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GU, Lin

INTEREST AND OBJECTIVE

Conducting research in systems, with focus on operating systems, wireless sensor networks, ubiquitous computing, and energy-efficient computing.

EDUCATION

- 2001–2006 Ph.D. in Computer Science, University of Virginia
Advisor: Prof. John Stankovic
Dissertation: Virtualizing Operating System for Wireless Sensor Networks
- 1998–2001 M.S. in Computer Science & Technology, Peking University
Ranking: No. 1 in the CS Department
Advisor: late Prof. Wang Xuan
- 1991–1996 B.S. in Computer Science, Fudan University

HONORS AND AWARDS

- ◆ Google Founder's Award (to the team), 2007
- ◆ Best Paper Award – ACM SenSys'06
- ◆ Outstanding Graduate Student Research Assistant of the CS Department (UVa , 2006)
- ◆ Best Student Paper Award – IEEE RTAS'04 (2004)
- ◆ Outstanding Graduate of Peking University (2001)
- ◆ Kodak Fellowship (2000-2001)
- ◆ Outstanding Student of Peking University(1999-2000)
- ◆ Motorola Fellowship (1993)
- ◆ People's Award II (By the Education Department of China, 1993)

SELECTED PAPERS

Highlight conference papers

- [1] **L. Gu** and J. A. Stankovic. *t-kernel*: Providing Reliable Operating System Support for Wireless Sensor Networks. In Proc. of the 4th ACM Conf. on Embedded Networked Sensor Systems (SenSys'06), Nov., 2006. (Acceptance ratio: 19%) – **Best Paper Award**.
- [2] **L. Gu**, D. Jia, P. Vicaire, T. Yan, L. Luo, T. He, A. Tirumala, Q. Cao, J. A. Stankovic, T. Abdelzaher, and B. H. Krogh. Lightweight Detection and Classification for Wireless Sensor Networks in Realistic Environments. In Proc. of the 3rd ACM Conf. on Embedded Networked Sensor Systems (SenSys'05), Nov., 2005. (Acceptance ratio: 16.8%)
- [3] **L. Gu** and J. A. Stankovic. Radio-Triggered Wake-Up Capability for Sensor Networks. In Proc. of the 10th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS'04), May, 2004 – **Best Student Paper Award**

Other conference papers

- [4] S. Lin, J. Zhang, G. Zhou, L. Gu, T. He and J. A. Stankovic, ATPC: Adaptive Transmission Power Control for Wireless Sensor Networks, In Proc. of the 4th ACM Conference on Embedded Networked Sensor Systems (SenSys'06), Nov., 2006. (Acceptance ratio: 19%)
- [5] **L. Gu** and J. A. Stankovic. (Demo Abstract) Demo: A Virtualizing OS Kernel for Wireless

- Sensor Networks. In Proc. of the 4th ACM Conf. on Embedded Networked Sensor Systems (SenSys'06), Nov., 2006.
- [6] T. He, P. A. Vicaire, T. Yan, L. Luo, L. Gu, G. Zhou, R. Stoleru, Q. Cao, J. A. Stankovic and T. Abdelzaher. Achieving Real-Time Target Tracking Using Wireless Sensor Networks, In Proc. of the 12th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS'06), Apr. 2006
 - [7] L. Luo, T. He, G. Zhou, L. Gu, T. Abdelzaher and J. A. Stankovic. Achieving Repeatability of Asynchronous Events in Wireless Sensor Networks with EnviroLog. In Proc. of the 25th IEEE Conf. on Computer Communications (InfoCom'06), Apr., 2006. (Acceptance ratio: 18%)
 - [8] T. He, P. Vicaire, T. Yan, Q. Cao, G. Zhou, L. Gu, L. Luo, R. Stoleru, J. A. Stankovic, and T. Abdelzaher. Achieving Long-Term Surveillance in VigilNet. In Proc. of the 25th IEEE Conf. on Computer Communications (InfoCom'06), Apr., 2006. (Acceptance ratio: 18%)
 - [9] **L. Gu** and J. A. Stankovic. (Extended Abstract) *t-kernel*: A Naturalizing OS Kernel for Low-Power Cost-Effective Computers. In Online Proc. of the 20th ACM Symposium on Operating Systems Principles (SOSP'05), Oct., 2005.
 - [10] T. He, L. Luo, T. Yan, L. Gu, Q. Cao, G. Zhou, R. Stoleru, P. Vicaire, Q. Cao, J. A. Stankovic, S. H. Son, and T. Abdelzaher. An Overview of the VigilNet Architecture. In Proc. of the 11th IEEE Intl. Conf. on Embedded and Real-Time Computing Systems and Applications, Aug., 2005 (Invited paper).
 - [11] T. He, Q. Cao, L. Luo, T. Yan, L. Gu, J. A. Stankovic, and T. F. Abdelzaher. (Demo Abstract) Electronic Tripwires for Power-Efficient Surveillance and Target Classification, In Second ACM Conference on Embedded Networked Sensor Systems (SenSys'04), Nov. 2004
 - [12] T. He, S. Krishnamurthy, J. Stankovic, T. Abdelzaher, L. Luo, T. Yan, L. Gu, J. Hui and B. H. Krogh. An Energy-Efficient Surveillance System Using Wireless Sensor Networks. The 2nd Intl. Conf. on Mobile Systems, Applications, and Services (Mobisys'04), June, 2004. (Acceptance ratio: 13.4%)
 - [13] T. Abdelzaher, B. Blum, D. Evans, J. George, S. George, L. Gu, T. He, C. Huang, P. Nagaraddi, S. H. Son, P. Sorokin, J. A. Stankovic, and A. Wood. EnviroTrack: Towards an Environmental Computing Paradigm for Distributed Sensor Networks. In Proc. of the 24th IEEE Intl. Conf. on Distributed Computing Systems (ICDCS'04), Mar., 2004. (Acceptance ratio: 17%)
 - [14] K. Sullivan, L. Gu and Y. Cai. Non-modularity in Aspect-Oriented Languages: Integration as a Crosscutting Concern for AspectJ. In Proc. of the 1st Intl. Conf. on Aspect-Oriented Software Development. (AOSD'02), Apr., 2002.

