCI-1-3) 1570785940
Title: Improved Compressive Sensing based on Sampling Rate Adjustments in Wireless Sensor Networks
Author(s): Faouzi Derbel (Germany)

Abstract − This paper presents compressive sensing (CS)-based approach that aims at finding a more energy-efficient deployment strategy of a wireless sensor network (WSN). The proposed approach takes advantage of the sparse nature of most natural data in order to minimize the number of the retrieved compressed samples, and thereby reduces the energy consumption of the deployed sensor nodes. Throughout the work, various CS-based reconstruction methods have been investigated and tested with regard to their efficiency in order to select the optimal approach. Then, a real-time scenario that applies the CS process in a small network has been investigated, comprising resource-limited nodes. Furthermore, the paper proposes a sample rate adjustment (SRA) scheme that adapts CS methods to the characteristics of the data. It exploits the variability of the data sparsity to further reduce the number of samples and minimize energy consumption. To test the performance of our approach, we implemented small programmable wireless modules, that are widely used for environmental monitoring scenarios.

Paper Reference: (SCI-1-4) 1570788631
Title: Cooling the Car while Parking Under the Sun
Author(s): Abdulwahid A. Saif; Mujahed Aldhaifallah (Saudi Arabia)

Abstract − With the increasing demand to provide green and efficient energy with an Inexhaustible source like the sun, we decided to get benefit by using the solar panel at the top of the car. Saudi Arabia considered one of the countries that have hot weather, and that cause lots of problems during office hours, damaging car's accessories and burning for combustible material like batteries. In this work we propose a coolant system for a car when parking under the sun. The work tries to give an a design of the proposed system with brief description of each part of the project like the solar panel, and the most suitable type for our project, the water radiator that is the future of the AC.

Paper Reference: (SCI-1-5) 1570783989
Title: Comparative Study of Transmitter and Resonator Coils for Wireless Power Transfer
Author(s): Abdallah Adawy; Ghada Bouattour; Mohammed Ibbini; Olfa Kanoun (Jordan-Tunisia-Germany)

Abstract − Multi-coil wireless power transfer WPT systems have a lot of benefits compared to single coil WPT systems in the terms of power capacity, power transfer efficiency, and free position. In this paper, a comparative study of two different types of multi-coil WPT systems is proposed. The first system contains three transmitter coils on the primary side, while the other system contains one transmitter coil and two resonator coils. Both multi-coil WPT systems are studied in three different cases. The resonator coils lead to higher output power in addition to system efficiency when the receiver has misalignment with transmitter coils. When the receiver coil is aligned with the transmitter coil, resonator coils can decrease the output power and power transfer efficiency. The multi-coil WPT systems are working at a frequency of 6.78 MHz. Resonator coils are also designed under the operating resonance frequency.

Paper Reference: (SCI-1-6) 1570788675
Title: Electrical and optical properties of Black Phosphorus under Strain effects: A First-principles Study
Author(s): Hichem Ferhati; Fayçal Djeffal; Seyfelislam Farah; Zohir Dibi (Algeria)

Abstract − In this work, the impact of the pressure on the electronic and optical characteristics of bulk Black Phosphorus (BP) is investigated using first principles calculations. In this context, the density functional theory (DFT), including Perdew- Burke-Ernzerhof Generalized Gradient Approximation (PBEGGA) and the screened hybrid (YS-PBE0) functionals with van der Waals correction is used to study the material properties under pressure effects. The band structures of bulk BP with and without pressure effects are extracted. It is revealed from DFT results that the band gap decreases with pressure increasing, where low a band gap value of 0.09 eV is achieved by introducing the critical pressure of 1.5 GPa. Further increasing the pressure leads to semi-metallic properties in bulk BP. In addition, the optical properties of the material under pressure are investigated by extracting the dielectric function and the optical constants under pressure effects. It is revealed that the strained bulk BP can enable enhanced optical performances over the middle infrared (Mid-IR) spectral band, making it highly suitable for the design of high performance photosensors appropriate for optical communication applications

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Paper Reference: (SCI-2-1) 1570793541
Title: Performance Investigation of Screen-Printed Carbon Electrodes Activated by MES-Acid
Author(s): Hussamaldeen Jaradat; Ammar Al-Hamry; Qiming Wang; Junfei Wang; Yu Zhou; Yucheng Song; Mohammed Ibbini; Olfa Kanoun (Jordan-Germany)

Abstract − Carbon is a well-known material for its properties, versatility, and availability and in its wide range of applications. Screen-printed carbon electrodes (SPCEs) have several attractive properties like their mass production, price effectiveness as well as technical properties. However, SPCEs performance usually needs to be enhanced with several approaches, such as modifying with nanocomposite materials, electrochemical activation, or doping. In this work, an investigation focused on the effect of 2-(N-morpholino)ethanesulfonic-acid (MES) -electrochemical activation of SPCEs was carried out. Electrochemical methods i.e. cyclic voltammetry and impedance spectroscopy

were utilized as characterization techniques. This study utilizes the concept of charge transfer resistance Rct and its drop as a measure to assess the enhancement in conductivity. The results show a great enhancement in charge transfer resistance (Rct). For graphite electrodes, Rct was reduced by 52% after pretreatment. Meanwhile, for the carbon nanotube-modified graphite electrodes, the Rct dropped by 54%.

Paper Reference: (SCI-2-2) 1570789155
Title: Flexible Lead-Free BCT/PDMS-Based Nanogenerator as Piezoelectric Energy Harvester
Author(s): Dalel Missaoui; Ayda Bouhamed; Khawla Jeder; Amina Ben Ayed; Anouar Njeh; Olfa Kanoun (Tunisia-Germany)

Abstract − Nowadays; there is a great demand to develop lead-free piezoelectric materials for wearable energy harvesters. Among the numerous piezoelectric materials, Calcium Barium Titanate Ba1-xCaxTiO3 (BCT) has been extensively used because it has approximately similar as to lead Titanate Zirconate (PZT). In this study, BCT (with x=0.2) nanoparticles were synthesized using the sol-gel method in order to be used to fabricate flexible and biocompatible nanogenerators (NGs). These NGs are made out of composites containing polydimethylsiloxane (PDMS) polymer and different percentages of BCT ranging from 10 to 20 wt%. Piezoelectric performance of NGs was examined using an artificial vibration source as well under tapping finger. The performance of the NGs was correlated to their electrical properties measured by impedance spectroscopy. The results illustrate that the nanogenerator with 15 wt% of BCT nanopowders achieves high piezoelectric performance with a maximum output voltage of 1.56 V under electrodynamic vibration shaker and 14.6 V under tapping finger. The impedance measurements affirm that PENG (15%) is the most suitable nanogenerator.

Paper Reference: (SCI-2-3) 1570764593
Title: Temperature Display on Web Browser Using Ethernet Shield And LM35 Sensor based on Arduino Board
Author(s): Ahmed Bouraiou; Ammar Necaibia; Abdeldjabbar Babahadj; Rachid Dabou; Abderrezzaq Ziane; Salah Lachtar; Nordine Sahouane; Seyfallah Khelifi; Abdelkrim Rouabhia; Issam Attoui; Mohammed Salah Bouakkaz; Naceredine Labed (Algeria)

Abstract − This work presents temperature display on web browser using Ethernet Shield And LM 35 Sensor based on Arduino IDE Environment. The web page programming was realized with Arduino Mega 2560 microcontroller using C/C++ language based only on the HTML 5 and CSS 3. It offers a simple way to the temperature display on HTML web page from anywhere of the world, which is an important task for monitoring and supervision of renewable energy systems such as photovoltaic and thermal applications.

Paper Reference: (SCI-2-4) 1570776027
Title: Effects of doping profile and temperature on the bifacial solar cell performances
Author(s): Asma Benchiheb; Nedjoua Benchiheb; Yasmina Saidi; Samira Dib (Algeria)

Abstract − In this paper, an optimization of a bifacial silicon solar cell structure is presented. This study takes into account the effects of temperature and doping level of each region of the device. As the simulation with the COMSOL software allowed us to demonstrate the link between the technological structure of a bifacial N+NPP+ type solar cell and the various characteristics and parameters obtained at the output when it is subjected to a polarization. Thus, we considered different doping levels and thicknesses of the N+ and P+ layers. It has been observed, for the emitter region, that the effects of temperature are negligible for low doping levels of the N + layer. However, in heavy doping, the benefit of reducing its thickness below 0.018μm is demonstrated, especially for the high temperature operating range. Concerning the p + layer located on the back face (forming the base) of the solar cell, the increasing in its doping level and its thickness improves the efficiency. However, increasing the temperature tends to reduce it, especially for high doping levels.

Paper Reference: (SCI-2-5) 1570786020
Title: Passive Wireless Optical Sensor In The Near Field For Atmospheric Corrosion Monitoring
Author(s): El Bouslemti Rahmouna; Salah Belkhodja Faouzi; Sayah Abd El Kader (Algeria)

Abstract − This article focused on the design of a passive, non-contact corrosion sensor based on the variation of radiofrequency (RF) wave propagation. Corrosion and degradation of materials are major problems. In this context, monitoring the degradation of materials is essential. We were inspired by passive chipless RFID (Radio Frequency Identification) technology for the development of a sensor based on a microwave function at 1.3 GHz. Experimental results prove the feasibility of a completely energetically passive RF sensor. The sensor works perfectly over a reading distance of around 10 cm. an improvement of this distance is possible.

Paper Reference: (SCI-3-1) 1570793542
Title: sEMG Features Selection by a Chaotic Salp Swarm Algorithm for Hand Gestures Classification
Author(s): Hiba Hellara; Rim Barioul; Salwa Sahnoun; Ayoub Choura; Ahmed Fakhfakh; Dhouha Bouchaala; Mohamed Deriche; Olfa Kanoun (Tunisia–Germany–UAE)

Abstract − Swarm intelligence algorithms are widely used for wrapper feature selection applications. Such algorithms have some limitations on exploration, exploitation, and local optima convergence. This paper considers the enhanced approaches of the Salp Swarm Algorithm (SSA) for feature selection from an sEMG dataset. In this paper, six different chaotic maps, namely: circle, tent, piecewise, logistic, singer, and sinusoidal map, are used to improve the balance between exploration and exploitation in SSA. After running the approaches twenty times, we compare these maps according to the average classification accuracy values, execution time, and the number of selected features. Results prove that the piecewise map shows the best performance by giving 79.80% accuracy in short time with a small number of selected features and good convergence speed.

