International Conference on Advanced Power Engineering and Energy

APEE

2024 IEEE INTERNATIONAL CONFERENCE ON ADVANCED POWER ENGINEERING AND ENERGY (APEE 2024)

PROGRAM BOOK

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Powering a Sustainable Future

KERANA TUHAN UNTUK MANUSIA
UNIVERSITI TEKNOLOGI MALAYSIA

UTM
UNIVERSITI TEKNOLOGI MALAYSIA

Faculty of Electrical Engineering

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Faculty of Electrical Engineering

Supported By:

CENTRE OF ELECTRICAL ENERGY SYSTEMS

Institute of High Voltage and High Current
IVAT

PEDG

MESSAGE FROM THE CHAIR

"Toward cultivating power engineering, the core values are the passion and commitment toward innovating solutions, empowering sustainable development goals, and publicizing a wide variety of intriguing issues relating to the academic and practical sections, leading to the advancement of technologies for accelerating industry, innovation and infrastructure. Under the shade, being blessed In the Name of God for Mankind."

"Advancing Power Engineering, Promoting Sustainability"

Assoc. Prof. Ir. Ts. Dr. Dalila Mat Said
Conference Chair

With immense pleasure, we extend a warm welcome to the 2024 IEEE International Conference on Advanced Power Engineering and Energy (APEE 2024), taking place at the KSL Hotel and Resort Johor Bahru, Malaysia, on September 10-11, 2024.

Our mission is to advance the forefront of research and development in power engineering and energy technologies, covering areas such as power systems, renewable energy, smart grids, energy storage, high voltage and power electronics. A key aim of APEE 2024 is not only to advance knowledge but also to foster strong networks and partnerships that will drive future collaborations and innovations within the global power engineering and energy community.

APEE 2024 is the 1st meeting of this conference series. organized by the Department of Electrical Power Engineering, Faculty of Electrical Engineering, Universiti Teknologi Malaysia, and co-sponsored by the IEEE Power Electronics Society (PELS) Malaysia Chapter.

We are honoured to present two distinguished keynote speakers: Prof. Ir. Dr. Mohd Zainal Abidin Ab. Kadir, an esteemed figure in lightning and high voltage engineering from Universiti Putra Malaysia (UPM), and Ir. Dr. Mohamed Fuad Faisal from Tenaga Nasional Berhad, TNB, a leading expert in renewable energy systems integration, battery storage, micro grid and power quality.

The conference promises a dynamic program filled with technical paper presentations and product exhibition. We are delighted to announce that we have received over 50 submissions from 17 countries, with each paper undergoing a rigorous peer-review process by experts in their respective fields, resulting in a final acceptance rate of 70% for oral presentations.

I would like to express my sincere gratitude to the organizing committees, reviewers, sponsor, exhibitor and partners for their tireless efforts in making this conference possible. To all the participants, thank you so much for your paper submission and involvement. Your contributions have made it a fruitful and informative event. We wish you a successful and enriching conference experience. Please enjoy your time in Johor Bahru.

Selamat Datang!

ORGANIZING COMMITTEE

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Mr. Abd Mohsin Abd Razak

Registration
Dr. Norazliani Md Sapari
Mrs. Nurninasakina Md Halim
Mr. Muhammad Zaim Hashim

CONTENTS

"Empowering Advanced Power Engineering and Energy"

DEPARTMENT OF ELECTRICAL POWER ENGINEEERING

The Department of Electrical Power Engineering (POWER) consists of 37 academic staff specializing in the fields of power system, energy, power electronics and high voltage. The objective of the department is to be a center of excellence in conveying academic activities, research activities, consultancy, training and education in the field of power engineering. The strength of the department is having most of the academic staff with PhD qualifications and active in research and consultancy activities. This enables the department to run the Bachelor of Electrical Engineering with Honors (SKEE/SEEEH) program (formerly called the Bachelor of Engineering (Electrical) program, codenamed SEEE or SKEE) and Master of Engineering (Electrical Power) (MEEP) and allocates staff as supervisors for postgraduate programs (MPhil and PhD) offered by the Faculty of Electrical Engineering.

Under four POWER's research entities, namely Institute of High Voltage and High Current (IVAT, MS ISO/IEC 17025 accredited laboratory), Centre of Energy System (CEES), and Power Electronics and Drives Research Group (PEDG), academic staff of POWER division are actively involved in research activities leading to producing research papers for leading journals and conferences at both national and international level. Through research and consultancy work, the staff managed to secure significant amount of money through grants and consultation fees.

