University at Buffalo
The State University of New York

Department of Computer Science and Engineering

Presents

Dr. Guoliang Xing
Michigan State University

A High-Fidelity Sensor System for Temperature Distribution Forecasting in Data Centers

Data centers have become a critical computing infrastructure in the era of cloud computing. Temperature monitoring and forecasting are essential for preventing server shutdowns because of overheating and improving a data center's operational energy efficiency. In this talk, I will describe a novel cyber-physical approach for temperature forecasting in data centers, which integrates Computational Fluid Dynamics (CFD) modeling, in situ wireless sensing, and real-time data-driven prediction. To ensure the forecasting fidelity, we leverage the realistic physical thermodynamic models of CFD to generate transient temperature distribution and calibrate it using in-situ sensor feedback. Both CFD-simulated temperature distribution and real sensor measurements are then used to train a time series-based algorithm for real-time prediction. Our approach leads to a portable, noninvasive thermal monitoring solution that does not rely on the infrastructure of monitored data center. Our evaluation on a testbed of five racks and 229 servers in a production data center show that our system can predict the temperature evolution of servers with highly dynamic workloads at an average error of 0.52 celsius, within a duration up to 10 minutes.
In the second part of this talk, I will briefly discuss our recent projects on smartphone systems and real-time volcano monitoring using a wireless sensor network.

Bio: Guoliang Xing is an Assistant Professor in the Department of Computer Science and Engineering at Michigan State University. He received the B.S. degree in electrical engineering and the M.S. degree in computer science from Xi'an Jiao Tong University, China, in 1998 and 2001, respectively, and the D.Sc. degrees in computer science from Washington University in St. Louis in 2006. From 2006 to 2008, he was an Assistant Professor of Computer Science at City University of Hong Kong. His research interests include wireless networking, smartphone systems, and cyber-physical systems. He received the NSF CAREER Award and the Best Paper Award at the 18th IEEE International Conference on Network Protocols (ICNP) in 2010. He is an Associate Editor for ACM Transactions on Sensor Networks (TOSN) and IEEE Transactions on Wireless Communications
(TWC).

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Refreshments for attendees after the talk. This talk is free and open to the public

For more information, please email **cse-dept@cse.buffalo.edu** or contact (716) 645-3180