Webinar on Next-Generation IoT

The Eighth Edition

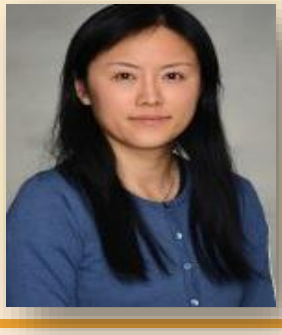
IEEE Communication Society
Technical Committee on Communications Software
Special Interest Group on "NFV and SDN Technologies"

All participants need to pre-register by 5:00 PM August 25, 2024, by filling up the following form: Registration Link

Prof. Long Le
IEEE Fellow
University of Quebec, Montreal, Canada

The Metaverse and Its Cybersecurity Challenges

Abstract: The Metaverse can be envisioned as a 3D immersive virtual world, where people can use Augmented/Virtual Reality (AR/VR) devices to access and interact with others through digital avatars. The Metaverse faces various security risks inherited from its predecessor and new specialized threats. It is challenging to mitigate and tackle these issues in a large-scale setting with numerous wearable devices such as IoT devices, augmented, virtual reality (AR/VR) headsets and the participation of various stakeholders from both physical and virtual worlds. In this seminar, we will first provide some background of the Metaverse. Then, we will describe how the blockchain and machine learning (ML) techniques can allow us to engineer building blocks and functions of the Metaverse including its economic/financial systems, metaverse governance, identity and authentication management, data and digital asset managements, machine learning based intrusion/anomaly detection systems. We then introduce a layer-based architecture of the Metaverse, discuss potential security threats and countermeasures for the Metaverse. Finally, we share our recent research findings in the Metaverse security in which advanced blockchain and ML techniques are employed to develop the Metaverse digital asset management and intrusion detection systems.



Prof. Min Dong
IEEE Fellow
Ontario Tech University, Canada

Scalable Multicast Transmission for 6G with Enhanced Computation-Communication Efficiency

Abstract: Next-generation wireless systems are anticipated to feature extremely large-scale antenna arrays to enable immersive and massive communication. For such systems to be practical, transmission solutions must be ultra-low-complexity and highly scalable. In particular, multicast transmission techniques at the physical layer can effectively support massive data distribution and access in mobile broadband, edge computing, distributed learning, and the Internet of Things applications. However, the highly complex computational methods and the communication costs of centralized processing architecture pose significant challenges. In this talk, we will first share our recent results on the optimal downlink multicast beamforming, highlighting how its structural properties can lead to highly scalable algorithm solutions. We will then discuss coordinated multicast transmission in multi-cell networks and present a highly scalable solution combined with a semi-distributed computing approach, resulting in orders of magnitude of savings in computation and communication for multi-cell coordination.

Prof. Aggelos Bletsas
Fellow IEEE
Rutgers University
New Brunswick, USA

Batteryless Internet of Things with Backscatter Radio

Abstract: Backscatter radio lies at the heart of commercial, batteryless radio frequency identification (RFID) tags and has recently attracted significant research interest. Backscatter radio is grounded on RF reflection principles that simplify communicator design to a single switch, connected to an antenna, offering ultra-low power consumption per tag, at the expense of reduced communication range and coverage. Bistatic or multistatic architectures, where illuminator and receiver of the tag-backscattered information are placed at distant locations, have been proposed to extend range and coverage, compared to conventional monostatic, at the expense of increased (installation) cost. In this talk, a distributed, real-time (less than 0.5msec latency), near-optimal, noncoherent sequence detection technique will be presented, tailored to the Miller line coding of commercial RFIDs and tested, with commercial, off-the-self, software-defined radios (SDR), connected over Ethernet. Experimental results show that doubling the number of transmitting antennas can roughly double indoor coverage, compared to the (commercial) monostatic architecture, allowing for scalable, low-cost RFID interrogation in warehouses. Work on cm-accuracy RFID tag indoor localization with a mobile robot, will also be shown. Next, design and implementation of a batteryless, RF-powered, reconfigurable intelligent surface (RIS) using RFIDs, perhaps the first of its kind, will be presented.

Dr. Arijit Roy, IIT Patna, India
Dr. Ayan Mondal, IIT Indore, India
Prof. Sudip Misra, IIT Kharagpur, India

More details can be found **here**
Date: August 26, 2024
Time: 7:00 PM - 09:00 PM, Indian Time (IST)