



3rd International Symposium on Sustainable Energy And Technological Advancements

(23rd – 24th February 2024)

ISSETA 2024 Special Session On

Application of Artificial Intelligence in Modelling, Control, and Optimization of Current Engineering Problems

Aims and scope of the session:

Artificial Intelligence (AI) has become a transformative force in various domains, such as engineering, finance, healthcare, and more, with its wide-ranging applications in modelling, control, and optimization across different industries. Its scope encompasses everything from improving predictive accuracy in healthcare and finance to optimizing energy consumption in smart cities. However, challenges related to data, interpretability, and ethical considerations must be addressed to ensure the successful and responsible implementation of AI in these domains. AI modelling involves creating algorithms and models that can simulate and predict real-world systems in various fields, from finance and healthcare to manufacturing and environmental monitoring. AI modelling primarily aims to leverage machine learning techniques to understand complex systems better, make predictions, and improve decision-making quality. AI has introduced a new dimension to control systems by enabling adaptive and intelligent control that plays a vital role in regulating processes and maintaining stability. AI-driven control systems can adjust their parameters and strategies based on real-time data autonomously, leading to enhanced performance, reduced errors, and increased efficiency. The scope of AI in control extends to autonomous vehicles, industrial automation, and smart grids, among others. The application of AI in optimization greatly enriches a critical aspect of various operations. AI-driven optimization algorithms can handle complex and high-dimensional problems, making them suitable for resource allocation, scheduling, and logistics optimization. As technology advances, AI's potential to transform modelling, control, and optimization becomes increasingly significant, promising more efficient and sustainable solutions for complex real-world problems.

Topics of interest:

This special session invites research papers from the following topics (but not limited) to further recognize the role of the Application of artificial intelligence in modelling, control, and optimization for performance enhancement of modern engineering systems.

1. Autonomous Vehicle Control:

- Real-time Path Planning Algorithms
- Human-AI Interaction in Autonomous Vehicles
- Safety Verification and Validation for Autonomous Vehicles

2. Smart Grid Control:

- Integration of Energy Storage Systems in Smart Grids
- Grid Stability and Resilience with AI
- Distributed Energy Resource Forecasting and Control

3. Industrial Robotics Control:

- Visual Object Detection and Tracking for Robotics
- Collaborative Robotics and Human-Robot Interaction
- Robot Path Planning and Collision Avoidance

4. AI in Industrial Automation:

- Quality Control and Defect Detection
- Supply Chain Optimization with AI
- AI-Enhanced Robotics in Industrial Automation

5. Process Modelling, Simulation and Optimization:

- Optimization of Chemical Processes with AI
- Energy Efficiency in Industrial Processes
- Waste Reduction and Sustainability in Manufacturing

6. Smart Factory Modelling:

- IoT Integration and Real-time Data Analytics
- Adaptive Production Scheduling and Resource Allocation
- Smart Factory Cyber-Physical Systems

7. Multi-Objective Optimization:

- Multi-Objective Evolutionary Algorithms
- Decision Support Systems with AI
- Robust Multi-Objective Optimization

8. Adaptive Control and Optimization:

- Model Predictive Control with Machine Learning
- Adaptive Control for Unmanned Aerial Vehicles (UAVs)
- Self-Optimizing Manufacturing Systems

9. Reinforcement Learning in Engineering Control:

- Reinforcement Learning for Robotic Manipulation
- RL-Based Real-time Control of Autonomous Navigation Systems
- Deep Reinforcement Learning in Control

10. AI for Disaster Management:

- Autonomous Disaster Response Robots
- AI-Enhanced Early Warning Systems
- Risk Assessment and Vulnerability Mapping with AI

Special session organizers:

1. Dr. Kishore Bingi

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Kishore Bingi received the B.Tech. Degree in Electrical and Electronics Engineering from Acharya Nagarjuna University, India, in 2012. He received the M.Tech. Degree in Instrumentation and Control Systems from the National Institute of Technology Calicut, India, in 2014, and a PhD in Electrical and Electronic Engineering from Universiti Teknologi PETRONAS, Malaysia, in 2019. From 2014 to 2015, he worked as an Assistant Systems Engineer at TATA Consultancy Services Limited, India. From 2019 to 2020, he worked as Research Scientist and Post-Doctoral Researcher at the Universiti Teknologi PETRONAS, Malaysia. From 2020 to 2022, he served as an Assistant Professor at the Process Control Laboratory, School of Electrical Engineering, Vellore Institute of Technology, India. Since 2022 he has been working as a faculty member at the Department of Electrical and Electronic Engineering at Universiti Teknologi PETRONAS, Malaysia. His research area is developing fractional-order neural networks, including fractional-order systems and controllers, chaos prediction and forecasting, and advanced hybrid optimization techniques. He is an IEEE and IET Member and a registered Chartered Engineer (CEng) from Engineering Council UK. He serves as an Editorial Board Member for the International Journal of Applied Mathematics and Computer Science and Academic Editor for Mathematical Problems in Engineering and the Journal of Control Science and Engineering.



2. Dr. P. Arun Mozhi Devan

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Dr. P. Arun Mozhi Devan received a B.Eng. degree (Hons.) in electronics and instrumentation engineering from the Muthayammal Engineering College, Rasipuram, Tamil Nadu, India, in 2012, and an M.Eng. degree (Hons.) in Control and Instrumentation Engineering from Sri Ramakrishna Engineering College, Coimbatore, Tamil Nadu, India, in 2016 and a PhD in Electrical and Electronic Engineering from Universiti Teknologi PETRONAS, Malaysia, Perak, Malaysia, in 2022. He was with Sri Ramakrishna Engineering College as an Assistant Professor in the Department of Electronics and Instrumentation Engineering from 2016 to 2018. He has been working with the Department of Research, Innovation & Commercialisation at Universiti Teknologi PETRONAS, Malaysia, since October 2022. His research interests include Control Systems, Fractional-order Control, Process Control, Process Modelling, Metaheuristic Optimization Techniques, and Wireless Control of Industrial Wireless Sensor Networks.



3. Dr. Abhaya Pal Singh

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Dr. Abhaya Pal Singh obtained a Bachelor of Technology in Electronics and Communication Engineering in 2009 from ITM, Gorakhpur, a Master of Technology in Electrical Engineering with a specialization in Control Systems in 2012 from VJTI, Mumbai, and a Ph.D. degree in 2019 from Symbiosis International University, Pune, India. Presently, he is a Researcher at REALTEK, at the Norwegian University of Life Sciences (NMBU), Ås, Norway. His research interests include vision-based control, robotics, fractional modeling and control, temporal logic, path planning, mathematical modeling, and precision agriculture. He has authored and co-authored several research papers and a comprehensive book titled "Fractional Modeling and Controller Design of Robotic Manipulators - With Hardware Validation," published by Springer Nature.

