Certificate of Attendance

Alla Eddine TOUBAL MAAMAR

Laboratoire Ingénierie des Systèmes et Télécommunications (LIST), Department of Electrical Systems Engineering, Faculty of Technology, University of M'hamed Bougara of Boumerdes, Boumerdes, Algeria.

Attended and presented the communication entitled:

A simple and accurate script to simulate solar panel models at variable environmental conditions of temperature and irradiation

in

IC-AIRES2025
Ninth International Conference on Artificial Intelligence in Renewable Energetic Systems

Held on October 28-30, 2025 in CAP-HYPROC Mostaganem, Algeria.

Co-Authors: Mourad NAIDJI, Aicha AISSA-BOKHTACHE, Rachid TALEB

p/ ICAIRES2025 Scientific Committee

Secretariat

On behalf of the Organizing Committee,

General Co-Chairman: Dr. Mustapha HATTI

A simple and accurate script to simulate a solar panel models at variable environmental conditions of temperature and irradiation

Alla Eddine TOUBAL MAAMAR[1,*], Mourad NAIDJI[2,3], Aicha AISSA-BOKHTACHE[4], Rachid TALEB[4]

1. Laboratoire Ingénierie des Systèmes et Télécommunications (*LIST*), Department of Electrical Systems Engineering, Faculty of Technology, University of M'hamed Bougara of Boumerdes, Boumerdes, Algeria.
2. Department of Electrical Engineering, Badji Mokthar-Annaba University, Annaba, Algeria.
3. Laboratory of Electrical Engineering (*LGE*), University of M'Sila, M'Sila, Algeria.
4. Laboratoire Génie Electrique et Energies Renouvelables (*LGEER*), Electrical Engineering Department, Hassiba Benbouali University of Chlef, Chlef, Algeria.

***a.toubalmaamar@univ-boumerdes.dz**

ABSTRACT

The application of renewable energy generated using solar panels has gained a lot of interest because of the growing demand for electricity, global warming, and air pollution. A solar panel is made up of a chain of photovoltaic cells, where a solar cell is used to convert the light into electrical energy due to the photovoltaic effect. The voltage of the solar cell can range from 0.3V to 0.6V based on the semiconductor material used and also its temperature. The voltage, current and therefore the power of a solar cell is not suitable for common uses, thus it is necessary to have the cell connected in sets in order to form a solar panel. The experimental installation of the different algorithms and techniques for power flow control and energy optimization from the solar panel to the load can destroy this equipment's, so mathematical modeling and simulation would be an extremely critical step to examine the algorithms behavior before its installation. The aim of this research study is to offer a tutorial guide on the modeling and simulation of the solar panel using MATLAB/Simscape. In this paper, we have given all the required data to model and simulate a photovoltaic panel step by step with all algorithms and simulation tips shared. The two main contributions of this paper are the model created and MATLAB algorithm developed for simulating the solar panel, which can be easily be changed by any user for any other research purpose.

KEY WORDS (3 to 6 key words)

Solar panel; Modeling and simulation; $I(V)/P(V)$ characteristics; Photovoltaic phenomenon; MATLAB/Simscape.

I. INTRODUCTION

The world is witnessing sudden climate changes and grave environmental problems that threaten living organisms due to human activity and that coincide with the growing demand for energy. According to many reports from international organizations concerned with the environment and climate change, there are few international efforts to reduce gas emissions and are not sufficient to reduce global warming and air pollution. In recent years, the topic of renewable resources has emerged in the global green economy as a mechanism for achieving and reviving sustainable development and energy security. The main renewable energies are: solar energy, green hydrogen, wind power, biomass, and hydroelectricity [1], [2]. The solar cell is the main unit of the solar energy conversion system, is based on the physical phenomenon photovoltaic effect [3], [4]. In literature, there is much research on solar energy and the aim is to increase the efficiency of the solar cell with optimal control of energy conversion [5]. The implementation of many

algorithms and methods for energy optimization and power flow control between the load and the solar panel can damage solar panel, so simulation would be a very important step to test the algorithms before integrated into the photovoltaic system. The most difficult problem when using MATLAB functions is that most tutorials start from a mathematical approach and that is not adapted to the needs of some research. However, another method exists, using Sim-Power-Systems and Sim-Scape, it was possible to model a system from a box and adjust parameters. Simscape is the multi-physical platform of MATLAB software, contain electrical components in the form of blocks (Resistor, Capacitor, Inductor, Diode) [6], [7]. MATLAB software has been utilized for their efficiency for simulating and modeling different power electronic circuits such as: high frequency DC/AC multilevel inverter [8], single-phase implementation of inverter using SHEPWM control [9], the five-level series resonant inverter [10], Five-Level LLC Resonant Converter [11], simulation of neural network based selective harmonic elimination scheme for five-level inverter [12], simulation of single-phase asymmetrical multilevel inverter structure with fewer switches but improved power quality [13]. This paper describes the simulation of an 85 W solar panel model using Matlab. The paper is divided into the following: Second Section explains the mathematical model of a photovoltaic cell and modeling an 85 W Solar Panel model with MATLAB/Simscape. The modeling of a 85 W Solar Panel model with MATLAB/Simscape is given in Section III. The results are explained in Section IV. The conclusions and future directions are given in Section V at last.

II. MATHEMATICAL MODEL OF A PHOTOVOLTAIC CELL

A solar cell may be represented as an electrical circuit [3], [14], as in Fig. 1.

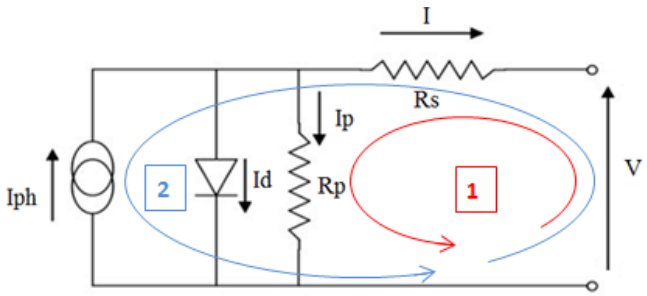

Fig. 1. The electrical model of a solar cell.

