Ministry of Higher Education and Scientific Research
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Facutly of technology
Solid Mechanics and Systems Laboratory

1st National Conference on Mechatronic Engineering NCME'2025

CERTIFICATE OF PARTICIPATION

Ref: 6

To whom it may concern, this is to certify that

Alla Eddine TOUBAL MAAMAR

On behalf of the co-authors, has participated in the 1st NCME'2025 at the Faculty of Technology, M'Hamed Bougara University of Boumerdes, on October 12–13, 2025, and presented the paper entitled:

An Efficient MLP Neural Network Algorithm for Diagnosis of Solar Panel Faults

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An Efficient MLP Neural Network Algorithm for Diagnosis of Solar Panel Faults

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***Abstract*— Solar panel systems play an important role in the supply of energy to the world, yet their reliability and efficiency are often impaired by various faults, including mismatch faults, partial shading, and environmental degradation. Early detection and classification of faults is crucial to prevent performance loss, early system degradation, and fire risk. This paper discusses the use of the artificial neural network (*ANN*) algorithm for fault detection and classification on solar panel system using a multilayer perceptron (*MLP*) type. The *MLP* was chosen because of its high computational power, generalization, and capacity to model complex, non-linear patterns in data. An *MLP* neural network is built and trained with current-voltage (*I-V*) and power-voltage (*P-V*) measurements to precisely detect and distinguish common *PV* faults. The system under consideration is adequate for classification, and the outcome shows a general fault detection accuracy of 95% at training for more than 30,000 iterations. The research strongly supports the feasibility of diagnosing typical PV faults like series resistance mismatch, cell degradation, shunt faults, and partial shading by applying *ANN*. The results demonstrate the stability of *ANN*-based fault diagnosis to enhance the reliability and maintenance of solar *PV* systems and serve as a solid point of reference for further studies on intelligent *PV* monitoring and fault detection.**

Keywords—Neural networks, faults diagnosis, solar panel, multilayer perceptron, I-V and P-V curves analysis.

I. INTRODUCTION

Currently, to prevent disastrous effects of climate change, there is a shift in modern society towards renewable energy sources as a replacement for fossil fuels [1]. Renewable energy sources are already a significant part of the energy market [2]. Solar photovoltaic (*PV*) energy has gained popularity recently due to its widespread availability, ease of installation, low pollution, modularity, and affordability. There have been advancements in the research of *PV* systems, specifically regarding efficiency, cost reduction, and the ability to obtain maximum power output from *PV* cells. However, *PV* systems are susceptible to various faults that can negatively impact their safe operation and conversion efficiency [3]. To maintain proper functioning of the photovoltaic system, it is crucial to identify and address any faults that may arise, and this can be achieved through the use of diagnostic methods. Traditional approaches to fault diagnosis can be complicated and have limitations, so there are newer techniques emerging, such as artificial neural networks. The use of neural networks has been successful in various fields, such as information processing [4], identifying faults in induction motors [5], detecting faults in gearboxes [6], and diagnosing health issues [7].

Artificial Neural Networks (*ANNs*) are computer programs inspired by the biological neural networks of neurons in the human brain. They are an essential part of machine learning, especially deep learning, and are applied to process data, recognize patterns, and make predictions by entering information through layers of interconnected artificial neurons [8]. It is important to mention that both the advantages and disadvantages of neural networks exist. Among the advantages are that they can process incomplete or noisy input data, capture complex functions, and are capable of learning from examples. Even so, there is no fixed rule or way of finding the ideal architecture of a neural network, for example, the number of hidden layers or hidden neurons per layer [9].

The primary objective of the study is to establish an *ANN*-based method for fault detection and classification of typical faults in solar panel such as mismatch faults, cell reduction faults, shunt faults, and partial shading. Particularly, we will design and deploy a multilayer perceptron (*MLP*) neural network algorithm with the ability to detect these faults effectively based on variations in voltage, current, and power relative to normal operating states. With this paper, our expectation is that we can showcase the enhanced efficacy of *ANN*-based solutions over conventional fault detection methods while overcoming the built-in limitation of neural network interpretability in real-world applications.

The structure of this paper is outlined as follows: Section 2 provides a broad introduction to neural networks and their properties. Section 3 details the use of neural networks for diagnosing faults in photovoltaic modules, while Section 4 presents the results of the study. Finally, Section 5 summarizes the main findings and draws conclusions.

II. NEURAL NETWORKS METHOD

Humans have the capacity to predict, recognize, and categorize information. For example, if we show a set of images in front of a 10-year-old boy, he will be able to recognize animal images and object images, e.g., a circle, a square, or a triangle. Although recognizing objects is a simple task for humans, it would be a difficult task for the most advanced computers and supercomputers. Researchers thus seek to emulate human intelligence and transfer the capability to machines. Artificial neural networks represent an important aspect in the field of artificial intelligence and have proven useful in numerous applications. *ANNs* are applied in function approximation, trajectory optimization, pattern recognition, and classification [10], [11], [12].

