

YI CUI

CONTACT INFORMATION

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RESEARCH SUMMARY

Distributed systems and computer networks with a focus on overlay network, peer-to-peer system, multimedia system, ubiquitous computing, and wireless network.

EDUCATION

- Aug 1999 – Aug 2005* *University of Illinois at Urbana-Champaign* *Urbana, IL*
Ph.D. in Computer Science
- Dissertation: “Content Distribution in Overlay Multicast”
Advisor: Klara Nahrstedt
- Aug 1997 – May 1999* *Tsinghua University* *Beijing, China*
M.S. in Computer Science
- Dissertation: “A 3D Ultrasonic Visualization System for Medical Diagnosis and Surgery Simulation”
Advisor: Long Tang
- Aug 1992 – May 1997* *Tsinghua University* *Beijing, China*
B.S. in Computer Science

EMPLOYMENT

- Aug 2005 – present* *Vanderbilt University* *Nashville, TN*
Assistant Professor of Computer Science in the Department of Electrical Engineering and Computer Science

RESEARCH EXPERIENCE

- May 2004 – Aug 2004* *Research Intern* *Microsoft Research, Redmond*
- Mentor: Jin Li
- PeerStreaming: Design and Implementation of an On-demand Distributed Streaming System
Designed and implemented a peer-to-peer streaming system. Employing the digital rights management technology, the system was able to combat the copyright violence, the most serious problem in peer-to-peer system.
- May 2000 – Aug 2005* *Research Assistant* *Department of Computer Science, University of Illinois*
- Advisor: Klara Nahrstedt
- Layered Peer-to-Peer Streaming
Proposed and developed a scalable media distribution solution in peer-to-peer networks. Considering the heterogeneity of end host resource capabilities, the media stream is divided and distributed among peer hosts as layered substreams. Each host with constrained bandwidth can still recover the signal with certain quality degradation, by receiving a subset of all layers.

- Price-based Resource Allocation in Overlay Multicast
Based on non-linear optimization theory, proposed a price-based resource allocation scheme for overlay multicast. In this solution, end nodes adjust their sending and receiving rates independently by exchanging pricing signals. The solution can be implemented in an entirely distributed fashion, and guarantee to converge to the optimal point, where the aggregated utility of all receivers is maximized.
- Middleware Solution for QoS-aware Ubiquitous Multimedia Service Delivery
Proposed a QoS-aware dependency management scheme for component-based systems, which dynamically and automatically adjusts the system configuration based on the end host and network resource availabilities. This scheme was built into *MobiMan*, a middleware system supporting configurable multimedia service delivery in the ubiquitous computing environment.

TEACHING EXPERIENCE

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| <i>Aug 2005 – Dec 2005</i> | <i>Assistant Professor</i> | <i>Department of EECS, Vanderbilt University</i> |
| <ul style="list-style-type: none"> ■ CS395-1: Special Topics in Multimedia Applications and Systems (11 graduate students enrolled) | | |
| <i>Jan 2000 – May 2000</i> | <i>Teaching Assistant</i> | <i>Department of Computer Science, University of Illinois</i> |
| <ul style="list-style-type: none"> ■ CS273: Introduction to Theory of Computation | | |
| <i>Aug 1999 – Dec 1999</i> | <i>Teaching Assistant</i> | <i>Department of Computer Science, University of Illinois</i> |
| <ul style="list-style-type: none"> ■ CS101: Introduction to Computing with Application to Engineering and Physical Science | | |

HONORS AND AWARDS

- Student Travel Grant, awarded by the programming committee of HPDC 2001
- Excellent Graduate Student Scholarship, awarded by Tsinghua University, 1998.
- Excellent B.S. Thesis, awarded by Tsinghua University, 1997.
- Excellent Student Scholarship, awarded by Tsinghua University, 1994–1996.

PUBLICATIONS

REFERED JOURNAL/MAGAZINE PUBLICATIONS

1. **Yi Cui**, Yuan Xue, and Klara Nahrstedt, “A Utility-based Distributed Maximum Lifetime Routing Algorithm for Wireless Networks”, to appear in *IEEE Transactions on Vehicular Technology*, Special Issue on Cross-layer Design in Mobile Ad hoc Networks and Wireless Sensor Networks, 2005.
2. **Yi Cui**, Yuan Xue, and Klara Nahrstedt, Optimal Resource Allocation in Overlay Multicast, to appear in *IEEE Transactions on Parallel and Distributed Systems*, 2005.
3. Klara Nahrstedt, Bin Yu, Jin Liang, and **Yi Cui**, Hourglass Content and Service Composition Framework for Pervasive Environments, *Elsevier Pervasive and Mobile Computing*, vol. 1, no. 1, 2005.
4. **Yi Cui**, Baochun Li, and Klara Nahrstedt, oStream: Asynchronous Streaming Multicast in Application-Layer Overlay Networks, *IEEE Journal on Selected Areas in Communications*, Special Issue on Recent Advances in Service Overlays, vol. 22, no. 1, 2004.
5. **Yi Cui**, Klara Nahrstedt, and Dongyan Xu, Seamless User-level Handoff in Ubiquitous Multimedia Service Delivery, *Multimedia Tools and Applications Journal (ACM/Kluwer)*, Special Issue on Mobile Multimedia and Communications and m-Commerce, vol. 22, no. 2, 2004.
6. **Yi Cui**, Yuan Xue, and Klara Nahrstedt, Optimal Distributed Multicast Routing using Network Coding: Theory and Applications, *ACM SIGMETRICS Performance Evaluation Review*, vol. 32, 2004.
7. Yuan Xue, **Yi Cui**, and Klara Nahrstedt, Maximizing Lifetime for Data Aggregation in Wireless

Sensor Networks, to appear in ACM/Kluwer Journal of Mobile Networks and Applications, Special Issue on Energy Constraints and Lifetime Performance in Wireless Sensor Networks, 2004.