Selected journal papers

- [15] P. Vicaire, T. He, T. Yan, Q. Cao, G. Zhou, L. Gu, L. Luo, R. Stoleru, J. A. Stankovic, and T. Abdelzaher. Achieving Long-Term Surveillance in VigilNet. To appear in TOSN in 2008
- [16] T. He, P. A. Vicaire, T. Yan, L. Luo, L. Gu, G. Zhou, R. Stoleru, Q. Cao, J. A. Stankovic, and T. Abdelzaher. Achieving Real-Time Target Tracking Using Wireless Sensor Networks. ACM Transaction on Embedded Computing System (TECS), 2007
- [17] T. He, S. Krishnamurthy, L. Luo, T. Yan, L. Gu, R. Stoleru, G. Zhou,, Q. Cao, P. Vicaire, J. A. Stankovic and T. F. Abdelzaher. VigilNet: An Integrated Sensor Network System for Energy-Efficient Surveillance. ACM Transactions on Sensor Networks (TOSN), 2005.
- [18] **L. Gu** and J.A.Stankovic. Radio-Triggered Wake-Up for Wireless Sensor Networks. Real-Time Systems, Springer, Vol. 29, No. 2-3, Mar., 2005, pp 157 – 182.
- [19] **L. Gu**, A. Pan, J. Sun and Y. Cui. An Analysis of Internet Secure Session and the Proving of a

Simplified Model. Computer Applications, Sept., 1999

Miscellaneous

- [20] **L. Gu** and J. A. Stankovic. *t-kernel*: a Translative OS Kernel for Sensor Networks, UVA CS Tech Report CS-2005-09, 2005
- [21] **L. Gu**. Virtualizing Operating System for Wireless Sensor Networks, PhD Dissertation, University of Virginia, Aug., 2006
- [22] **L. Gu**. Information Retrieval and Automatic Feature Set Construction for Text Classification. Master Thesis, Peking University, July, 2001
- [23] **L. Gu**, T. Yan, L. Luo, T. He, J. A. Stankovic, and Sang H. Son. The Extended VigilNet: Spatiotemporal Processing for Fine-Granularity Classification with Unsophisticated Hardware, to be submitted to the Transactions on Sensor Networks

EXPERIENCE

2008–present **Hong Kong University of Science and Technology, Hong Kong**

- ◆ Assistant Professor

2006–2008 **Google Inc., Mountain View, CA**

- ◆ Software engineer, working on backend server systems.

2001–2006 **Graduate Research Assistant at the Real-Time & Embedded Lab, Univ. of Virginia**

- ◆ Designed *t-kernel*, a new OS kernel for sensor networks and general embedded systems. Implemented on MICA2 motes (8-bit MCU, 4K RAM, no protection or privilege hardware), the *t-kernel* provides 64K virtual data memory, OS protection, and preemptive priority scheduling without relying on traditional hardware support. The corresponding paper won the Best Paper Award of SenSys'06.
- ◆ Led a team to design and deploy the Extended VigilNet – a large-scale, self-organizing surveillance sensor network that detects and classifies people, people with ferrous objects, small vehicles, and large vehicles. Deployed and field-tested in California, this system is, to date, the most sophisticated sensor network built with Mote-class devices.
- ◆ Helped in teaching several graduate-level courses and mentored an undergraduate student for his final project and thesis.
- ◆ Developed a number of middleware services for the NEST (Networked Embedded System Technology) project sponsored by DARPA. Designed and implemented a reliable data-link protocol, a TDMA based collision-free MAC protocol, multiple sensing algorithms, and a hierarchical sensing and classification architecture.
- ◆ Invented a radio-triggered wake-up mechanism to eliminate the periodic listening in many power management schemes. It saves a significant portion of energy in a low-power network and the corresponding hardware is being developed. The corresponding paper won the Best Student Paper Award in RTAS'04.
- ◆ Designed *vdb*, a set of debugging tools for TinyOS developers. The *vdb* is free of TinyOS (nesC) wiring and can be used anywhere in TinyOS modules.

