

# KYOUNGWON SUH

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## RESEARCH INTERESTS

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My research interests are in the area of Computer Networks and Distributed Systems. More specifically, I am interested in network measurement and inference, overlay and peer-to-peer networks, multimedia streaming, network modeling and performance evaluation.

## EDUCATION

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- **Ph.D. in Computer Science** **September, 2007**  
UNIVERSITY OF MASSACHUSETTS, AMHERST Amherst, MA  
Thesis Title: Monitoring, Measurement, and Control of Multimedia Traffic in IP Networks  
Advisors: Prof. Jim Kurose and Prof. Don Towsley  
Committee: Prof. Jim Kurose, Prof. Don Towsley, Prof. Prashant Shenoy, and Prof. Lixin Gao
- **Master of Science (M.S.) in Computer Science** **October, 2000**  
RUTGERS UNIVERSITY Piscataway, NJ
- **Master of Science (M.S.) in Computer Engineering** **February, 1993**  
SEOUL NATIONAL UNIVERSITY Seoul, Korea
- **Bachelor of Science (B.S.) in Computer Engineering** **February, 1991**  
SEOUL NATIONAL UNIVERSITY Seoul, Korea

## PROFESSIONAL EXPERIENCE

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- **Tenure-track Assistant Professor** **August'07 -**  
**School of Information Technology** Illinois State University, Normal, IL
- **Senior Research Engineer** **October'96-August'98**  
**Media & Communication Laboratory** LG Electronics, Korea
- **Research Engineer** **February'93-October'96**  
**Media & Communication Laboratory** LG Electronics, Korea

## PUBLICATIONS

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### Journal Papers

1. **Kyoungwon Suh**, Christophe Diot, Jim Kurose, Laurent Massoulie, Christoph Neumann, Don Towsley, Matteo Varvello, "Push-to-Peer Video-on-Demand system: design and evaluation", *IEEE Journal on Selected Areas in Communications (JSAC)*, pp. 1706-1716, December, 2007.
2. Yang Guo, **Kyoungwon Suh**, Jim Kurose, Don Towsley, "DirectStream: A directory-based peer-to-peer video streaming service", *Elsevier Computer communications Journal*, volume 31,

February, 2008.

3. Christoph Neumann, Nicolas Prigent, Matteo Varvello, **Kyoungwon Suh**, “Challenges in Peer-to-Peer Gaming”, *ACM SIGCOMM Computer Communication Review*, January, 2007.
4. Joongheon Kim, Wonjun Lee, Eunkyo Kim, Dongshin Kim, **Kyoungwon Suh**, “Optimized transmission power control of interrogators for collision arbitration in UHF RFID systems”, *IEEE Communications Letters*, January, 2007
5. Yang Guo, **Kyoungwon Suh**, Jim Kurose, Don Towsley, “P2Cast: peer-to-peer patching for video on demand service”, *Multimedia tools and applications Journal*, Kluwer, November, 2006.
6. **Kyoungwon Suh**, Yang Guo, Jim Kurose, Don Towsley, “Locating network monitors: complexity, heuristics, and coverage”, *Elsevier Computer communications Journal*, August, 2005. (*invited*)

#### Conference and Workshop Papers

7. Michael Zink, **Kyoungwon Suh**, Yu Gu, Jim Kurose, “Watch Global, Cache Local: YouTube network traffic at a campus network – measurements and implications”, *Multimedia Computing and Networking Conference (MMCN) sponsored by SPIE and IS&T*, January, 2008 (*best paper award; acceptance ratio for long papers: 26%*).
8. Wei Wei, **Kyoungwon Suh**, Yu Gu, Bing Wang, Jim Kurose, “Passive online rogue access point detection using sequential hypothesis testing with TCP ACK-pairs”, *ACM Internet Measurement Conference (IMC)*, October, 2007 (*acceptance ratio for long papers: 15%*).
9. **Kyoungwon Suh**, Daniel R. Figueiredo, Jim Kurose, Don Towsley, “Characterizing and detecting Skype-relayed traffic”, *IEEE INFOCOM*, April, 2006 (*acceptance ratio: 18%*).
10. **Kyoungwon Suh**, Yang Guo, Jim Kurose, Don Towsley, “Locating network monitors: complexity, heuristics, and coverage”, *IEEE INFOCOM*, March, 2005 (*acceptance ratio: 17.2%*).
11. Weifeng Chen, Yong Huang, Bruno Ribeiro, **Kyoungwon Suh**, Honggang Zhang, Edmundo de Souza e Silva, Jim Kurose, Don Towsley (*in alphabetical order*), “Exploiting the IPID field to infer network path and end-system characteristics”, *Passive and Active Measurement Workshop*, March, 2005 (*acceptance ratio: 28%*).
12. Yang Guo, **Kyoungwon Suh**, Jim Kurose, Don Towsley, “A peer-to-peer on-demand streaming service and its performance evaluation”, *IEEE International Conference on Multimedia & Expo (ICME)*, July, 2003 (*acceptance ratio: 57.9%*).
13. Yang Guo, **Kyoungwon Suh**, Jim Kurose, Don Towsley, “P2Cast: peer-to-peer patching scheme for VoD service”, *World Wide Web Conference*, May, 2003 (*acceptance ratio: 12.8%*).