NOTE FROM DIRECTOR OF POWER DEPARTMENT

Assoc. Prof. Ts. Dr. Shahrin Md Ayob
Director, POWER Department

*"With the advancement of technology, Sparked the revolutionary of research commitment, intensifying world-class research outcomes, encouraging the publishing of research works in the field of advanced power engineering and energy, fulfilling industrial sustainability, empowering progressive multilateral relationships, Driven by **S**ustainable **D**evelopment **G**oals, spearheading the development of strategic technology and innovation, attaining excellence in power engineering for the well-being and prosperity of mankind, May the Divine bless the endeavor."*

"Spurring Innovation, Fostering Excellence"

Greetings!

The Department of Electrical Power Engineering (POWER) at Universiti Teknologi Malaysia is among the oldest and most integral divisions within the Faculty of Electrical Engineering. The department is staffed by 2 professors, 12 associate professors, and 23 senior lecturers, each specializing in diverse areas within electrical power engineering such as high voltage, power systems, power electronics, electrical drives, energy markets, and renewable energy technologies.

The POWER department offers a range of academic courses, both core and elective, that support existing undergraduate and postgraduate programs. Our academic programs are of high quality and are fully accredited by the Malaysian Engineering Accreditation Council (EAC) and the Malaysian Qualifications Agency (MQA). Our laboratories are also equipped with the latest technology to support both teaching and research. Thanks to our strong track record in teaching and research, we have successfully attracted funding from both local and international institutions/industries, leading to a substantial number of research students (over 150) currently pursuing Master of Philosophy (M.Phil.) and Doctor of Philosophy (Ph.D.) degrees in Electrical Engineering.

Looking ahead, the POWER department remains committed to contributing to Malaysian society through research, scholarship, teaching, and learning, with an unwavering dedication to excellence.

RESEARCH

Institute of High Voltage and High Current
IVAT

The Institute of High Voltage and High Current (IVAT) of the School of Electrical Engineering, Universiti Teknologi Malaysia was established in 1991. It was initially an educational laboratory which provides facilities for carrying out experiments, research and consultancy services in high voltage engineering beginning as early as the 1970s. The establishment of IVAT stems out from the needs of the country for a center which carries out research and development, test and calibration works in high voltage areas, so that efficient technologies and power system apparatus can be effectively employed for the transmission and distribution to the consumer of electrical energy. In 1992, the institute became the first institution in the country to be accredited to handle high voltage test and calibration works according to ISO/IEC Guide 25. In 2004, IVAT was accredited with the ISO/IEC 17025 in the field of high voltage electrical calibration. In certification, IVAT has also successfully migrated to MS ISO/IEC 17025 since July 2007 till date. Recently in 2013, IVAT was accredited with the on-site calibration and the scope of calibration had been extended up to 180 kV AC (alternating current), 180 kV DC (direct current) and 140 kV impulse.

The Centre of Electrical Energy Systems (CEES) was established with the mission of providing innovative research and development solutions to the challenges described above. The centre aims to be an internationally renowned centre of excellence and is currently undertaking research projects in various areas of energy sustenance and supervising postgraduate students.

CENTRE OF ELECTRICAL ENERGY SYSTEMS

PEDG

The Power Electronics and Drives Research Group (PEDG) is dynamically involved in projects and research in the field of power electronics and drives. PEDG has a strong team who are actively involved in research and development with local industries and government agencies. PEDG constantly conducts short courses, conferences, and technical talks and has publications in international refereed journals and conferences. There are more than 20 postgraduate students currently attached to the PEDG group. Research topics include, but are not limited to the following: control of inverters, multi-level inverters, fuzzy logic control of power converters, hardware-in-the-loop simulation, control of DC-DC converters, Direct Torque Control of induction motors, electric vehicle systems and sensorless drives.

Institute of High Voltage and High Current

IVAT

Ts. Dr. Zulkarnain Ahmad Noorden

Director of Institute of High Voltage and High Current (IVAT)

INSTITUTE OF HIGH VOLTAGE AND HIGH CURRENT (IVAT)

The Institute of High Voltage and High Current (IVAT) of the Faculty of Electrical Engineering, Universiti Teknologi Malaysia was established in 1991. It was initially an educational laboratory which provides facilities for carrying out experiments, research and consultancy services in high voltage engineering beginning as early as the 1970s.