1998–2001 **Founder Research Group, Beijing Institute of Computer Science & Technology of Peking University**

- ◆ Conducted research on information retrieval and network security. Designed and implemented a text classification system for articles in any natural language (tested with Chinese). Its performance is the best among reported results – both the Recall and Precision are higher than 98%.
- ◆ Helped in teaching and supervising undergraduate thesis work.

1998 **Microsoft Corp., Shanghai**

Technical support engineer for Microsoft SQL Server, Transaction Server, Message Queue

Server, OLAP (PLATO) Server and Cluster Server. Responsibilities included source-code level understanding and debugging of major enterprise products (e.g., SQL Server), and production system performance tuning for key customers.

1996–1997 Huatek Software Engineering Co. Ltd., Shanghai
Developed commercial software with SQL on Oracle/PeopleSoft.

1993–1996 OSI Conformance Testing Lab.
Network Information Engineering Center of Fudan University, Shanghai
As an undergraduate RA, developed network protocols and hardware drivers for a Distributed SCADA (Supervisory Control And Data Acquisition) system.

PROFESSIONAL TALKS

- ◆ “Reliable System Software for Function-Rich Sensor Networks”, invited talk at City University of Hong Kong, Aug., 2008
- ◆ “Construct Useful and Reliable Wireless Sensor Networks”, invited talk at Shanghai Jiao Tong University, July, 2008
- ◆ “Make a Sensor Net Work”, invited talk at the Department of Computer Science and Electrical Engineering, University of Maryland at Baltimore County, Baltimore, MD, Sept., 2005
- ◆ Multiple paper presentations at SenSys’06, SenSys’05, RTAS’04
- ◆ Multiple demo and poster presentations at SenSys’06, SOSP’05
- ◆ Talks on my research work at Microsoft Research, AT&T Labs, SUNY Stony Brook, and University of Iowa.

PROFESSIONAL SERVICES

- ◆ Program committee member of the following conferences: ICPADS’08, ICDCS’08, SUTC’08, ICDE’08, INSS’09
- ◆ Reviewer of the following journals: the ACM Transactions on Sensor Networks (TOSN), the IEEE transactions on Wireless Communications
- ◆ Reviewer of the following conferences: InfoCom’08, SUTC’08, ICSS’07, the IEEE Real-Time Systems Symposium (RTSS’05), the IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA’06), the ACM Transactions on Computing Systems (TECS)
- ◆ Member of ACM and IEEE

TEACHING EXPERIENCE

- ◆ Lecture material preparation for “Wireless Sensor Networks”, UVa, 2004
- ◆ Lecture material preparation for “Operating Systems”, UVa, 2003
- ◆ Teaching assistant for “the C/C++ programming languages”, UVa, 2002
- ◆ Teaching assistant for “Compiler Development”, Peking University, 2000
- ◆ Mentor of undergraduate students’ thesis work at Peking University and UVa

SOFTWARE RELEASES

- ◆ *t-kernel* for MICA2: An OS kernel for energy-and-cost-efficient platforms. It supports 64KB virtual data memory, OS protection, and preemptive priority scheduling on MICA2 family Motes. Binary release is scheduled in early 2007.
- ◆ *vdb*: Debug utilities for TinyOS. Used by Mica2 developers in the U.S., France, China, Korea, and Poland
- ◆ **VigilNet** (as a key contributor): A robust, self-organizing, wireless sensor network for long-term surveillance and target classification, consisting of 40,000 lines of code running on ExScal

- (XSM) motes (MICA2-class devices).
- ◆ **S-PRIME**: TDMA collision-free MAC protocol on TinyOS.
 - ◆ **EnviroLog** (as a contributor): Event capture and replay service used for debugging, tuning, and loyal simulation with real-world sensor readings.
 - ◆ **Magnetic classifier**: Magnetic sensing and classification module. Used by Berkeley Mote developers including groups at U.C. Berkeley and CMU.
 - ◆ **Middleware** implementation on TinyOS/Mote: Reliable One-Hop Data-Link Protocol, MIR driver, Regional Collaborative Detection and Classification