The Kirchhoff's laws enable us to represent the mathematical model of a photovoltaic cell by equation (1):

$$I = I_{ph} - I_d - I_p = I_{ph} - I_s\left(e^{\frac{q(V+R_sI)}{nkT}} - 1\right) - \frac{V+R_sI}{R_p}$$

Where: I, V: Current (A) and voltage (V), produced by the solar cell; Id, Ip: Diode current (A) and parallel resistor current (A); Rs, Rp: Series and parallel resistors of the solar cell (Ω); k: The Boltzmann constant, equals (k = 1.38×10-23 J/K); n: Ideality factor of the solar cell, ranges from 1 to 2; T: Temperature of a diode, in Kelvin (K); q: Electron charge, equals (q= 1,6×10-19 Coulomb); Iph: Photo-current produced by the solar cell (A). The photo-current is proportional to the solar irradiance (E), can be described by the following equation (2):

$$I_{ph} = \frac{E}{E_{ref}}\left(I_{phref} + \mu_{scc}\left(T - T_{ref}\right)\right)$$

Where: E: The actual solar irradiance (W/m²); Eref: The solar irradiance at STC (W/m²); T: The actual temperature

(K); Tref: The STC temperature (K); μscc: Short-circuit current temperature coefficient; STC: Strictly-controlled Test Condition. These are test conditions of Cell temperature of 25 (°) and Global solar irradiance of 1000 (W/m²). The selection of the series and parallel resistances for simulation is discussed in research papers [15] and [16]. The series and parallel resistances can be computed through the following equations:

$$R_p > \frac{10V_{co}}{I_{cc}};\ R_s < \frac{0.1V_{co}}{I_{cc}}$$

Where:

$$I_{cc} \approx I_{ph};\ V_{co} = V_t.\ln\left(\frac{I_{ph}}{I_s}+1\right);\ V_t = \frac{nkT}{q}$$

c

$$I_s = \frac{I_{ph}}{e^{\left(\frac{V_{co}}{ncell.V_t}\right)}-1}$$

III. SIMULATION OF A 85 W SOLAR PANEL

In this study, we used the STP085B-12 Solar photovoltaic panel. The STP085B-12 Solar series provides cost-effective photovoltaic power for general-purpose use by direct operation of DC loads, or AC loads on inverter-equipped systems. The panel consists of 36 multi-crystalline silicon solar cells connected in series to produce a maximum output of 85W. The technical data of this photovoltaic panel are given in Table 1.

Table 1. The technical data of STP085B-12 the solar photovoltaic panel.

Maximum power at STC (Pmax)	85 W
Optimum operating voltage (Vmp)	17.8 V
Optimum operating current (Imp)	4.80 A
Open-circuit voltage (Voc)	22.2 V
Short-circuit current (Isc)	5.15 A
Operating temperature	- 40°C to + 85°C
Temperature coefficient of Isc	0.037 %/°C
Temperature coefficient of Uoc	- 75 mV/°C
Temperature coefficient of Pmax	- 0.48 %/°C
Max. system voltage	715 V
Max. fuse rating	15 A
Length	1195 mm
Width	541 mm
Thickness	30 mm
Weight	8 Kg

Fig.2 illustrates the experimental kit of panel photovoltaic test, to check the simulation results and compare the achied results.

Fig. 2. The STP085B-12 Solar photovoltaic panel. (1): Panel, (2): Ampermeter, (3): Voltmeter, (4): Load.

The simulation of a 60 w solar panel model is based on the following steps:

*A. **Step One***

Design of a solar cell model with MATLAB, using equation (2) and the Electrical model (see Fig. 3). The Gain block represents the temperature coefficient of the short-circuit current, μ_{scc} = 0.065 % [19]. Double click on the resistors blocks, R_s, R_p, and write the values r_s, r_p. Double click on the diode block for configured, in parameterization: use parameters I_s and N, in Saturation current, I_S: is, and Emission coefficient, N: ncell/2.

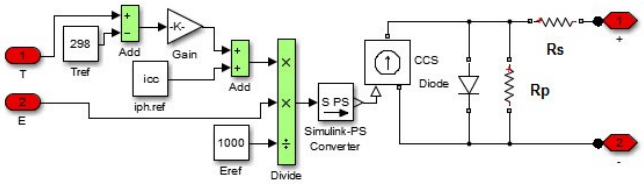

Fig. 3. The electrical model of a solar cell in MATLAB software

*B. **Step Two***

Design of a 85 w solar panel with a subsystem model in MATLAB (see Fig. 4). Select the blocks of the first step and with a right-click on the mouse, select to create a subsystem from the selection. Copy-paste the created subsystem, to obtain two 18- Solar cells, connect each 18- Solar cells with a bypass diode.

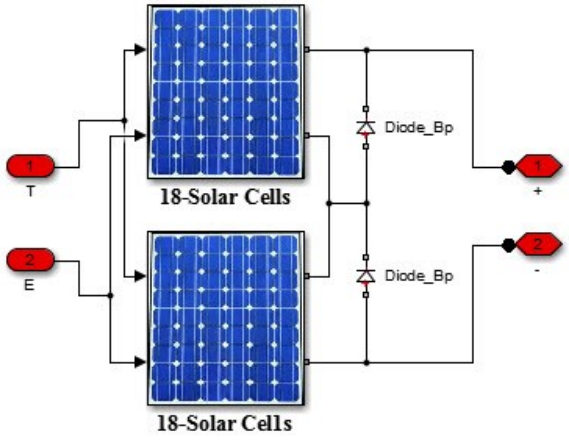

Fig. 4. The Subsystem model of a 85 W solar panel

C. Step Three

Design of a photovoltaic system for test a 85 w solar panel model (see Fig. 5). Select the blocks of the second step and create a subsystem of solar panel. The Connection of an ammeter and voltmeter for the visualization of the current and voltage curves. A variable resistor and a ramp block to ensure a steady increase or decrease of a signal (current, voltage). PS-Simulink: to convert or simulate a physical signal. Simulink-PS: to convert the simulated signal into a physical signal. Solver Configuration: solving system equations, an important component for a simulation. Workspace: used to view the simulation results as data. Save the MATLAB simulation with the name (SolarPanel.slx).

