

Joshua Robinson, Ph.D.

CONTACT INFORMATION

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RESEARCH INTERESTS

Network measurements, network anomaly detection, combinatorial optimization, text mining and document classification, wireless protocols, network deployment and resource provisioning, and wireless medium access protocols.

HONORS

MobiCom 2008 Best Paper Award Winner

Rice President's Fellowship, 2003-2009

PUBLICATIONS

G. Ranjan, R. Keralapura, S. Ranjan, J. Robinson, and Z. Zhang, "Mapping Cellular Data Service Network Infrastructure via Geo-intent Inference," to appear in *Proceedings of IEEE INFOCOM 2011 Mini-Conference*, Shanghai, China, April 2011.

J. Robinson, M. Singh, R. Swaminathan, and E. Knightly, "Deploying Mesh Nodes under Non-Uniform Propagation," *Proceedings of IEEE INFOCOM 2010*, San Diego, CA, March 2010.

J. Robinson, R. Swaminathan, and E. Knightly, "Assessment of Urban-Scale Wireless Networks with a Small Number of Measurements," *Proceedings of ACM MobiCom 2008*, San Francisco, CA, September 2008. (**Best Paper Award Winner**)

J. Robinson, M. Uysal, R. Swaminathan, and E. Knightly, "Adding Capacity Points to a Wireless Mesh Network Using Local Search," *Proceedings of IEEE INFOCOM 2008*, Phoenix, AZ, April 2008.

J. Robinson and E. Knightly, "A Performance Study of Deployment Factors in Wireless Mesh Networks," *Proceedings of IEEE INFOCOM 2007*, Anchorage, AK, May 2007.

J. Camp, J. Robinson, C. Steger, and E. Knightly, "Measurement Driven Deployment of a Two-Tier Urban Mesh Access Network," *Proceedings of ACM MobiSys 2006*, Uppsala, Sweden, June 2006.

J. Robinson, K. Papagiannaki, C. Diot, X. Guo, and L. Krishnamurthy, "Experimenting with a Multi-Radio Mesh Networking Testbed," *1st workshop on Wireless Network Measurements (WiN-Mee)*, Riva del Garda, Italy, April 2005.

EDUCATION

Rice University, Houston, TX

Ph.D. in Electrical and Computer Engineering, January 2009

- Thesis Title: Deployment and Assessment of Wireless Mesh Networks
- Advisor: Edward Knightly

M.S. in Electrical and Computer Engineering, completed June 2006

B.S. in Electrical and Computer Engineering, May 2003

PROFESSIONAL EXPERIENCE

Google, Inc, Mountain View, CA

April 2011 - Present

Software Engineer: Software engineer in search infrastructure team, working on maintaining web-scale search index for Google's primary search product.

Narus, Inc, Sunnyvale, CA

April 2009 - April 2011

Senior Member of the Technical Staff: Responsible for managing research projects, including university collaborations. Technical lead on a new development work to build a new distributed processing platform and productize the algorithms developed in research. Worked in the areas of distributed systems, map/reduce, speech processing, text mining, and machine learning. Projects include:

- Document Classification: designing novel algorithms for topic classification of short, internet communications.

- Botnet detection: research using machine learning algorithms to detect bot activity using communication graph features.
- Speech Processing: collaborating on research for scalable speaker identification algorithms.
- Geo-localization: research on algorithms for inferring cellular base station infrastructure and user locations based on HTTP activity.
- User identifier tracking: built demo system for monitoring and linking Internet users' disparate accounts.
- Traffic Classification: research on algorithms for classifying unknown application protocols and designed methodology for evaluating classifier consistency.

Held US security clearances; more information available upon request.

Rice University, Houston, TX

May 2003 - April 2009

Graduate Student: Performed Ph.D. level research on wireless mesh networks, selected projects include:

- **Mesh Node and Gateway Deployment.** I proposed and evaluated approximation algorithms for both gateway deployment and mesh node placement. These algorithms build upon graph theoretic techniques and incorporate realistic contention effects and physical-layer models. Evaluation of these algorithms utilized realistic topologies and scenarios.
- **Measurement Assessment.** To assess a deployed network, I proposed a framework for predicting spatial performance with a limited measurement budget. The framework uses coarse-grained terrain maps and carefully chosen measurement locations to accurately predict performance. Validation required a large-scale measurement study (30000 locations) in two networks and showed that my framework achieves high accuracy.

HP Labs, Palo Alto, CA

September 2007 - December 2007

Research Intern: Research work on experimental evaluation of deployed wireless mesh networks. Conducted large-scale measurement study of two commercial networks and developed algorithms to more efficiently measure and characterize wireless networks.