Paper Reference: (SCI-3-2) 1570783467
Title: A ternary composite's dielectric modeling as a binary one
Author(s): Rabah Delfouf; Abdelhalim Brahimi; Nacerdine Bourouba; Nacerdine Bouzit; Juan Pablo Martìnez Jiménez (Algeria–Spain)

Abstract − The work developed in this article consists of the optimization of the modified Lichtenecker model (MLL) and its validation using experimental data from a time domain reflectometry measurement bench. This model will allow the prediction of the dielectric behavior of ternary mixtures and the simplification of ternary model into that of the binary. The practical results taken for this type of composites concern the evolution of the permittivity over a broad frequency spectrum that ranges from DC to 10GHz. The use of the modified Lichtenecker law allowed us to find the shape factor which by different methods of approximation we managed to optimize this theoretical model. This performance was confirmed by the low relative errors obtained. The focus of this research is on the use of these materials in the downsizing of telecommunications and microelectronics components.

Paper Reference: (SCI-3-3) 1570783424
Title: A Monitoring Smart Insole for Walking Performance
Author(s): Samir Boukhenous (Algeria)

Abstract − Gait analysis is the study of lower limb movement for identification of gait events and the measurements of kinetics and kinematics parameters. Gait analysis is very important procedure in assessing and improving many quality of life indicators. Recently, it is reported that foot plantar pressure can be used to asses gait stability and risk of fall. Foot pressure is measured when the foot is already touching the ground. This article shows an instrumented insole for the monitoring of walking performance. It also can be used to identify gait events such as heel strike, toe off, the timing of swing, stance, stride, the double support phase and also cadence.

Paper Reference: (SCI-3-4) 1570788195
Title: Evanescent optical Kerr effect using silica nanofibers immersed in nonlinear liquids
Author(s): Oussama Laouedj; Abderrahim Azzoune; Azzedine Bouaraba (Algeria)

Abstract − Optical nanofibers with tiny diameters can confine light allowing to generate nonlinear effects and an intense evanescent field that can interact with the external medium. In this paper, we theoretically demonstrate the contribution of the evanescent field to the Kerr effect in a silica nanofiber immersed in highly nonlinear liquids (water, ethanol, and acetone) at wavelength 820nm. We found that we can have an evanescent Kerr effect higher than the usual Kerr effect inside the core for nanofiber's diameter below 0.806μm in acetone. Therefore, these nanofibers can be used as excellent sensors of external media especially for hard-to-reach places using evanescent optical Kerr effect.

Paper Reference: (SCI-3-5) 1570788680
Title: Magnetic properties of RF sputtered NbO-Ni and NiO-Nb thin films: Application of Preisach model
Author(s): A. Bendjerad; A. Benhaya; Hichem Ferhati; F. Smaili; S. Rahmani; Fayçal Djeffal; A. Lahmar (Algeria–France)

Abstract − In the present study, (NiO)-niobium (Nb)/ niobium oxide (NbO)- nickel (Ni) bilayer structure was prepared by using Radio Frequency (RF) magnetron sputtering technique. The sub-layers were deposited successively on glass substrate. The magnetic properties of the prepared samples were carried out at room temperature in both perpendicular and parallel magnetic field to the sample. The Preisach model was used to fit the magnetic behavior of the developed NiONb/ NbO-Ni bilayer thin films. XRD measurements were performed to assess the structural properties of the elaborated thin-films. It is found that the obtained results correlates well with the experimental ones, were a good agreement between the experimental data and the theoretical modeling is recorded. Therefore, the obtained results indicate the effectiveness of the proposed methodology based on experiments assisted by accurate modeling approaches and provides a sound pathway for developing potential alternative materials for sensing and spintronics applications

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Paper Reference: (SCI-3-6) 1570788483
Title: Extraction of the complex permittivity from single pulse terahertz transmission spectroscopy
Author(s): Feriel Latreche; Mohamed Lazoul; Ayoub Boutemedjet (Algeria)

Abstract − Terahertz spectroscopy is a very efficient technique for material detection and identification especially due to the unique spectral fingerprint of materials in the terahertz range. In this work, we describe a reliable calculation method that allows the calculation of the complex permittivity from terahertz spectroscopy measurements in transmission mode. This model-based calculation method will allow for substance detection and identification without requiring model simplification nor any sample restrictions. We find out that, when correctly employed, this method yields good results compared to other already published methods.

Paper Reference: (SCI-3-7) 1570784022
Title: Evaluation of a Pyroelectric Sensor Transfer Function Model Using Measurements
Author(s): Nejmeddine Sifi; Raja Maghrebi (Tunisia)

Abstract − The purpose of this paper is to present an evaluation study of a pyroelectric sensor model implemented in MATLAB/SIMULINK environment. The model was proposed by Odon to serve as a basis for the analysis of the dynamic behavior of a pyroelectric sensor. The model consists of some cascaded transfer functions taking into account the material characteristics and geometrical parameters which have been synthesized in the form of thermal and electrical time constants and a global multiplying coefficient. The study performed is relevant to evaluate the validity of the model by comparing its simulated response to measurement obtained on a pyroelectric sensor prototype. To achieve this evaluation, an optimization algorithm is used to estimate the parameters values of the transfer function model so that an acceptable correlation between simulated and measured responses is obtained. The semi-experimental evaluation approach has been applied to a prototype sensor with a pyroelectric material thickness of 25 um. The estimated values of the parameters were very interesting in terms of uncertainties.

Paper Reference: (SCI-4-1) 1570790864
Title: Design of a Wearable Multi-Sensor Node for Human Movement Identification based on RSSI Measurements
Author(s): Mahdi Mnif; Bilel Ben Atitallah; Dhouha El Houssaini; Salwa Sahnoun; Ahmed Fakhfakh; Olfa Kanoun (Tunisia–Germany)

Abstract − A portable Wireless Body Area Network (WBAN) composed of physiological and inertial sensors integrated into a telemedical system promises to become an important infrastructure element in home-based remotely supervised patient rehabilitation. It offers a better and less expensive alternative to rehabilitation and benefits patients, physicians, and society through abnormal conditions early detection, and supervised rehabilitation by continuous monitoring for extended periods of time and near real-time updates of patients' medical records through the Internet. In this work, a compact, energy efficient and multi-sensing wireless body attached sensor node with a 4-layer PCB configuration and a 35 mm diameter is developed to implement a WBAN-based system for health status monitoring. The node uses CC430F5137IRGRZ microcontroller integrating the necessary hardware for implementing RSSI measurements. Therefore, an RF transmission is designed to monitor the RSSI measurements for distance estimation and movement identification. Indeed, all sensing and location information are stored in Firebase real-time database, then processed and visualized by a web interface.

Paper Reference: (SCI-4-2) 1570791143
Title: A Combination of Energy Harvesting and Wireless Power Transfer for Applications in Harsh Environments
Author(s): Kholoud Hamza; Ghada Bouattour; Carlo Trigona; Roberto La Rosa; Salvatore Baglio; Ahmed Fakhfakh; Olfa Kanoun (Tunisia–Italy–Germany)

Abstract − Energy Harvesting (EH) and power delivery are key technologies for self-powered systems toward mobile electronics, the internet of things, and sensor networks. The excessive application of wires also increases the possibility of a short circuit and fire sparks. Wireless power transfer (WPT) is an excellent alternative for this problem that would eliminate cables and increase electrical safety. The current challenge of wireless power transfer is distance and misalignment. This paper investigates the effect of EH with WPT. The system works under a wide band of frequencies from 26 Hz to 30 Hz and various accelerations from 0.14 g to 0.19g. The harvester was implemented by electronic components and experimentally tested to determine the maximum generated power which is 330 mW at 560 Ω as load impedance at 29 Hz of the resonance frequency. Results showed that at an ideal distance and alignment and under different acceleration, the output voltage of the rectifier increased to 4.2 V at 0.19 g, and the DC-DC converter is stable to 3.2 V. The output voltage of the receiving coil is decreasing as the distance and the lateral misalignment are decreasing. The output voltage of the receiving coil value is obtained when the system is in ideal alignment and distance. The system can work under a wideband of distance from 0 mm to 8 mm and a wideband of lateral misalignment from 0 mm to 5 mm.

Paper Reference: (SCI-4-3) 1570784068
Title: A Comparative Analysis of Different Diaphragm Shaped for MEMS Capacitive Pressure Sensor
Author(s): Tahar Lahreche; Malika Kandouci; Yacine Hadjadj (Algeria)

Abstract − A capacitive pressure sensor consists of a movable diaphragm which reasons change in capacitance for an applied pressure. This paper presents the design, simulation and analysis of capacitive pressure sensor based on Micro Electro Mechanical Systems (MEMS) technology. The comparison of square and circular shape diaphragm for same overlapping area between plates are approved out. The results show that the membrane deflection is linearly related to the applied pressure. The circular membrane structure provides a high

capacitance of 1.325 pF at 25000 Pa. Additionally, in case of increasing temperature, the results show that the capacitance for circular shape is also higher than that for square shape. The design, simulation and analysis are performed using COMSOL Multiphysics 5.4.

Paper Reference: (SCI-4-4) 1570787530
Title: Energy Aware Disjoint Dominating Sets Algorithm for Heterogeneous Wireless Sensor Networks
Author(s): Ahmed Khedr (UAE)

Abstract – There are endless applications of Wireless Sensor Networks (WSNs) in our daily lives, such as safety, environmental monitoring, health-care, animal monitoring etc. However, one of the key issues in WSN is energy constraints. Among the various methods that aim to overcome this issue, one of the common approach is to apply sleep-awake scheduling by selecting disjoint groups of nodes called dominating set. Each group carry out the tasks on behalf of their nearby nodes. This helps to prolong network lifespan by distributing data collection responsibilities across these groups, such that one group is responsible for handling these tasks for certain period of time, and then is replaced by another group, and so on. In this paper, given a network of nodes with heterogeneous energy, our target is to determine the energy-aware disjoint dominating sets that help to extend the total network lifetime. To achieve this target, we present Bees algorithm-based method. The efficiency of the proposed algorithms are proved through simulations.

Paper Reference: (SCI-4-5) 1570782604
Title: Improved Sample Volume in Cylindrical Perturbed Cavity for Permittivity Calculation
Author(s): Khawla Ghorab; Mohamed lahdi Riabi; Rawdha Thabet; Jun Wu Tao (Algeria–France)

Abstract – An estimate of the maximum volume of a dielectric material, based on the cavity perturbation technique, is performed for accurate calculation of the complex permittivity. It is observed that a cylindrical perturbed cavity makes it possible to obtain a maximum volume ratio of dielectric sample to cavity which is more appreciable in comparison with a rectangular perturbed cavity. Some geometries and natures of the sample have been tested and a low loss material with a low dielectric constant and a thin disk shape ensures the best maximum volume ratio.