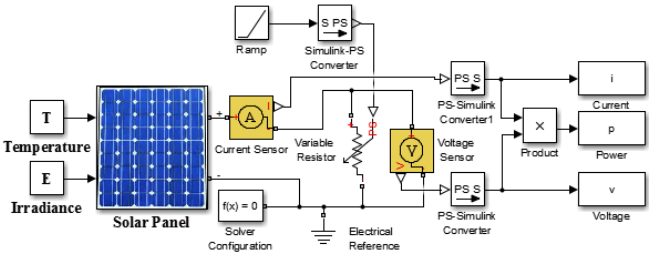

Fig. 5. The Photovoltaic system with a 60 w solar panel

IV. RESULTS DISCUSSION

MATLAB code for simulation of the solar panel with variable irradiance and variable temperature is given as:

```
% Start
clear all
clc
%constant%
k=1.38e-23;%constant de boltzman
q=1.6e-19;%cste de la charge electrique
icc=5.15;%courant de court circuit  3.8
vco=22.2;%tension de circuit ouvert  21.1
vpm=17.8;%tension au point maximum  17.1
ipm=4.8;%courant au point maximum   3.5
rp=360;%resistance parallel module PV
rs=0.5;%resistance serie module PV
ncell=36;%nombre de cellule d'un module PV
n=1;%facteur d'idéalite

subplot(2,2,1)
E=1000;
%l'ensoleillement constant et la temperature varieer de 0-25-50-75 degre
hold all;
for T=273:25:348
vt=n*k*T/q;
is=icc/(exp(vco/(ncell*vt))-1);%courant saturation diode
sim('systemePV_sain.slx')
plot(v,i)
axis([0,25,0,5.5])
end
legend('t=0°','t=25°','t=50°','t=75°');
grid
title('E=1000 w/m2,T:variable')
xlabel('Voltage (V)')
ylabel('The current (A)')
subplot(2,2,2)
T=298;
%la temperature cste 25 degre et l'ensol variable 400-600-800-1000
hold all;
for E=400:200:1000
vt=n*k*T/q;
```

```
is=icc/(exp(vco/(ncell*vt))-1);
sim('systemePV_sain.slx')
plot(v,i)
axis([0,25,0,5.5])
end
grid
legend('E=400w/m²','E=600w/m²','E=800w/m²','E=1000w/m²');
title('T:25°c,E:variable')
xlabel('Voltage (V)')
ylabel('The current (A)')
subplot(2,2,3)
E=1000;
%l'ensoleillement constant et la temperature varieer de 0-25-50-75 degre
hold all;
for T=273:25:348
vt=n*k*T/q;
is=icc/(exp(vco/(ncell*vt))-1);
sim('systemePV_sain.slx')
plot(v,p)
axis([0,25,0,95])
end
legend('t=0°','t=25°','t=50°','t=75°');
grid
title('E=1000 w/m2,T:variable')
xlabel('Voltage (V)')
ylabel('The power(w)')

subplot(2,2,4)
T=298;
%la temperature cste 25 degre et l'ensol variable 400-600-800-1000
hold all;
for E=400:200:1000
vt=n*k*T/q;
is=icc/(exp(vco/(ncell*vt))-1);
sim('systemePV_sain.slx')
plot(v,p)
axis([0,25,0,95])
end
grid
legend('E=400w/m²','E=600w/m²','E=800w/m²','E=1000w/m²');
title('T=25°c,E:variable')
xlabel('Voltage (V)')
ylabel('The power (w)')
% End
```

Fig. 6 shows the impact of Irradiance and Temperature on the I=f(v) and P=f(v) characteristics after the simulation and the run of MATLAB code.

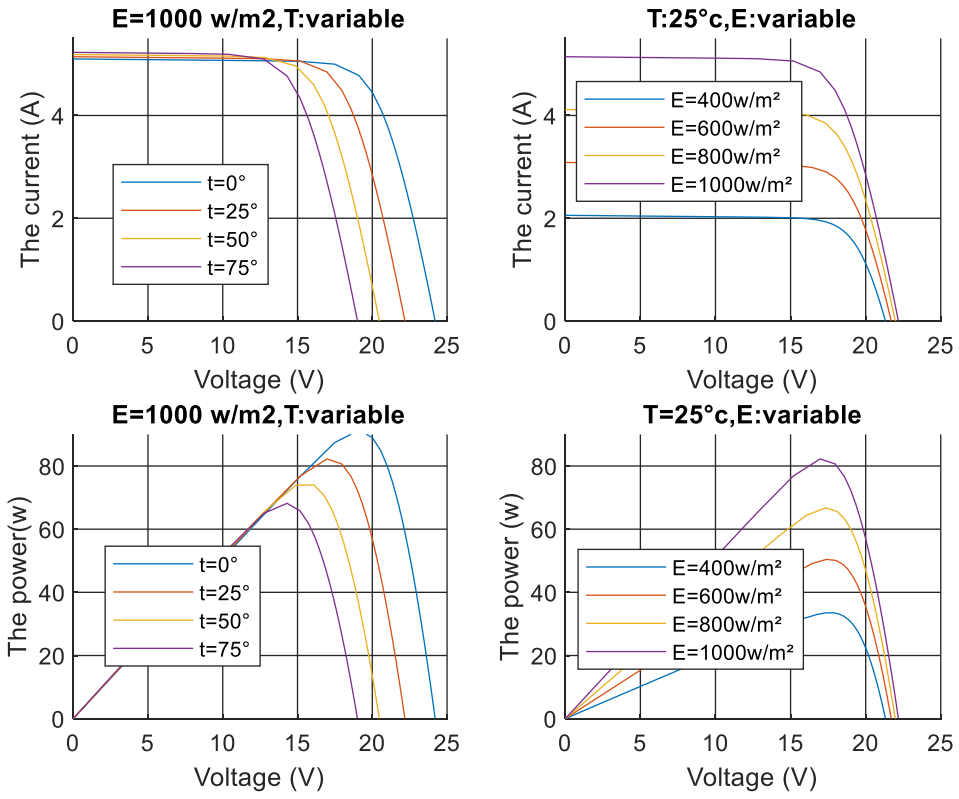

Fig. 6. The (I-V) and (P-V) curves of the solar panel with various scenarios of temperature and irradiance values.

V. CONCLUSION

In this paper, contribution to the simulation of a 85 w Solar panel model with MATLAB is presented. The electrical circuit of a solar cell with mathematical equations is given with MATLAB code for simulation. From obtained results, it has been observed the effectiveness of the analysis. For future research, we would suggest associating the solar panel with a boost converter and control the system with MPPT controller, Fuzzy Logic controller, neural network controller or other metaheuristic algorithms.

REFERENCES

[1] J. Zhao et al., "The determinants of renewable energy sources for the fueling of green and sustainable economy," Energy (Oxf.), vol. 238, no. 122029, pp. 122029, 2022, doi: 10.1016/j.energy.2021.122029

[2] V. J. Chin, Z. Salam, and K. Ishaque, "Cell modelling and model parameters estimation techniques for photovoltaic simulator application: A review," Applied Energy, vol. 154. Elsevier BV, pp. 500–519, Sep. 2015. doi: 10.1016/j.apenergy.2015.05.035.

[3] Krismadinata, N. Abd-Rahim, H. Wooi Ping, J. Selvaraj, "Photovoltaic Module Modeling using Simulink/Matlab," Procedia Environmental Sciences, vol. 17, pp. 537-546, 2013.

[4] S. Irvine. "Solar Cells and Photovoltaics," In: Kasap S., Capper P. (eds) Springer Handbook of Electronic and Photonic Materials. Springer Handbooks. Springer, Cham, 2017.

[5] N. Barth, R. Jovanovic, S. Ahzi, M. A-Khaleel, "PV panel single and double diode models: Optimization of the parameters and temperature dependence," Solar Energy Materials and Solar Cells, vol. 148, pp. 87-98, 2016.

[6] H. Bellia, R. Youcef, and M. Fatima, "A detailed modeling of photovoltaic module using MATLAB," NRIAG Journal of Astronomy and Geophysics, vol. 3, no. 1. Informa UK Limited, pp. 53–61, Jun. 2014. doi: 10.1016/j.nrjag.2014.04.001.