REFERRED CONFERENCE/WORKSHOP PUBLICATIONS

8. Yuan Xue, Yi Cui, and Klara Nahrstedt, “A Utility-based Distributed Maximum Lifetime Routing Algorithm for Wireless Networks”, to appear in Proc. of International Conference on Quality of Service in Heterogeneous Wired/Wireless Networks (Qshine), Orlando, FL, August, 2005.
9. **Yi Cui**, Yuan Xue, and Klara Nahrstedt, Optimal Distributed Multicast Routing using Network Coding: Theory and Applications, in Proc. of ACM Workshop on MAThematical performance Modeling and Analysis (MAMA, in conjunction with SIGMETRICS), New York, NY, June, 2004.
10. **Yi Cui**, Baochun Li, and Klara Nahrstedt, On Achieving Optimized Capacity Utilization in Application Overlay Networks with Multiple Competing Sessions, in Proc. of ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), Barcelona, Spain, June, 2004.
11. **Yi Cui**, Yuan Xue, and Klara Nahrstedt, Max-min Overlay Multicast: Rate Allocation and Tree Construction, in Proc. of IEEE International Workshop on Quality of Service (IwQoS), Montreal, Canada, June, 2004. (acceptance ratio: 19%)
12. **Yi Cui**, Yuan Xue, and Klara Nahrstedt, Optimal Resource Allocation in Overlay Multicast, in Proc. of IEEE International Conference on Network Protocols (ICNP), Atlanta, GA, November, 2003. (acceptance ratio: 13%)
13. **Yi Cui** and Klara Nahrstedt, Layered Peer-to-Peer Streaming, in Proc. of ACM International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV), Monterey, CA, June, 2003. (acceptance ratio: 30%)
14. **Yi Cui** and Klara Nahrstedt, Proxy-based Asynchronous Multicast for Efficient On-demand Media Distribution, in Proc. of SPIE Multimedia Computing and Networking (MMCN), Santa Clara, CA, January, 2003.
15. **Yi Cui** and Klara Nahrstedt, Supporting QoS for Ubiquitous Multimedia Service Delivery, in Proc. of ACM Multimedia (Doctoral Symposium), Ottawa, Canada, November, 2001.
16. **Yi Cui** and Klara Nahrstedt, QoS-Aware Dependency Management for Component-Based Systems, in Proc. of IEEE International Symposium on High Performance Distributed Computing (HPDC), San Francisco, CA, August, 2001.
17. **Yi Cui**, Dongyan Xu, and Klara Nahrstedt, SMART: A Scalable Middleware Solution for Ubiquitous Multimedia Service Delivery, in Proc. of IEEE International Conference on Multimedia and Expo (ICME), Tokyo, Japan, August, 2001.

MANUSCRIPTS UNDER REVIEW

18. **Yi Cui**, Baochun Li, and Klara Nahrstedt, On Achieving Optimized Capacity Utilization in Application Overlay Networks with Multiple Competing Sessions, submitted to IEEE/ACM Transactions on Networking.
19. Jin Li and **Yi Cui**, PeerStreaming: Design and Implementation of an On-demand Distributed Streaming System, submitted to IEEE Transactions on Multimedia.

PATENT

1. Jin Li and Yi Cui, A Digital Rights Management Scheme for On-demand Distributed Streaming System, MS No. 309614.1, a continuation-in-part of U.S. patent application serial no. 10/934,823, filed on September 3, 2004.

2. Jin Li and Yi Cui, A Random Access Read/Write Media Format for an On-demand Distributed Streaming System, MS No. 312385.1, a continuation-in-part of U.S. patent application serial no. 10/934,823, filed on September 3, 2004.

PROFESSIONAL ACTIVITIES AND SERVICES

- Member
IEEE and ACM
- TPC Member
IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks 2006
- External Referees for Conferences and Journals
IEEE Wireless Communications Magazine, IEEE Transactions on Multimedia, Multimedia Tools and Applications Journal, IEEE Transactions on Networking, IEEE Transactions on Parallel and Distributed Systems, IEEE Networking Magazine
INFOCOM 2003, ICDCS 2003, ICME 2001–2002, ICNP 2002, IwQoS 2001–2003, ACM Multimedia 2001–2003, ICC 2003–2004, Middleware 2003, SIGMETRICS 2004, PerCom 2004
- Session Chair
SPIE Multimedia Computing and Networking (MMCN 2003).