Paper Reference: (SCI-4-6) 1570784041
Title: Very high sensitivity of one dimensional photonic crystal biosensor for glucose monitoring
Author(s): Faiza Bounaas (Algeria)

Abstract – This paper investigates a one-dimensional (1D) photonic crystal (PhC) based optical sensor. Three defect air layers filled with glucose solution separated by two thin cells of titanium dioxide (TiO2) are used as sensing regions. The sensing principle is based on the transmission peak shifts caused by the analyte refractive index (RI) change. Using the transfer matrix method (TMM), the effects of the temperature and the glucose concentration on the resonant wavelength are analyzed. The analysis found that our designed device offers a high sensitivity of 993 nm/RIU and a quality factor of 1.314*10e-6. Moreover, the developed biosensor has a simple design, and it can be a promising platform for RI based glucose sensing.

Paper Reference: (SCI-5-1) 1570795930
Title: A mononuclear nickel(II) complex as a redox mediator for electrochemical sensors
Author(s): Saddam Weheabby; Ammar Al-Hamry; Salem Nasraoui; Tobias Rueffer; Olfa Kanoun (Germany–Tunisia)

Abstract – The mononuclear nickel bis(oxamidato) complex [(L)Ni]2-; L = o-phenylenebis(N-ethyloxalamide) has a potential for use in electrochemical sensors. The [(L)Ni]2- complex was characterized by, for example, UV-vis spectroscopy, and its redox properties were studied by cyclic voltammetry. [(L)Ni]2- shows a reversible redox event corresponding to the NiII/NiIII redox couple at E = 360 mV (delta Ep = 60 mV). To study the electrochemical sensitivity a screen-printed carbon electrode (SPCE) was used and functionalized with [(L)Ni]2-. The modified electrode [(L)Ni]2-SPCE has been fabricated by drop-casting of [(L)Ni]2- on the working electrode. The [(L)Ni]2-SPCE electrode exhibits the characteristic of improved reversibility and enhances the current response of ferri/ferrocyanide redox couple compared to SPCE. Furthermore, the modified electrode shows a good electrocatalytic activity toward the oxidation of D-glucose and the reduction of nitrate, providing means as a new and promising electrochemical sensors material.

Paper Reference: (SCI-5-2) 1570768173
Title: Online Pressure Measurement in the Ski Boot to Analyze the Carving Technique
Author(s): Fabian Hildebrandt; Roman Gruden (Germany)

Abstract – This paper describes the design of an online pressure measurement system to determine the correct load for the carving technique in skiing. For this purpose the state of the art for insole pressure measurement, skiing analysis and mobile data acquisition devices is being investigated. The research shows that there is no pressure measurement system available yet that uses pressure sensors on the lower leg to make statements about the lower extremity movements during skiing. Therefore, a pressure measurement system was developed, which uses eight sensors under the soles of the feet and on the lower legs and transmits the collected data via Bluetooth Low Energy (BLE) to a cell phone. The measurement data is displayed and stored for further analysis with the phyphox application. With the help of the measurement system it is possible to make statements about incorrect posture and typical movement sequences during carving and to obtain reproducible results. In the outlook, optimization proposals for further research are presented.

Paper Reference: (SCI-5-3) 1570778347
Title: An on-chip transformer in ferrite-based technology
Author(s): Yamina Benhada, Kheria Mendez and Mokhteria Derkaoui (Algeria)

Abstract – The comprehensive characterization of a integrated transformer, stacked and intertwined is investigated in this paper. This paper is decomposed into three parts. First of one concern a presentation the monolithic transformer topologies. Then the geometric dimensions and electrical model of our component are presented. An equivalent circuit is proposed to extract the model parameter in these transformers to investigate the high-frequency performance. The last part concerns simulation results of thermal modeling, using the software Comsol 5.3 based on finite element method that allowed us to determine the operating temperature in the materials of this integrated planar transformer, stacked and intertwined without magnetic core and with magnetic core in 3D space dimension.

Paper Reference: (SCI-5-4) 1570788672
Title: Enhanced Photoresponse of Ultraviolet Photodetector via RF Sputtered ZnO/a-SiC Heterostructure
Author(s): Fayçal Djeffal; Hichem Ferhati; A. Benhaya; A. Bendjerad (Algeria)

Abstract – In this study, metal-semiconductor-metal (MSM) ultraviolet (UV) photodetector (PD) structure based on amorphous-silicon Carbide (a-SiC) was developed by RF sputtering deposition. ZnO thin-film behaving like as passivation and efficient UV absorber layer was sputtered on the a-SiC film forming a heterostructured device. A comprehensive study of the device structural and optical performances was performed by XRD and UV-Vis spectra measurements. Significantly, the fabricated device exhibits an excellent ultraviolet absorption ability (85MSM UV-PD reveals a good responsivity of 37 mA/W, an extremely reduced dark current of 10 pA and high ION/IOFF ratio of 120 dB at self-powered mode. These improved performances can be explained by the effect of the heterostructure nature of the developed ZnO/a-SiC, which leads to enhance photoinduced carrier generation mechanism and also transport of carriers. The obtained results suggest that the fabricated amorphous UV MSM PD herein show a cost-effective approach for developing novel self-powered UV photosensors potentially appropriate for high temperature and power applications

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Paper Reference: (SCI-5-5) 1570775787
Title: Probe Characterization Using Stochastic Search Algorithms and Radial Basis Functions Neural Networks
Author(s): Ahmed Melahi; Boukhalfa Bendahmane (Algeria)

Abstract − Within this paper, the auto-compensated electrostatic induction probe is characterized by generating its Point Spread Function (PSF) and its inverse. New approaches based on the stochastic Search Algorithms (SSA) are proposed to obtain several Point Spread Functions and their inverses. Radial Basis Functions Neural Networks are used to approximate the original measures in order to have two-dimensional array representation of the potential on the surface of the material. These new approaches are tested, validated, and compared to each other in term of rapid convergence and best cost obtained. The obtained PSFs and inverse PSFs give approximations within a good accuracy in predicting the measure or the real distribution of the potential on the surface of the material.

Paper Reference: (SCI-6-1) 1570779487
Title: Energy Harvesting from Rose of Jericho Movements
Author(s): Carlo Trigona, Erika Costa, Nicolò Cascone, Salvatore Baglio (Italy)

Abstract − In this paper an energy harvesting based on motions imposed through spontaneous rose of Jericho movements. The plant curls its branches and seedpods inward in the dry condition, forming a ball that opens only when moistened. Its movements correlated with the environmental conditions are used to scavenge energy through flexible piezoelectric foils located around the plant.The architecture is composed of 8 piezoelectric transducer where each one, when mechanically sollecitated through the plant, is able to generate an open circuit voltage of about 20 mVpp.The proof of concept of the system together with preliminary mechanical and electrical considerations will be presented in the paper showing the suitability of the proposed solution as energy harvester from mechanical motion imposed through natural movements coming from rose of Jericho plant.

Paper Reference: (SCI-6-2) 1570783420
Title: Multi Objective Task Offloading in Fog Computing using Sparrow Search algorithm
Author(s): Marya Jehad Alseid, Ali A. El-Moursy, Ahmed Khedr (UAE)

Abstract − The Internet of Things (IoT) has become an important part of different applications such as smart homes, healthcare, agriculture, industries, and education. This dependency on IoT from different sectors led to a large increase in the number of IoT devices. This will cause a congested network due to the large number of data requests generated from IoT devices. IoT devices can offload real-time tasks generated by IoT applications to remote servers to improve the Quality of Service (QoS). Offloading tasks to remote servers such as the cloud can reduce the consumed energy but it will cause additional cost and delay. Offloading to the cloud can improve IoT performance but it's restricted with high latency. Fog computing is a new form of cloud computing that can perform delay-sensitive and intensive tasks. Delay can be reduced effectively by offloading tasks to fog nodes in a cloud-fog environment. Developing an effective offloading strategy to meet users' requirements is challenging. In this paper, using Sparrow Search Algorithm (SSA), an efficient Offloading Fog Algorithm (OFA-SSA) is proposed to offload tasks from IoT devices to fog nodes. The objective is to minimize response time and cost. The proposed OFA-SSA is compared with the Ant Colony Optimization (ACO) algorithm and Particle Swarm Optimization (PSO) algorithm. The simulation results show that the proposed task offloading strategy using OFA-SSA improves the convergence and it outperforms the existing algorithms in minimizing the response time.

Paper Reference: (SCI-6-3) 1570789199
Title: Effect of sonication Amplitude on Piezoelectric and Mechanical Properties of BCZT/PVDF-HFP Composite
Author(s): Khawla Jeder; Ayda Bouhamed; Hamadi Khemakhem; Olfa Kanoun (Tunisia–Germany)

Abstract − In order to improve the piezoelectric properties of polyvinylidene fluoride-hexafluoro (PVDF-HFP), we dispersed in PVDF-HFP nanoparticles of Ba0.85Ca0.15Zr0.1Ti0.9O3 prepared by the sol-gel method. Also, the obtained BCZT was sonicated with different amplitudes before filling into the PVDF-HFP matrix. The effects of sonication amplitude on the structure, mechanical properties and piezoelectric properties of BCZT/PVDF-HFP composites were investigated. Changes in the homogeneity of the composite and changes in their properties were studied. X-ray diffraction (XRD) results show that BCZT powder crystallizes in the pure perovskite structure. The tetragonal phase P4mm was identified and confirmed by Rietveld refinement. Three different tests for each polymer with a specific amplitude (Amp20; Amp30; Amp40) will provide an overview of the particle distribution in the matrix. The electrical analysis reveals that the BCZT particles with an amplitude of 40% are homogeneously dispersed in the PVDF-HFP polymer matrix. At the same time, according to the mechanical analysis, the error between the 3 composite tests decreases from 20 amp to 40 amp. It is noted that sonication with an important amplitude improves the piezoelectric properties as well as the mechanical properties. The present results provide an insight into optimizing composite materials to achieve better homogeneity, and on the other hand as promising candidates for electronic and energy storage devices.

Paper Reference: (SCI-6-4) 1570781786
Title: High overtone acoustic resonator HBAR based on IDT's/c-tilted ZnO/Si for timing applications
Author(s): Farouk Laidoudi; Cinzia Caliendo; Muhammad Hamidullah; Fares Kanouni; Fouad Boubenider; Fayçal Medjili (Algeria–Italy)

Abstract − In this paper, the frequency characteristics of high overtone bulk acoustic modes, generated by interdigital transducers IDT's on c-tilted ZnO/Si, are theoretically and experimentally investigated. The origin and characteristics of high overtone acoustic modes in ZnO piezoelectric layer on silicon substrate are discussed and one port HBAR resonator, based on c-axis tilted ZnO/Si, is fabricated and tested by network analyzer. The results achieved in this work are of interest in design and fabrication of radiofrequency sources and electronic timing devices based on thin film technology.

