

# XIAOHUI LIU

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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.

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## 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>

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## Technical Skills

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

**Databases:** MS SQL Server, MySQL

**Wireless Standards:** 802.11, 802.15.4

**Operating systems:** Linux, Mac OS X, Windows

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## 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

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## 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.