Xiaohui Liu

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Summary

- 6+ years experience in developing large-scale distributed, embedded, and real-time wireless networking protocols/software
- 6+ years experience in parsing, analyzing, visualizing and presenting terabytes of data
- 2 years experience in web development

Education

2008–2014 **Wayne State University**, *Ph. D. in Computer Science*, GPA 3.93/4.0.

2004–2008 **Wuhan University, China**, *B. S. in Computer Science*, GPA 3.60/4.0.

Patent

H. Zhang, X. Liu, C. 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 is the first practical distributed scheduler to ensure reliability of wireless communication while maximizing throughput, eliminating the fundamental hidden-terminal issue.

- Designed the architecture of PRKS: split code into reusable encapsulated components, grouped components wth coupled functionalities, and organized groups in a tree hierarchy.
- Implemented, single-handedly, PRKS, its two variants, and four state-of-the-art protocols from scratch, on sensors with only 48kB ROM, 10kB RAM, and 8MHz 16-bit MCU using TinyOS. The source code (∼**58,000** lines) is available at `https://github.com/xhliu/prks`.
- Depolyed these protocols in two sensor network testbeds of 127+ nodes.
- Increased link reliability from as low as 0% in the state of the art to 95% in PRKS.

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

MTA is the best distributed routing protocol to deliver probabilistic real-time traffic.

- Implemented, independently, MTA, its seven variants, and four other protocols from the ground up in TinyOS. Code (∼**16,000** lines) is at `https://github.com/xhliu/mta`.
- Modified TinyOS kernals systematically to make code run concurrently and enable real-time computing, including radio stack, time synchronization, and resource arbitration.
- Increased deadline success ratio by 89% and reduced transmission cost by a factor of 9.7, shown by measurements in two testbeds of 127+ nodes.

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

LifeCode is a remote health monitoring system.

- Built a Windows mobile phone application in C# to receive and display real-time heartbeat rates collected by wearable 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.

- Modified database schema and wrote PHP code to enable users to insert, update, delete, search, and dump tickets online 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.

- 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.

- 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

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.*