SCI-6-5 Paper Reference: (SCI-6-5) 1570781489
Title: Numerical modeling of electrical/optical combination for the simulation of PIN photodiode
Author(s): Samir Labiod (Algeria)

Abstract − PIN photodiode has emerged as the most promising technology for optical device design. The analyze of their optical and electrical performances versus the technological parameters is so important. We present in this paper an efficient numerical model of the PIN photodiode based on electromagnetic description of the optical carrier generation with drift-diffusion model self- consistent solving. The numerical model is based on a finite-difference approximation of drift-diffusion model (DDM), which contain the Poisson equation and the carrier transport equations. In order to improve the convergence of the proposed model, Gummel's scheme was used to handle the active device model coupling. Numerical results are generated and discussed such as the space distribution of the electrostatic potential, electrons concentration, terminal current for different power intensity and finally spectral sensitivity. The results show that the PIN photodiode has a good sensitivity for a large optical wavelength. Furthermore, comparisons with a 2D numerical simulation like SILVACO-TCAD give evidence for the good accuracy of the proposed model.

Paper Reference: (SCI-6-6) 1570775888
Title: Modeling of Birefringent Photonic Waveguide Based Sensor
Author(s): Abdelbaki Cherouana; Idris Bouchama; Abdelhalim Bencheikh (Algeria)

Abstract − In this work, we have studied the influence of the source's wavelength, geometrical and physical parameters on the sensitivity of uniaxial anisotropic planar optical sensor. Our study was concerned LiNbO3 as wave guiding film. The results show that, for both TE

and TM modes, the increase of the source's wavelength, cover and the core refractive indices induce the increase of maximal sensitivity. On the contrary, the increase of the core thickness and the substrate refractive index induces the decrease of the sensor sensitivity.

Paper Reference: (SCI-6-7) 1570779487
Title: Thermal model for heat conduction in octagonal integrated inductor multilayer
Author(s): Amina Benhada; Mokhtaria Derkaoui; Fatima Zohra Medjaoui; Azzeddine Hamid (Algeria)

Abstract − The main of this paper is to develop a thermal model of an octagonal integrated inductor multilayer. A comprehensive study on the topology of inductor is presented to obtain a better performance. Temperature distribution is obtained using analytical calculation from finite difference method.

Paper Reference: (SCI-7-1) 1570795385
Title: Reliable Wake-up Receiver with Increased Sensitivity using Low-Noise Amplifiers
Author(s): Robert Fromm; Olfa Kanoun; Faouzi Derbel (Germany)

Abstract − For power-limited wireless sensor networks, energy efficiency is a critical concern. Receiving packets is proven to be one of the most power-consuming tasks of a wireless sensor node. Wake-up receivers enable asynchronous communication while maintaining low power consumption. Recent wake-up receiver designs have low sensitivity, high power consumption, or lack of reliability and reproducibility. The proposed receiver circuit utilizes a two-stage low-noise amplifier to achieve a sensitivity of –80 dBm. A duty-cycling approach was introduced to reduce the average power consumption to 14.2 μW. The reliability of the proposed design was ensured by introducing a special low-frequency modulation scheme. The reproducibility of the design was ensured by only using commercial off-the-shelf components.

Paper Reference: (SCI-7-2) 1570783308
Title: Improving the Current Ratio and ambipolar behavior in Junctionless CNTFETs Using GMGWF
Author(s): Khalil Tamersit; Hocine Bourouba; Abdellah Kouzou (Algeria)

Abstract − In this paper, a new improvement technique based on an upward gate work function is computationally suggested to boost the current ratio of junctionless carbon nanotube field-effect transistors. The simulation method is based on the non-equilibrium Green's function formalism. It has been found that the dilation in the band-to-band tunneling (BTBT) window near the source induced by the electrostatic effects of the upward gate work function, is efficient in mitigating the BTBT mechanism as well as its associated detrimental effects. As result, improvements in terms of switching characteristics have been reached, where lower leakage current, reduced ambipolar behavior, and improved current ratio are recorded. The obtained results indicate that the upward gate work-function technique is an intriguing improvement method that can be applied to boost the performance of other nano-FETs suffering from the BTBT such as the graphene nanoribbon field-effect transistors.

Paper Reference: (SCI-7-3) 1570783422
Title: Energy-Aware Cluster Head selection protocol with Balanced Fuzzy C-mean Clustering in WSN
Author(s): Imen Azzouz; Boumedyen Boussaid; Ahmed Zouinkhi; Mohamed Naceur Abdelkrim (Tunisia)

Abstract − The Energy saving in wireless sensor network has become one of the ascending issue. To manage the remaining energy in nodes and extend the life time of the network, clustering is one of the efficient solution. Structuring homogenous and stable clusters as well as choosing the optimal cluster head is the key of an energy efficient clustering. This paper deals with an Energy Aware Cluster head selection protocol based on balanced Fuzzy C-means clustering approach. This approach proposes uniform and stable cluster formation using Balanced Fuzzy C-means algorithm with modified centroid. As for Cluster Head selection, three parameters are considered such as Residual energy of the node, Distance from the Base Station and Distance-Ratio. Simulation results on Matlab of the proposed approach are compared to classic energy efficiency approaches such as LEACH, C-LEACH and TSILEACH.

Paper Reference: (SCI-7-4) 1570788200
Title: Optimal tapers for efficient entangled photon pair generation in silica tapered optical fibers
Author(s): Abderrahim Azzoune; Oussama Laouedj (Algeria)

Abstract − Sources of entangled photon pairs are key components for quantum cryptography which is a perfectly secure way of communication based on the laws of physics. Benefiting from a versatile, fully fibered, and inexpensive source is a real challenge in this area. We present a design of an entangled photon pair source based on spontaneous parametric down-conversion using a silica nanofiber. This nanofiber is connected to the original standard telecom fiber by two tapers. The control of light propagation in these tapers until the nanofiber is essential for adiabatic power transfer to the nanofiber to maximize photon pair generation rate. The modest efficiency of this process is compensated by the very low insertion losses of the nanofiber in quantum networks using its two adiabatic tapers. An optimal design of these adiabatic tapers is investigated.

Paper Reference: (SCI-7-5) 1570726503
Title: A Low-Power Maximally-Flat Transconductor in Subthreshold CMOS
Author(s): Lazhar Fekih-Ahmed (Tunisia)

Abstract − A new CMOS wide-linear range fully-differential transconductor is proposed. The transconductor employs 5 unbalanced differential pairs with transistor aspects ratios chosen optimally using Padé-type approximation theory. It achieves a linear range of 86mV at a 1V supply voltage. The total harmonic distortion is less than 2% for input voltages up to 0.2V pp and frequencies up to 1MHz. Monte Carlo simulation demonstrated that the transconductor linear range is robust to parameter variations.

Paper Reference: (SCI-7-6) 1570775728
Title: Design and Analysis of SAW Delay Lines for Sensors Applications
Author(s): Saad Amara; Fares Kanouni (Algeria)

Abstract − The purpose of this study is to model the surface acoustic wave (SAW) delay line for enhancing the device performance of sensors applications. We use, the acousto-mechanical properties, obtained based on the density functional theory (DFT) approach, to calculate the insertion loss of two port for the interdigital transducer (IDT)/AlScN/Sapphire SAW delay line. We investigate the parameters, which are obtained by using different types of SAW delay line modeling. We show that the P-matrix model combined with the coupling-of-modes (COM) approach provides an accurate result in comparison to the experimental results. In addition, we exhibit a decrease in the insertion losses value, an increase in the Sc concentration, and a left shift in the resonance frequency. This obtained result is very promising for SAW sensors design. This promising result will contribute significantly to the SAW sensors design.

Paper Reference: (SCI-8-1) 1570788263
Title: LMC for upper limbs physical rehabilitation in post-stroke patients: a usability evaluation
Author(s): Zineb Hadjadj; Mostefa Masmoudi; Abdelkrim Meziane; Nadia Zenati (Algeria)

Abstract − Stroke in Algeria is one of the most important causes of severe physical disability. Since the disease strongly influences the quality of life of patients, optimal solutions for the treatment of post-stroke patients are needed. The use of new technologies in the field of rehabilitation aims to reduce the impact of functional problems. Recent studies have shown that technologies such as virtual reality and video games can provide a way that can motivate and help patients recover their motor skills. In this paper, our objective is to evaluate the

usability of the Leap Motion Controller virtual reality system (LMC), which is a sensor that captures the movement of the patient's hands and fingers without the need to place sensors or devices on the body, with serious games specifically designed for upper limbs rehabilitation in post-stroke patients. We measured the usability of the LMC system used with serious games as well as the level of satisfaction among healthy participants and post-stroke patients from Bounaama Djilali Hospital (CHU Douera) in Algeria. The results show favorable data, for the first time, the LMC is a usable tool, measured by the System Usability Scale (SUS). In addition, participants demonstrated good motivation, enjoyment and the majority of them said that they would like to use the proposed system in future treatment. Nevertheless, further studies are needed to confirm these preliminary findings.

Paper Reference: (SCI-8-2) 1570789180
Title: Enhanced Dielectric and Mechanical Properties of PVDF-HFP/Zn-BCZT Composite
Author(s): Amina Ben Ayed; Ayda Bouhamed; Najmeddine Abdelmoula; Hamadi Khemakhem; Olfa Kanoun (Tunisia–Germany)

Abstract − The use of flexible and environmentally friendly materials to replace lead materials-based energy harvesters could lead to a big breakthrough in wearable electronics. Polymeric composites including organic polymer and inorganic nanoparticles are suitable candidates. To this aim, lead-free Zinc doped Ba0.85Ca0.15Zr0.10Ti0.90O3 (Zn-BCZT) nanoparticles were produced using a sol-gel technique and embedded into a polymer matrix (PVDF-HFP) (poly(vinylidene fluoride-cohexafluoropropylene) via solution casting process in N, N-dimethylformamide (DMF) solvent with different ratio in order to enhance their electrical, and mechanical properties. The results illustrate that the real part of permittivity increased as a function of solvent volume and the tangent loss tends to increase. The Young´s modulus is increased with the addition of solvent from 226 to 319 MPa and tensile strength increased from 13.5 to 17.5 MPa as well. The improved tensile were may attributed to the uniform dispersion and good interfacial interaction between PVDF-HFP polymer and Zn-BCZT particles. The findings show that solvent has an influence on the modification of dielectric and mechanical characteristics.

