



The Institute of Electrical and Electronics Engineers (IEEE)

Galveston Bay Section
Joint Societies Chapter



ONLINE Virtual Meeting

Friday, February 26th, 2020 11:00 AM- 12:00 PM US-CDT(Houston)

TOPIC: “Operational Security and Control Challenges in Smart Energy Systems”

Speaker: Osama A. Mohammed, PhD, IEEE Fellow, ACES Fellow,

Distinguished Professor & Associate Dean of Research, Director,
Energy Systems Research Laboratory, Florida International University, Miami, Florida USA

Presentation:

The development of innovative cybersecurity technologies, tools and methodologies that advance the energy system’s ability to survive cyber-attacks and incidents while sustaining critical functions, is needed for the secure operation of utilities, industrial systems, smart homes and transportation systems. It is essential to verify and validate the ability of the developed solutions and methodologies so that they can be effectively used in practice. The development of solutions to mitigate cyber vulnerabilities throughout the energy delivery system is essential to protect hardware assets. It will also make systems less susceptible to cyber threats and provide reliable delivery of electricity if a cyber incident occurred. In this talk, we will describe how the developed solution can protect the power grid, industrial systems, smart homes and transportation systems and infrastructures from cyber-attacks as well as build cybersecurity protection into emerging power grid components and customer-based services. This includes microgrid and demand-side management components as well as protect the network (substations and productivity lines) and data infrastructure to increase the resilience of the energy delivery systems against cyber-attacks. The development of secure operation and cybersecurity capabilities in energy systems should span over multiple strategies; in the near term, midterm and long term. The continuous security state monitoring across cyber-physical domains is the goal in the near term. The development of continually defending interoperable components that continue operating in degraded conditions is required in the midterm. The development of methodologies to mitigate cyber incidents to quickly return to normal operations is necessary for all system components in the long term. We will discuss R&D efforts in these research areas centered on the development of operational frameworks related to communication and interoperability control and protection in various platforms including smart homes and electric vehicles. One of the emerging research areas is the scalable cloud-based Multi-Agent System for the control of largescale penetration of Electric Vehicles (EVs) and their infrastructure into the power grid. This is a system that is able to survive cyber-attacks while sustaining critical functions. This framework’s network will be assessed by applying contingencies and identifying the resulting signatures for detection in real-time. As a result, protective measures can be taken to address the dynamic threats in the foreseen grid-integrated EV parks where the developed system will have an automated response to a cyber-attack. In distributed energy management systems, the protection system must be adaptive. It is assisted by communication networks to react to dynamic changes in the microgrid configurations. In this regard, this presentation will also describe a newly developed protection scheme with extensive communication for power networks to monitor the microgrid during these dynamic changes. The robustness and availability of the communication infrastructure is required for the success of protection measures.

**Registration is required by Thursday Feb 25th 2021
COB to attend.**

Professor Osama A. Mohammed

Osama A. Mohammed is a Distinguished Professor of Electrical Engineering and the Associate Dean of Research at the College of Engineering, Florida International University. He is the interim director of the School of Electrical, Computer and Logistics Engineering, and the director of the Energy Systems Research Laboratory at Florida International University. He has performed research on various topics in power and energy systems, design optimization and physics based modeling in electric drive systems, power electronics and other low-frequency environments. He is world-renowned for his contributions in these areas. He has also performed research in the areas of EMI, wideband gap devices, and ship power systems modeling and analysis. He currently has active research projects for several federal agencies in these areas in addition to other projects in power system operation, smart grid distributed control and interoperability, cyber physical systems, and co-design of cyber and physical components for future energy systems applications. Professor Mohammed has 16 patents awarded and several others pending. He has published more than 850 articles in refereed journals and other IEEE refereed international conference records. His publications are highly cited and his presentations are frequently invited; at research, academic and industrial organizations and conferences worldwide. He also authored a book and several book chapters.

Dr. Mohammed is a Fellow of IEEE and an elected fellow of the Applied Computational Electromagnetic Society. He received the prestigious IEEE Power and Energy Society Cyril Veinott Electromechanical Energy Conversion Award and the 2012 Outstanding Research Award from Florida International University, the 2017 outstanding doctoral mentor and the distinguished Professor designation in 2018. He served or currently serving as editor/associate editor of several IEEE Transactions including the IEEE Transactions on Energy Conversion, the IEEE Transactions on Smart Grid, the IEEE Transaction on Industry Applications, IEEE Transactions on Magnetics, in addition to COMPEL, several Elsevier journals and the ACES Journal. Professor Mohammed also served as the International Steering Committee Chair for the IEEE International Electric Machines and Drives Conference (IEMDC), the IEEE Biannual Conference on Electromagnetic Field Computation (CEFC) and COMPUMAG. Professor Mohammed was the General Chair for more than 12 major international conferences in addition to being vice chair or editorial board chair for six other conferences over the past 30 years. He currently serves on the IEEE IAS Council as Region 3 Chapters representative and the Miami Section Chapter Chair. He served as the president of the Applied Computational Electromagnetic Society (ACES). He was a member of the IEEE/Power Engineering Society Governing Board (1992-1996) and was the Chairman of the IEEE Power Engineering Society Constitution and Bylaws committee. He continues to serve as chair, officer or as an active member on several IEEE PES committees, sub-committees, conference and technical working groups.

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