

VIJAY ERRAMILI

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PARTICULARS

EDUCATION

Boston University
Ph. D. in Computer Science

Boston, MA
Expected 2008

University of Texas
M. S. in Computer Science

Dallas, TX
June 2003

University of Delhi
B. Tech. in Instrumentation and Control

New Delhi, India
June 2001

RESEARCH INTERESTS

My research interests span the areas of network measurements, performance analysis and network algorithms. My research is primarily empirical in nature, addressing problems in both wireless and wireline networks. I am currently also interested in social networks and specifically in problems in the intersection of social networks and mobile networks.

DISSERTATION

Title: "Forwarding in Mobile Opportunistic Networks"
Advisor: Prof. Mark Crovella
Committee: Prof. Azer Bestavros, Prof. John Byers, Dr. Christophe Diot

My thesis deals with first, the characterization of mobility traces and second, using these characterizations to guide the design, analysis and implementation of forwarding algorithms for mobile opportunistic networks.

ACADEMIC HONORS

- Graduate Fellowship, Boston University, 2003-Present.
- Graduate Fellowship, University of Texas at Dallas, 2001-2003.
- Best Undergraduate Thesis Award in Engineering, University of Delhi, 2001.
- Second Prize for All India Project proposal contest held by HCL-Dataquest, 2001.
- Selected to participate in the Regional Maths Olympiad, 1995.

RESEARCH EXPERIENCE

- **Algorithms for Mobile Opportunistic Networks: Design and Analysis**, (May 2007 - Present): We focused on designing forwarding algorithms with the express intent of decreasing costs associated with forwarding of messages in such networks. We drew concepts from optimal stopping theory to design and analyse algorithms. We compared our algorithms with existing algorithms on real mobility traces and showed the superior performance of our algorithms.

Algorithms for Mobile Opportunistic Networks: Study of Paths, (Oct 2006 - May 2007): Instead of designing forwarding algorithms directly, we started by characterizing and studying the properties of all opportunities available to algorithms; the set of all available paths. We used contact traces gathered in conference and university settings for this work. The work consisted of characterizing our data sets, enumerating the set of paths and understanding the performance of existing algorithms in light of our characterization results.

Characterization and Modeling of Traffic Matrices, (Jan 2005 - Apr 2006): Models for intra-domain traffic matrices are very useful for many aspects of network operations including traffic matrix estimation, forecasting etc. However complete models for traffic metrics which capture both spatial and temporal idiosyncrasies of traffic is a non-trivial task. The most prevalent model called the gravity model is based on the assumption of source/destination node independence which does not hold in the Internet. Starting with real traces, we developed a model called the independent connection model which is conceptually as simple as the gravity model, does a better job in reproducing and fitting real data and has physically interpretable parameters.

Aggregation and Topology Control in Sensor Networks, (Sep 2003 - Jan 2004): Wireless sensor networks are characterized by their limited energy resources. To conserve energy, application-specific aggregation or fusion of data reports from multiple sensors help in reducing energy consumption by reducing the amount of data flowing thru the network. In addition there is work on topology control in such networks; scheduling nodes to sleep when they are in use. We presented an integrated analytical model to study the joint performance of both aggregation and topology control.

- **Research Intern, Thomson Paris, Paris, France**, May 2006 - Oct 2006
Characterization of Contact Traces from Pocket Switched Networks: This work involved characterizing mobility contact traces, applying social network analysis to extract communities from data, and studying the feasibility of using these social communities for forwarding.
- **Research Intern, IBM Research Labs, New Delhi**, Dec 2000 - May 2001.
Mobility Models for MANETs: This work involved investigating more realistic models for mobility used for simulation for MANETs at that time.
- **Research Intern, Center for Research in Cognitive Systems, India**, April - Aug. 2000.
Helped develop cognitive user interfaces for educational software.
- **Undergraduate Research Intern, Qnetworx**, Dec 1999 - Jan 2000.
Traffic Modeling: Studied properties of Internet link traffic as well as models used to represent such traffic, under Dr. Len Forsys.

WORK EXPERIENCE

- **Systems Architect, Optessa Inc (formerly Netaps Inc.)**, Dec. 2002 - May. 2003. I worked on the computational engine of "Netaps MLS"-software for assembly line sequencing. The software was selected in a competitive RFP process by major automobile manufacturing companies and is currently installed in several plants in North America and Europe and is in use to sequence production of automobiles every month. Work included algorithm development and implementation.
- **Intern, Qnetworx Inc.**, May 2002 - Aug. 2002. I worked on "PlanIt!" a server farm dimensioning software. Work included developing analytical models and developing the prototype in Mathematica.
- **Intern, Qnetworx Inc.**, May 2001 - Aug. 2001. I worked on developing NS scripts for simulating large scale UMTS networks.
- **Technical Columnist, PCQuest**, Oct. 1999 - Aug. 2001. I wrote a monthly technical column in PCQuest, India's largest selling IT Magazine.

TEACHING EXPERIENCE

- **Teaching Assistant**. CS112: Data Structures, Prof. Leo Reyzin, Spring and Fall 2007, Boston University.

