Department of Computer Science, The University of Hong Kong

CS Seminar

From Content-Centric Internet to Tactile Internet: Some Thoughts on Future IoT Architecture Design

Professor Zhi-Li Zhang
University of Minnesota

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Venue:
CPD-LG.18
Central Podium
Centennial Campus
The University of Hong Kong

Abstract:

Recent years have witnessed the proliferation of various mobile and sensor devices, from mobile phones to smart home devices. These mobile and sensor technologies – together with a whole gamut of emerging applications they enable -- usher a new era of Internet of Things (IoT) services that will revolutionize the way how we live E and interact with each other and the physical world. For example, various kinds of (physical or virtual) sensors in the physical and/or cyber worlds have not only allowed us to collect a whole gamut of (spatial-temporal) data, but also afforded us the opportunity to apply advanced data analytics, machine learning algorithms to extract actionable knowledge (or AI), make intelligent decisions in response to events, take actions and effect changes in the physical world, e.g., via remotely controlling and issuing commands to smart (mobile or embedded) devices (i.e., actuators) -- namely, the so-called "Tactile" Internet.

Emerging IoT applications and services are putting a strain on today's network architecture, which has primarily served as a giant information repository and distribution platform. The challenges posed by emerging IoT applications and services call for re-thinking and re-architecting of existing networking, compute and storage infrastructures. In this talk, we will put forth some initial thoughts on the challenges and architectural design issues for future IoT networks. Leveraging and building upon the CONIA – content (provider)-oriented, namespace-independent network architecture -- that we have advocated and have been developing for multimedia content delivery, we advance a new IoT architecture -- referred to as IoTa -- that represents a paradigm shift from content delivery to remotely accessing, controlling or steering real or virtual objects (such as sensors or actuators) in perceived real-time by human operators or machines. The proposed IoTa architecture is application-driven and software-defined}. While it borrows ideas from software-defined networking (SDN) and network function virtualization (NFV), it constitutes a refactoring of the conventional "control-data plane separation" by incorporating and integrating information (including content, control and command) delivery, compute and storage functions in a unifying (network architecture) framework.

About the Speaker:

Professor Zhang is McKnight Distinguished University Professor and Qwest Chair Professor at Department of Computer Science & Engineering, University of Minnesota. He received his B.S. degree in Computer Science from Nanjing University, China, and his M.S. and Ph.D.' degrees in Computer Science from the University of Massachusetts, Amherst. Dr. Zhang's research interests lie broadly in computer communication and networks, Internet technology, multimedia and emerging applications. His past research was centered on the analysis, design and development of scalable Internet QoS solutions to support performance-demanding multimedia applications. His current research focuses on building highly scalable, resilient and secure Internet and cyber-physical systems & infrastructures and developing mechanisms to enhance Internet service availability, reliability and security, and on developing next generation, service-oriented, manageable Internet architectures to provide better support for creation, deployment, operations and management of value-added smart services and underlying networks, including mobile, cloud and content delivery services and networks. Dr. Zhang has published more than 150 journal, conference and workshop papers. Dr. Zhang has received several honors for his research, and he is co-recipient of a number of Best Paper Awards. He is a Fellow of IEEE.

All are welcome!
For enquiries, please call 2859 2180 or email enquiry@cs.hku.hk
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