Paper Reference: (SCI-8-3) 1570765872
Title: Thin film bulk acoustic resonators based on c-axis tilted yttrium-doped AlN for Viscosity sensors
Author(s): Fares Kanouni; Farouk Laidoudi; Saad Amara (Algeria)

Abstract − thin film bulk acoustic resonators FBAR based on polar c-axis tilted Yttrium-doped AlN is proposed as liquid viscosity sensor. Firstly, the effect of tilting angle on the electromechanical proprieties of Yttrium-doped AlN thin film is investigated. A Giant shear mode electromechanical coupling coefficient is observed in c-axis tilted AlYN films. Secondly, the electrical admittance of AlYN-FBAR is demonstrated for different Yttrium concentrations. The resonant frequencies shift down due to viscous liquid loading. The obtained results show that FBARs based on tilted c-axis AlYN thin films are promising for high sensitive liquid sensors.

Paper Reference: (SCI-8-4) 1570783448
Title: Simultaneous extraction of related semiconductor parameters based on EBIC and Genetic Algorithms
Author(s): Souhaila Soualmia (Saudi Arabia)

Abstract − The aim of this work is the simultaneous extraction of defect free region related semiconductor parameters. Basically, the diffusion length and the surface recombination velocity from any electron beam induced current EBIC (as a function of beam position in a normal collector configuration) are extracted using genetic algorithms. Near optimum values for the two parameters are obtained with an error less than 0.48% for the diffusion length and less than 2.25% for the normalized surface recombination velocity in 95% of the cases, and an error less than 0.5% for the diffusion length and less than 2.5% for the normalized surface recombination velocity in 100% of the cases. The results indicate that the proposed method is very successful.

Paper Reference: (SCI-8-5) 1570775873
Title: Comparison between a simple serial and a voltage doubler rectifiers circuits
Author(s): Mounira Ben Yamna; Nabil Dakhli; Hedi Sakli (Tunisia)

Abstract − A 3.5 GHz rectifier circuit were designed and studied in this paper. A comparison between the simple serial topology with single Schottky diode and voltage doubler topology. The rectifying circuit is developed for Internet of Things (IoT) and 5G applications. It has been designed and optimized with KEYSIGHT ADS software. The RF-DC conversion circuit achieves an efficiency of 44.9% and 20.63% respectively for simple circuit and doubler voltage topology.

Paper Reference: (SCI-9-1) 1570787751
Title: Terahertz Spectroscopy And Imaging Based On A Soft Lock-in Implementation
Author(s): Boufateh Bezziou; Mohamed Lazoul; Ayoub Boutemedjet (Algeria)

Abstract − Recent development of terahertz time-domain spectrometers associated with a scanning imaging module gave rise to higher levels of detection and identification performances by hyperspectral imaging in the terahertz range. In this work, we present the latest results of our implemented terahertz imaging system based on a terahertz time-domain spectrometer setup associated with a raster scanning module. The image is created pixel by pixel by moving the object in X and Y directions in the focal plane of the terahertz beam using two linear stages. The device can be used simultaneously to provide a terahertz intensity image of an object as well as to record the temporal forms of the transmitted terahertz pulses at each point of the object. The resulting image describes the object transmittance in terahertz domain while the temporal forms may be used to perform other advanced signal processing. The terahertz beam is generated and detected using two photoconductive antennas is very weak, to face this challenge and improve detection efficiency, the use of a lock-in system is necessary especially when the materials under test are very absorbent. Thus, a soft lock-in detection method is implemented to reduce the noise of the electro-optic detection and thus increase the detection efficiency.

Paper Reference: (SCI-9-2) 1570789173
Title: Assessing the electrical properties of DPLF-CNT/PDMS bio-composite using impedance measurements
Author(s): Jawhar Aloulou; Ayda Bouhamed; Olfa Kanoun; Chedly Bradai (Tunisia–Germany)

Abstract − In this contribution, multi-walled carbon nanotubes (MWCNT), Polydimethylsiloxane (PDMS) and Doom palm leaf fibers (DPLF) composite is investigated. This study was done to validate the potential of this novel material for pressure sensing. Materials with different weights fractions are manufactured by solution mixing and stencil printing methods. Using MWCNT as a first filler in PDMS polymer, contributes to a piezoresistive properties. Adding DPLF to the mixture enhances the mechanical and electrical properties of the composite. The performance of these materials was analyzed using impedance spectroscopy, linear sweep voltammetry and the results are discussed.

Paper Reference: (SCI-9-3) 1570775653
Title: Indoor Human Identification Using Advanced Machine-Learning-Based Strategy
Author(s): Ibrahim Naimi; Mohammed Baniyounis (Oman–Jordan)

Abstract − Major research efforts have been exerted to improve the accuracy of indoor person identification and facilitate the context-aware home services. These researches suffered from the low value of Correct Classification Rate (CCR), due to several technical reasons. In this paper, an advanced system combines pyroelectric infrared and floor-pressure sensors is proposed to identify persons in smart homes. Cooperative Multi-sensor strategy has been adopted to extract explicit information indicating the person's body size to improve the identification accuracy. A novel Machine-Learning-Based strategy is proposed to extract distinctive feature vector that represents the person's body size. Neural Network (NN) and Support Vector Machine (SVM) are used to improve the CCR of person identification. A

prototype was designed and implemented. In addition, several test cases were conducted to examine and evaluate the effectiveness of the proposed system in identifying persons with high values of CCR.

Paper Reference: (SCI-9-4) 1570775659
Title: A multi-sensor farming prototype system for growing tomato in Algeria
Author(s): Omrane Bouketir (Algeria)

Abstract − This paper introduces and explains the development procedure of a smart system developed to help farmers in the growing of tomato in greenhouse in Algeria. The system based on Arduino microcontroller card, takes the values of the temperature, the humidity, the light intensity and the soil humidity in the greenhouse as input parameters. Four sensors are used to capture these values and feed them to the Arduino card. After a proper processing, the system outputs the corresponding values of the speed of fans, the illumination intensity and the amount of water used to irrigate the plant. To achieve the correct humidity and temperature, two fans are used to replace the air inside the greenhouse by air from outside. This ventilating process is quite complex due the correlation between the temperature and the humidity. The amount of water needed by the plant is controlled by a pump which is driven by a pwm dc chopper. The right values of these parameters are selected based on a thorough study of the tomato plant and its required conditions to grow efficiently.. (Abstract)

Paper Reference: (SCI-9-5) 1570788431
Title: ECG Data Forecasting Based on Linear Models Approach: a Comparative Study
Author(s): Ghada Ben Othman; Lilia Sidhom; Ines Chihi; Ernest Kamavuako; Mohamed Trabelsi (Tunisia–Luxembourg–UK–Kuwait)

Abstract − This paper investigates the replacement of the surface electrodes (physical sensors) measuring the electrocardiogram (ECG) signals by forecasting linear algorithms. The aim is to test the ability to overcome the loss of information in case of failure of any electrode. From real ECG signals measured in different auscultation sites, the ability to predict the ECG signal of one site depending on another site is evaluated by 3 methods. In this paper, based on quantitative criteria, a comparative study between Linear regression (LR) model, K-nearest neighbors model (KNN) and Random forest regression (RFR). The advantages and drawbacks of each one are also highlighted also that the three models are very accurate in building a new ECG signal.segment similar to the real signal. Keywords- ECG Signals, Multi-Sensor System, Linear Models, Prediction, Real-Data, Comparative Study.

Paper Reference: (SCI-9-6) 1570780480
Title: Explicit modeling of the electrostatic surface-potential for the surrounding-gate FETs
Author(s): Billel Smaani (Algeria)

Abstract − This paper deals with the analytical modeling of the electrostatic surface-potential for the cylindrical surrounding-gate (SRG) MOSFETs devices. It is based on the analytical explicit solution of the surface potential obtained from solving Poisson's equation based on the full-depletion approximation. The proposed solution is simple, compact, and continues from the subthreshold to strong inversion and also from the linear to the saturation region. Moreover, the impact of varying the device parameters on the surface-potential is well investigated.

Paper Reference: (SCI-9-7) 1570775295
Title: Graphene Biosensor for Carbon Monoxide Monitoring
Author(s): Mohamed Bouherour; Nabila Aouabdia; Meryem Lamri Zeggar; Nourelhouda Touidjen; Sawsen Rouabah (Algeria)

Abstract − carbon monoxide asphyxiation is responsible for the loss of many human lives every year in Algeria, and this is increasing every year, the exposure to this gas leads to harmful consequences for the organism which leads to death. For this purpose, the initial step is to detect these gases with miniature structure and solid progressed estimation methods using a simulation software tool. In this work, we are going to present graphene-kapton sensor device able to detect and recognize carbon monoxide toxic gas.

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A soft sensor of stator winding temperature prediction for PMSMs based on extreme learning machine

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***Abstract*—Permanent magnet synchronous motor (PMSM) plays an effective role in electric vehicle applications. Monitoring PMSM's temperature in real-time is critical to its safety and reliability. The traditional method of PMSM temperature monitoring is to install temperature sensors into the motor, and it is a very expensive method. Currently, the lumped-parameter thermal networks (LPTNs) are the appropriate alternative for determining PMSM components' temperatures. However, they lack physical interpretability once the degrees of freedom are reduced in order to meet real-time requirements. The approach based on soft sensors is an efficient and economical way to solve such problems. In this paper, a soft sensor is developed to predict the stator winding temperature using an extreme learning machine (ELM). Furthermore, the Principal Component Analysis (PCA) technique is used to select effective and relevant variables. The performance of the model is evaluated based on five statistical indicators: the correlation coefficient (R^2), the root relative squared error (RRSE), the mean square error (MSE), the mean absolute error (MAE), and the root-mean-squared error (RMSE). The results showed that the PCA-ELM model has a high efficiency to predict the stator winding temperature with RMSE = 0.0622, MAE = 0.0480, MSE = 0.0039, RRSE = 6.73% and R^2 = 0.9955. Moreover, it has low computational complexity. Due to its low computational complexity and high performance, this application could have a direct influence and economic savings on the development and design of PMSMs temperature monitoring systems.**

Keywords—soft sensor; stator winding temperature; permanent magnet synchronous motor; principal component analysis; extreme learning machine.