- **Teaching Assistant.** CS350: Fundamentals of Computing Systems, Prof. Azer Bestavros, Spring 2005, Boston University.
- **Teaching Assistant.** CS455/655: Computer Networks, Prof. John Byers, Fall 2004, Boston University.
- **Teaching Assistant.** CS112: Data Structures, Prof. John Byers and Prof. Wayne Snyder, Spring 2004, Boston University.
- **Teaching Assistant.** CS3375: Principles of Unix, Fall 2001 and Spring 2002, University of Texas at Dallas.

PUBLICATIONS

PAPERS

1. Vijay Erramilli, Mark Crovella, “Forwarding in Opportunistic Networks under Resource Constraints,” to appear in *Proceedings of ACM MobiCom Workshop on Challenged Networks (CHANTS)*, San Francisco, Sept. 2008.
2. Vijay Erramilli, Augustin Chaintreau, Mark Crovella, Christophe Diot, “Delegation Forwarding,” in *Proceedings of ACM International Symposium on Mobile Ad Hoc Networking and Computing (MOBIHOC)*, Hong Kong, May 2008.
3. Vijay Erramilli, Augustin Chaintreau, Mark Crovella, Christophe Diot, “Diversity of Forwarding Paths in Pocket Switched Networks,” in *Proceedings of ACM Internet Measurements Conference (IMC)*, San Diego, 2007. A more detailed version of this paper appears in technical report as, “Diversity of Forwarding Paths in Pocket Switched Networks,” *BUCS-TR-2007-005*, May 2007
4. Vijay Erramilli, Mark Crovella, Nina Taft, “An Independent Connection Model for Traffic Matrices,” in *Proceedings of ACM Internet Measurement Conference (IMC)*, Rio de Janeiro, 2006. A more detailed version of this paper appears in technical report as, “An Independent Connection Model for Traffic Matrices,” *BUCS-TR-2006-022*, Sept. 2006
5. Vijay Erramilli, Ibrahim Matta, Azer Bestavros, “On the Interaction between Data Aggregation and Topology Control in Wireless Sensor Networks,” in *Proceedings of IEEE Communications Society Conference on Sensor and Ad Hoc Communications and Networks (SECON)*, Santa Clara, California, 2004.

EXTENDED ABSTRACTS

6. Vijay Erramilli, Augustin Chaintreau, Mark Crovella, Christophe Diot, “Explosions in Pocket Switched Networks,” *Proceedings of ACM Annual International Conference on Mobile Computing and Networking (MOBICOM)*, Montreal, Canada, Sept. 2007.

PENDING PAPERS

7. “Diversity of Forwarding Paths in Pocket Switched Networks,” with Augustin Chaintreau, Mark Crovella, Christophe Diot. In preparation for *IEEE/ACM Transactions on Mobile Computing*.

OTHER REPORTS

8. Vijay Erramilli, Akshay Damarla, R. Ramesh, Rajeev Shorey “Performance Analysis of Cluster-Based and Random-Waypoint Mobility Models,” University of Delhi/IBM Research, July 2001.
9. Vijay Erramilli, “Analytical models for TCP over Wireless Networks,” Bachelors Thesis Report, May 2001, University of Delhi.

TALKS

CONFERENCE TALKS

1. (*Pending*) “Forwarding in Opportunistic Networks under Resource Constraints,” *ACM Mobicom Workshop on Challenged Networks (CHANTS)*, San Francisco, Sept. 2008.
2. “Delegation Forwarding,” *ACM International Symposium on Mobile Ad Hoc Networking and Computing (MOBIHOC)*, Hong Kong, May 2008.
3. “Diversity of Forwarding Paths in Pocket Switched Networks,” *ACM Internet Measurements Conference (IMC)*, San Diego, CA, Oct. 2007.

4. "An Independent Connection Model for Traffic Matrices," *ACM Internet Measurements Conference (IMC)*, Rio de Janeiro, Brazil, Oct. 2006.
5. "On the Interaction between Data Aggregation and Topology Control in Wireless Sensor Networks," *IEEE Communications Society Conference on Sensor and Ad Hoc Communications and Networks (SECON)*, Santa Clara, California, Oct. 2004.

INDUSTRY/OTHER TALKS

6. "Forwarding in Mobile Opportunistic Networks,"
 - Boston University, Boston, USA - Jan. 2008.
 - Dept. of Computer Science, University of Hyderabad, India - Aug 2007.

PROFESSIONAL ACTIVITIES

- Internet Chair, ASWN 2004
- President, IEEE Student Chapter, NSIT, University of Delhi

SERVICE

- Reviewer - *ACM SIGCOMM 2006, ACM IMC 2007, ACM IMC 2006, ACM MOBICOM 2007, IEEE INFOCOM 2004, 2005, IEEE ICNP 2004, IEEE RTSS 2004, ACM CCR*
- Coordinator for Network Reading Group 2004-2005, Dept. of Computer Science, Boston University

LANGUAGES

Proficient in English, Hindi and Telugu. Working knowledge of French.

REFERENCES

FROM ACADEMIA

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 Professor
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FROM INDUSTRY

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