

WenZhan Song

Assistant Professor, Computer Science
Director, Sensorweb Research Lab
Washington State University, Vancouver, WA
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RESEARCH INTEREST

Distributed Systems, Embedded Systems
Wireless Networks, Sensor Networks, Sensor Web Services
Algorithm Design and Analysis

EDUCATION

Illinois Institute of Technology **Chicago, IL**
Ph.D. of Computer Science, May 2005
Emphasis: network algorithms and protocols design in distributed systems, specifically peer-to-peer technology, wireless ad hoc and sensor networks.
Thesis: Energy Efficient Wireless Networks
Advisor: Dr. Xiang-Yang Li

Nanjing University of Science & Technology **Nanjing, China**
Master of Physical Science, December 1999
Emphasis: image processing and pattern recognition.
Thesis: Auto-Reading on Shadowed Films
Advisor: Dr. Shi-Lun Zeng
Bachelor of Computer Science, July 1997

FUNDING

(PI) "**Optimized Autonomous Space - In-situ Sensorweb**" (\$1,628,979 over 3 years: **January 2007- December 2009**), NASA ROSES Advanced Information Systems Technology Program (with B. Shirazi, S. Chien, R. LaHusen, S. Kedar and F. Webb)

(PI) "**Smart Sensor Network for Volcano Monitoring**" (\$5,000 over 1 year: **June 2006 – May 2007**), WSU Vancouver Research Mini-Grant

PUBLICATIONS

Journal Articles

Wen-Zhan Song, Yu Wang, Changhua Wu and Xiang-Yang Li
Multihop Scatternet Formation and Routing for Large Scale Bluetooth Networks,
The International Journal of Ad Hoc and Ubiquitous Computing, 2008

Wen-Zhan Song, Fenghua Yuan, Richard LaHusen and Behrooz Shirazi
Time-Optimum Packet Scheduling for Many-to-One Routing in Wireless Sensor Networks,
The International Journal of Parallel, Emergent and Distributed Systems, 2007

Wen-Zhan Song, Weizhao Wang and Kousha Moaveni-Nejad
Lifetime-Maximized Cluster Association in Two-Tiered Wireless Sensor Networks,
Wireless Communications and Mobile Computing Journal, WILEY (**WCMC**), 2007

Wen-Zhan Song, Xiang-Yang Li, Ophir Frieder, Weizhao Wang

Localized Topology Control for Unicast and Broadcast in Wireless Ad hoc Networks
IEEE Transaction on Parallel and Distributed Systems (**IEEE TPDS**), Vol. 17, No. 4, April 2006

Xiang-Yang Li, Wen-Zhan Song and Yu Wang

Localized Topology Control for Heterogeneous Wireless Sensor Networks
ACM Transactions on Sensors Networks (**ACM TOSN**), Vol. 2, No. 1, February 2006

Wen-Zhan Song, Yu Wang, Xiang-Yang Li, Ophir Frieder

Localized Algorithms for Energy Efficient Topology in Wireless Ad Hoc Networks,
ACM/Kluwer Mobile Network and Applications (**ACM MONET**), Volume 10, number 6, Pages 911-923, October 2005.

Xiang-Yang Li, Yu Wang, Wen-Zhan Song

Applications of k-Local MST for Topology Control and Broadcasting in Wireless Ad Hoc Networks,
IEEE Transaction on Parallel and Distributed Systems (**IEEE TPDS**), Vol. 15, No.12, December 2004

Wen-Zhan Song, Xiang-Yang Li, Yu Wang, WeiZhao Wang

dBlue: Low Diameter and Self-Routing Bluetooth Scatternet,
Elsevier Journal of Parallel and Distributed Computing (**JPDC**), Volume 65, Issue 2, Pages 178-190, February 2005

Kousha Moaveninejad, Wen-Zhan Song, Xiang-Yang Li

Robust position-based routing for wireless ad hoc networks,
Elsevier Journal of Ad Hoc Networks (**ADHOC**), Vol 3, Issue 5, Pages 546-560, September 2005

Xiang-Yang Li, Wen-Zhan Song, Yu Wang

Efficient Topology Control for Wireless Ad Hoc Networks with Non-uniform Transmission Ranges,
ACM Wireless Networks (**ACM WINET**), Vol. 11, No. 3, May 2005.