[7] Y. Khlifi, "Mathematical Modeling and Simulation of Photovoltaic Solar Module in Matlab-Mathworks environment," International Journal of Scientific & Engineering Research, vol. 5, no. 2, pp. 448-454, 2014.
[8] A. E. Toubal Maamar, M. Helaimi, R. Taleb, "Analysis, Simulation and Experimental Validation of High Frequency DC/AC Multilevel Inverter," Przeglad Elektrotechniczny, vol. 1, no. 8, pp. 16-19, 2020.
[9] A. E. Toubal Maamar, M. Helaimi, R. Taleb, H. Mouloudj, O. Elamri, and A. Gadoum, "Mathematical Analysis of N-R Algorithm for Experimental Implementation of SHEPWM Control on Single-phase Inverter," in SSRG Int. J. Eng. Trends Technol., vol. 68, no. 2, pp. 9–16, Feb 2020, doi: 10.14445/22315381/ijett-v68i2p202.
[10] A. E. Toubal Maamar, M. Helaimi, R. Taleb, M. Kermadi, S. Mekhilef, A. Wahyudie, M. Rawa, "Analysis and Small Signal Modeling of Five-Level Series Resonant Inverter," IEEE access. vol. 9, pp. 109384-109395, 2021, doi: 10.1109/ACCESS.2021.3102102.
[11] S. Alatai, M. Salem, I. Alhamrouni, D. Ishak, A. Bughneda, and M. Kamarol, "Design Methodology and Analysis of Five-Level LLC Resonant Converter for Battery Chargers," Sustainability, vol. 14, no. 14, p. 8255, Jul. 2022, doi: 10.3390/su14148255.
[12] A. E. Toubal Maamar, M. Helaimi, R. Taleb, M. Kermadi, and S. Mekhilef, "A neural network based selective harmonic elimination scheme for five-level inverter," in Int. J Circ Theor Appl., vol. 50, no. 1, pp. 298-316, 2022, doi:10.1002/cta.3130.
[13] A. E. T. Maamar, M. Kermadi, M. Helaimi, R. Taleb, and S. Mekhilef, "An Improved Single-Phase Asymmetrical Multilevel Inverter Structure With Reduced Number of Switches and Higher Power Quality," in IEEE Trans. Circuits Syst. II: Express Briefs, vol. 68, no. 6, pp. 2092-2096, June 2021, doi: 10.1109/TCSII.2020.3046186.
[14] S. Singer, B. Rozenshtein, S.Surazi, "Charctérization of PV Array output Using a Small Number of measured Parameters," Solar Energy, vol. 32, pp. 603-607, 1984.
[15] P.B. Savitha, M.S. Shashikala, K.L. Puttabuddhi, "Modelling of Photovoltaic Cell/Module under Environmental Disturbances using MATLAB/Simulink," International Journal of Engineering Trends and Technology, vol. 9, no. 1, pp. 48-55, 2014.
[16] H. Tian, F. Mancilla-David, K. Ellis, E. Muljadi, and P. Jenkins, Detailed Performance Model for Photovoltaic Systems. Preprint. United States: N. p., 2012.
[17] A.E. Toubal Maamar, S. Ladjouzi, R. Taleb, and Y. Kacimi, "Détection et classification de défauts pour un GPV: Etude comparative entre la méthode de seuillage et réseaux de neurones," J. Ren. Energies, vol. 21, no.1, pp. 45-53, 2018.

TUESDAY OCTOBER **28**, 2025

Auditorium

8h00		RECEPTION & REGISTRATION
8H30		OPENING CEREMONY Representative of Ibn Badis University of Mostaganem Representative of the Faculty of Science and Technology Representative of the local authorities Representative of Conference Organizers
CAP-HYPROC Auditorium		KEYNOTE SPEAKERS **Moderator** **Prof. Cherif BENOUDJAFER (Univ. Bechar)**
09H00	**Dr. Abdallah KHELLAF** CDER, Bouzaréah, Alger. ALGERIA Overview of artificial intelligence applications in hydrogen chain value	
09H45	**Pr. Adel MELLIT** Seddik Benyahia University, Jijel. ALGERIA The role of artificial intelligence in advancing the solar energy sector: Bridging the gap between academic research and industry	
10H30 – 11H00	COFFEE BREAK offered by FST-Mostaganem	
12H15	**Dr. Benameur NEHAR** Abou Bekr Belkaid University, Tlemcen. ALGERIA Cultivating Global and Smart Citizenship through Virtual Exchange on the UN SDGs in Higher Education	
Online 01H00	**Dr. Gokul PANDY** IEEE-SM, Richmond section chair, USA meet.google.com/mrf-syzy-hch Revolutionizing Client Service Agreements: Selenium-Driven Open-Source Robotics Process Automation	
11H00 12H00	POSTER SESSION-1- CAP-HYPROC Hall **Moderators: Prof. Youcef SOUFI (Univ. Tebessa); Mr. Kheireddine MERHOUM (UMBB)**	
	AI-Based Optimization and Control Systems **Prof. Abdelghani AISSAOUI (Univ. Bechar); Dr. Abdelkader HADJ DIDA (ASAL-Oran)**	
11H00	**22**	- Souad TAHRAOUI *AI-Powered Fault Diagnosis in Dynamic Systems with Tornado Algorithm Optimization*
11H10	**29**	- Azeddine BELOUFA *PSO-Optimized High-Gain Observer-Based Backstepping Control for TRMS Trajectory Tracking*
11H20	**191**	- Fatima Zohra MEDJAOUI *Experimental Validation of a Square Planar Micro-Coil Model*

