

Computer Science Colloquia

Date: Tuesday, April 4, 2017

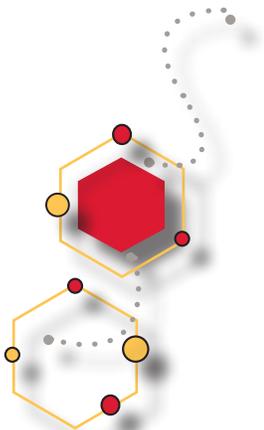
Time: 3:30 pm

Location: B29 Atanasoff

Achieving Low-Delay and Fast-Convergence in Data-Intensive Mobile Computing

Due to the proliferation of smart mobile devices and Internet-of-Things (IoT), recent years have witnessed an explosive growth of mobile data demands. As a result, today's mobile computing infrastructures are being stretched to their capacity limits. The quest for an ever-increasing system capacity has attracted tremendous research interests to develop new data-intensive mobile computing technologies, which is envisioned to be the backbone of future IoT. However, the emerging IoT applications also introduce much more stringent performance requirements on throughput, latency, and convergence speed in controlling the systems infrastructure.

To this end, in this talk, we introduce a new momentum-based joint congestion control and scheduling optimization approach to address the above challenges. Based on this momentum-based approach, we develop a cross-layer optimization framework that offers throughput-optimality, fast-convergence, and significant delay reduction. Further, we show that the proposed momentum-based approach offers an elegant three-way trade-off in throughput, delay, and convergence, which is achieved under a near index-type simple policy with two control degrees of freedom. Our work opens the door to an unexplored research paradigm that leverages advanced techniques based on "memory/momentum" information for data-intensive mobile computing systems design.



*Part of the Computer Science
Seminar Series*

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Jia (Kevin) Liu received his Ph.D. degree in the Bradley Department of Electrical and Computer Engineering at Virginia Tech, Blacksburg, VA in 2010. He then joined the Ohio State University as a postdoctoral researcher. He is currently a Research Assistant Professor in the Department of Electrical and Computer Engineering at the Ohio State University. His research areas include theoretical foundations of control and optimization for computer systems, distributed algorithms design, cyber-physical systems, and data analytics infrastructure. Dr. Liu is a senior member of IEEE. His work has received numerous awards at top venues, including IEEE INFOCOM 2016 Best Paper Award, IEEE INFOCOM 2013 Best Paper Runner-up Award, IEEE INFOCOM 2011 Best Paper Runner-up Award, and IEEE ICC 2008 Best Paper Award. He was a recipient of the Bell Labs President Gold Award in 2001 and Chinese Government Award for Outstanding Ph.D. Students Abroad in 2008. He is currently the Sole PI of two active NSF grants on Massive MIMO networking and low-delay and fast-convergence stochastic network optimization. His research has also been funded by AFOSR, AFRL, and ONR.