Rice University, Houston, TX

Spring 2003 - Spring 2007

Teaching Assistant: Elec 220 – Introduction to Computer Engineering. Spring semester 2003, 2005, 2006, and 2007. Developed initial course syllabus and led weekly lab lectures.

Fulbright & Jaworski LLC, Houston, TX

December 2004 - March 2006

Technical Consultant: Consulted on two patent infringement cases related to (i) CDMA2000 technology and (ii) Internet router traffic shaping policies. Reviewed internal documentation for infringement evidence.

Intel Research, Cambridge, UK

February 2004 - August 2004

Research Intern: Research work on experimental platforms for wireless mesh networking. Built wireless testbed and performed multi-radio interference experiments, heavily using Linux and 802.11b. Measured and quantified impact of operating multiple radios in a single node.

PATENTS FILED

“Machine Learning Based Botnet Detection Using Real-time Connectivity Graph Based Traffic Features,” Pending, filed January 2011.

“System and Method for Collecting and Processing Information of an Internet User Via IP-Web Correlation,” Pending, filed October 2009.

“System and Method for Identifying Network Applications Based on Packet Content Signatures,” Pending, filed July 2009.

“System and Method for Identifying Network Applications,” Pending, filed July 2009.

“Algorithms for the Deployment of Wireless Mesh Nodes,” Pending, filed April 2009.

“Assessment of Urban-Scale Wireless Networks with a Small Number of Measurements,” Pending, filed April 2009.

“Adding Capacity Points to a Wireless Mesh Network Using Local Search,” Pending, filed April 2009.

MEDIA COVERAGE “Popping no-coverage bubbles in citywide WiFi networks,” *Ars Technica*, Oct. 1, 2008.
(<http://arstechnica.com/news.ars/post/20081001-popping-no-coverage-bubbles-in-citywide-wifi-networks.html>)

“HP collaborates to identify Wi-Fi dead zones cheaply,” *iTnews Australia*, Sept. 30, 2008.
(<http://itnews.com.au/News/85705,hp-collaborates-to-identify-wifi-dead-zones-cheaply.aspx>)

“Zeroing in on Wi-Fi ‘dead zones’: Award-winning technique inexpensively finds gaps in wireless networks,” *Rice News*, Sept. 25, 2008.
(<http://www.media.rice.edu/media/NewsBot.asp?MODE=VIEW&ID=11493&SnID=330181524>)

CONFERENCE PRESENTATIONS “Deploying Mesh Nodes Under Non-Uniform Propagation,” *IEEE INFOCOM 2010*, San Diego, CA, March 2010.

“Assessment of Urban-Scale Wireless Networks with a Small Number of Measurements,” *MobiCom 2008*, San Francisco, CA, September 2008.

“Adding Capacity Points to a Wireless Mesh Network Using Local Search,” *IEEE INFOCOM 2008*, Phoenix, AZ, April 2008.

“A Performance Study of Deployment Factors in Wireless Mesh Networks,” *IEEE INFOCOM 2007*, Anchorage, AK, May 2007.

“Experimenting with a Multi-Radio Mesh Networking Testbed,” *1st workshop on Wireless Network Measurements (Winmee)*, Riva del Garda, Italy, April 2005.

SOFTWARE DEVELOPED Document Classification: parser, classifier, and query engine (C++)
Targetted web page crawler and parser (Ruby)
Mesh Node Placement: Placement algorithms *Minimize-Nodes* and *Measure-and-Place* (C)
Mesh Assessment: Algorithm to predict coverage with limited measurements (Matlab)
Capacity Point Deployment: Local search algorithms *MinHopCount* and *MinContention* (C)
Mesh Topologies: Monte-carlo simulator for coverage and connectivity (C)

PROFESSIONAL ACTIVITIES Technical program committee member for IMC 2009
Authored online documentation for Ns-2 802.11 module (over 50 unique visitors per day)

Technical Reviewer for Journals/Conferences:

- IEEE/ACM Transactions on Networking
- IEEE Transactions on Vehicular Technology
- IEEE Transactions on Mobile Computing
- IEEE Communications Magazine
- Journal on Selected Areas in Communications: Mesh Networks
- IEEE INFOCOM 2005, 2009, 2010, 2011

COMPUTER SKILLS Packages: Matlab, Ns-2, iPerf, Microsoft Office, LaTeX, MySQL
Languages: C/C++, Ruby, Matlab, Perl, Bash Shell Scripting, MIPS Assembly
Operating Systems: Unix/Linux, MacOS X, Windows