I. INTRODUCTION

Permanent magnet synchronous motor (PMSM) plays an effective role in various industrial applications due to its simple structure, high efficiency, small size, and high power factor [1]. A PMSM consists of a stator with a winding which is supplied in three-phase and produces a magnetic field rotating at the supply frequency and a rotor where the magnetic field is produced by permanent magnets. The load capacity of most PMSMs is related to temperature. Exceeding the thermal limit of PMSM leads to many damages such as magnet demagnetization and breakdown of the stator winding insulation [2]. Monitoring and controlling the temperature of PMSMs is critical to their safety and reliability. The conventional method for monitoring and controlling PMSM temperature is to install temperature sensors into the machine. This method enables easy obtaining of temperature data with small measurement errors. However, this method suffers from a major drawback which is the high cost of conducting the monitoring process [3, 4].

Recently, several methods for measuring temperature known as indirect methods have been proposed. Indirect methods are based on temperature-related parameters [4] and can be divided into three basic methods: back electromotive force (BEMF) [5], high-frequency signal injection (HFSI) [6], and thermal model [7]. The BEMF method is based on the linear relationship between temperature and flux linkage [8]. However, this method suffers from many drawbacks, including the difficulty of creating a flux observer model, and it requires a complex analysis of the harmonic components. Moreover, this method cannot estimate the temperature in the case of a standstill of the motor or in the case of low speed [4]. The HFSI method is based on high-frequency voltage injection and the temperature is measured depending on the variation of the high-frequency resistance with temperature. The advantage of this method is that it can be used to estimate the temperature at low speed, including zero speed [4]. However, it has many negative effects on the motor, including unnecessary mechanical vibration and torque harmonics. Moreover, it does not give information on the

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spatial distribution of machine temperature. The thermal models' method includes the lumped parameter model and the finite element model. This method can provide more detailed information on the spatial distribution of machine temperature [4]. However, this method requires accurate knowledge of machine geometry, materials, and cooling system, which makes estimating machine temperature more difficult [5].

The above problems led to thinking about how to find an alternative to traditional methods of predicting machine temperature based on data collected from experiments. Currently, machine learning methods are considered a promising method for predicting and estimating machine component temperatures directly, and they have received great interest among researchers. Wallscheid et al. [9] presented the first machine learning model approach to predict the temperature of PMSM components including stator winding, stator teeth, stator yoke, and permanent magnets of rotor. In their study, the long short-term memory (LSTM) and the gated recurrent unit (GRU) models were investigated. Moreover, they used particle swarm optimization to improve the hyperparameters of the model. Their study showed encouraging results. Kirchgässner et al. [10] investigated the performance of the linear regression model to predict the temperature of PMSM components including stator winding, stator teeth, stator yoke, and permanent magnets of rotor. The results showed that the model has a similar predictive performance to the classic thermal modeling based on lumped parameter thermal networks (LPTNs), with low computational complexity. Guo et al. [11] proposed a deep neural network (DNN) model to predict the stator winding temperature of a PMSM. The proposed model showed a good performance in predicting the temperature of the stator winding. Cai et al. [12] proposed a novel method called Pseudo-Siamese Nested LSTM (PSNLSTM) to predict the temperature of PMSM components, including stator winding, stator teeth, and stator yoke. The proposed method showed high efficiency in predicting the temperature of PMSM components. In [13] the authors used deep recurrent neural networks (RNNs) and convolutional neural networks (CNNs) with residual connections to predict the temperature of PMSM components including stator winding, stator teeth, stator yoke, and permanent magnets of rotor. Furthermore, they used Bayesian optimization to improve the hyperparameters of the models. The results showed that the proposed models have a performance similar to those of classic thermodynamics-based approaches. Savant et al. [14] presented a comparative study of three machine learning techniques to predict the temperature and torque values of PMSM. The results showed that the Random Forest (RF) model gives the best performance compared to other models. Devi et al. [15] proposed a CNN model to predict the ambient temperature of PMSM. The proposed model showed a good performance.

Although the above studies provided encouraging results, however, this method is still in the early investigation stage and requires further study [9]. In this work, a soft sensor for stator winding temperature prediction is developed using an extreme learning machine (ELM). Furthermore, the principal component analysis (PCA) technique is used to select effective and relevant variables. The rest of the paper is organized as follows: Section II presents the proposed approach. A summary of the methods used is given in Section III. Section IV presents the results and discussion. The conclusion and future work are given in section V.

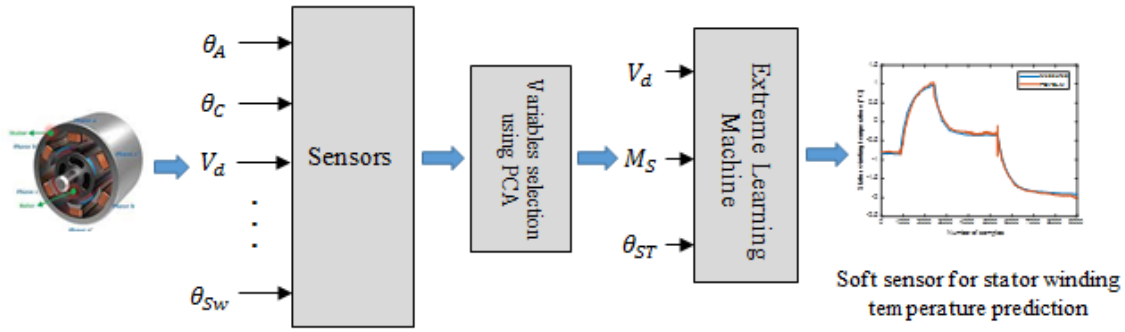

Fig. 1. The proposed approach for soft sensor development.

II. PROPOSED APPROACH

Fig. 1 shows a diagram of the soft sensor development process for stator winding temperature prediction. First, effective and relevant variables are selected using the PCA technique to ensure better performance of the soft sensor, as well as to save the costs of the monitoring system. These variables are then used as inputs for ELM to build the prediction model. Finally, this model is used to predict the stator winding temperature.

III. METHODS

A. Principal Component Analysis (PCA)

PCA is one of the most popular dimensionality-reduction methods. PCA is used to convert a dataset containing a large number of correlated variables into a dataset containing a small number of uncorrelated variables while preserving as much information as possible (variance) [16]. The PCA algorithm can be summarized in four steps:

Step 1. Data standardization:

$$Z = \frac{X - \mu}{\delta} \tag{1}$$

Where $X \in R^{k \times p}$ is the data matrix, μ is the average of the vector X, and δ is the standard deviation of the vector X.

Step 2. Linearly convert the vector Z to another vector S_t with M-dimension by computing the eigenvectors of the covariance matrix C_x:

$$C_x = \frac{1}{M}\sum_{j=1}^{M} ZZ^T \tag{2}$$

Step 3. Solve the eigenvalue problem:

$$\lambda_j V_j = C_x V_j, j = 1,2,...,M \tag{3}$$

Where λ_j represents the eigenvalues of the covariance matrix C_x, and V_j represents the eigenvectors.

Step 4. Compute the components of S_t:

$$S_t(j) = V_j^T X, j = 1,2,...,M \tag{4}$$

The new components are called principal components (PCs). The number of PCs in S_t is reduced by using the first eigenvectors (V_j) sorted in descending order of the eigenvalues (λ_j) [17].

B. Extreme Learning Machine

An extreme learning machine (ELM) is a feedforward neural network with a single layer of hidden nodes (SLFN: single hidden layer feedforward neural network) [18], as shown in Fig. 2. ELM differs from the standard neural network in terms of the parameters of the hidden nodes, in that the parameters of the hidden nodes including the weights are randomly assigned and never updated for the ELM network. Whereas for the standard neural network, these parameters need to be reset in each iteration until the end of the training process. On the other hand, ELM uses the Moore-Penrose generalized inverse to adjust its weights. Compared to the traditional neural network based on learning algorithms of gradient-descent, ELM has better generalization performance and faster training speed.

Given a k training example $\{(x_1, y_1), ..., (x_k, y_k)\} \in R^n \times R^m$, the ELM output with $\tilde{k}$ hidden nodes can be expressed as follows [19]:

$$Oj = \sum_{i=1}^{\tilde{k}} \beta_i f_i(x_j) = \sum_{i=1}^{\tilde{k}} \beta_i f_i(\omega_i . x_j + \alpha_i), j = 1,2,...,k \tag{5}$$

Where ω_i represents the weight connecting the input nodes and the i^{th} hidden node, $f(x)$ represents an activation function, β_i represents the weight connecting the output nodes and the i^{th} hidden node and is obtained by the method of least-squares, and α_i represents the bias of the i^{th} hidden node. Equation (5) can be written as follows [18]:

$$H\beta = T \tag{6}$$

Where:

$$H = \begin{bmatrix} f(\omega_1 . x_1 + \alpha_1) & ... & f(\omega_{\tilde{k}} . x_1 + \alpha_{\tilde{k}}) \\ ... & ... & ... \\ f(\omega_1 . x_k + \alpha_1) & ... & f(\omega_{\tilde{k}} . x_k + \alpha_{\tilde{k}}) \end{bmatrix}_{k \times \tilde{k}} \tag{7}$$

$$\beta = \begin{bmatrix} \beta_1^T \\ ... \\ \beta_{\tilde{k}}^T \end{bmatrix}_{\tilde{k} \times m}, T = \begin{bmatrix} t_1^T \\ ... \\ t_k^T \end{bmatrix}_{k \times m} \tag{8}$$

Taking into account most of the cases where $k \times \tilde{k}$. Thus, β cannot be calculated through the direct matrix inversion. To overcome this problem, the smallest norm least-squares solution is calculated [18]:

$$\hat{\beta} = H^+ T \tag{9}$$

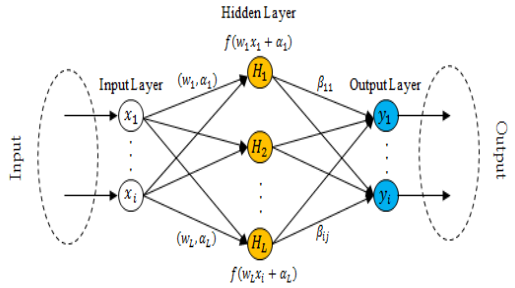

Fig. 2. The basic structure of the ELM.

Where H^{+} represents the Moore–Penrose generalized inverse of H [18]. The ELM algorithm can be summarized in the following three steps [18]:

Step 1. Randomly generate bias α_i and weight ω_i.

Step 2. Calculate hidden layer output matrix H.

Step 3. Calculate the weight of the output $\hat{\beta}$.