A. *The Architecture of a Formal Neuron*

An artificial neuron is a basic computing element. It performs a single computation based on the input it receives, and each input is mapped to a specific weight. The neuron takes a weighted sum of the output of other neurons, and the total sum is passed through a non-linear transfer function [13]. Fig. 1 shows the model of an artificial neuron.

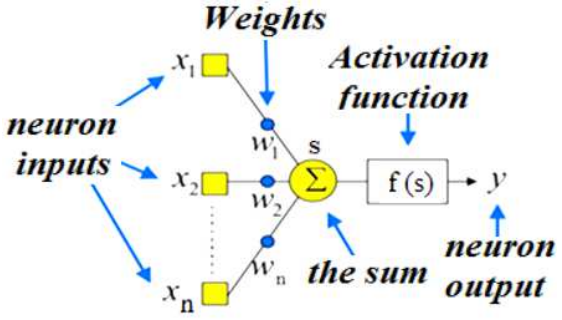

Fig. 1. Artificial neuron model.

The performance of the neuron is written by the following equation:

$$S = X_1W_1 + X_2W_2 + ... + X_nW_n = \sum_{i=1}^{n} X_iW_i \quad (1)$$

$$Y = f(S) \quad (2)$$

Where: S is the weighted sum. X_1, X_2, … , X_n: are the neuron inputs. W_1, W_2, … , W_n: The synoptic weights that govern the rate of passage of the input signals. Y: The neuron's output, and f is the transfer function.

Table I enumerates the transfer functions commonly employed in neural network training. Among these functions, the log-sigmoid transfer function is used most often in multilayer networks with the back-propagation algorithm.

TABLE I. *THE COMMON TRANSFER FUNCTIONS.*

Name	Input/output relation
Hard limit	$f(s) = \begin{cases} 0 & x<0 \\ 1 & x \geq 0 \end{cases}$
Symmetrical hard limit	$f(s) = \begin{cases} -1 & x<0 \\ +1 & x \geq 0 \end{cases}$
Linear	$f(x) = x$
Log-sigmoid	$f(x) = \dfrac{1}{1+e^{-x}}$
Hyperbolic tangent	$f(x) = \dfrac{e^{x} - e^{-x}}{e^{x} + e^{-x}}$

B. *Training of the MLP Neural Networks*

The process of developing a neural network to achieve a desired behavior is referred to as "learning". During this phase, the connection weights are modified multiple times until they reach their optimal value. Based on [9], the learning algorithm (see Fig. 2) involves initializing the weights randomly and presenting inputs to the network to calculate the output. The error is then calculated by comparing the obtained output with the desired output, and the weights are corrected accordingly to reduce the error. This process is repeated until the desired level of accuracy is achieved.

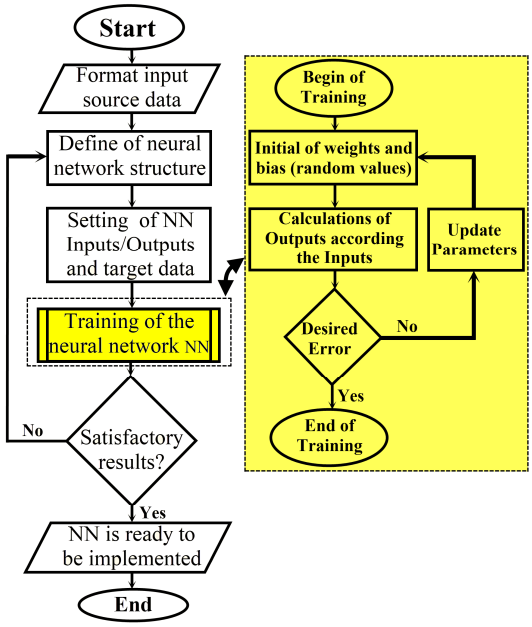

Fig. 2. The learning algorithm of a neural network.

All the neural networks have one general learning process broken down into four steps:

1) Step 1: Random initialization of weights.
2) Step 2: Feeding inputs and computation of resulting outputs.
3) Step 3: Computation of differences between outputs.
4) Step 4: Adjustment of weights based on computed errors.

Steps 2, 3, and 4 repeat until the learning process is halted.

II. APPLICATION OF THE MLP NEURAL NETWORKS IN SOLAR PANEL FAULT DIAGNOSIS

The photovoltaic panel can be identified by its *P-V* and *I-V* characteristic curves. Several pieces of information can be collected by analyzing the *P-V* and *I-V* signals. The first step is to create a standard photovoltaic panel and use it as a reference. Then, introduce some faults in the second photovoltaic panel with the same specification and obtain data on the defects. The goal is to compare the measurement errors of the normal photovoltaic panel with those of the second panel under diagnosis. Maximum voltage error (e_v), maximum current error (e_i), and maximum power error (e_p) are computed in the second step to develop a database and apply it in a neural method. The method of neural networks is utilized to diagnose four selected faults in the photovoltaic panel. A detailed description of each fault is provided in Table II.

