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Summary

Xiaohui Liu

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o 6+ years protocol development experience in distributed, embedded, and real-time wireless networks, designing MAC, routing, scheduling, and in-network processing protocols

o 2 years web development experience

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. Provi- sional Application #61/788,445, International Application #PCT/US2014/27055

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

Experience

4/12 – 4/14 **Research Assistant**, *Wayne State University*, Michigan.

The patent-pending Physical-Ratio-K based Scheduling Protocol (PRKS) is the first-ever practical dis- tributed scheduling algorithm to ensure reliability of wireless communication while maximizing throughput. o Designed the architecture of PRKS: split code into reusable encapsulated components, grouped

components wth coupled functionalities, and organized groups in a tree hierarchy.

o Implemented, single-handedly, PRKS, its two variants, and four state-of-the-art protocols from scratch, on sensors with merely *10kB* RAM using TinyOS. The source code (∼***58,000*** lines) is available at <https://github.com/xhliu/prks>.

o Debugged, *without gdb*, these complex distributed protocols in two multi-hop dynamic testbeds of 127+ sensors and fixed non-repeatable and timing-dependent bugs caused by race conditions and inconsistent distributed states.

o Increased link reliability from as low as 0% in the state of the art to 95% in PRKS.

9/09 – 3/12 **Research Assistant**, *Wayne State University*, Michigan.

Multi-Timescale Adaptation (MTA) Routing Protocol is the best distributed routing algorithm for delivering probabilistic real-time traffic.

o 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>.

o Modified TinyOS kernals systematically to make code run concurrently and enable real-time computing,

including radio communication stack, time synchronization, and resource arbitration.

o Increased deadline success ratio by 89% and reduced transmission cost by a factor of 9.7, shown in two testbeds of 127+ nodes.

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

LifeCode is a remote health monitoring system to compete in Microsoft Imagine Cup.

o 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 **System Administrator**, *Wayne State University*, Michigan.

Students in lab course CSC1000 report machine breakdowns by filing tickets in a web-based system.

o Designed database schema and implemented the ticketing system using the Linux, Apache, MySQL, and PHP (LAMP) stack, enabling users to insert, update, delete, search, and dump tickets online.

12/07 – 3/08 **Software Engineer Intern**, *Wicresoft Company*, China.

Microsoft Forefront Security (MFS) is a business antivirus software product that can be controlled over the network.

o Wrote test cases and tested MFS on different Windows families, architectures, and languages.

o Automated tests using MS-DOS scripting to run MFS on remote machines with various above configu- rations.

9/06 – 11/07 **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.

o Designed database schema using SQL Server and Access.

o 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](http://www.tinyos.net/). I have reported several bugs, including:

o Patch accepted: fixing bug to set default tx power in cc2420x. [https://github.com/sallai/](https://github.com/sallai/tinyos-main/commit/974ff870551d6fcc86f44e311dcbfd0fb71dbc94)

[tinyos-main/commit/974ff870551d6fcc86f44e311dcbfd0fb71dbc94](https://github.com/sallai/tinyos-main/commit/974ff870551d6fcc86f44e311dcbfd0fb71dbc94)

o Patch accepted: fixing bug in duplicate detection in CTP. [https://www.millennium. berkeley.edu/pipermail/tinyos-help/2010-March/045095.html](https://www.millennium.berkeley.edu/pipermail/tinyos-help/2010-March/045095.html)

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.*