COLLEGE OF ENGINEERING AND COMPUTER SCIENCE

FACULTY RESEARCH TALKS

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Zoom talk | Friday, April 29, 2022 | Noon to 1 p.m.

PRESENTER 1:
HAOFEI YU
Assistant Professor, Civil, Environmental and Construction Engineering

Using Cellphone Location Data to Track Historical Individual Movements for Health Studies

The spatiotemporal movements of individuals, or time-activity pattern, has significant implications for health studies, particularly for quantifying an individual's historical exposure to environmental factors. In this talk, Dr. Yu will summarize an ongoing project to extract historical individual time-activity pattern from cellphone location data, including call detail record, Google and iPhone data.

Dr. Yu's research interests include air quality modeling, emission inventory, health impact assessment, and air quality sensors. He received his M.S. in environmental engineering from the University of Shanghai for Science and Technology and Ph.D. in environmental health from the University of South Florida. Before joining UCF in 2017, he was a research associate at Georgia Institute of Technology and Pacific Northwest National Laboratory.

PRESENTER 2:
TANIA ROY
Assistant Professor, Materials Science and Engineering, NanoScience Technology Center

Devices for Artificial Intelligence Using Two-Dimensional Materials

Advances in machine learning and artificial intelligence have been mainly from the architecture and software levels, with the basic building blocks still being CMOS transistors. This causes the hardware to be bulky and power-hungry. Dr. Roy's group is developing neuromorphic devices functioning similar to the neurons and synapses of the human brain, which can serve as the basic building blocks of neural network hardware, making the systems energy-efficient, scalable and compact. In this talk, Dr. Roy will discuss her use of novel semiconducting two-dimensional materials to make artificial neurons and synapses which can perform pattern recognition. She will also discuss her efforts in developing optoelectronic synapses using 2D materials which, similar to optic nerves, combine the functions of photodetectors with analog memory.

Dr. Roy's research interests lie in developing hardware for artificial intelligence applications using novel functional materials, including two-dimensional materials. She also works on energy-harvesting devices, particularly advanced photon management systems in ultra-thin solar cells. She won the NSF CAREER award in 2019 and UCF Luminary award in 2021. Prior to joining UCF in 2016, Dr. Roy was a postdoctoral researcher at the University of California, Berkeley. She obtained her Ph.D. in electrical engineering from Vanderbilt University.

PRESENTER 3:
WEI SUN
Associate Professor, Electrical and Computer Engineering, RISES Cluster, FSEC Energy Research Center

Secure Renewables for a Resilient Power Grid

Increasing grid-edge devices and distributed renewable energy resources enable better sustainability and efficiency with their connectivity, computational and control capabilities; however, they also expose the overall electricity infrastructure to new cyber vulnerabilities. This talk will introduce the innovative security enhancement solutions from a recently funded DOE project, including a multi-layer, multi-channel cyber-physical defense and survival mechanism for operating distribution networks with high penetration of renewables, and distributed and interoperable security algorithms and schemes for both IT and OT systems.

Dr. Sun is the drector of Siemens Digital Grid Lab. He received his Ph.D. from Iowa State University in 2011. His research interests include power system restoration, self-healing smart grid, renewable integration, and cyber-physical system security and resilience. He is the co-chair of the IEEE PES Power System Restoration Working Group, and IEEE PES Task Force on Power System Restoration with Renewable Energy Sources. He is currently an associate editor of *IEEE Transactions on Sustainable Energy* and *IEEE Transactions on Industry Applications*. He received the Microsoft Research Software Engineering Innovations Award in 2014.

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