TABLE II. *DESCRIPTION OF THE FAULTS*

Fault Number	Description
Fault 1	Mismatch faults can be generated by changing the value of series resistors. The defect is caused by improper connectivity and cracks in the photovoltaic cells.
Fault 2	Reducing the number of cells in the PV panel; this alters their characteristics.
Fault 3	Shunt fault in the photovoltaic panel.
Fault 4	Partial shading fault, this fault can be generated by varying the photocurrent.

The proposed neural network framework is developed through four sequential phases:

A. Residues generation

To compute residues, we compare a defective *PV* panel with a standard *PV* panel. We then compute the maximum and average value of the errors (current, voltage, and power). To accomplish this task, we select four faults and take 30 measurements for each, resulting in a total 120 samples.

B. Collection of Data

Measurements are gathered and stored in a file to create a database that contains essential information for each defect, which will enable their classification.

C. Architecture of the MLP Neural Network

We define the neural network by stating the input layer, hidden layer, and output layer and also the activation function and the learning algorithm. For this research, we employ the *MLP* network 06-30-04, which has 06 inputs in the input layer, 30 in the hidden layer, and 04 in the output layer. For the hidden layer, the "Hyperbolic tangent" transfer function and for the output layer the "linear function" is utilized. The "back-propagation algorithm" learning algorithm is employed.

D. Neural Network Learning

For training the neural network, we used the 120 sample database we gathered, using average and max values of current, voltage, and power errors as inputs. The desired output was represented by a binary code, with [1000] signifying "Fault 1", [0100] representing "Fault 2", [0010] for "Fault 3", and [0001] indicating "Fault 4". The database was divided into training and testing sets for the neural network.

III. RESULTS AND DISCUSSION

Neural network technique is utilized to detect and identify faults. The development process of the neural network is a multi-stage process involving residues formation, data gathering, setup of the neural network structure, and training of the neural network. The learning blocks of the neural network using *MATLAB* software with 5000 and 30000 epochs are shown in Fig. 3 and Fig. 4, respectively.

We observe in Fig. 3 that more than 5000 epochs are required to achieve the maximum desired error of 0.01. To find the squared error in the training process of the neural network with a target value of the performance function as 0.01, the number of epochs should be set until the performance is substantially improved. We observe in Fig. 4 that the maximum desired error is reached after 19820 iterations without having completed the full 30000 epochs.

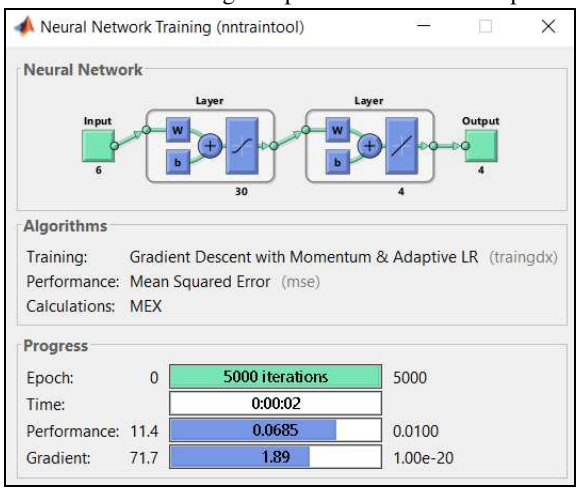

Fig. 3. MATLAB block of the neural network training with 5000 epochs.

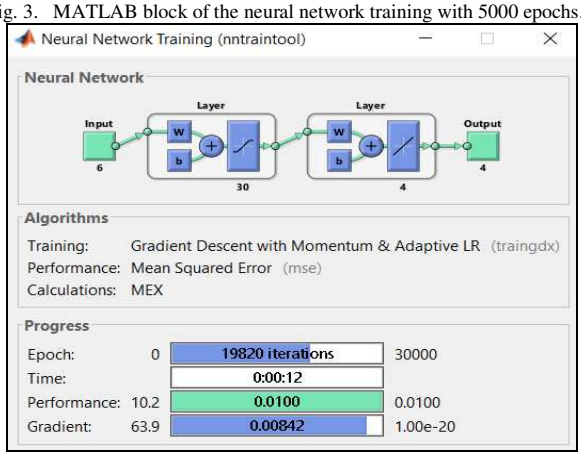

Fig. 4. MATLAB block of the neural network training with 30000 epochs.

The neural network approach is applied to achieve the goal of classifying four faults of solar panel and simultaneously indicating the accuracy of faults classification, thus enabling us to evaluate its effectiveness. Fig. 5 and Fig. 6 illustrate the neural network's performance when trained with 5000 and 30000 epochs, respectively. In both, mean squared error (*MSE*) also declines sharply in the initial stages, gradually converging afterward. With 5000 epochs, the optimal training error is 0.068, whereas with 30000 epochs it drops to 0.0099, showing that more training leads to better convergence and less error. But more epochs also increase computational time, and therefore, their choice should be optimized. Fig. 7 shows the comparison of four solar panel faults in classification accuracy. Accuracy is enhanced by increased epochs for Fault 1 and Fault 4, but for Fault 2 and Fault 3, relative performance is not affected, showing that the faults already have a good classification using fewer epochs. The result is an impression that more training is useful based on the type of fault. Generally, the neural network presents solar panel fault classification with high performance.

