MISSISSIPPI STATE UNIVERSITY
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

MISSISSIPPI STATE UNIVERSITY
CENTER FOR ADVANCED VEHICULAR SYSTEMS

Joint ECE and CAVS Distinguished Lecture

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Artificial Intelligence for Smart City Transportation

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Abstract: We live in an era of real-time gathering of information and its dissemination. The size of the digital universe is estimated to be around 50 Zettabytes today and expected to double every two years. The growth of exploitable data has the potential to trigger disruptive changes in the transportation sector and is having a profound impact in urban planning, intelligent mobility, and safety. Vehicle loop detectors that have traditionally been deployed at intersections to detect the passage of vehicles have high deployment and maintenance costs; and are not always useful for observing the movements of pedestrians and scooters. The use of other modalities, such as Video, Radar and LIDAR has great potential to improve accuracy and timeliness in the detection of vehicles, pedestrians, bicyclists, etc. As part of the I-Street Trapezium project we are collecting this information at 27 intersections in Gainesville using Video Camera, Radar and LIDAR. Additionally, data is being collected from interactions of vehicles with onboard units (that mimic the behavior of future connected vehicles) with Roadside Units. This information is then synthesized to create a real-time city-wide traffic palette that is used to improve traffic safety and operations.

In this talk, I will present our work on use of artificial intelligence and machine learning techniques for real-time incident detection, vehicle classification, space-time trajectories, near-misses and travel-time distributions of vehicles and pedestrians while maintaining individual privacy. I will also present our work on developing signalized intersection control strategies and sensor fusion algorithms for jointly optimizing vehicle trajectories and signal control for a mixture of autonomous vehicles and traditional vehicles at every intersection. All these applications directly impact traffic safety and operations. This work is in collaboration with Anand Rangarajan and Lily Elefteriadou. It is supported by NSF (CPS and Smart Cities program), and Florida DOT. We will also like to thank the City of Gainesville and Florida DOT District 5 for their support and participation.

Biographical Notes: Sanjay Ranka is a Professor in the Department of Computer Information Science and Engineering at University of Florida. His current research interests are High Performance Computing and Artificial Intelligence for health care and transportation. He teaches courses on data science (three course curriculum), data mining and parallel computing. From 1999-2002, he was the Chief Technology Officer at Paramark (Sunnyvale, CA). At Paramark, he developed a real-time optimization service called PILOT for marketing campaigns. PILOT served more than 10 million optimized decisions a day in 2002 with a 99.99% uptime. Paramark was recognized by VentureWire/Technologic Partners as a top 100 Internet technology company in 2001 and 2002 and was acquired in 2002. He has also held positions as a tenured faculty positions at Syracuse University and as a researcher/visitor at IBM T.J. Watson Research Labs and Hitachi America Limited. He is a fellow of the IEEE and AAAS, and a past member of IFIP Committee on System Modeling and Optimization. He is an associate Editor-in-Chief of the Journal of Parallel and Distributed Computing and an associate editor for ACM Computing Surveys, IEEE/ACM Transactions on Computational Biology and Bioinformatics, Sustainable Computing: Systems and Informatics, Knowledge and Information Systems, and International Journal of Computing. He is also an editorial board member of Applied Sciences (Computing and Artificial Intelligence). Additionally, he is a book series editor for CRC Press for Bigdata. In the past, he has been an associate editor for IEEE Transactions on Parallel and Distributed Systems and IEEE Transactions on Computers. His work has received 12000+ citations with an h-index of 54 (based on Google Scholar).

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