Finally, the output of ELM can be computed by:

$$Oj = \sum_{i=1}^{\tilde{k}} \hat{\beta} \times f_i\left(\omega_i . x_j + \alpha_i\right) \tag{10}$$

IV. RESULTS AND DISCUSSION

This study aims to develop a soft sensor for predicting stator winding temperature by using the least possible number of input parameters. For this purpose, a dataset containing 30,000 samples of 12 variables obtained from the Kaggle Data Science online competition platform is used [20]. These variables are ambient temperature (θ_A), coolant temperature (θ_C), direct-axis voltage (V_d), quadrature-axis voltage (V_q), motor speed (M_S), torque (T_m), direct-axis current (I_d), quadrature-axis current (I_q), permanent magnet surface temperature (θ_{pm}), stator yoke temperature (θ_{Sy}), stator tooth temperature (θ_{ST}), and stator winding temperature (θ_{Sw}). Table I shows the descriptive statistics for the variables that make up the dataset. Initially, the PCA technique is applied and the variables correlation analysis is done to select the variables that have the greatest influence on the soft sensor. These variables are then used as inputs to ELM for predicting θ_{Sw}. Fig. 3 shows the steps of the soft sensor development. Experiments were performed in an Intel® Core™ i3 and 2.40-GHz CPU processor with 4-GB RAM running Windows 8.1 operating system (64 bit).

A. Variables selection using PCA

Table II represents the application of PCA to the total dataset. From Table II it can be seen that the first three PCs represent 85.7631% of the total variance proportion.

- Axis one (52.9497%), in this axis, M_S, T_m, θ_{pm}, θ_{Sy}, θ_{ST}, and θ_{Sw} show strong positive loading, whereas V_d and I_d show strong negative loading.

TABLE I. DESCRIPTIVE STATISTICS OF VARIABLES

Inputs	Minimum	Maximum	Mean	Standard deviation
θ_A (°C)	-1.6585	0.6420	-0.3452	0.4112
θ_C (°C)	-1.1566	-1.0128	-1.0700	0.0179
V_d (V)	-1.5749	0.3366	-0.3325	0.7156
V_q (V)	-1.3066	1.7628	0.6327	0.6767
M_S (RPM)	-1.2224	2.0242	0.3642	1.0130
T_m (N.m)	-0.4046	1.9671	0.2031	0.6344
I_d (A)	-1.8449	1.0328	0.1588	0.9585
I_q (A)	-0.2574	1.8940	0.2166	0.6459
θ_{pm} (°C)	-2.5242	2.2917	-0.7177	0.9959
θ_{Sy} (°C)	-1.8347	0.1901	-1.0969	0.4870
θ_{ST} (°C)	-2.0661	1.0784	-0.9718	0.7711
θ_{Sw} (°C)	-2.0200	1.5885	-0.8644	0.9263

TABLE II. DESCRIPTIVE STATISTICS OF THE CREATED PRINCIPAL COMPONENTS

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
Eigenvalues												
	6.3540	2.5834	1.3542	0.8780	0.4299	0.2485	0.0981	0.0427	0.0084	0.0021	0.0005	0.0003
Percent of total variance proportion												
	52.9497	21.5284	11.2850	7.3164	3.5825	2.0706	0.8172	0.3558	0.0704	0.0178	0.0040	0.0022
Cumulative percent of total variance proportion												
	52.9497	74.4781	85.7631	93.0795	96.6620	98.7326	99.5498	99.9056	99.9760	99.9937	99.9978	100
Variables eigenvectors obtained through the PCA application												
θ_A	0.3453	**-0.6619**	-0.4826	-0.0543	0.3460	0.2946	0.0166	-0.0034	0.0060	-0.0010	-0.0002	0.0004
θ_C	0.3700	-0.0876	0.0163	0.9245	-0.0035	0.0195	0.0017	0.0026	0.0001	-0.0000	0.0000	-0.0000
V_d	**-0.8795**	0.3311	-0.2099	0.0460	-0.0792	0.0732	0.2199	0.1026	0.0123	0.0025	0.0008	0.0008
V_q	-0.1024	**0.6909**	**0.6291**	-0.0036	0.0264	0.3386	-0.0278	-0.0011	-0.0172	-0.0046	-0.0007	-0.0011
M_S	**0.6305**	**0.7081**	0.0901	-0.0067	0.2855	-0.0760	-0.0368	0.0275	0.0587	0.0033	-0.0007	0.0046
T_m	**0.6334**	**-0.6261**	0.4400	-0.0635	-0.0639	-0.0012	0.0333	0.0599	-0.0138	-0.0046	-0.0005	0.0116
I_d	**-0.8926**	-0.2762	-0.0421	0.0320	-0.3065	0.1420	-0.0546	-0.0640	0.0534	-0.0052	-0.0015	0.0041
I_q	0.5887	**-0.6435**	0.4729	-0.0657	-0.0731	0.0167	0.0166	0.0628	0.0369	0.0062	0.0011	-0.0094
θ_{pm}	**0.7599**	0.2800	-0.4821	-0.0399	-0.2622	0.0875	-0.1467	0.1104	-0.0055	-0.0025	-0.0011	-0.0003
θ_{Sy}	**0.9577**	0.1687	-0.0814	-0.0505	-0.1702	0.0793	0.0701	-0.0613	-0.0030	0.0348	-0.0035	0.0017
θ_{ST}	**0.9626**	0.1987	-0.0964	-0.0480	-0.1179	0.0301	0.0695	-0.0474	0.0065	-0.0131	0.0171	0.0001
θ_{Sw}	**0.9749**	0.1434	-0.0760	-0.0478	-0.0816	-0.0161	0.1079	-0.0396	0.0055	-0.0248	-0.0131	-0.0021

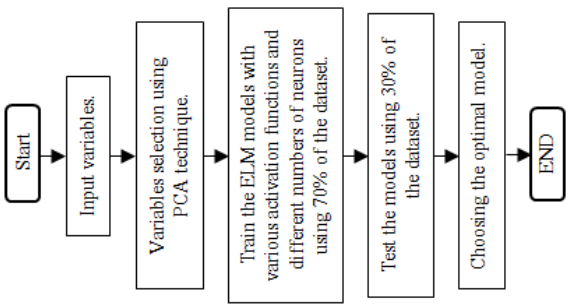

Fig. 3. Flowchart of the soft sensor development process.

- Axis two (21.5284%), in this axis, V_q and M_S show strong positive loading, whereas θ_A, T_m, and I_q show strong negative loading.
- Axis three (11.2850%), in this axis, V_q shows strong positive loading.

It can also be seen that the first axis correlates negatively with V_d (-0.8795) and I_d (-0.8926), and positively with M_S (0.6305), T_m (0.6334), θ_{pm} (0.7599), θ_{Sy} (0.9577), θ_{ST} (0.9626), θ_{Sw} (0.9749). However, axis two correlates negatively with θ_A (-0.6619), T_m (-0.6261), and I_q (-0.6435), and positively with V_q (0.6909) and M_S (0.7081). Whereas, axis three correlates positively with V_q (0.6291) only.

Finally, we can keep only the θ_{ST}, M_S, and V_q to predict θ_{Sw}.

B. Soft Sensor Development

After selecting the variables which are θ_{ST}, M_S, and V_q, they are used as inputs to ELM for predicting θ_{Sw}. In this research, the data were divided into 70% (i.e., 21000 samples) to train the models and 30% (i.e., 9000 samples) to test the performance of the models. To evaluate the performance of our models, five indicators were used which are the correlation coefficient (R^2), the root relative squared error (RRSE), the mean square error (MSE), the mean absolute error (MAE), and the root-mean-squared error (RMSE), and they are defined as follows:

$$R^2 = \frac{\left(\sum_{i=1}^{k}(m_i-\overline{m})(y_i-\overline{y})\right)^2}{\sum_{i=1}^{k}(m_i-\overline{m})^2\sum_{i=1}^{k}(y_i-\overline{y})^2} \tag{11}$$

$$RRSE = \sqrt{\frac{\sum_{i=1}^{k}(m_i-y_i)^2}{\sum_{i=1}^{k}(\overline{m}_i-y_i)^2}} \tag{12}$$

$$MSE = \frac{\sum_{i=1}^{k}(y_i-m_i)^2}{k} \tag{13}$$

$$MAE = \frac{\sum_{i=1}^{k}|y_i-m_i|}{k} \tag{14}$$

$$RMSE = \sqrt{\frac{\sum_{i=1}^{k}(m_i-y_i)^2}{k}} \tag{15}$$

Where y_i (°C) and m_i (°C) are the predicted and actual value of the data respectively. $\overline{y}$ (°C) and $\overline{m}$ (°C) represent the mean of the predicted and actual value respectively, and k is the number of data points.

TABLE III. PERFORMANCE OF ELM MODEL FOR Θ_{SW} SOFT SENSOR (WITHOUT VARIABLES SELECTION)

Activation function	Neurons	RMSE	MAE	MSE	RRSE (%)	R^2	Time (s)	
							Training	Testing
sigmoid	6	0.2998	0.2391	0.0899	32.44	0.8947	0.0469	0
	10	0.2835	0.1880	0.0804	30.67	0.9058	0.0469	0.0469
	15	0.3261	0.2590	0.1063	34.63	0.8754	0.0781	0.0313
	18	0.3501	0.2877	0.1226	37.65	0.8564	0.0938	0.0313
	20	0.2559	0.1801	0.0655	27.70	0.9233	0.1250	0.0469
RBF	6	0.6032	0.4325	0.3638	64.39	0.5737	0.0469	0
	10	0.7065	0.6025	0.4992	74.41	0.4151	0.0313	0
	15	0.6534	0.4999	0.4269	66.19	0.4997	0.0625	0
	18	0.7471	0.5899	0.5581	80.77	0.3460	0.0781	0.0469
	20	0.6490	0.5577	0.4212	70.20	0.5065	0.1094	0.0313
relu	6	0.2407	0.1776	0.0579	25.85	0.9321	0	0
	10	0.3515	0.3142	0.1235	37.57	0.8552	0.0469	0.0313
	15	0.2610	0.2102	0.0681	28.24	0.9202	0.0781	0
	18	**0.2042**	**0.1564**	**0.0417**	**22.10**	**0.9511**	**0.0781**	**0**
	20	0.2195	0.1739	0.0482	23.76	0.9435	0.0625	0.0313

TABLE IV. PERFORMANCE OF PCA-ELM MODEL FOR Θ_{SW} SOFT SENSOR

Activation function	Neurons	RMSE	MAE	MSE	RRSE (%)	R^2	Time (s)	
							Training	Testing
sigmoid	6	0.1580	0.1132	0.0250	17.01	0.9708	0.0156	0.0313
	10	0.1089	0.1007	0.0119	11.79	0.9861	0.0625	0
	15	0.0908	0.0761	0.0082	9.80	0.9903	0.0781	0
	18	**0.0622**	**0.0480**	**0.0039**	**6.73**	**0.9955**	**0.0938**	**0.0313**
	20	0.1739	0.1415	0.0302	18.82	0.9646	0.1250	0.0313
RBF	6	0.3627	0.2809	0.1316	39.27	0.8458	0.0313	0
	10	0.5332	0.3741	0.2843	54.55	0.6669	0.0781	0
	15	0.1301	0.1043	0.0169	14.05	0.9802	0.0469	0.0469
	18	0.3396	0.2640	0.1154	35.78	0.8648	0.0781	0.0469
	20	0.4068	0.3162	0.1655	43.49	0.8061	0.0625	0.0313
relu	6	0.1036	0.0794	0.0107	11.21	0.9874	0.0313	0
	10	0.2325	0.2101	0.0540	24.96	0.9367	0.0625	0.0313
	15	0.1422	0.0966	0.0202	15.34	0.9763	0.0781	0
	18	0.1018	0.0813	0.0104	11.02	0.9879	0.1094	0.0313
	20	0.1269	0.1086	0.0161	13.74	0.9811	0.1094	0

In order to obtain the optimal model, three activation functions (*sigmoid*, *RBF*, and *relu*) and different values for the number of hidden neurons were used.