11H30	**218**	- Nawres BOUAM *Optimization of Robotic Navigation for Safety and Efficiency in the Oil and Gas Industry Using the A* Algorithm*
11H40	**149**	- Soumia TOUAMI *Control of Brushless Doubly-Fed Generator BDFIM using Neuro-fuzzy Controllers*
Photovoltaic Systems and MPPT Techniques **Prof. Abdelghani HARRAG (Univ. Setif); Dr. Fatima BOUTLILIS (Univ. Mostaganem)**		
11H00	**106**	- Amel ABBADI *Enhanced Accuracy in Estimating PEM Fuel Cell Parameters Using the Walrus Optimization Algorithm*
11H10	**216**	Yamina BELGAID *Optimal tuning of a PI controller using the Particle Swarm Optimization (PSO) algorithm for wind turbine applications*
11H20	**147**	- Khadidja DERBALI *Optimization of the Solar Cell Double Diode Model Estimation Using the Dung Beetle and Arctic Puffin Optimizers with Lambert-W Function and Newton-Raphson Methods*
11H30	**134**	- Fethia HAMIDIA *Enhanced MPPT Algorithms for PV Panels: Review and Comparative Analysis*
11H40	**188**	- Fatima SALHI *A Comparative Analysis of MPPT Techniques for Grid Connected PV System*
11H50	**209**	- Fatima SALHI *Photovoltaic Pumping System Based On MPPT-DNN*
12H00	**194**	- Mokhtaria DERKAOUI *Stand Alone Photovoltaic Module with an Integrated On-Chip Circular Spiral Inductor*
Power Electronics and Advanced Converters **Prof. Mouloud DENAI (ESGEE-Oran) ; Dr. Fethi AKEL (UDES-CDER)**		
11H00	**183**	- Oqeyl DJEBOURI *A Performance Analysis of a High-Gain three Phase Interleaved Boost Converter with Switched Capacitor Network for Photovoltaic Systems under Different Environmental Conditions*
11H10	**132**	- Brahim LACHI *Direct Torque Control (DTC) of a Synchronous Drive Using a Three-Level NPC Inverter in an Electric Traction Application*
11H20	**150**	- Abdelkader RABAH *A Novel Method for Inverter Open-Circuit Fault Diagnosis Using Improved Variational Mode Decomposition*
11H30	**116**	- Oqeyl DJEBOURI *A Comparative Evaluation of Metaheuristic Algorithm Using Two Different Simulation Current Calculation Methods for Extracting Photovoltaic Single-Diode Model Parameters*
11H40	**138**	- Kada BECHAREF *Development of a Compact Wideband Bandpass Filter Incorporating Complementary Interdigital Resonator E (CIRE) on a Half-Mode Substrate Integrated Waveguide Coupled with Corrugated Structures*
13H30-14H30	POSTER SESSION -2-	CAP-HYPROC Hall
Moderators: Prof. Youcef SOUFI (Univ. Tebessa); Mr. Kheireddine MERHOUM (UMBB)		
Hybrid Energy Systems and Storage Technologies **Dr. Rafika BOUDRIES (CDER Bouzareah); Dr. Missoum IBRAHIM (Univ. Mostaganem)**		
13H30	**42**	- M'hamed SEKOUR *Energy Management in a Hybrid Fuel Cell–Battery–Supercapacitor System for Drone*
13H40	**130**	- Abdeldjalil DAHBI *An Experimental Study of a Stand-alone Hybrid system installed in Adrar*
13H50	**172**	- Henia FRAOUCENE *Effect of Rectifier load resistance on the RF received Wake-up Signal at 2.45 GHz*
14H00	**220**	- Abdallah BOUAM *Experimental Feasibility Study of a Cogeneration System Based on the Coupling of a Vortex Tower and NPP Cooling System for Sustainable Energy Production*

14H10	**7**	- Rachid KHELFAOUI *Smart Control and Energy Optimization of a Solar-Driven Absorption Cooling System in Béchar (Algerian Sahara)*
Smart Agriculture and IoT Applications **Prof. Baghdad HADRI (Univ. Mostaganem) Prof. Saliha AREZKI (USTHB Algiers)**		
13H30	**49**	- Zoubir BELGROUN *Development of an ontology-based solution to agricultural semantics*
13H40	**50**	- Zoubir BELGROUN *A Smart Solution for Monitoring Greenhouses Utilizing the Internet of Things*
13H50	**101**	- Mouloud TIZZAOUI *Design Considerations for a Stand-Alone PV-Powered Evaporative Cooling of Greenhouse in the Saharan Environment*
14H00	**27**	Ali BOUZIANE *Clean Combustion Modeling of Premixed DME Flames with LES: A Step Toward RCCI-Compatible Fuels for Green Mobility*
14H10	**204**	- Tewfik LAMRANI *Advancements and Challenges in Multimodal RFID Sensors: From Industrial IoT to Smart Applications*
14H20	**165**	- Mokrane MEHDI *Enhancing Energy Efficiency in Domestic Refrigerators: Experimental and Statistical Evaluation of Phase Change Material Integration*
Energy Forecasting and Predictive Maintenance **Prof. Mohamed Arezki MELLAL (Univ. Boumerdes) Dr Mohamed BENZIDANE (Univ. Mostaganem)**		
13H30	**222**	- Dalila CHERIFI *Predictive Maintenance of Wind Turbines Using Machine Learning: Addressing Fault Detection with SCADA Data*
13H40	**155**	- Walid BOUKERNE *Study and Implementation of an End-to-End OFDM-Based Data Transmission System Using SDR*
13H50	**113**	- Kacem GAIRAA *Intra-Hour Solar Irradiance Forecasting Based on Feature Selection Techniques*
14H00	**159**	- Lamia MAY *A Dynamic Stress-Reset Model for maintenance Optimization Integrating Physics-Informed Fatigue Accumulation and Resource-Aware Intervention Efficiency*
14H10	**196**	- Abderrahmane KHELFAOUI *Solar Declination Measurement Test and Comparison with Declination Tables and Theoretical Methods*
Thermal Systems and Advanced Energy Technologies **Dr. Mohamed AYAD (UDES); Dr. Slimane SOUAG (Univ. Mostaganem)**		
13H30	**181**	- Amina Lyria DEGHAL *Numerical and Analytical Study of the Influence of Geometrical Parameters on the Performance of a Vortex-Type Cooling Tower*
13H40	**219**	- Amel DADDA *Influence of Chimney Geometry on Coriolis Force Generation in a Vortex Tower Prototype*
13H50	**186**	- Ridha ALLICHE *Dimensionless Analysis and Correlation of Nusselt Number in a Regenerator-Free LTD Stirling Engine*
14H00	**127**	- Kheira BELHAMIDECHE *The effect of heat transfer fluid flow rate and heat exchanger installation depth on the performance of low enthalpy geothermal energy*
14H10	**109**	- Abdellah MEKEDEME *Modeling and Simulation of Herschel-Bulkley Drilling Fluids in Vertical Boreholes with Rotating Bits*
14H30 – 15H30		LUNCH