Book Chapters

Yu Wang, Wen-Zhan Song, Xiang-Yang Li

Scatternet formation and Self-Routing in Bluetooth Networks,
Book Chapter of "Wireless LANs and Bluetooth", Nova Science Publishers 2005

Xiang-Yang Li, Wen-Zhan Song

CDMA Code Assignment in Wireless Ad hoc Networks,
Book chapter in "Design and Analysis of Wireless Networks", Nova Science Publishers 2004.

Conference Papers

Fenghua Yuan, Wen-Zhan Song, Nina Peterson, Yang Peng, Lei Wang, Behrooz Shirazi, Rick LaHusen

Design of Lightweight and Transparent Sensor Network Management System
Fourth IEEE International Workshop on Sensor Networks and Systems for Pervasive Computing (**IEEE PerSeNS 2008**)

WenZhan Song, Behrooz Shirazi, Rick Lahusen, Sharon Kedar, Steve Chien, Frank Webb, John Pallister, Dan Dzurisin, Seth Moran, Mike Lisowski, Danny Tran, Ashley Davis, David Pieri

Optimized Autonomous Space In-situ Sensor-Web for Volcano Monitoring
IEEE Aerospace 2008

Animesh Dalakoti, Nina Picone, Behrooz A. Shirazi, Wen-Zhan Song and Ali Hurson
Priority-based Network Quality of Service
The 10th International Conference on Computer Science & Informatics (**CSI 2007**)

Weizhao Wang, Wen-Zhan Song, Xiang-Yang Li and Kousha Moaveni-Nejad
Optimal Cluster Association in Two-Tiered Wireless Sensor Networks
The 3rd IEEE International Conference on Distributed Computing in Sensor Systems (**IEEE DCOSS 2007**)

WenZhan Song, Behrooz Shirazi, Rick LaHusen, Steve Chien, Sharon Kedar, Frank Webb
An Optimized Autonomous Space In-situ Sensorweb (OASIS) for Volcano Monitoring The American Geophysical Union Fall Meeting (**AGU 2006**)

Weizhao Wang, Yu Wang, Xiang-Yang Li and Wen-Zhan Song
Efficient Interference-Aware Link Scheduling for Wireless Networks
The Twelfth Annual International Conference on Mobile Computing and Networking (**ACM MOBICOM 2006**) (*acceptance ratio 12%: 35 out of 298*)

Yu Wang, Wen-Zhan Song, Weizhao Wang, Xiang-Yang Li and Ophir Frieder
LEARN: Localized Energy Aware Restricted Neighborhood Routing for Ad Hoc Networks
The Third Annual IEEE Communications Society Conference on Sensor and Ad Hoc Communications and Networks (**IEEE SECON 2006**)

Wen-Zhan Song, Fenghua Yuan and Richard LaHusen
Time-Optimum Packet Scheduling for Many-to-One Routing in Wireless Sensor Networks
The Third IEEE International Conference on Mobile Ad-hoc and Sensor Systems (**IEEE MASS 2006**). (*acceptance ratio 25%: 49 out of 197*)

Wen-Zhan Song and Xiang-Yang Li
Hierarchical Self-routing Scatternet for Multihop Bluetooth Networks
IEEE Consumer Communications & Networking Conference (**IEEE CCNC 2006**)

Xiang-Yang Li, Wen-Zhan Song, Weizhao Wang
A Unified Energy-Efficient Topology for Unicast and Broadcast,
The Eleventh Annual International Conference on Mobile Computing and Networking (**ACM MOBICOM 2005**). (*accept ratio 10.2%: 23 out of 224*) (**Best Paper Candidate**)

