Xiaoyang Zhong

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EDUCATION

PhD in Computer Science   May. 2018

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

- Research Domain: Computer Networks and Systems

BS in Electrical Engineering   Jul. 2011

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

SKILLS

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

EXPERIENCE

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

- Solved essential problems in the area of Wireless Sensor Networks (WSNs) and the Internet of Things (IoT) including both theoretical and practical problems; authored/co-authored 9 journal/conference papers.
- Developed **a complete WSN application suite** for long-term environmental monitoring in cooperation with other students, including sensor node application, data collection gateway, and web-based management system.

PROJECTS

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

- Developed the core components of a sensor node application for a WSN testbed of 100 nodes running RTOS, which integrated complex functionalities including sampling, routing, wireless reprogramming, compressed sensing, etc.
- Enabled remote accessing by implementing multi-hop networking based on IEEE 802.15.4.
- Solved the MAC layer mismatch problem between heterogeneous node devices using a packet sniffer.
- Maintained and updated the application based on the principles of software development life cycle.

System Administration (Python, PostgreSQL, SVN)   Aug. 2016 – Current

- Administrated a sensor network management system deployed using Linux Apache server, including network data/status monitoring, PostgreSQL database management, and version control using SVN.
- Improved the management efficiency by developing scripts using Python to automate the management process.

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

- Designed a scalable routing protocol for node actuation in large-scale IoT systems with resource-constraint devices.
- Improved the scalability by 5x by developing a Bloom filter based source routing algorithm, leading to the minimization of the packet overhead and the energy overhead.
- Achieved > 98% reliability by implementing opportunistic routing into the packet forwarding process.

Network Analysis and Benchmarking (Python)   Aug. 2016 – May. 2018

- Analyzed the network performance and routing dynamics of a real-world WSN testbed from three aspects including link level characteristics, routing level characteristics, and temporal characteristics.
- Demonstrated an effective metric based on entropy theory to measure the amplitude of topological dynamics.
- Devised the first WSN benchmark data suite with full topological information for the research community.

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; applied RPL routing protocol to build a low power IPv6 multi-hop network.

- Designed a server to parse the sensor data and send notifications through email (SMTP) and SMS (Twillio).

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 an oscilloscope.
- Reduced the unit price of the sensor board to less than $10 (about 80% reduction v.s. commercial boards).

Topology Reconstruction for Dynamic WSNs (C/nesC, Python) Oct. 2013 – Oct. 2015
- Designed a topology reconstruction algorithm in cooperation with another student for very dynamic WSNs.
- Achieved > 96% reconstruction accuracy by implementing a decoding algorithm based on compressed sensing.
- Reduced packet overhead by implementing a path encoding mechanism using a 4-byte field in each packet.

Wireless Reprogramming for Outdoor WSN testbed (C/nesC, Java) Sep. 2013 – Jun. 2014
- Designed a mobile tool for outdoor WSN testbed reprogramming, maintenance, query, and diagnosis.
- Enabled 2x faster deployment of new applications and reduced the labor for maintaining WSN testbed.

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' active/standby states.
- Improved energy efficiency of the whole network for 30%; achieved fast system convergence.

PROFESSIONAL ACTIVITIES

- **Peer Reviewer:**   IEEE Wireless Communications and Networking Conference (WCNC) 2016 ~ 2018
  IEEE Local Computer Networks Conference (LCN) 2015 ~ 2018
  International Journal of Distributed Sensor Networks (IDJSN) 2017

HONORS & AWARDS

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

SELECTED PUBLICATIONS

- X. Zhong and Y. Liang, "Scalable Downward Routing for Wireless Sensor Networks and Internet of Things Actuation", in *LCN* 2018 (submitted for review) and in *arXiv:1802.03898*.

- 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.

ADVISORS

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