REMOTE SESSION		
ROOM A-1-28		**Dr. Akshay SHARMA (SM-IEEE); Dr. Hadj Larbi BEKALOUZ (Univ. Mostaganem)**
		:: meet.google.com/mrf-syzy-hch
15H30	**33**	-Hamza BENYEZZA IoT-Based Platform for Monitoring and Managing Fuel Delivery Trucks
15H45	**58**	- Ahmed BOURAIOU Design of Sustainable IoT-Based Weather Monitoring
16H00	**85**	- Lynda OUZANE *Design and simulation of a smart energy meter for real time monitoring*
16H15	**96**	- Faycal BENYAMINA *Enhanced LVRT Control of Grid-Tied Inverters under Unbalanced Grid Faults Using Notch Filter-based Sequence Extraction*
16H30	**137**	- Halima MAHIDEB *Indoor and Outdoor Air Quality Monitoring with IoT-AI Technologies: Current State and Integration Challenges*
ROOM B-1-28		**Prof. Amel ABBADI (Univ. Medea); Dr. Sakina ATOUI (UDES-CDER)**
		:: meet.google.com/nzt-jvxh-icq
15H30	**60**	- Mustapha MEROUAH Enhanced MPPT in PV Systems Using k-Nearest Neighbors and Integral Backstepping Control
15H45	**64**	- Hizia ABED Real time identification of the parameters of a photovoltaic panel by ant colony optimization in the continuous domain
16H00	**94**	- Ryma LEBIED Robust Solar System with Different advances techniques
16H15	**98**	- Samah BOUAROUDJ Novel High Efficiency ZCS DC/DC Interleaved Boost Converter For Photovoltaic Solar System
16H30	**206**	- Alla Eddine TOUBAL MAAMAR A simple and accurate script to simulate solar panel models at variable environmental conditions of temperature and irradiation
ROOM A-2-28		**Prof. Lamia HAMZA (Univ. Bejaia); Dr. Anup KAGALKAR (SM-IEEE)**
		:: meet.google.com/mrf-syzy-hch
17H00	**25**	- Amina MAZIGHI *Innovation in infiltration estimation: From empirical model to AI-based solutions*
17H15	**37**	- Sonia BAAZIZ *AI-Assisted Design and Characterization of a Novel Cytosine-Based Hybrid Material for Renewable Energy Applications*
17H30	**76**	- Abdesselem BEGHRICHE *AI-Driven Smart Management and Optimization of Green Hydrogen Production in Renewable Energy Grids Using Bio-Inspired Algorithms and Edge Computing*
17H45	**158**	- Sara OUARTI *A Hybrid Deep Learning Approach for Anomaly Detection in Smart Grid Systems*
18H00	**199**	- Mohamed ADAIKA *Intelligent Fault Detection in Transformer Magnetic Oil Level Indicators Using Machine Learning for Smart Renewable Grids*
ROOM B-2-28		**Prof. Fethia HAMIDIA (Univ. Medea); Dr. Nouamen KELLIL (UDES-CDER)**
		:: meet.google.com/nzt-jvxh-icq
17H00	**43**	- Mokhtar Mahmoud MOHAMMEDI *SMO Speed Sensorless Fault Assessment Technique Based on DFIG-WECS*
17H15	**104**	- Mourad NAIDJI *A Novel Nature-Inspired Approach for Wind Farm Location Optimization Considering Wake Effects*
17H30	**115**	- Hadjira MECHRI *Efficient Wind Energy Extraction and Fault Detection in a PMSG-Based WECS with NPC Inverter*
17H45	**153**	- Lakhdar SAIHI *Fuzzy Logic Control of Variable-Speed Wind Turbine Base on DFIG*
18H00	**92**	- Samira HADIBI *Impact of System Complexity on the Nonlinear Dynamics of Coupled Axial-Torsional Drilling Models*
COFFEE BREAK		

WEDNESDAY OCTOBER 29, 2025

RooM A	**INTERNET OF THINGS :: meet.google.com/mrf-syzy-hch**	**Prof. Abdellah CHAOUCH (Univ. Mostaganem); Dr. Fatiha BECHIRI (Univ. Mostaganem)**
08H00	**162**	- Rafika BOUDRIES *Methanation of CO_2 Removed From Raw Natural Gas for Smart Urban Centers in the In-Salah Region*
08H20	**74**	- Ibtissam CHEKKAL *Artificial Intelligence Applications for Indoor Thermal Comfort in Residential Buildings: A Scoping Review of Early Design Methods*
08H40	**17**	- Farouk BENAHMED *Home Monitoring System using IoT and Deep Learning model*
09H00	**177**	- Imane YAHIAOUI *State of Health Estimation of Lithium-Ion Batteries in Electric Vehicles*
RooM B	**ELECTRICAL VEHICLE & CONTROL :: meet.google.com/nzt-jvxh-icq**	**Prof. Emrt Fateh KRIM (Univ. Setif); Dr. Mansour ABED (Univ. Mostaganem)**
08H00	**81**	- Abdelmoumene TOUABI *A Concise Survey on Neural Networks Compression Techniques*
08H20	**175**	- Chahrazad BENGANA *AI-Based Fault Detection for PDC Bit Wear Monitoring Using Random Forest Classification*
08H40	**135**	- Sarah Kawther SEDJAR *Intelligent Optimization and Modeling of Miniaturized Photovoltaic Cells for Embedded Applications using Hybrid AI Techniques*
09H00	**14**	- Fatna LAZGHEM *Artificial intelligence and plant disease detection: A critical analysis of advances, challenges and strategies for resilient agriculture*
RooM A	**GRID-CONNECTED CONTROL SYSTEMS:: meet.google.com/mrf-syzy-hch**	**Prof. Katia KOUZI (Univ. Laghouat) ; Dr. Saliha REZINI (Univ. Mostaganem)**
09H30	**110**	- Oussama HARROUZ *Short-Term PV Power Forecasting Using LSTM: A Case Study of grid-connected PV system in Adrar City*
09H50	**213**	- Amira LAGHOUATI *A Novel Method for Cost-Effective Green Hydrogen Production Using Sound Wave-Assisted Electrolysis*
10H10	**161**	- Fayçal Hadj Mihoub SIDI MOUSSA *Modeling and Control of a Grid-Connected Hybrid Wind-Photovoltaic System with a PMSG-Based Wind Turbine and PSO-MPPT Algorithm for the PV Array*
10H30	**65**	- Toufik TRIF *Photovoltaic and Wind Power Forecasting Using LSTM Networks with Adaptive Hyperparameter Tuning*
RooM B	**ENERGY MANAGEMENT & MATERIALS in RENEWABLES :: meet.google.com/nzt-jvxh-icq**	**Dr. Merzak FERROUKHI (USTHB, Algiers) ; Dr. Saadiya BENATMANE (Univ. Mostaganem)**
09H30	**128**	- Idriss Hadj MAHAMMED *Estimating Power Outputs of Thin Film CIS PV Modules Using Neuronal Approach: A case Study in Arid Environment*
09H50	**152**	- Walid REZIG *Biomass Diatomite-Supported Ferrihydrite Silicide Hybrid Granule Catalyst TiO2: Synthesis and Evaluation for Photocatalytic Dye Removal*
10H10	**19**	- Abdelkarim CHERHABIL *Metaheuristic Approaches for Medical Image Denoising*
10H30	**129**	- Ayoub MEGHEBBAR *When Machines Speak Human: Detecting Computer Generated Reviews Using Transformer Models*
10H50	**13**	- Nadir MAHAMMED *Fake no More: Smarter Social Media Detection With RTGBO*
COFFEE BREAK		