Xiang-Yang Li, Kousha Moaveni-Nejad, Wen-Zhan Song and Weizhao Wang
Interference-Aware Topology Control for Wireless Sensor Networks,
The Second Annual IEEE Communications Society Conference on Sensor and Ad Hoc Communications and Networks (**IEEE SECON 2005**). (*accept ratio 25%: 55 out of 202*)

Wen-Zhan Song, Yu Wang, Xiang-Yang Li, Ophir Frieder
Localized Algorithms for Energy Efficient Topology in Wireless Ad Hoc Networks,
The Fifth ACM International Symposium on Mobile Ad Hoc Networking and Computing (**ACM MOBIHOC 2004**). (*acceptance ratio 10.3%: 24 out of 233*)

Xiang-Yang Li, Yu Wang, Peng-Jun Wan, Wen-Zhan Song, and Ophir Frieder
Localized Low-Weight Graph and Its Applications in Wireless Ad Hoc Networks,
IEEE INFOCOM 2004. (*acceptance ratio 18.3%: 261 out of 1420*)

Wen-Zhan Song, Xiang-Yang Li
CBRRain: Provide Content Based Routing Service Over Internet Backbone,
The Thirteenth IEEE International Conference On Computer Communications And Networks (**IEEE ICCCN 2004**). (*acceptance ratio 35%: 73 out of 207*)

Xiang-Yang Li, Wen-Zhan Song, Yu Wang
Localized Topology Control for Heterogenous Wireless Ad Hoc Networks,

The First IEEE International Conference on Mobile Ad-hoc and Sensor Systems (**IEEE MASS 2004**). (*acceptance ratio 25%: 52 out of 207*)

Kousha Moaveninejad, Wen-Zhan Song, Xiang-Yang Li

Position-based Routing for Heterogeneous Wireless Ad Hoc Networks
WWAM04 workshop of **IEEE ICDCS 2004**.

Wen-Zhan Song, Xiang-Yang Li, Yu Wang and WeiZhao Wang

dBBBlue: Low Diameter and Self-Routing Bluetooth Scatternet,
ACM DialM-POMC, 2003.

WeiZhao Wang, Xiang-Yang Li, Kousha Moaveni-Nejad, Yu Wang and Wen-Zhan Song

The Spanning ratios of Beta-Skeletons,
Canadian Computational Conference on Geometry (**CCCG**), 2003.

SERVICES

- Organizer

Co-Chair, The workshop on Smart Sensing and Situation Awareness in Sensor Networks, in conjunction with the 4th IET International Conference on Intelligent Environments.

Publicity chair, The 3rd International Conference on Algorithmic Aspects in Information and Management

- Program Committee Member:

IEEE ICC 2007, IEEE MASS 2006-2007, IEEE GlobeCOM 2006-2007, IEEE PerCom 2006

- Reviewer of Journals:

IEEE Transaction on Mobile Computing, ACM Wireless Networks, IEEE Sensors Journal
IEEE Transaction of Parallel and Distributed Systems

- Coordinator of the MPA program for Chinese government officials in Chicago

EMPLOYMENT

2005-present Washington State University

Vancouver, WA

Assistant Professor

- Research focusing on smart sensor networks, including system robustness, situation awareness, cross-layer design and middleware design.

- PI of 1.6M NASA OASIS (Optimized Autonomous Space - In-situ Sensorweb) research project, involving computer scientists (Washington State University), space scientists (NASA Jet Propulsion Laboratory (JPL)), and Earth scientists (USGS Cascade Volcano Observatory (CVO)), to develop a prototype dynamic and scaleable hazard monitoring sensor-web and apply it to volcano monitoring. The combined Optimized Autonomous Space - In-situ Sensorweb (OASIS) will have two-way communication capability between ground and space assets, use both space and ground data for optimal allocation of limited power and bandwidth resources on the ground, and use smart management of competing demands for limited space assets.