The establishment of IVAT stems out from the needs of the country for a center which carries out research and development, test and calibration works in high voltage areas, so that efficient technologies and power system apparatus can be effectively employed for the transmission and distribution to the consumer of electrical energy.

Vision

To be the center of excellence in the field of high voltage and high current in the country.

Mission

Synergising expertise to nurture holistic talents and lead in excellence and creativity

LIGHTNING RESEARCH & SAFETY

Lightning Research and Safety division undertakes research, development and commercialization on areas related to lightning and lightning safety. This is in line with the presence of many high-rise structures in Malaysia which make them prone to lightning strikes and the consequent damages to property and lives. The division aims to improve knowledge and understanding related to lightning phenomenon, lightning characterization and localization, lightning protection, grounding systems, lightning simulation and lightning safety.

Provide

a conducive lightning research environment

Carry out

research and development in the field of lightning and safety

Conduct

short courses and seminars in the field of lightning and safety

Enhance

learning activities and the dissemination of knowledge

Strengthen

collaborations with industries

DISCHARGES, DIELECTRICS, AND DIAGNOSTICS

Discharges, Dielectrics, and Diagnostics division focuses on the following research areas:

Electrical
discharge, detection, and monitoring

Partial
discharge analysis on polymeric insulating materials

Condition
monitoring of high voltage equipment

Diagnosis
and fault analysis

Forensic
investigation

Material
assessment

Plasma
and ozone generation applications

Low voltage
and telecommunication surge protective devices

ISO 17025

IVAT

Share Me With Others!

Our Services

Assoc. Prof. Ts. Dr. Norzanah Rosmin
Director of Centre of Electrical Energy Systems (CEES)

Centre of Electrical Energy Systems (CEES)

Electrical energy plays a critical role in modern society, affecting both economic prosperity and the quality of life. The finite nature of conventional energy sources, such as oil and coal, has made energy supply and consumption a major concern for governments, communities, and businesses. To tackle these challenges, there is a growing focus on developing and adopting alternative energy sources, including hydro, photovoltaics, biomass, wind, and distributed generation. These efforts are being encouraged by government policies and incentives aimed at promoting a more sustainable energy future.

In response to these pressing issues, the Centre of Electrical Energy Systems (CEES) was established with a mission to provide innovative solutions for energy problems. CEES is committed to promoting effective energy management, which includes energy efficiency, power reliability, and monitoring energy use at all levels of generation, distribution, and end-use. With a focus on excellence, CEES is actively involved in cutting-edge research and graduate student supervision to advance sustainable energy solutions. The center aims to become a recognized leader in the field, providing the knowledge, expertise, and technologies needed to create a more sustainable energy future.

