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CS-Colloquium

Emerging Cyber-Human Workplaces with Internet of Things
Challenges and Opportunities

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Wann?   12. Dezember 2017, 13:15 Uhr

Wo?   Hörsaal 2 (HS2)
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Abstract

The Internet of things (IoT) with 34 billion connected devices by 2020 will generate more 'big data' than ever. While Cloud Computing has been a viable solution for processing and analyzing very large volumes of data, dealing with billions of live data sources continuously feeding from all "corners" of the Internet would make it a serious bottleneck for IoT analytics in the cloud. In particular, on-demand video streaming already takes up 70% of Internet traffic. **Non-stop streaming of IoT data will add substantially more stress on the Internet if IoT applications are not deployed responsibly**.
In this presentation, we discuss potential solutions for this emerging challenge as video streaming and IoT streaming coalesce. We re-examine conventional wisdom in **network design** and consider a new concept called **traffic deduplication**; and we present a **Deduplication Overlay Network (DON)** that shows congestion can surprisingly be turned into advantage.

Another great IoT challenge is due to 'thing' heterogeneity (i.e., the diversity of cameras and sensors) and a **new computation model** is needed **for heterogeneous data stream processing**.

We discuss this capability in an IoT architecture based on a Boolean abstraction. A **Boolean query-processing framework** is also presented as a potential standard approach for applications **to share IoT infrastructure**. These features are part of ThingStore, an online ecosystem for development and deployment of IoT applications.

While an IoT environment fusing human and machine intelligence opens up a host of new opportunities, the human teams may be overwhelmed trying to keep up with massive amount of real-time information. This calls for **new communication and collaboration tools** to enable the human teams **to deal with information overload in real-time decision making**. Tabletop, a virtual multimedia conferencing system, is one such environment to support teamwork in an IoT-enabled human-cyber workplace. The team members can not only share and discuss multimedia information, but also cooperate on IoT devices as they collaborate. A short video will be presented to demonstrate this Tabletop system.

Bio

Dr. Kien A. Hua is a Pegasus Professor and Director of the Data Systems Lab at the University of Central Florida.

He was the Associate Dean for Research of the College of Engineering and Computer Science at UCF.

Prior to joining the university, he was a Lead Architect at IBM Mid-Hudson Laboratory, where he led a team of senior engineers to develop a highly parallel computer system, the precursor to the highly successful commercial parallel computer known as SP2.

Currently, Prof. Hua is also serving as a domain expert on spaceport technology at NASA. Prof. Hua received his B.S. in Computer Science, and M.S. and Ph.D. in Electrical Engineering, all from the University of Illinois at Urbana-Champaign, USA.

His diverse expertise includes network and wireless communications, Internet of Things, data analytics, image/video computing, medical imaging, mobile computing, sensor networks, spaceport technology, and intelligent transportation systems.

He has published widely with 13 papers recognized as best/top papers at conferences and a journal. Many of his research have had significant impact. His paper on Chaining technique began the peer-to-peer data sharing and video streaming revolution. His Skyscraper Broadcasting, Patching, and Zigzag techniques have each been heavily cited in the literature, and have inspired many commercial systems in use today. Prof. Hua has served as a Conference Chair, an Associate Chair, and a Technical Program Committee Member of numerous international conferences, and on the editorial boards of several professional journals.

He was a General Co-Chair of 2014 ACM Multimedia; and he is currently organizing the 2018 IEEE International Conference on Cloud Engineering (IC2E). Prof. Hua is a Fellow of IEEE.