

## COMPUTER SCIENCE RESEARCH SEMINAR

### Dependable Industrial Wireless Sensor-Actuator Networks

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**Friday, November 8, 2019 at noon in room T-1, Engineering Building**

**Abstract:** Industrial Internet of Things (IoT), underlying the Fourth Industrial Revolution (or Industry 4.0), promises one of the largest potential economic effects of IoT - up to \$47 trillion in added value globally by 2025. Industrial networks, the underlying support of Industrial IoT, typically connect hundreds or thousands of sensors and actuators in industrial facilities, such as manufacturing plants, steel mills, oil refineries, and infrastructures implementing complex monitoring and control processes. IEEE 802.15.4-based wireless sensor-actuator networks (WSANs) operate at low-power and can be manufactured inexpensively, which makes them ideal for industrial networks where energy consumption and costs are important. The current approach to implementing WSANs has poor scalability and error-prone configuration, posing prohibitive barriers to the use of WSANs. To enhance the network scalability, we propose to replace the centralized network architecture with a hierarchically distributed architecture combined with novel cross-technology communication (CTC) and distributed networking techniques. To better configure the networks, we develop a new network configuration framework, which leverages state-of-the-art simulator to relate high-level network performance to low-level network parameters and employs genetic algorithm and linear physical programming to select network parameters. Experimental results show our solutions effectively improve the network scalability and reliability, and better meet the application quality of service (QoS) requirements compared to the state of the art.

**Bio:** Junyang Shi is a Ph.D. candidate in the Department of Computer Science at Binghamton University under the supervision of Assistant Professor Mo Sha. His research interests include industrial wireless sensor-actuator networks, embedded systems, and IoT. He has published papers in IEEE/ACM Transactions on Networking and highly selectively conferences including ICNP'19, INFOCOM'19, IoTDI'19, and ICDCS'18.

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**Refreshments will be provided!**