2001-2005 Illinois Institute of Technology

Chicago, IL

Research Assistant

- Conducted research and development on distributed algorithms for wireless ad hoc and sensor networks, focusing on energy conservation (topology control, optimizing sensor networks), network capacity (spectrum reuse) and routing (position-based routings and data-centric routing) related issues.

- Proposed an innovative architecture for peer-to-peer networks to improve the search efficiency and increase the security. The core idea aims to provide an efficient mechanism to search and share real-time information in networks.

Teaching Assistant

- Graduate courses: Cryptography and Network Security, Project Management, Introduction to Advanced Studies.

- Undergraduate courses: Computer Organization and Assembly Language, Discrete Structures.

2004 Summer Lucent Technologies**Lisle/Naperville, IL****Summer Internship – Lucent Worldwide Service**

- Designed the automation tools for cellular wireless system deployment. It takes the system snapshot from tens of MM-APs (Mobility Management Application Processor) in Lucent MSC simultaneously then analyzes the system status intelligently. It saves 99% percent time for baseline documentation, troubleshooting and translation comparison.
- Designed the framework for International system snapshot data center, using Perl and JavaScript. It accommodates all kind of system snapshot with a well-organized interface, such as from OMPs (Operation and Management Platform), ECPs (Executive Cellular Processor) and MM-APs (Application Processors).

1999-2001 Alcatel Shanghai Bell Co.LTD**Shanghai, China****Software System Engineer**

- Participated in designing the system architecture for Multiservice Switch server - Matix2000[®], which integrated various Internet access services (including Dial-up, ISDN) and value-added services (including VPDN, callback, AODI) into a robust platform.
- Developed embedded system software with C/C++ under VxWorks and Tornado, which implemented various network protocols and telecom standards. The software has been integrated into Multiservice Switch Product - Matix2000[®].
- Represented Shanghai Bell and worked together with other top telecom manufacture delegates to formulate *China Telecom Equipment Standard*.

1997-1999 Jiangsu Intrasoft Network Co.LTD**Nanjing, China****Software Engineer**

- Implemented various firewall and packet filtering standards for network security product – StopHacker[®], which includes intruding detection and network monitoring function.
- Designed the script language interpreter for InterPower[®] – a software platform for developing web-based database applications.

COLLABORATORS

Matt Welsh, Computer Scientist, Harvard University

Steve Chien, Computer and Space Scientist, Jet Propulsion Laboratory, NASA

Richard Lahusen, Earth Scientist, Cascades Volcano Observatory, USGS

Sharon Kedar, Geophysicist, Jet Propulsion Laboratory, NASA

Frank Webb, Geophysicist, Jet Propulsion Laboratory, NASA

Daniel Dzurisin, Geophysicist, Cascades Volcano Observatory, USGS

John Pallistor, Geologist, Cascades Volcano Observatory, USGS

Seith Moran, Seismologist, Cascades Volcano Observatory, USGS

Mike Lisowski, Geophysicist, Cascades Volcano Observatory, USGS

Behrooz Shirazi, Chair Professor of Computer Science, Washington State University

Ophir Frieder, Chair Professor of Computer Science, Illinois Institute of Technology

Xiang -Yang Li, Associate Professor of Computer Science, Illinois Institute of Technology

Peng-Jun Wan, Associate Professor of Computer Science, Illinois Institute of Technology

Yu Wang, Assistant Professor of Computer Science, University of North Carolina at Charlotte

Suresh Singh, Professor of Computer Science, Portland State University

Others

- Honored as “Best Chinese PhD Student” (40 in US, 200 worldwide), by Ministry of Education, China, 2004.
- Fluent in English and Mandarin Chinese
- Member of ACM, IEEE and AGU

REFERENCES

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