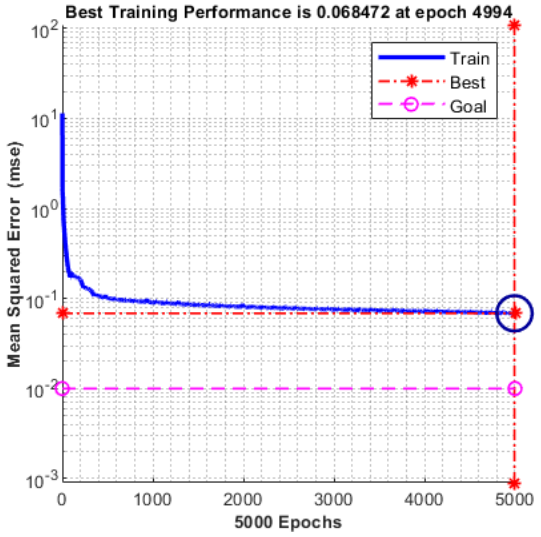

Fig. 5. The quadratic error with 5000 epochs.

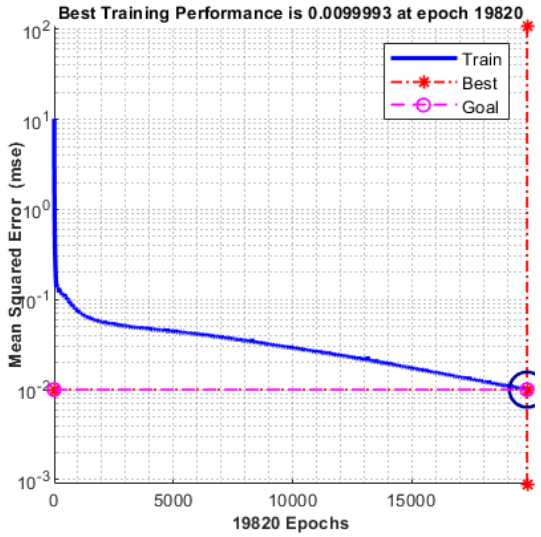

Fig. 6. The quadratic error with 30000 epochs.

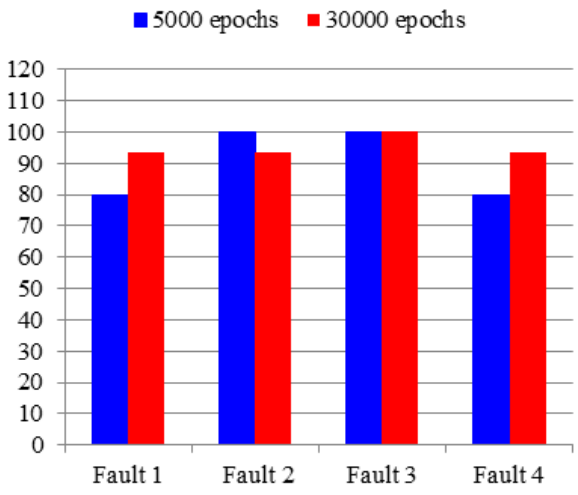

Fig. 7. Accuracy comparison of faults classification.

IV. Conclusion

The current work is successfully able to exemplify the fault detection and classification ability of artificial neural networks in solar panel. The proposed *MLP* network with 06-30-04 architecture provided excellent classification accuracy of 95% on achieving 30,000 epochs of training. By observing deviations of voltage, current, and power from nominal conditions, the model successfully diagnosed four faults: mismatch defects, cell reduction faults, shunt faults, and partial shading. Nonetheless, the study does recognize the inbuilt "black-box" characteristic of neural networks, which limits interpretability of results, an important operational deployment factor. Future research needs to encompass the development of understandable *AI* methods without trade-offs with diagnostic precision, extend the fault database to additional operating conditions, and explore real-time implementation avenues. Such findings are significant contributions to the design of intelligent maintenance systems for solar power plants that can potentially increase their reliability and working life in renewable energy systems.

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12-13 october,2025

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The 1st National Conference on Mechatronic Engineering (NCME'2025) is a hybrid, peer-reviewed event focused on integrating AI into mechatronics. Held in Boumerdes, Algeria, on 12–13 October 2025, it offers a platform for researchers and professionals to share innovations and applications. The program includes keynote talks, technical sessions, workshops, and networking, with discussions on trends, challenges, and the future of AI in mechatronic systems.

Important Dates

Full Paper Submission Deadline: 03rd August, 2025

Acceptance Notification: 15th September, 2025

Conference Date: 12-13th October 2025

Participation fees

	On-site	On-line
Students	4000 DA	2500 DA
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Fee of Additional paper 50%

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Plenary 1: Generic Tool for Design of Resilient Hybrid Renewable Energetic Systems.

Belkacem OULD BOUAMAMA (Polytechnic School of Lille, France).

Plenary 2: Condition monitoring for Prognostics and Health Management.