RooM A	**SMART ENERGY MANAGEMENT & IoT :: meet.google.com/mrf-syzy-hch**	**Prof. Adel MELLIT (Univ. Jijel); Dr. Leila GHOMRI (Univ. Mostaganem)**
11H30	**221**	- Saliha AREZKI *Hybrid Simulation-Experimental Framework for Dynamic PV Reconfiguration in Agricultural Applications with Real-Time IoT Supervision*
11H50	**68**	- Abderrahmane HALLOUI *A Review on Optimized Task Offloading Strategies in Fog Computing and IoT*
12H10	**87**	- Mohammed BEKHTI *Comparative Techno-economic and environmental performance of Standalone hybrid energy systems for Telecommunications Towers: A Case study of the African Unity Road in Southern Algeria*
12H30	**141**	- Mansour BENDREF *AI-Driven Real-Time Adaptive Beam Steering for 5G Fixed Wireless Access Antenna Systems*
RooM B	**ELECTRICAL NETWORK CONTROL :: meet.google.com/nzt-jvxh-icq**	**Prof. Benaissa BEKKOUCHE (Univ Mostaganem); Prof. Cherif BENOUDJAFER (Univ. Bechar)**
11H30	**54**	- Seif Elislam CHELLI *Proportional resonance controller versus PI controller performances of PWM controlled rectifier connected to an unbalanced three-phase grid voltages*
11H50	**11**	- Zana KARI *The Interest of Shielding for Integrated Inductance*
12H10	**59**	- Abdelhak FLIH *HVDC fault location using Artificial Neural Network method*
12H30	**117**	- Samia SAIB *Improvement of the performance of the electrical network by the integration of FACTS devices*
12H50	**131**	- Tahani nor el Houda TSRIAT *Performance Analysis of Adaptive P&O, ANN and PSO Based MPPT Algorithms for Photovoltaic Systems*
13H00 – 14H00		LUNCH
RooM A	**STORAGE and ELECTRICAL VEHICLE :: meet.google.com/mrf-syzy-hch**	**Prof. Hadj Adda BENTOUNES (Univ. Mostaganem); Prof. Mohamed Arezki MELLAL (UMBB)**
14H00	**139**	- Bouziane BOUSSAHOUA *A New Priority List Algorithm for power system unit commitment problem solution*
14H20	**182**	- Aissa HAMLAT *Advanced Non-Linear Control Designed for Fuel Cell/Super-Capacitor Hybrid Electric vehicle*
14H40	**212**	- Houaria NEDDAR *Towards a Decarbonized Life: Impact of Fuel Cell Performance Parameters*
15H00	**123**	- Wiame GUENAYA *Evaluating The Performance of NMC and NCA Battery Technologies for Electric Vehic*
15H20	**223**	- Salim DJAHFA *Estimating parameters values of battery lead-acid using Simulink Design Optimization*
RooM B	**ENERGY MANAGEMENT & MICROGRIDS :: meet.google.com/nzt-jvxh-icq**	**Prof. Mostefa RAHLI (USTO); Dr. Khadidja BERADJA (Univ. Mostaganem)**
14H00	**168**	- Zohra OUCHIHA *Effect of EGV cluster on working 2-blade Savonius rotor*
14H20	**154**	- Randa BENKHELIFA *Adaptive Preprocessing for Improving Early Detection and Classification of Anomalies on Photovoltaic Panels*
14H40	**89**	- Djamel SELKIM *Optimal Power Management and Control of Islanded Microgrid to Prevent Under-Frequency Load Shedding During Load Variations*
15H00	**133**	-Hadj Abderrahim MEBARKI *Space Vector Modulation Control of a Three-Level NPC Inverter*
15H20	**184**	- Ahmed DAHIA *Numerical study of the behavior of air flow circulation through Novel Vortex Tower Prototype using CFD code*

15H40	**192**	- Fatna BAHLOULI *Heat Dissipation Strategies for Planar Inductive Components*
COFFEE BREAK		
THURSDAY 30 OCTOBER 2024		
Welcome COFFEE & TEA		
RooM A-1-30		**Intelligent Control Systems for Renewable Energy::** meet.google.com/mrf-syzy-hch **Dr. Kheyreddine DJOUZI (UMBB) ; Dr. Aoued MEHARRAR (Univ. Tissemssilt)**
9H00	**88**	- Kheira MENDAZ *Artificial Neural Proportional Integral control Wind Turbine Based Doubly Fed Induction Generator*
9H15	**32**	- Nesrine NESRINE *Dual-Loop Control Strategy for a Standalone PV Boost Converter Using PSO-Tuned PI and Model Predictive Current Control*
9H30	**148**	- Mohammed Kabir BOUMEGOUAS *Robust Nonlinear Control for Buck-Boost Converter Using Sliding Mode Control For Battery Storage System of Electric Vehicle*
9H45	**121**	- Amina Dounia BABOU *Genetic Algorithm Enhanced Backstepping for Real-time Trajectory Tracking of a Twin Rotor MIMO System*
10H00	**151**	- Habiba HOUARI *Advancing PID Control Quarter-Car Suspension System with Metaheuristic Optimization Comparative Study*
RooM B-1-30		**AI-Based Fault Detection and Diagnostic Systems::** meet.google.com/nzt-jvxh-icq **Dr. Bhushan B. CHAUDHARI (IEEE-SM, India); Dr. A. TAMILSARAN (India)**
9H00	**40**	- Fatima Zohra BOUDJELLA *Hybrid Approach for DGA Diagnosis of Transformers: Comparison of Supervised Classifiers with Advanced Preprocessing*
9H15	**83**	-M. ALLAM *Intelligent Control of a doubly fed induction generator for wind energy conversion systems in variable speed*
9H30	**70**	- Abderrahmene MOKHTARI *Neural Network Sliding Mode Observer Based Fault diagnosis for Wind Turbine Benchmark Model*
9H45	**173**	- Ahmed DJERBOUB *Intelligent Fault-Tolerant Control for Boost Converter IGBT Failures Using SVM within PV-Integrated Four-Leg SAPF Systems*
10H00	**197**	- Mohamed ADAIKA *Deep Learning-Based Detection of Environmental Faults in Photovoltaic Systems under Dust and Humidity Conditions*
RooM C-1-30		**Electric Vehicles and Advanced Motor Drives::** meet.google.com/siz-ewma-buv **Prof. Mounir BOUHEDDA (Univ. Medea); Dr. Ahmed MEDIANI (CDER)**
9H00	**4**	- Nawal TOUHAMI *Classification of Electric Vehicles: A Comprehensive Overview*
9H15	**28**	- Norediene AOUADJ *Independent Control with MTPA-DTC of Five-leg inverter-dual IPMSM motors powertrain used in Vehicle propulsion system*
9H30	**52**	- Norediene AOUADJ *Enhanced Direct Torque Control of PMSM Drives for Electric Traction Systems: A Comparative Study Between Classical DTC and a Hybrid Fuzzy Logic–SVM Approach*
9H45	**71**	- Mohamed MILOUDI *AI-Driven EMI Analysis and Experimental Measurement in DC Motor Drives: Comparative Study of Chopper Topologies for Enhanced Electromagnetic Compatibility*
10H00	**75**	- Justin MOSKOLAI NGOSSAHA *Next-Generation Urban Mobility for Developing Countries:AI-Supported Digital Twin Framework*