#### Technical Reports

14. **Kyoungwon Suh**, “A study on the use of deterministic and non-deterministic AI techniques for fault localization problem in IP networks”, University of Massachusetts at Amherst, 2004.
15. **Kyoungwon Suh**, Thu D. Nguyen, “A practical defense against SYN Denial-of-Service attacks”, DCS-TR-452, Rutgers University, 2001.
16. **Kyoungwon Suh**, Brett J. Vickers, “A survey of application management for network management and traffic engineering”, DCS-TR-425, Rutgers University, 2000.

#### RESEARCH EXPERIENCE

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- **Research Assistant** **August’01-August’07**  
**Computer Networks Research Group**  
DEPARTMENT OF COMPUTER SCIENCE UMass Amherst

***Characterizing and Detecting Skype-relayed Traffic:*** We develop a novel method to characterize the nature of Skype relay traffic and to detect its presence in the network using the measurements collected passively at the edge of a large network. We propose several flow-level metrics to capture the nature of relay traffic, and we are able to detect Skype relay traffic traversing across the access

point of a large network using these metrics. In addition, we find that the proposed metrics can be applied more broadly in detecting relay traffic generated by other multimedia applications.

***Locating Network Monitors and Controlling their Sampling:*** We study the large network-monitoring problem. The objective is to monitor a large fraction of IP flows in a cost-effective manner by carefully placing monitors and controlling their sampling rates. To address the tradeoff between monitoring cost and monitoring coverage, we consider minimum cost and maximum coverage problems under various budget constraints. We show that all of the defined problems are NP-hard. We propose greedy heuristics, and show that the heuristics offer solutions close to the optimal through experiments using synthetic and real network topologies. In addition, our experiments show that a small number of monitors is often enough to monitor most of the traffic in an entire IP network.

***Exploiting the IPID Field to Infer Network Path and End-system Characteristics:*** In this work, we develop several new techniques which use the IPID field to infer (a) the amount of internal (local) traffic generated by a server; (b) the number of servers in a large-scale, load-balanced server complex; and (c) the difference between one-way delays of two machines to a target computer. We validate the use of these techniques through empirical measurement studies.

***Passive Online Rogue Access Point Detection:*** In this work, we propose online algorithms to detect rogue access points (unauthorized wireless access points) using sequential hypothesis tests applied to passively-measured packet header data collected at a gateway. The online algorithms utilize a TCP ACK-pair technique that we develop to passively differentiate wired and wireless LAN TCP traffic. Depending on whether training sets are available, we propose two sequential hypothesis tests: one with training and the other without training. Extensive experimental validations in various scenarios and over hosts with various operating systems demonstrate the excellent performance of our approach.

***Pull-based Peer-to-Peer Video-on-Demand services:*** In this work, we propose the P2Cast and Directstream architectures that use peer-to-peer approaches to cooperatively stream video using patching techniques, while only relying on unicast connections among peers. We address the following two key technical issues in P2Cast and Directstream: (1) constructing an application overlay appropriate for streaming; and (2) providing continuous stream playback (without glitches) in the face of disruption from an early departing client.

- **Research Intern** **March'06-July'06**  
**Thomson Paris Research Lab** Thomson, France

***Push-to-Peer Video on Demand system:*** We propose the Push-to-Peer architecture, a peer-to-peer approach to cooperatively stream video. The main departure from previous work is that content is proactively pushed to peers, and persistently stored before the peer-to-peer transfers begin. The initial content placement increases content availability and improves use of peer uplink bandwidth. Our specific contributions are: (i) content placement and associated pull policies that allow optimal use of uplink bandwidth and perfect balancing of download rates among competing downloads; (ii) performance analysis of such policies in the case of controlled environments such as DSL networks under ISP control; (iii) distributed load balancing strategies for initial selection of serving peers; (iv) distributed strategies to cope with dynamic uplink bandwidth.

- **Research Assistant** **September'99-June'01**  
**Networks Research Group**  
DEPARTMENT OF COMPUTER SCIENCE Rutgers, Piscataway

*Practical Network and system support for defending TCP SYN flooding attacks:* We propose an approach to defending Internet services against TCP SYN Denial-of-Service (DoS) attacks. Our approach is based on the deployment of a network of responding hosts at the connection points between edge networks and the core of the Internet. Each responding host protects some range of IP addresses and generates RST packets when it detects that an unreachable IP address it is protecting is being used as the spoofed source address of a TCP connection. These RST packets allow the victim of a SYN DoS attack to quickly drop spoofed connection requests.