ACTIVITIES

CONSULTANCY

RESEARCH

COMMUNITY SERVICE

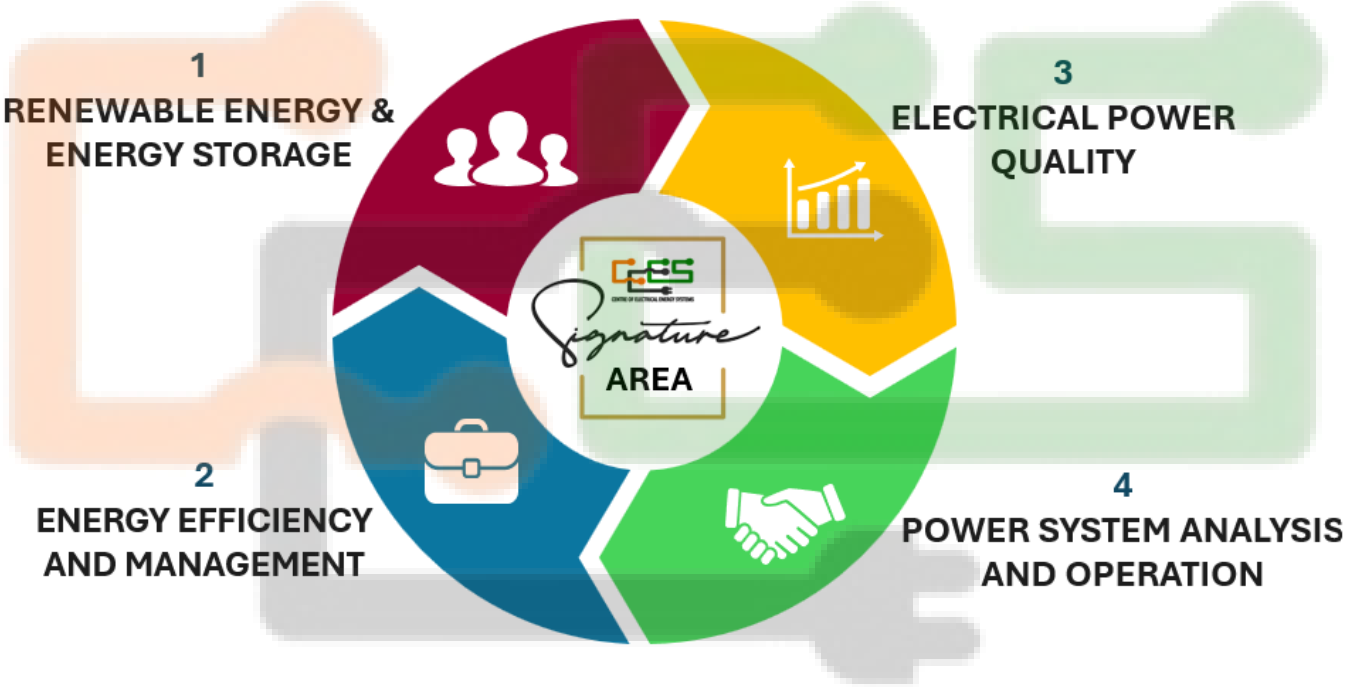
TRAINING/WORKSHOP

Vision

To be an internationally renowned centre of excellence in electrical power and energy.

Mission

To provide innovative ideas and solutions in electrical power and energy.



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Scan Me !

Assoc. Prof. Ir. Dr. Mohd Junaidi Abdul Aziz
Head of Power Electronics and Drive Research Group (PEDG)

Power Electronics and Drives Research Group (PEDG)

The Power Electronics and Drives Research Group (PEDG) is a research group formed under the Faculty of Electrical Engineering, Universiti Teknologi Malaysia. The group is actively involved in research in the area of power electronics static applications such as renewable/alternate energy power conditioning systems, active power filters, static var generators, battery chargers and DC power supplies. In the field of drives, the group focuses on high-performance drive systems, which include direct torque control and field-oriented control.

The group currently consists of eleven members. In recent years the group has grown its expertise through its involvement in carrying out research projects and consultancies for industries and government agencies. The research and consultancy outcomes have been published in widely known Electrical Engineering journals and conference publications at both national and international levels. PEDG is always looking forward to collaborating as much as possible with industry and universities/college universities in Malaysia through platforms ranging from short-term to long-term consultancy, joint research, and development, planning and training as well as post-graduate students' supervisions.

Research Area

- Power Electronics Converters: Topology and Control
- Control of Electrical Drives: AC Motor Drives
- Power Electronics Application in Photovoltaic Systems
- Power Electronics Application in Renewable Energy System
- Power Electronics Modeling and Simulation
- Electric Vehicle Converters and Charger
- Battery Management System

Fact & Figure

- **Publications** 873
- **Supervision** 645
- **Total Grants** 25
- **Total Grants Received** RM 2.79 Millions

