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Workshop Proposal on

Title: “Recent Advancements of Control in Electric Vehicles & Energy Systems”

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Introduction

The recent research and development directions focus on exciting topics in the field of electrical and autonomous vehicles. This research enables to improve safety, energy efficiency, comfort, and transport economy. Electric vehicles (EVs) are the new trend worldwide to replace traditional vehicles using fossil fuel, and control system which allow us to reduce environmental pollution and avoid dependence on fossil fuels, such as gasoline and diesel. Battery, motor, and energy storage technologies, along with advanced control algorithms, contribute to improving the performance of EVs. Safety, performance, convenience, cost, and battery recycling technologies play important roles in the sustainable future of EVs. In addition, this research enables to improve safety, energy efficiency, comfort, and transport economy. The research tasks can be classified into several groups such as vehicle modeling, performance requirements, control of chassis elements and power train, and, moreover, route planning and trajectory design. The tools and methods for such developments range from classic and modern control theory, game-theoretical approaches, nonlinear programming, artificial intelligence, and machine learning. The new advantages of supervised and reinforcement learning also show high potential for individual and multi-agent control of electrical and autonomous vehicles.

In addition, road vehicles other components of transport systems are also included such as rail vehicles and ships, where simultaneous energy efficient and safe operation can be handled with similar tools and approaches.

In view of the above, it is necessary to develop infrastructure, charging stations, and charging technologies that facilitate the wide application of EVs worldwide. Development and application of advanced control technologies along with artificial intelligence (AI) to improve performance and flexible operation of EVs are new challenges and big opportunities to develop EVs further: This workshop covers present and future perspectives on EVs with respect to sustainability. We are pleased to receive new contributions from students, researchers, scientists from universities/ research institutes/ companies all over the world to build an academic network for developing EVs in the future. Topics of interest include (but are not limited to) the following:

- Advanced control/ optimization algorithms applied to EVs
- Robust Control, Model Predictive Control, Power Electronics Converter for EVs
- Topologies/ technology of EV components (motor, battery, converters, etc.)
- Simulations, virtual- and augmented reality to EVs
- Energy-efficient control strategies for EVs
- Self-driving vehicles, autonomous functions of EVs
- Actuator and control integrations to EVs
- Testing and validation of EVs
REFERENCES

Biographies

Dr. Awadhesh Kumar is currently working as an Assistant Professor in the Department of Electrical Engineering, Madan Mohan Malaviya University of Technology, Gorakhpur. He received his bachelor’s degree in Electrical and Electronics Engineering from Birla Institute of Technology (BIT), Mesra, Ranchi, Master’s degree in Instrumentation and Control from National Institute of Technical Teachers Training and Research (NITTTR) Chandigarh Punjab, and Ph.D. Degree from Motilal Nehru Institute of Technology (MNNIT) Allahabad, in Electrical Engineering. He is currently the Executive & Professional member of Automatic Control and Dynamic Optimization Society (ACDOS) India, International Federation of Automatic Control (IFAC) affiliate, Professional member of IEEE and Institution of Engineers (IE) India and Professional Member of International Association of Engineers (IAENG). He was the topper of the district Gorakhpur in High School and stood second among all the M. Tech. Students in his batch at NITTTR Chandigarh. During his Ph.D., he secured 10/10 CPI in MNNIT, Allahabad. His research interests mainly include Control Systems, Model Order Reduction, Controller Design, Modelling and simulation through MATLAB, Applications of Artificial Intelligence and Optimization Techniques to Control design, Control Applications to Energy Systems. He has guided 28 M.Tech thesis, one Ph.D thesis submitted and presently 2 M.Tech. and 8 Ph.D. scholars are working under him. He has guided more than 30 B.Tech. projects also. He is a regular reviewer of many International and National journals. He has published 62 research papers in reputed journals and conferences.
International Journals:

2. Santosh Kumar Suman and Awadhesh Kumar, “Reduced Order Modelling and Balancing Control of Bicycle Robot”, FME Transactions, 2021, Vol.49, No.4 (Scopus, SCImago, Accepted).
3. Santosh Kumar Suman and Awadhesh Kumar, “Order Reduction of Air-Core Linear Section Electrical Transformer Model”, Engineering Letters, (ESCI, Accepted).
4. Santosh Kumar Suman and Awadhesh Kumar, “Hybrid Method Extended to MIMO System”, Engineering Letters, (ESCI, Accepted).

Book Chapters:


Shekhar Yadav is currently working as an Assistant Professor in the Department of Electrical Engineering, Madan Mohan Malaviya University of Technology, Gorakhpur. He received bachelor’s degree in Electrical Engineering from Institute of Engineering & Technology, M. J. P. Rohilkhand University, Bareilly in 2007, Master’s degree in Control Systems from IIT (BHU) Varanasi, and Ph.D. degree from IIT (BHU) Varanasi in 2010 and 2017 respectively. He is Professional member of Automatic Control and Dynamic Optimization Society (ACDOS) India, International Federation of Automatic Control (IFAC) affiliate, Professional member of IEEE and Institution of Engineers (IE) India. His main research includes Control System, Optimization, Model Order Reduction, Intelligent & Optimization Control Techniques. He has published many papers in International Journals & Conferences.


Sabha Raj Arya received Bachelor of Engineering degree in Electrical Engineering from Government Engineering College Jabalpur, in 2002, Master of Technology in Power Electronics from Motilal National Institute of Technology, Allahabad, in 2004 and Ph.D. degree in Electrical Engineering from Indian Institute of Technology (I.I.T) Delhi, New Delhi, India, in 2014. He has joined as Assistant Professor, Department of Electrical Engineering, Sardar Vallabhbhai National Institute of Technology, Surat. His fields of interest include power quality, design of power filters and distributed power generation. He received Two National Awards namely INAE Young Engineer Award from Indian National Academy of Engineering, POSOCO Power System Award from Power Grid Corporation of India in the year of 2014 for his research work. He is also received Amit Garg Memorial Research Award-2014 from I.I.T Delhi from the high impact publication in a quality journal during the session 2013-2014. At present, he has published more than Hundred research paper in internal national Journals and conferences. He also serves as an Associate Editor for the IET (U.K.) Renewable Power Generation.