Dr. Moncef SOUALHI (University of Franche Comté, Besançon, France).

Workshop

Prognostics in Practice: A Hands-On Python Workshop;

Dr. Khaled BENAGGOUNE (Data Engineer in Advanced Maintenance Analytics (AMA) team, Alstom, France)

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NCME'25 general program

Day 1		
Time		**Activity**
08:00 - 09:30		Conference Registration
		Algerian national anthem
09:30 -10:30	Opening Ceremony	Honorary's Speech
		Dean's Speech : Pr. SAIDI Mohamed
		General chairman speech : Pr. BENAZZOUZ Speech
10:30 - 11:15		**Plenary Session N01:** "L'IA et la mécatronique : une Histoire de synergie entre le soft et le hard" *Belkacem OULD BOUAMAMA*
11:15 - 11:45		Coffee Break
11:45 - 12:30		**Plenary Session N02:** "Condition monitoring for Prognostics and Health Management" *Dr. SOUALHI Moncef*
12:30 - 13:45		Lunch Break
14:00 - 15:00		**Workshop:** "Prognostics in Practice: A Hands-On Python" *Dr.BENAGGOUNE Khaled*
15:00 - 16:30		Oral Session / Poster Session /Online session
Day 2		
09:30 - 10:15		**Plenary Session N03:** "Analyse et impact sur la visibilité internationale des Universités Algériennes" *Belkacem OULD BOUAMAMA*
10:15 - 10:45		Coffee Break
10:45 - 12:15		Oral Session / Poster Session /Online session
12:15 - 13:15		Closing ceremony
13:30 - 14:30		Lunch break

ORAL PRESENTATION

Sunday, October 12th, 2025					
Oral					
Time	**Topic**	**ID**	**Name**	**Title**	***Chair***
15:00	5	39	MERABET Oussama	Microgrid protection scheme using dual settings numerical protective relays	**Pr Djamel BENAZZOUZ**
15:15	5	137	AMRANI Mohammed	Design of an Intelligent Model Using Artificial Neural Networks for Real-Time Monitoring of a Pharmaceutical System	**Pr Chemeseddine RAHMOUNE**
15:30	1	3	DJENAIHI Elhani	Automated Design of Deep Neural Networks Using Combined Evolutionary Algorithms	**Pr Faiza BOUMEDIENE**
15:45	1	133	GHANAI Mouna	ECG denoising using statistical thresholding	**Dr Hadjila BOURNINE**
16:00	4	35	TOUZOUT Walid	Conventional Methods vs Artificial Intelligence for Battery Management Systems in Autonomous Systems	**Dr Boulaem IKHLEF**
16:15	3	81	SAADAOUI Rafik	Data Analysis, Networking, and Cloud Computing Using a Raspberry Pi Zero and BME680 Sensor A Personalized Indoor Air Quality	**Dr Walid TOUZOUT**
16:30	3	107	MAOUCHE Malak	Robust Trajectory Tracking Control of a robotic Manipulator Using Fractional Order PID Controller	

POSTER PRESENTATION

Sunday, October 12th, 2025					
Poster					
Time	**Topic**	**ID**	**Name**	**Title**	**Chair**
15:15 - 15:45	1	4	SATTA Samia	Effect of Creepage Distance on Flashover Voltage and Critical Length of Parallel Discharges of a uniform polluted glass insulator	**Pr. Ahmed CHELLIL** **Pr. Youcef TOUATI** **Dr. Adel AFIA**
		15	ELKIHEL Manar	Machine Learning and Smart Systems for Dynamic environmental Modelling	
		38	SEKINI Mohamed	Bearing Fault Diagnosis Using Feature Engineering and SVM-based Classification	
		43	SABRI Khier	Quality Control of Cast Pump Impellers Using a Convolutional Neural Network	
		6	TOUBAL Maamar	An Efficient MLP Neural Network Algorithm for Diagnosis of Solar Panel Faults	
	2	134	ZARA Abdeldjabar	Study of the Factors Influencing CFRP Structures Using a Coupled Numerical Approach	**Pr. Salah AGUIB** **Dr. MELOUSSI Mounir**
		136	OULAD Abdelmoumine	Optimization-Based Structural Health Monitoring of Steel Pipelines Using XFEM and Balancing Composite Motion Algorithms	
		135	FAHEM Noureddine	ANN prediction model for the behavior of composite plates under low-velocity impact using a parametric finite element approach	
	3	130	LOUBAR Hocine	Integration of A* and RRT Algorithms for Quadcopter Navigation in 3D Environment	**Dr. Belkacem MANSER** **Dr. Hand OUELMOKHTAR** **Dr. Toufik BETTAHAR**
	4	53	CHEKIR Amira	Accelerating Face Recognition: Dlib on FPGA	
		64	ABABSA Amani	Predictive modeling of gas turbine exhaust temperature using ML techniques	
		83	SAADAOUI Rafik	Non-Invasive Acoustic Monitoring of Pneumatic Systems in Mechatronics Using Edge Data Analysis and Cloud Integration	
		1	MOUHOUB Khadidja	Design of a System and Critical Review of Conductance Probe Techniques for Gas Holdup Measurement with Perspectives on AI Assisted Analysis	