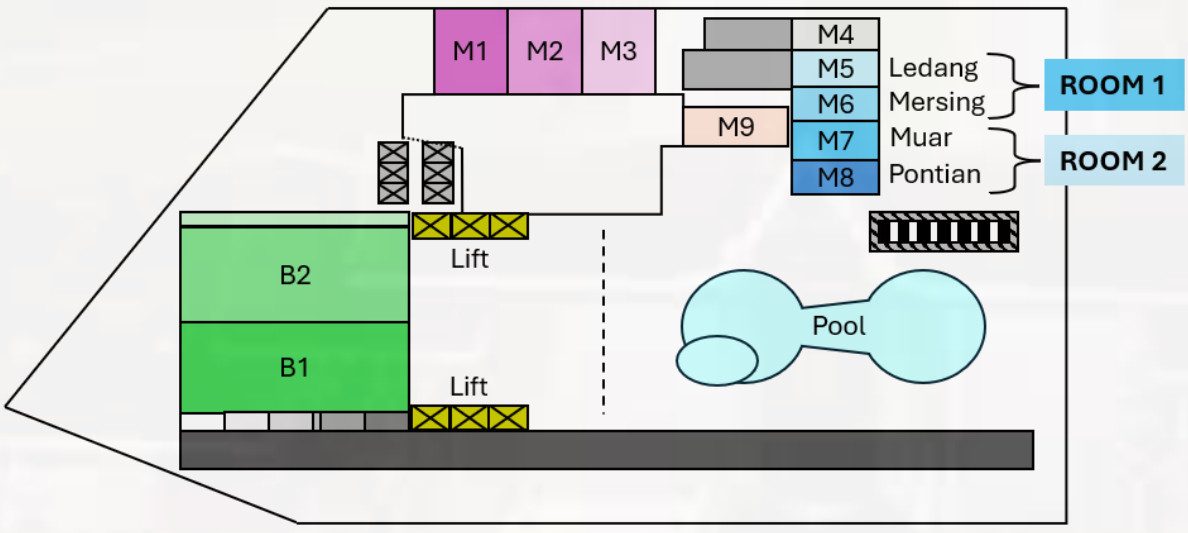
PROGRAM OVERVIEW

Short Itinerary	Day 1 (10 September 2024)	
Time	**Activities**	**Venue**
8.30 A.M	**Registration**	Registration Counter (In Front of the Main Hall)
9.30 A.M	**Opening Ceremony** ▪ Welcoming Speech by **Assoc. Prof. Ir. Ts. Dr. Dalila Mat Said** ▪ Opening Remarks by **Prof. Dr. Jafri Bin Din**	Main Hall
9.45 A.M	Keynote Speech by ***Professor Ir. Dr. Mohd Zainal Abidin Bin Ab. Kadir***	Main Hall
10.45 A.M	**Break (Breakfast)**	In Front of the Main Hall
11.00 A.M	Keynote Speech by ***Ir. Dr. Mohamed Fuad Faisal***	Main Hall
12.00 AM	Best Paper Awards Announcement & Photo Session	Main Hall
12.20 P.M	**Break (Lunch)**	Cafeteria/Restaurant/Dining
2.00 P.M	Parallel Session 1	APEE Parallel Room 1 and Room 2
3.20 P.M	**Break (Teatime)**	In Front of the Main Hall
3.40 P.M	Parallel Session 2	APEE Parallel Room 1 and Room 2
5.00 P.M	**The End of Day 1**	

Short Itinerary	Day 2 (11 September 2024)	
Time	**Activities**	**Venue**
9.00 A.M	Parallel Session 3	APEE Parallel Room 1 and Room 2
10.20 A.M	**Break (Breakfast)**	In Front of the Main Hall
10.40 A.M	Parallel Session 4	APEE Parallel Room 1 and Room 2
1.00 P.M	**Break (Lunch)**	Cafeteria/Restaurant/Dining
2.00 P.M	**The End of Day 2**	

NAVIGATION TO THE CONFERENCE VENUE

FLOOR PLAN FOR CONFERENCE EVENT



Layout at KSL Resort Level 7

Please park your vehicle on levels 5 or 6 and proceed to the escalator to reach Level 7 for the conference event. Alternatively, if you park on any other level, please take the elevator to Level 7 to attend the event.

CONFERENCE SESSION

DAY 1 (10 September 2024)				
Parallel 1	**Energy**	**Chair Session**: Ir. Dr. Syed Norazizul Bin Syed Nasir		
Session 1A	**Time**	**Title**	**Presenter Name**	**Venue**
1	2.00 PM - 2.20 PM	An Improved Non-Isolated High-Gain SC & SI-Based DC-DC Converter For EV Charging Applications	Dalya Hamzah Mussa AL-Mamoori	**ROOM 1 LEDANG/ MERSING**
2	2.20 PM - 2.40 PM	Distribution Transformer Losses Analysis due to Photovoltaic-Induced Current Harmonics	Muhammad Haziq Mohd Wazir	
3	2.20 PM - 3.00 PM	Harmonic Analysis in Grid-Connected Photovoltaic System Under Varying Solar Irradiance	Muhamad Nuqman Anuar	
4	3.00 PM - 3.20 PM	Rule-Based Energy Management Strategy using 2-State Level for Standalone PV/Wind/Diesel System	Dr. Madihah Md Rasid	
	3.20 PM - 3.40 PM	**Tea Break**		**In Front of Main Hall**