- **Research Intern** **June'00-August'00**  
**Applied Research Laboratory** Telcordia Technologies, Morristown  
Developed an application-level network monitoring mechanism and investigated traffic engineering approaches in MPLS-enabled networks.
- **Research Intern** **June'99-August'99**  
**Applied Research Laboratory** Telcordia Technologies, Morristown  
Designed and implemented a Next Generation Network (NGN) Service Management System (SMS) based on LDAP interface.
- **Senior Research Engineer** **October'96-August'98**  
**Media & Communication Laboratory** LG Electronics, Korea  
Developed system software for LG smart-phones. Responsibilities included design and implementation of an embedded-kernel and SDK (software development toolkit).
- **Research Engineer** **February'93-October'96**  
**Media & Communication Laboratory** LG Electronics, Korea  
Developed a multiprocessor operating system for the SMP system with 10 Pentium processors in TICOM III Project (Jointly funded by Korean Government and industries). Responsibilities included restructuring and retargeting Unixware 2.x Kernel to a newly developed LG multiprocessor system and integrating all system software components.

## **TEACHING EXPERIENCE**

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- **Assistant Professor** **August'07 -**  
**School of Information Technology** Illinois State University, Normal, IL  
**(formerly Department of Applied Computer Science)**  
Taught undergraduate courses on operating systems, computer architecture, Java programming language, and systems analysis and design.
- **Teaching Assistant** **September'98-July'00**  
**Department of Computer Science** Rutgers University, Piscataway  
Teaching Assistant for undergraduate courses on computer architecture, computer networks, and introduction to computers and applications.
- **Primary Instructor** **June'91-July'91**  
**Education and Research Computing Center** Seoul National University, Korea  
Taught an undergraduate course on C programming language.

## **PROFESSIONAL ACTIVITIES**

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- External Reviewer for several network conferences and journals, including *IEEE/ACM Transaction on Networking*, *IEEE JSAC*, *IEEE Internet Computing*, *Elsevier Computer Networks*, *IFIP Networking 2004* and *2007*, *ACM CoNext 2006*, *NSDI 2007*, *IEEE CCNC 2007*, *IEEE INFOCOM 2008*, *ACM MOBIHOC 2008*
- Technical program committee member for CoNet-07
- Graduate certificate committee member in Illinois State University
- Member of ACM and IEEE.

## AWARDS/HONORS

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- Best paper award from SPIE/ACM MMCN conference, January, 2008.
- CRA academic careers workshop travel grant, February, 2008.
- ACM SIGCOMM student travel grant, August, 2001.
- Telcordia Technologies (formerly Bellcore) Inc. research fellowship, 9/1999-6/2001.
- LG Electronics Inc. industry academic liaison scholarship, Korea, 1991-1993.
- Excellent undergraduate student scholarship, Seoul National University, Korea, 1989-1991.
- Honorable mention in the annual student thesis contest sponsored by Korea Information Science Society, Korea, 1991.

## TALKS

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- “Monitoring, measurement, and control of multimedia traffic in IP networks”, presented at Korea University, Seoul, Korea, December, 2007. (invited)
- “Monitoring, measurement, and control of multimedia traffic in IP networks”, presented at Texas A&M University, College Station, Texas, March, 2007. (invited)
- “Characterizing and detecting Skype-relayed traffic”, presented at *IEEE INFOCOM*, Barcelona, Spain, April, 2006.
- “Characterizing and detecting Skype-relayed traffic”, presented at Avant-Premiere INFOCOM, Paris-Networking Seminar, Paris, France, April, 2006. (invited)
- “Locating network monitors: complexity, heuristics, and coverage”, presented at *IEEE INFOCOM*, Miami, Florida, March, 2005.
- “Exploiting the IPID field to infer network path and end-system characteristics”, presented at *Passive & Active Measurement Workshop*, Boston, Massachusetts, March, 2005.
- “P2Cast: Peer-to-Peer patching scheme for VoD service”, presented at *World Wide Web Conference*, Budapest, Hungary, May, 2003.

## PATENTS

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- Method and system for distributing multimedia content using push, pull and peer-to-peer downloading, patent application filed under PCT (Patent Cooperation Treaty), application Number: PCT/FR2007/050622, September, 2006.

## SOFTWARE

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- TCP flow analysis and inference tool for detecting rogue wireless access points, 2006.
- Flow analysis and inference tool for detecting Skype-relay traffic, 2005.
- Operating system kernel for TICOM III shared memory multiprocessor system, 1996.
- Distributed online bulletin board system (BBS), multi-user chat service, and weather report service provided by KETEL, one of the most popular online BBS services in late 80’s in Korea, 1989.

## SKILLS

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- Languages: C/C++, Java, Perl, assembly Language, Pascal, Fortran, MPI, SQL, HTML.

- Operating Systems: Unix, Linux and Windows.
- Tools: Matlab, CPLEX, Network Simulator.
- Protocol design and implementation; Network monitoring tool implementation, OS kernel design and implementation;
- Endace DAG Cards.

## REFERENCES

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### **Prof. Jim Kurose**

*Distinguished Professor*

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### **Prof. Chansu Yu**

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*Director*

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