10H15	**102**	- Abdelkader MERAH *Finite-Horizon LQR and Kalman Estimator Design for Robust Lateral Dynamics Control in Autonomous Driving*
COFFEE BREAK		
RooM A-2-30	**Smart Grid Systems and Power Quality::** meet.google.com/mrf-syzy-hch **Pr. Houaria NEDDAR (Univ. Mostaganem); Dr. Abdelhakim IDIR (Univ. M'sila)**	
11H00	**12**	- Khadidja MEDJDOUBI *Study of a Hybrid UPQC with Intelligent Control*
11H15	**16**	- Khadidja MEDJDOUBI *Improving energy quality with renewable energy sources integrated into Algeria's southwest grid*
11H30	**111**	- Abderrezzaq ZIANE *Secure and Scalable Framework for Real-Time Net Metering in Smart Grids*
11H45	**178**	- Boubakar FARADJI *Comparative Study of Centralized and Decentralized Electrical Network Configurations for Equal Installed Power Capacity*
12H00	**142**	- Lakhder AYHAR *Comparative Study of Synchronization Techniques for Grid-Following Inverters*
RooM B-2-30	**IoT and Wearable Smart Systems::** meet.google.com/nzt-jvxh-icq **Dr. Satish KABADE (IEEE-SM, India); Dr. Meriem DJEZZAR (Univ. Khenchela)**	
11H00	**62**	- Sabrina MEHDI *Internet of Wearable Things Systems: A Comprehensive Analysis of Development Challenges and Characteristics*
11H15	**169**	- Rania DJEHAICHE *Smart Environment Management Using Dual IoT/M2M Platforms*
11H30	**205**	- Adil BAKRI *Forest Fire Detection using Sensor Networks and Mobile Communication Systems*
11H45	**215**	- Adil BAKRI *A Wearable Smart Glasses Approach for Real-Time Driver Drowsiness and Fatigue Detection to Improve Road Safety*
12H00	**190**	- Ibrahim ALDREES *Giving a Voice: A Novel Approach Combining Visual and Product-based Applications to Sign Language Translation*
12H15	**125**	- Mohamed Ilyas RAHAL *Towards Smart Automation: An IoT-Integrated Control Strategy for Industry 4.0*
RooM C-2-30	**AI for Transportation and Autonomous Systems::** meet.google.com/siz-ewma-buv **Dr. Rajaganapathi Rangdale Srinivasa RAO (IEEE-M), India; Dr. Mokhtar ABBASSI (Tunisia)**	
11H00	**9**	- Abdelkader MEKKAOUI *A New Differential Evolution-based Routing Protocol for Surveillance Drones in Urban Areas*
11H15	**55**	- Chaima AYACHI AMAR *Reinforcement Learning for Energy-Aware Vehicle Routing in Renewable-Powered Microgrid Systems*
11H30	**67**	- Fathi Rezzag AOUID *Robust Palmprint Authentication Using Curvature-Enhanced Bifurcation Coding*
11H45	**75**	- Justin MOSKOLAI NGOSSAHA *Next-Generation Urban Mobility for Developing Countries:AI-Supported Digital Twin Framework*
12H00	**179**	-Badia KLOUCHE *Artificial Intelligence-Based Approaches for Misinformation Detection: A Case Study of Ooredoo's Corporate Innovation Strategy*
12H15	**217**	- Abderrahmane TAMALI *A Myoelectric-Controlled 3D-Printed Prosthetic Arm: Design and Implementation*
RooM A-3-30	**Deep Learning for Energy Forecasting and Monitoring::** meet.google.com/mrf-syzy-hch **Prof. Younes CHIBA (Univ. Medea); Dr. Anup KAGALKAR (IEEE-SM), India;**	
12H30	**157**	- Lamis SERRAT *Hourly Global Solar Irradiance Forecasting in a Desert Region Using a Deep Neural Model with Hybrid Inputs*

12H45	**195**	- Lydia TOUAHRI *An Empirical Attention-Based LSTM Approach for Weekly Sales Forecasting in an Agri-Food Firm*
13H00	**198**	- Mohamed ADAIKA *Intelligent Classification of Partial Shading in PV Systems Using LSTM and DNN Models: A Comparative Study*
13H15	**210**	- Amira RAMZI *AI-Based Crop Yield Classification from Satellite Imagery: Enhancing Agricultural Monitoring in Algeria*
13H30	**143**	- Meryem Mamia BENOSMAN *Enhanced RVNN-Based Digital Predistortion for Wideband Power Amplifiers with Memory Effects*
RooM B-3-30		**Hydrogen Production and Hybrid Energy Systems::** meet.google.com/nzt-jvxh-icq **Dr. Maria MALVONI (ENEA-Italia); Dr. Amine HARTANI (Univ. Adrar);**
12H30	**95**	- Cherif MESKINE *Design and MILP-Based Optimization of Hydrogen-Integrated Multi-Energy Microgrids: Case Study at IMT Mines Albi*
12H45	**112**	- Hani BELTAGY *Sizing and simulation of a hybrid Photovoltaic-Wind system for green hydrogen production*
13H00	**100**	- Elaid BOUCHETOB *Efficiency Analysis and Reliability Prediction of DC-DC Boost Converters for PV Application: Wide Band-Gap Devices*
13H15	**107**	- Boucif ZINA *Numerical Study of a Solar Air Heater Featuring a Corrugated Collector Plate*
13H30	**82**	-Salah Eddine ZIRAR *Control Strategy of a Wind Energy Conversion System Based on Five-phase Permanent-Magnet Synchronous Generator*
RooM C-3-30		**Advanced Materials and Wireless Communications ::** meet.google.com/siz-ewma-buv **Prof. Abdelkader BENABDELLAH (Univ. Tiaret); Dr. Abdellah REZOUG (UMBB)**
12H30	**47**	- Ghania DEKKICHE *Facile sonochemical synthesis and characterization of cobalt oxide nanoparticles in the presence of ionic liquid*
12H45	**164**	- Mayliss YOUSFI *Vulnerability Cost Hardening using Stochastic Games and K-means in VANET Environments*
13H00	**156**	- Abdelouahab BOURAIOU *Study of the influence of some parameters on the performances of a superconducting patch antenna*
13H15	**136**	- Khadidja RAHMOUNE *Control of grid-connected PV system associated with LCL filter for power production and power factor correction*
13H30	**63**	- Yamina BEKRI *New Simple and Accurate Closed-Form Expressions for the Electromagnetic Parameters of a Novel Quasi-TEM Cylindrical Coaxial Directional Coupler for High-Power Telecommunications Applications*
13H45	**66**	- Amel HAOUZI *Spectrum and Energy Efficiency for DL - NOMA Systems in Cognitive Radio/5G Networks*
14H00 – 15H00		LUNCH
08H00 To 13H45		WORKSHOP ***Prof. Dalila CHERIFI*** (IGEE, UMBB, Algeria) *Introduction to Machine Learning*
13H50		CLOSING CEREMONY