CONFERENCE SESSION

DAY 1 (10 September 2024)				
Parallel 1	**Energy**	**Chair Session:** Ts. Dr. Norazliani Md Sapari		
Session 1B	**Time**	**Title**	**Presenter Name**	**Venue**
1	2.00 PM - 2.20 PM	Stand-Alone Microgrid Energy Distribution through P2P Trading and Energy Storage Integration	Nor Ashbahani Mohamad Kajaan	**ROOM 2 MUAR/ PONTIAN**
2	2.20 PM - 2.40 PM	Improve PV Microgrid Connected to Main Grid Using Hybrid Backstepping Controller	Sabah Abdulmatalib Sewah	
3	2.20 PM - 3.00 PM	Combined and Substituted Use of Batteries Electric Vehicles and Hydrogen in Nanogrid Configurations	Ahmed Tijjani Dahiru	
4	3.00 PM - 3.20 PM	Electric Vehicle Integration into the Power Grid: A Study of V2G Potential in Selangor, Malaysia	Shen Yuong Wong	
	3.20 PM - 3.40 PM	**Tea Break**		**In Front of Main Hall**

CONFERENCE SESSION

DAY 1 (10 September 2024)				
Parallel 2	**Energy**	**Chair Session**: Ts. Dr Aizat Bin Azmi Dr Madihah Md Rasid		
Session 2A	**Time**	**Title**	**Presenter Name**	**Venue**
5	3.40 PM - 4.00 PM	Impact of EV charging station on electrical distribution system with PV system	Aminudin Anuar	**ROOM 1 LEDANG/ MERSING**
6	4.00 PM - 4.20 PM	Performance Evaluation of Bifacial Photovoltaic Thermal Systems in Environmental Condition	Ahmad Rajani	
7	4.20 PM - 4.40 PM	Impact of Pole Height and Lamp Power on the Performance of Solar-LED Street Lighting Systems	Muhammad Daniel Mohd Zulkepli	
8	4.40 PM - 5.00 PM	Microgrid System Modelling for Hybrid Renewable Energy Market in Malaysia	Muhammad Zahid Zainul Abidin	
	5.00 PM	**The End of Day 1**		

CONFERENCE SESSION

DAY 1 (10 September 2024)				
Parallel 2	**Power Electronics**	**Chair Session**: Assoc. Prof. Ir. Ts Dr. Tan Chee Wei		
Session 2B	**Time**	**Title**	**Presenter Name**	**Venue**
5	3.40 PM - 4.00 PM	Impact of Parameters Variation in HF Model of Induction Motor on SFRA Signature	Rizwanullah Khan	**ROOM 2 MUAR/ PONTIAN**
6	4.00 PM - 4.20 PM	Hardware Implementation of Finite Control Set-Predictive Torque Control for Induction Motor Drives	Mohammad Hashim Saleh Al Takrouri	
7	4.20 PM - 4.40 PM	Proposed Single DC-Source High Gain SC-MLI Topology for Medium and High-Power Drive Applications	M Saad Bin Arif	
8	4.40 PM - 5.00 PM	Design and Analysis of DCM Flyback LED Driver with Variable Compensation Circuits	Ts. Mohd Zaki Daud	
	5.00 PM	**The End of Day 1**		

CONFERENCE SESSION

DAY 2 (11 September 2024)				
Parallel 3	**High Voltage**	**Chair Session**: Dr Rasyidah Mohd Idris Dr Siti Maherah Hussin		
Session 3A	**Time**	**Title**	**Presenter Name**	**Venue**
9	9.00 AM - 9.20 AM	Analyzing Lightning Activity and Windstorm Characteristics in a Severe Tropical Thunderstorm	Noraishah Bahari	**ROOM 1 LEDANG/ MERSING**
10	9.20 AM - 9.40 AM	Electrical Breakdown Properties of Calcium Zirconate-based Polyethylene Nanocomposites	Khalida Binti Razalie	
11	9.40 AM - 10.00 AM	Analytical Solution of the Voltage Distribution Problem Along Insulator String of Nonuniform Disks	Alexander S Carrascal	
12	10.00 AM - 10.20 AM	Enhancing the Breakdown Strength of PP/EPDM Blend: The Role of PP-g-MAH Compatibilizer	Yanan Dai	
	10.20 AM - 10.40 AM	**Tea Break**		**In Front of Main Hall**