ONLINE PRESENTATION - TOPIC 2 -

Sunday, October 12th, 2025						
Online						
Time	**Topic**	**ID**	**Name**	**Title**	**Link**	**Chair**
15:15 - 15:30	2	68	DJOUDAR Bochra	Experimental Characterization and Numerical Validation of Terminal Velocities in Falling Droplets	Link 1	**Dr .Mohamed AITCHIKH** **Dr.Mounir MELOUSSI** **Dr. Roumissa ZENZEN**
15:30 - 15:45	2	71	NEHILA Abdelhak	Development of a Cost-Effective Precision Platform for Satellite Solar Sensor testing		
16:00 - 16:15	2	86	BENMOUSSA Moufida	Application of the AMDEC Method on an Air Cooler		
16:15 - 16:30	2	105	HAMZA Fouzi	AI-Assisted Statistical Analysis of Cutting Parameters' Influence on Tool Life in Hard Turning		

ONLINE PRESENTATION - TOPIC 3-

Sunday, October 12th, 2025						
On line						
Time	**Topic**	**ID**	**Name**	**Title**	**link**	***Chair***
15:00 -15:15	3	10	TAMALI Abderrahmane	An Optimized Vertical LiDAR Approach for SLAM and Remote Exploration of Hazardous Environments	Link 2	**Dr.Walid TOUZOUT** **Dr. Said ALEM** **Dr.Hand OUELMOKHTAR**
15:15 - 15:30	3	92	Chahira Kezzal	Deep Perception for Autonomous Driving: A Robust 3D Tracking Framework		
15:30 - 15:45	3	98	Souhaib Louda	Wall-following behaviour in a differential mobile robot by using sonar sensors, FSM, and a PID controller		
15:45 -16:00	3	103	Abdullah Salem BAQUHAIZEL	A Mechatronic GSM-Based Car Alarm System for Real-Time Intrusion Detection Using Phone Call Alerts		
16:00 - 16:15	3	108	NAFA FARES	Design and Implementation of a Parallel Kinematic Delta Robot		

ONLINE PRESENTATION - TOPIC 5-

Sunday, October 12th, 2025

On line

Time	Topic	ID	Name	Title	link	*Chair*
15:30-15:40	5	5	Nadhir Abdelaziz	Impact of Internal Channel Geometry on the Thermal Performance of a Parabolic Trough Solar Collector with Phase Change Material in a DoublePipe Thermal Energy Storage System	Link 3	**Pr.Chemseddine RAHMOUNE** **Dr. Mohamed SAHRAOUI**
15:40-15:50	5	8	kechida abdelhak	Smart Control for Stand-alone Photovoltaic Systems Using Fuzzy Logic		
15:50-16:00	5	30	DRIS Keltoum	High efficient double perovskite solar cell type HTL/Cs2TiBr6/MASnBr3/ETL		
16:00-16:10	5	31	MEDJBER AHMED	Fuzzy-Controlled Wind Power Supply for a Welding Station		
16:10-16:20	5	32	MEDJBER AHMED	Autonomous Wind Power System for Agricultural Water Management		
16:20-16:30	5	41	Mohamed Redha Sken	Observer-Based Sensorless Speed Control for Dual-Star Induction Motors in Solar Power Systems with Multi-Cell Inverter		
15:00 - 15:10	5	42	Mohamed Redha Sken	Artificial Bee Colony-Optimized Sensorless Drive for Dual-Star Induction Motors in Photovoltaic Systems with FLC-MPPT	Link 4	**Dr.Toufik BETTAHAR** **Mr. Taha MAARADJI**
15:10 - 15:20	5	45	chebabhi ardjouna	Hybrid Renewable Energy System Sizing for Continuous Industrial Load Applications		
15:20 - 15:30	5	48	Benazzouz Afak	Performance Enhancement of a Solar Absorption Cooling System Using Hydrogen Auxiliary Heating and Nanofluid Thermal Storage with Autonomous Control		
15:30 - 15:40	5	63	Mounir Rouabah	ab-initio study of CdTe/ZnTe heterojunctions and their applications in photovoltaics		
15:40 - 15:50	5	66	FAREH Saifeddine	Numerical Investigation of Dimethyl Ether Blending Effects on Biogas laminar Diffusion Flame Characteristics and Emission Formation		
15:50 - 16:00	5	70	Brakchi Mohamed segl	Formation of Nitric Oxide and Nitrogen Dioxide in Propane Diffusion Flames		
16:00 - 16:10	5	73	Chaouki Messasma	Robust Control of an Autonomous PV-Wind Hybrid Energy System Using H∞ Strategy*		
16:10 - 16:20	5	75	Abderahmane ABID	A Virtual-Capacitor Feed-Forward for Faster DC-Link Regulation in PV-HESS Microgrids		

