Xiaohui Liu

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Objective

I have over six years of hands-on experience in developing distributed, embedded, and real-time wireless networking protocols/software, including implementing over ten protocols verified in real-world testbeds of 127+ nodes. One salient feature of these protocols is that their performance is guaranteed and provable since their design and implementation are not based on heuristics or ad hoc techniques, but on rigorous theoretical underpinnings such as probability theory, statistics, Markov decision process, and control theory. My objective is to find a position where I can apply my systems and theory skills to solve grand real-life challenges.

Education

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

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

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

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

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.*

Taming Uncertainties in Real-Time Routing for Wireless Networked Sensing and Control. Xiaohui Liu, Hongwei Zhang, Qiao Xiang, Xin Che, Xi Ju. In ***International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc)***, *2012.*

Towards Predictable Real-Time Routing for Wireless Networked Sensing and Control. Xiaohui Liu, Hongwei Zhang, Qiao Xiang. In ***Cyber-Physical-Systems (CPS)***

Week Workshop on Real-Time Wireless for Industrial Applications (Real-Win), 2011.

Adaptive Instantiation of the Protocol Interference Model in Mission-Critical Wireless Networks. Xin Che, Xiaohui Liu, Xi Ju, Hongwei Zhang. In **IEEE Communications Society Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON)**, *2010.*

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 Real-Time Systems Symposium (RTSS)**, *2009.*

Poster Abstract: PRK-Based Scheduling for Predictable Link Reliability in Wireless Networked Sensing and Control. Hongwei Zhang, Xiaohui Liu, Chuan Li, Yu Chen, Xin Che, Feng Lin, Le Yi Wang, George Yin. In **International Conference on Cyber-Physical Systems (ICCPS)**, *2013.*

Projects (selected)

Physical-Ratio-K based Scheduling Protocol (PRKS)

PRKS guarantees the reliability of a wireless link is no less than requirement in the presence of interference while maximizing throughput. I single-handedly implemented PRKS, its two variants, and four state-of-the-art protocols from the ground up, on resource-constrained sensors using TinyOS. Through measurement studies in two sensor network testbeds, each consisting of 127+ sensors, we observed that PRKS enables predictably high link reliability (95% vs 0% in others) . The source code is publicly available at `https://github.com/xhliu/prks`.

Multi-Timescale Adaptation (MTA) Routing Protocol

MTA identifies minimal energy paths that can meet probabilistic deadlines of real-time traffic, given the notorious dynamics and uncertainties of path delays in wireless networks. I managed to independently implement the whole protocol, its seven variants, and four other protocols from scratch on sensors using TinyOS. Two testbeds of 127+ sensors have verified MTA's significant advantages over the state of the art for a variety of settings, improving deadline success ratio by 89% and reducing transmission cost by a factor of 9.7. Code is at `https://github.com/xhliu/mta`.

Technical Skills

Languages: expert in C, TinyOS/nesC, and Matlab; proficient in C++ and LaTex; prior experience in Java, Objective-C, ASP, HTML, Javascript, and PHP

Wireless Standards: 802.11, 802.15.4

Operating systems: Linux, Mac OS X, Windows

Experience

6/09 – 11/14   **Research Assistant**, *Wayne State University*, Dr. Hongwei Zhang.

1/10 – 1/12   **President**, *ACM Student Chapter at Wayne State University*.

8/08 – 5/09   **Teaching Assistant**, *Wayne State University*.

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

5/07 – 12/07   **Chief Development Officer**, *Trinity Studio*.