Queen's SCHOOL OF Computing

On Advancing Edge Capabilities for Cyber-Physical and Autonomous Systems

The aspirations on smartening tomorrow's cities rely significantly on the development of cognitive cyber-physical and autonomous systems, providing intelligent, distributed, and human independent management solutions to such cities' various processes. These systems typically constitute of distributed physical devices that can smartly communicate, self-learn/adapt, make autonomous decisions, and intelligently interact with humans. Being heavily-dependent on time critical connectivity, processing, recognition, and decision-making, the success of these systems is contingent on fulfilling substantial leaps in the networking, computing, and artificial intelligence capabilities of terminal (i.e., edge) systems and devices. This talk will highlight some recent trends in advancing the capabilities of edge systems and devices, and their aptitude to revolutionize the design/operation of cyber-physical and autonomous systems. It will start by presenting one of the latest mobile edge computing approaches, namely hierarchical mobile edge computing, smartly distributing the computational assignments between the infrastructural resources and edge devices. It will also introduce the novel paradigm of mobile edge learning, jointly optimizing the allocation of resources andlearning tasks to multiple wireless edge devices with heterogeneous computing and communication capacities. The talk will then illustrate some edge-based improvements and designs to current and future cyber-physical and autonomous systems, namely autonomous vehicles, UAV-based real-time monitoring, and autonomous/electric mobility on-demand systems. Open problems and future directions in the above areas will be also indicated. The talk will be concluded by sharing a tentative vision of establishing a new research lab at Queen's School of Computing, leading innovation in cyber-physical/autonomous systems, and advancing their enabling technologies.

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11:30am-12:30pm

BioSciences 1102

Light Refreshments

Sameh Sorour

Sameh Sorour is an Assistant Professor at University of Idaho, USA. He received his B.Sc. And M.Sc. degrees from Alexandria University in 2002 and 2006, respectively, and his PhD from University of Toronto in 2011. His PhD thesis was nominated for the Governor General's Gold Medal Award. After his graduation, he held a MITACS industrial postdoctoral fellowship with Siradel Canada and University of Toronto. Prior to moving to University of Idaho in 2016, he held another postdoctoral fellowship at King Abdullah University of Science and Technology (KAUST), and an assistant professor position at King Fahd University of Petroleum and Minerals (KFUPM). During his PhD and postdoctoral fellowships, he led several research projects with industrial partners and government agencies, such as LG Korea, the European Space Agency, the Canadian National Institute for the Blind (CNIB), and Siradel France. Dr. Sorour is currently a senior IEEE member and an Editor for IEEE Communications Letters. His research and educational interests lie in the broad areas of advanced computing, learning, and networking technologies for cyber-physical and autonomous systems. Topics of particular interest include cloud/edge/IoT computing, learning, networking, and their applications in multimodal/coordinated autonomous driving, autonomous/electric mobility on demand systems, layered/virtualized management of future transportation networks, tactile cyber-physical systems, and smart energy and healthcare systems.