ORAL PRESENTATION

Monday, October 13th, 2025					
Oral					
Time	**Topic**	**ID**	**Name**	**Title**	***Chair***
10:45	5	40	MERABET Oussama	Optimal coordination of DOCRs using Evaporation rate water cycle metaheuristic algorithm	**Pr BENAZZOUZ / Pr RAHMOUNE**
11:00	5	88	MAARADJI Taha	Multifault Isolability in Li-ion Batteries combining Model-Based Residual Generation and Hardware Redundancy	
11:15	5	132	SERBOUH Yahia	Solar Water Pumping System Performance Evaluation, Using Artificial Neural Network	
11:30	1	44	BENBAKHTA Mohamed	AI-based vibration signal analysis for milling tool health diagnosis	**Dr GOUGAM / Dr AFIA**
11:45	1	127	MEDJOUDJ Islam	Multi domain autoencoder based health indicators construction for bearing remaining useful life estimation using ANFIS	
12:00	4	82	SAADAOUI Rafik	Embedded Machine Learning and AI for Mechatronic Systems: Adaptive PID Control via TinyML on Xiao ESP32-S3	**Dr IKHLEF**

POSTER PRESENTATION

Monday, October 13th, 2025					
Poster					
Time	**Topic**	**ID**	**Name**	**Title**	**Chair**
10:45 - 11:15	1	2	IKHLEF Boualem	Motor Fault classification based on thermal images and Decision Tree Classifier	***Dr. Said ALEM*** ***Dr. Fawzi GOUGAM*** ***Dr. Adel AFIA***
		7	GOUGAM Fawzi	Prognostics of Bearing Remaining Useful Life Using Machine Learning	
		11	AFIA Adel	Intelligent fault diagnosis of robotic cutting tools in industry 4.0 smart manufacturing	
		100	ZIANI Ridha	Dynamic modeling and analysis of a spur gear transmission with crack fault considering temperature effects	
		57	BOUCHAREB Ayoub	Robust Diagnosis of Bearing Faults under Variable Operating Conditions Using Dynamic Mode Decomposition of Electrical Signals	
		116	AOUIMAR Yamina	Diagnosing and Locating Short-Circuit Faults in Power Transformers with Frequency Response Analysis (FRA)	
		137	OUAHABI Mustapha	Automation and Safety Improvement of Sorting Assembling-Quality Control Production System within CDTA	
		117	ALLOUANE Bilel	Artificial Intelligence-Based Approach for Predictive Maintenance of Bearings	
	2	9	MELOUSSI Mounir	Smart Monitoring of Shear Thickening Fluid Jets Using Adaptive Image Processing Techniques in MATLAB	***Dr.Abdessamed AITCHIKH*** ***Dr. Noureddine FAHEM***
		65	HARHOUT Riad	Study and Analysis of the Magneto Mechanical Behavior of Smart Composite Sandwich Beam	
		80	ZOUAI Mohamed	Fault Detection Strategy Using Black-Box Modeling and Statistical Distance: Example Of Distillation Column	
		125	DJABRI ISSAM	Smart Materials for Smart Machines:Exploring Silicene NanoRibbons with DFT for future AI Devices	
	5	104	BENREDOUANE Soumi	Optimization of a Graphene Based Alkaline Electrolyzer for Renewable Hydrogen Production: Toward Energy-Efficient Mechatronic Systems	**Pr. Djamel BENAZZOUZ** ***Pr .Chemseddine RAHMOUNE***
		129	BERRAZOUANE Sofiane	Accurate Parameter Estimation of Li-Ion Battery Models using Enhanced Runge-Kutta Optimization	
	3	37	TOUZOUT Walid	Comparative Study of Artificial Intelligence Based Battery State of Charge (SoC) and Remaining Charging and Discharging Time Estimation	

ONLINE PRESENTATION - TOPIC 1 -

Monday, October 13th, 2025						
On line						
Time	**Topic**	**ID**	**Name**	**Title**	**link**	***Chair***
10:45 - 11:00	1	ID_33	IOURZIKENE Zouhir	Multi-class Classification of Brain Tumor MRI Images Using a Hybrid CNN and SVM Approach	link 5	**Pr. Faiza BOUMEDIENE** **Dr. Hadjila BOURNINE**
11:00 - 11:15	1	ID_54	BACHIRI Med Elssaleh	Classifying skin cancers using a new deep learning model		
11:15 - 11:30	1	ID_72	BEHIM Meriem	Combined fault detection of an electric vehicle PMSM		
11:30 - 11:45	1	ID_74	HAMDANE Houssem	Time-frequency Analysis for Robust Motor defects Diagnosis		
11:45 -12:00	1	ID_85	MEKHILEF khedidja	A Hybrid ResNet–Vision Transformer Approach for Industrial Defect Classification		
12:00-12:15	1	ID_91	HADRAOUI Moustafa	Réalisation d'un systéme mécatronique marchée par énergie solaire		

