Zhong, Xiaoyang

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EDUCATION

PhD in Computer Science   Aug. 2011 – May. 2018

    Purdue University (West Lafayette, IN, USA)   GPA: 3.93

-   Research Domain: Computer Networks and Systems

BS in Electrical Engineering   Sep. 2007 – Jul. 2011

    University of Science and Technology of China (Hefei, Anhui, China)   GPA: 3.45

EXPERIENCE

Graduate Researcher, CS@Purdue University, Indianapolis, IN   Aug. 2011 – May. 2018

- Worked on a broad range of research topics in the area of Wireless Sensor Networks (WSNs) and the Internet of Things (IoT) including both theoretical and practical problems in hardware and software.
- Designed and developed a complete WSN application suite for long-term environmental monitoring in cooperation with other group members, including node application, gateway, and management system.
- Advised many undergraduate and master students for their thesis/independent study projects.
- Authored/Co-authored 9 journal/conference papers, with 3 papers under review.

PROJECTS

System Administration (Java, Python, Apache, PostgreSQL, SVN)   Aug. 2016 – Now

- Administrated a sensor network management system deployed using Linux Apache server, including network data/status monitoring, PostgreSQL database management, and version control using SVN.

Wireless Sensor Network Application (C/nesC, Java)   Aug. 2012 - Now

- Designed and implemented WSN node application in cooperation with other group members for a real-world WSN testbed of 100 nodes. The functionalities include sampling, routing, wireless reprogramming, compressed sensing, etc. Everything fits in devices with 4KB RAM or 48 KB ROM.
- Implemented multi-hop networking based on IEEE 802.15.4 (the underlying standard of ZigBee).

Downward Routing Protocol for the Internet of Things (C/nesC, Python)   Mar. 2016 - Now

- Designed and implemented a reliable, energy efficient, and extremely scalable routing protocol for node actuation in large-scale IoT systems with resource-constraint devices.
- Designed a novel Bloom filter to encode source-route which worked on networks with hundreds of hops.
- Applied opportunistic routing during packet forwarding and achieved packet delivery ratio > 98%.

IoT Smart Systems (C/C++, Python)   Sep.2015 – Sep. 2017

- Designed a Smart Home using Raspberry Pi to control home devices using the CoAP protocol.
- Designed a Greenhouse using TelosB to monitor temperature, humidity, light, and soil moisture.
- Designed a server to display the data and send notification through email (SMTP) and SMS (Twillio).

Topology Reconstruction for Dynamic WSNs (C/nesC, Python)   Oct. 2013 – Oct. 2015

- Designed a topology reconstruction algorithm based on compressed sensing in cooperation with another student for very dynamic WSNs by piggybacking a 4-byte field in each data packet.
- Deployed the algorithm on real-world WSN testbed and achieved 96% reconstruction accuracy.

Over-The-Air Programming for Outdoor WSN testbed (C/nesC, Java)   Sep. 2013 – Jun. 2014

- Designed a mobile tool for outdoor WSN testbed reprogramming, maintenance, query, and diagnosis.
- Reduced the laborious work for maintaining heterogeneous and duty-cycled WSN deployments.

Quality of Service Control for the Internet of Things Systems (C/nesC)   Mar. 2012 – Jun. 2013

- Designed a distributed QoS control algorithm based on Gur Game to control nodes' sleep/active states.
- Improved energy efficiency of the whole network for about 30%; achieved fast system convergence.

Sensor Board and Driver for TelosB (TI MSP430) Platform (C/nesC, Eagle)   May. 2015 – Aug. 2016
- Designed a 2-layered sensor board using Eagle to drive analog and digital Decagon sensors (e.g., MPS-2).
- Solved the clock drifting problem of TelosB during UART communication using a fridge and oscilloscope.
- Reduced the cost of unit sensor board to be less than $10.

Network Dynamics and Benchmarking (Python)   Aug. 2016 – May. 2018
- Analyzed the network dynamics of a real-world heterogeneous WSN testbed from three perspectives including link level characteristics, network level characteristics, and temporal characteristics.
- Designed metrics based on network entropy to concretely measure the extent of network level dynamics.
- Devised a benchmark data suite for the research community as a reference for protocol evaluation.

SKILLS

- **Programming Languages**: C/C++, nesC, Java, Python, Javascript   **Frameworks**: Angular
- **Operating Systems**: Linux, Real-Time Systems   **Tools**: Git, SVN
- **IoT/WSNs/Embedded Platforms**: TinyOS, Contiki OS, Raspberry Pi, Arduino, TelosB, IRIS, MicaZ

HONORS & AWARDS

- 2018   Gersting Award for an Outstanding Graduate Student (Purdue School of Science)
- 2014   IEEE Travel Grant to attend IEEE MASS 2014

SELECTED PUBLICSTIONS

- X. Zhong and Y. Liang, "Scalable Downward Routing for Wireless Sensor Networks and Internet of Things Actuation", in *LCN* 2018 (submitted for review).

- G. Villalba, F. Plaza, X. Zhong, T. W. Davis, M. Navarro, Y. Li, T. A. Slater, Y. Liang, and X. Liang, "A Networked Sensor System for the Analysis of Plot-Scale Hydrology", *Sensors*, 2017, 17(3), 636.

- X. Zhong and Y. Liang. "Raspberry Pi: An Effective Vehicle in Teaching the Internet of Things in Computer Science and Engineering", *Electronics* (Basel), 2016.

- R. Liu, Y. Liang, and X. Zhong. "Monitoring Routing Topology in Dynamic Wireless Sensor Network Systems," in *ICNP*, 2015.

- X. Zhong, M. Navarro, G. Villalba, X. Liang, and Y. Liang. "MobileDeluge: Mobile Code Dissemination for Wireless Sensor Networks." In *MASS*, 2014.