Table III represents the ELM model performance of the θ_{Sw} soft sensor without variables selection. From the table, we note that the value of the RMSE ranges between 0.2042 and 0.7471, the value of the MAE ranges between 0.1564 and 0.6025, the value of the MSE ranges between 0.0417 and 0.5581, the value of the RRSE ranges between 22.10 (%) and 80.77 (%), and the value of the R^2 ranges between 0.3460 and 0.9511. We can also note that using the activation function *relu* gives the best performance with 18 neurons. Fig. 4 shows the measured and predicted θ_{Sw} for the optimal ELM model. From the analysis of the results of training and testing time, it is observed that all models have low computational complexity.

Table IV represents the PCA-ELM model performance of the θ_{Sw} soft sensor. From the table, we note that there is a significant improvement in the performance, where the value of the RMSE ranges between 0.0622 and 0.5332, the value of the MAE ranges between 0.0480 and 0.3741, the value of the MSE ranges between 0.0039 and 0.2843, the value of the RRSE ranges between 6.73 (%) and 54.55 (%), and the value of the R^2 ranges between 0.6669 and 0.9955. We can also note that using the *sigmoid* activation function gives the best performance with 18 neurons. Furthermore, all models have low computational complexity. Fig. 5 shows the measured and predicted θ_{Sw} for the optimal PCA-ELM model.

By comparing the results of the two tables, it is clear that the PCA-ELM model is well suited to this problem. Based on previous studies, our model showed results that are superior to those of previous studies conducted using the same database as the results of the study described in [11] as their model showed the RMSE = 0.2368, the MAE = 0.1515, and R^2 = 0.9439 using their proposed method. In addition, the study described in [14] reported good results with R^2 = 0.993.

V. CONCLUSION AND FUTURE WORK

This paper presents a contribution to the development of a soft sensor to predict θ_{Sw} based on integrating machine learning and feature extraction techniques. In this work, the ELM algorithm for soft sensor development was implemented. Furthermore, the PCA technique was used to select the variables that have a significant impact on the soft sensor. The results showed that the PCA-ELM model has high performance compared to the standalone ELM model. Moreover, it has low computational complexity. Due to its low computational complexity and high performance, the proposed PCA-ELM model can be an effective tool for predicting θ_{Sw}.

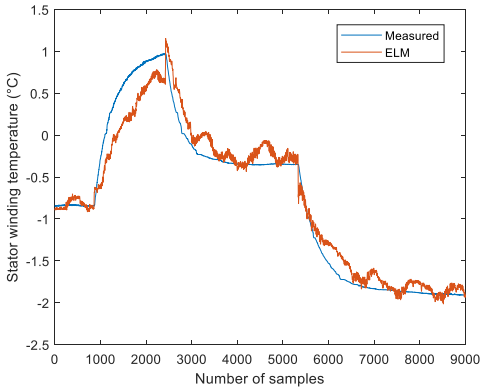

Fig. 4. Prediction results of the optimal ELM model.

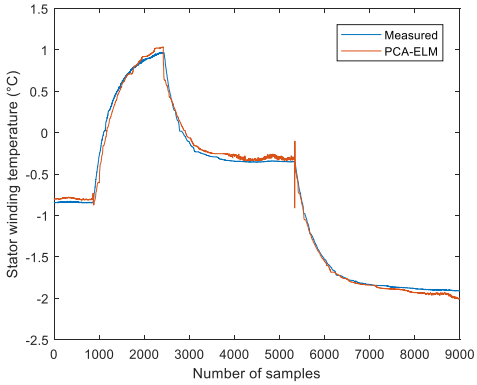

Fig. 5. Prediction results of the optimal PCA-ELM model.

In future research work, we will use nonlinear feature extraction techniques such as kernel principal component analysis (KPCA) and kernel independent component analysis (KICA). The use of signal decomposition techniques such as the variational mode decomposition (VMD) and the complete ensemble empirical mode decomposition (CEEMDAN) can also greatly improve forecasting. In addition to using nonlinear feature extraction and signal decomposition techniques, we will also attempt to investigate the performance of deep learning techniques such as long short-term memory (LSTM), Gated Recurrent Units (GRU), and convolutional LSTM (ConvLSTM).

REFERENCES

[1] Advantages and Applications of Permanent Magnet Synchronous Motor. https://www.stanfordmagnets.com/advantages-and-applications-of-permanent-magnet-synchronous-motor.html. Accessed 16 July 2021.

[2] C. Li, F.-C. Huang, and Y.-Q. Wang, "An applicable real-time thermal model for temperature prediction of permanent magnet synchronous motor," J. Syst. Control Eng., vol. 231, no. 1, pp. 43-51, 2016.

[3] D. Reigosa, D. Fernandez, H. Yoshida, T. Kato, and F. Briz, "Permanent magnet temperature estimation in PMSMs using pulsating high frequency current injection." In: Proceedings of the IEEE Energy Conversion Congress and Exposition (ECCE), Pittsburgh, PA, USA, 2014, pp. 3159–3168.

[4] H. Ding, X. Gong, and Y. Gong, "Estimation of Rotor Temperature of Permanent Magnet Synchronous Motor Based on Model Reference Fuzzy Adaptive Control," Math. Probl. Eng., 2020.

[5] D. D. Reigosa, D. Fernandez, T. Tanimoto, T. Kato, and F. Briz, "Permanent-magnet temperature distribution estimation in permanent-magnet synchronous machines using back electromotive force harmonics," IEEE Tran. Ind. Appl., vol. 52, no. 4, pp. 3093–3103, 2016.

[6] D. D. Reigosa, F. Briz, P. García, J. M. Guerrero, and M. W. Degner, "Magnet temperature estimation in surface PM machines using high-frequency signal injection," IEEE Trans. Ind. Appl., vol. 46, no. 4, pp. 1468–1475, 2010.

[7] Y. Jiang, D. Wang, J. Chen, Q. Zhang, and T. Xuan, "Electromagnetic- thermal-fluidic analysis of permanent magnet synchronous machine by bidirectional method," IEEE Trans. Magn., vol. 54, no. 3, pp. 1–5, 2018.

[8] K. Liu, and Z. Q. Zhu, "Mechanical parameter estimation of permanent magnet synchronous machines with aiding from estimation of rotor PM flux linkage." In: Proceedings of the 2014 IEEE Energy Conversion Congress and Exposition (ECCE), Pittsburgh, PA, USA, 2014, pp. 3115–3125.

[9] O. Wallscheid, W. Kirchgässner, and J. Böcker, "Investigation of Long Short-Term Memory Networks to Temperature Prediction for Permanent Magnet Synchronous Motors." In: Proceedings of the International Joint Conference on Neural Networks, Anchorage, AK, USA, 2017.

[10] W. Kirchgässner, O. Wallscheid, and J. Böcker, "Empirical Evaluation of Exponentially Weighted Moving Averages for Simple Linear Thermal Modeling of Permanent Magnet Synchronous Machines." In: 2019 IEEE 28th International Symposium on Industrial Electronics (ISIE), Vancouver, BC, Canada, (2019).

[11] H. Guo, Q. Ding, Y. Song, H. Tang, L. Wang, and J. Zhao, "Predicting Temperature of Permanent Magnet Synchronous Motor Based on Deep Neural Network," Energies, 2020.

[12] Y. Cai, Y. Cen, G. Cen, X. Yao, C. Zhao, Y. Zhang, "Temperature Prediction of PMSMs Using Pseudo-Siamese Nested LSTM," World Electr. Veh. J., 2021.

[13] W. Kirchgässner, O. Wallscheid, and J. Böcker, "Estimating Electric Motor Temperatures With Deep Residual Machine Learning," IEEE Trans. Power Electroni., vol. 36, no. 7, pp. 7480-7488, 2021.

[14] R. Savant, A. A. Kumar, and A. Ghatak, "Prediction and Analysis of Permanent Magnet Synchronous Motor parameters using Machine Learning Algorithms." In: 2020 Third International Conference on Advances in Electronics, Computers and Communications (ICAECC), Bengaluru, India, (2021).

[15] M. S. Devi, R. Ranjan, U. K. Sharma, K. Kumari, and A. Duggishetti, "Convolutional Neural Network Enactment Layer based Ambient Temperature Prediction of Electric Motor." Turk. J. Comput. Math. Educ., vol.12, no. 9, pp. 1847 – 1855, 2021.

[16] S. Dilmi, and M. Ladjal, "A novel approach for water quality classification based on the integration of deep learning and feature extraction techniques," Chemom. Intell. Lab. Syst., vol. 214, pp. 104329, 2021.

[17] A. Widodo, B.-S. Yang, and T. Han, "Combination of independent component analysis and support vector machines for intelligent faults diagnosis of induction motors," Expert Syst. Appl., vol. 32, pp. 299–312, 2007.

[18] G. B. Huang, Q. Y. Zhu, and C. K. Siew, "Extreme learning machine: theory and applications. Neurocomputing," vol. 70, pp. 489–501, 2006.

[19] S. Ding, X. Xu, and R. Nie, "Extreme learning machine and its applications," Neural Comput. Appl., vol. 25, pp. 549–556, 2014.

[20] Electric Motor Temperature: 185 hrs recordings from a permanent magnet synchronous motor (PMSM). https://www.kaggle.com/wkirgsn/electric-motor-temperature. Accessed 15 January 2021.