Monday, October 13th, 2025						
On line						
Time	**Topic**	**ID**	**Name**	**Title**	**link**	***Chair***
10:45 - 11:00	1	ID_95	BOURIA Latifa	Automated pneumonia classification using a customized CNN	link 6	**Dr. Mohammed TAHI** **Mr. Ali DAMOU** **Mr. Taha MAARADJI**
11:00 - 11:15	1	ID_111	BOURIA Latifa	Automatic Alzheimer disease classification using bag of feature and SVM		
11:15 - 11:30	1	ID_101	MOULAY Kheireddine	Capacitor Fault Detection in Modular Multilevel Converters based on Discrete Wavelet Transform and Neural Networks		
11:30 - 11:45	1	ID_102	KETFI Meryem	Advances in Medical Image Segmentation for Early Diagnosis: From Traditional Methods to Deep Learning		
11:45 -12:00	1	ID_114	_LAIFAOUI Abdelkrim	Reliability Analysis of Polyvinyl Chloride Insulation Subjected to Sinusoidal Electrical Stress		

ONLINE PRESENTATION - TOPIC 3-

Monday, October 13th, 2025						
On line						
Time	**Topic**	**ID**	**Name**	**Title**	**link**	***Chair***
10:45 - 11:00	3	ID_110	MOKHTARI Rida	Experimental Comparison of Classical and Neural Controllers for the Rotary Inverted Pendulum	Link 7	**Pr.Youcef TOUATI** **Dr. Zeina LARABI**
11:00 - 11:15	3	ID_113	MOKHTARI Rida	Modified Super Twisting Sliding Mode Controller for Gun Launched Coaxial Rotor UAVs		
11:15 - 11:30	3	ID_121	Alane Badreddine	Particle Swarm Optimization for Blind Audio Source Separation		
11:30 - 11:45	3	ID_122	Alane Badreddine	Motor Imagery Tasks Identification using SWLFCC Features with Different Electrodes Configurations		
11:45 -12:00	3	ID_124	Alane Badreddine	Face Recognition Enhancement through Triangle-Based Background Removal and Statistical Feature Analysis		

ONLINE PRESENTATION - TOPIC 4-

Monday, October 13th, 2025						
On line						
Time	**Topic**	**ID**	**Name**	**Title**	**link**	***Chair***
10:45 - 11:00	4	ID_55	Islam Amine Bouchedjera	Neuro-CORONA: A Fuzzy-Neural Routing Protocol for Embedded Nano-Networks Mesh in Smart Structures	Link 8	**Dr. YAKHLEF Yassine** **Dr.IKHLEF Boualem**
11:00 - 11:15	4	ID_67	Wafa Bouras	Designing a Federated Learning-Based IoMT Architecture: Enhancing Privacy, Security, and Scalability in Healthcare IoT		
11:15 - 11:30	4	ID_78	Djamel Eddine Benzellat	Securing Edge Computing for AI-Driven Mechatronic Systems: A Survey on Challenges, Threats, and Mitigation Strategies		
11:30 - 11:45	4	ID_131	Abdelaziz Maaref	UWB Pulse Optimization with Linear Combination waveforms and Firefly Algorithm		

ONLINE PRESENTATION - TOPIC 5-

Monday, October 13th, 2025						
On line						
Time	**Topic**	**ID**	**Name**	**Title**	**link**	***Chair***
11:30-11:45	5	ID_79	Abdelfatah Marni Sand	Simulation and Analysis of a Thermosyphon System Integrated with Membrane Distillation Using TRNSYS	Link 9	**Pr.Chemeseddine RAHMOUNE** **Mr. Taha MAARADJI**
11:45-12:00	5	ID_84	DILMI Ali	Analysis of various load values affecting the efficacy of a self-excited induction generator		
12:00-12:15	5	ID_89	Mennai Noussaiba	Systematic Design of a Passive Damped LCL Filter for Grid-Tied Voltage Source Inverters		
12:15-12:30	5	ID_97	Hamidat Mohammed	Modeling and Control of an Intelligent Flywheel Energy Storage System for an isolated wind Turbine		
10:45 - 11:00	5	ID_109	BEN AZOUZ Ouafa	Structural characteristics of hydrogenated amorphous silicon crystallized by nickel induced crystallization	Link 10	**Pr. Djamel BENAZZOUZ** **Dr. Sofiane BERRAZOUANE** **Dr. Toufik BETTAHAR**
11:00 - 11: 15	5	ID_112	FAREH Saifeddine	Impact of Air-Side Partial Premixing of DME Fuel on the Structure and Emissions of Biogas/Air Laminar Diffusion Flame		
11:15 - 11: 30	5	ID_115	Kheir-Eddine Arrif	CFD Study on the Impact of Tip Cavity Geometry and Shroud Motion on Leakage Flow and Thermal Loading in Transonic Turbine Blades		
11:30 - 11: 45	5	ID_120	Kheir-Eddine Arrif	Modeling the Effect of Piston Motion Profiles on Wave Behavior and Porosity in High-Pressure Die Casting		
11:45 - 12: 00	5	ID_126	Rabiai Attia	Space Vector Modulation for Three Phase Cascaded H-Bridge Inverter		
12:00 - 12: 15	5	ID_97	Hamidat Mohammed	Modeling and Control of an Intelligent Flywheel Energy Storage System for an isolated wind Turbine		