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Summary

I have developed distributed, embedded, and real-time wireless networking protocols/software for over six years. I have also built web applications for two years.

Education

2008–2014 **Wayne State University**, *Ph. D. in Computer Science*.

2004–2008 **Wuhan University, China**, *B. S. in Computer Science*.

Patent

Hongwei Zhang, Xiaohui Liu, Chuan Li, “PRK-Based Scheduling for Predictable Link Reliability”, U.S. Provisional Application #61/788,445, International Application #PCT/US2014/27055

Experience

4/12 – 4/14 **Physical-Ratio-K based Scheduling Protocol (PRKS)**, *Research Assistant*, Wayne State University, MI.

PRKS guarantees the reliability of a wireless link is no less than requirement in the presence of interference while maximizing throughput. I

- Implemented, single-handedly, PRKS, its two variants, and four state-of-the-art protocols from the ground up, on resource-constrained sensors using TinyOS. The source code is publicly available at <https://github.com/xhliu/prks>.
- Carried out measurements in two sensor network testbeds, each consisting of 127+ sensors, and verified that PRKS enables predictably high link reliability (95% vs 0% in others).

9/09 – 3/12 **Multi-Timescale Adaptation (MTA) Routing Protocol**, *Research Assistant*, Wayne State University, MI.

MTA identifies minimal energy paths that meet probabilistic deadlines of real-time traffic, taming dynamics and uncertainties of path delays in wireless networks. I

- Implemented, independently, the whole protocol, its seven variants, and four other protocols from scratch on sensors using TinyOS. Code is at <https://github.com/xhliu/mta>.
- Verified MTA’s significant advantages over the state of the art for a variety of settings, in two testbeds of 127+ sensors, improving deadline success ratio by 89% and reducing transmission cost by a factor of 9.7.

2/09 – 5/09 **LifeCode**, *Technical Team Member*, LifeCode Health, MI.

LifeCode is a remote health monitoring system. A wearable sensor measures biometric parameters such as heartbeat rate and transmits the data to a mobile phone. The phone processes and displays the data locally, which also uploads it to servers so health care professionals can access it via a web interface. I

- Built a Windows mobile phone application in C# to receive and display real-time heartbeat rates collected by sensors and transmitted to the phone via Bluetooth.

11/08 – 5/09 **CSC1000 Ticketing System**, *System Administrator*, Wayne State University, MI.

Students in lab course CSC1000 report machine breakdowns by filing tickets in this web-based system, where IT personnel can track and update the status of each ticket. I

- Modified database schema and wrote PHP code to enable users to insert, update, delete, search, and dump tickets via a web interface using the Linux, Apache, MySQL, and PHP (LAMP) stack.

12/07 – 3/08 **Microsoft Forefront Security (MFS)**, *Software Engineer Intern*, Wicresoft Company, China.

MFS is a business antivirus software product that can be controlled over the network. I

- Wrote test cases and tested MFS on different Windows families, architectures, and languages.
- Automated tests using MS-DOS scripting to run MFS on remote machines with various above configurations.

9/06 – 11/07 **Websites**, *Chief Development Officer*, Trinity Studio, China.

Trinity Studio is a studio I co-founded with three classmates, building websites for small businesses, government agencies, and universities. I

- Designed database schema using SQL Server and Access.
- Developed back end using ASP, IIS, and ODBC.

Open Source Community Participation

TinyOS is the de facto operating system for low-power wireless devices, such as those used in sensor networks and personal area networks. <http://www.tinyos.net>. I have reported several bugs, including:

- Patch accepted: fixing bug to set default tx power in cc2420x. <https://github.com/sallai/tinyos-main/commit/974ff870551d6fcc86f44e311dcbfd0fb71dbc94>
- Patch accepted: fixing bug in duplicate detection in CTP. <https://www.millennium.berkeley.edu/pipermail/tinyos-help/2010-March/045095.html>

Technical Skills

Languages: expert in C, TinyOS/nesc, and Matlab; proficient in C++ and \LaTeX ; prior experience in Java, C#, Objective-C, ASP, PHP, Javascript, and HTML

Mathematical tools: probability theory, statistics, Markov chain, Markov decision process, linear optimization, queueing theory, and control theory

Databases: MS SQL Server and MySQL

Operating systems: Linux, Mac OS X, and Windows

Wireless Standards: 802.11 and 802.15.4

Awards

2009 Microsoft Imagine Cup US Software Design Top 15 Finalist

2012 Outstanding Graduate Research Assistant (GRA) Award, Wayne State University

2005 National Scholarship, China

Selected Publications

Adaptive Instantiation of the Protocol Interference Model in Wireless Networked Sensing and Control. Hongwei Zhang, Xin Che, Xiaohui Liu, Xi Ju. In *ACM Transactions on Sensor Networks (ToSN)*, 2014.

Taming Uncertainties in Real-Time Routing for Wireless Networked Sensing and Control. Xiaohui Liu, Hongwei Zhang, Qiao Xiang, Xin Che, Xi Ju. In *IEEE Transactions on Smart Grid (TSG)*, 2013.

When In-Network Processing Meets Time: Complexity and Effects of Joint Optimization in Wireless Sensor Networks. Qiao Xiang, Jinhong Xu, Xiaohui Liu, Hongwei Zhang, Loren J. Rittle. In *IEEE Transactions on Mobile Computing (TMC)*, 2011.