CONFERENCE SESSION

DAY 2 (11 September 2024)				
Parallel 3	**Power System**	**Chair Session:** Assoc. Prof. Ir. Ts. Dr. Jasrul Jamani Jamian		
Session 3B	**Time**	**Title**	**Presenter**	**Venue**
9	9.00 AM - 9.20 AM	A Simulation Study of Initiation of Ferroresonant Modes of a Single-Phase Transformer	Saifulbahri Bin Haji Md. Ja'afar	**ROOM 2 MUAR/ PONTIAN**
10	9.20 AM - 9.40 AM	Hybrid CNN-BiLSTM Model for Power Quality Disturbance Classification	Jalal Tavalaei	
11	9.40 AM - 10.00 AM	Optimization Techniques to Minimize the Power Loss and Maintain Voltage Stability for A Power System	Norhafezaidi Mat Saman	
12	10.00 AM - 10.20 AM	Microgrid Reliability Assessment: Failure Event and Survival Profile using Kaplan-Meier Analysis	Tinton Dwi Atmaja	
	10.20 AM - 10.40 AM	**Tea Break**		**In Front of Main Hall**

CONFERENCE SESSION

DAY 2 (11 September 2024)				
Parallel 4	**High Voltage**	**Chair Session**: Dr. Norhafezaidi Mat Saman Ts Dr. Mona Riza Mohd Esa		
Session 4A	**Time**	**Title**	**Presenter Name**	**Venue**
13	10.40 A.M - 11.00 A.M	Thermal Aging on Polypropylene/Magnesium aluminate nanocomposites	Aizat Bin Azmi	**ROOM 1 LEDANG/ MERSING**
14	11.00 A.M - 11.20 A.M	Breakdown Strength of Polypropylene Blended with Propylene-based and Ethene-based Copolymers	Muhammad Syahir Redwan	
15	11.20 A.M - 11.40 A.M	Enhancing Wind Turbine Blade Lamination with Nano Particles for Lightning-Resistant	Amir Izzani Mohamed	
Chair Session: Assoc. Prof Eur. Ing. Ir. Ts. Dr Lau Kwan Yiew				
16	12.00 P.M - 12.20 P.M	Wind Turbine Lightning Protection Receptor With Sharp Needles	Amir Izzani Mohamed	**ROOM 1 LEDANG/ MERSING**
17	12.20 P.M - 12.40 P.M	Simulation of Electric Field in XLPE with Various Voltage Application	Voon Foo Hua	
18	12.40 P.M - 1.00 P.M	PV-Based Water Pumping System for Oil Palm Irrigation in Malaysian Conditions	Dr. Siti Maherah Hussin	
	1.00 PM - 2.00 PM	**Lunch**		**Cafeteria / Restaurant**
	2.00 PM	**End of Day 2**		

CONFERENCE SESSION

DAY 2 (11 September 2024)				
Parallel 4	**Power System**	**Chair Session**: Dr Norjulia Mohamad Nordin		
Session 4B	**Time**	**Title**	**Presenter**	**Venue**
13	10.40 A.M - 11.00 A.M	Analysis of Paralleling Transformer with Different Topology Considering Single Phase to Ground Fault	Syed Norazizul Syed Nasir	
14	11.00 A.M - 11.20 A.M	Enhancing Energy Consumption Forecasting: Fusion of Ensemble Learning and Time Series Analysis	Ateequr Rahaman Mohammed	**ROOM 2 MUAR/ PONTIAN**
15	11.20 A.M - 11.40 A.M	Voltage Sag mitigation using Dynamic Voltage Restorer(DVR) for three-phase fault	Rasyidah Mohamad Idris	
Chair Session: Assoc. Prof Ts. Dr. Norzanah Rosmin Ts. Mohd Zaki Daud				
16	12.00 P.M - 12.20 P.M	Optimal Placement and Sizing for Distributed Generation based on an Improved Differential Evolution	Norazliani Binti Md sapari	
17	12.20 P.M - 12.40 P.M	Analysis and Evaluation of an Off-Grid Mini-Grid PV System for Rural Electrification	Nnaemeka Genesis Ajah	**ROOM 2 MUAR/ PONTIAN**
18	12.40 P.M - 1.00 P.M	Wind Speed Forecast using Machine Learning Approach at Al Duqum Area	Nusaiba Al Busaidi	
	1.00 PM - 2.00 PM	**Lunch**		**Cafeteria / Restaurant**
	2.00 PM	**End of Day 2**		