Ashwin Rao
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Postdoctoral Researcher at Inria
Inria, 2004 Route des Lucioles, 06902 Sophia Antipolis, France

Research Interests

Communication networks, mobile systems, social networks, large scale experiments, peer-to-peer systems, wireless networks, performance modeling and evaluation.

Education

Inria *(September 2009 to December 2013)*

- PhD in Computer Science under the supervision of Arnaud Legout and Walid Dabbous.

- Thesis Title: Improving Transparency and End-User Control in Mobile Networks.

- I designed a platform that empowers end-users to seamlessly monitor their mobile Internet traffic regardless of the OS and ISP, and to control this traffic for improving privacy. I also used this platform to detail the network characteristics of video streaming traffic.

Indian Institute of Technology Delhi *(July 2006 to August 2009)*

- Master of Science (by Research) in Information Technology (CGPA 9.5/10).

- My thesis titled Performance Evaluation of Secure Communication in Vehicular Networks was supervised by Arzad Kherani and Anirban Mahanti.

University of Pune *(July 2000 to July 2004)*

- Bachelor of Engineering in Computer Science (First class with an aggregate of 69%).

Publications

Work in progress

1. Using the Middle to Meddle with Mobile. <u>Ashwin Rao</u>, Arash Molavi Kakhki, Abbas Razaghpanah, Amy Tang, Justine Sherry, Shen Wang, Phillipa Gill, Arnaud Legout, Arvind Krishnamurthy, Alan Mislove, and David Choffnes. Available as Technical Report NEU-CCS-2013-12-10.

Peer-reviewed Conference Publications

1. Studying Social Networks at Scale: Macroscopic Anatomy of the Twitter Social Graph. Maksym Gabielkov, <u>Ashwin Rao</u>, and Arnaud Legout. Accepted in ACM SIGMETRICS 2014.

2. Data Plane Throughput vs Control Plane Delay: Experimental Study of BitTorrent Performance. Claudio Testa, Darrio Rossi, <u>Ashwin Rao</u>, and Arnaud Legout. In Proc. of IEEE P2P 2013.

3. Network Characteristics of Video Streaming Traffic. <u>Ashwin Rao</u>, Yeon-sup Lim, Chadi Barakat, Arnaud Legout, Don Towsley, and Walid Dabbous. In Proc. of ACM CoNEXT 2011.

4. A Survey on YouTube Streaming Service. Majed Haddad, Eitan Altman, Rachid El-Azouzi, Tania Jimenez, Salah Eddine Elayoubi, Sana Ben Jamaa, Arnaud Legout, and <u>Ashwin Rao</u>. In Proc. of ValueTools 2011.

5. Can Realistic BitTorrent Experiments be Performed on Clusters? <u>Ashwin Rao</u>, Arnaud Legout, and Walid Dabbous. In Proc. of IEEE P2P 2010.

6. Performance Evaluation of 802.11 Broadcasts for a Single Cell Network with Unsaturated Nodes. <u>Ashwin Rao</u>, Arzad Kherani, and Anirban Mahanti. In Proc. of IFIP Networking 2008.

Peer-reviewed Journal Publications

1. Performance of Node Eviction Schemes in Vehicular Networks. Arzad Kherani and <u>Ashwin Rao</u>. In Proc. of IEEE Transactions of Vehicular Technology, February 2010.

Peer-reviewed Workshop Publications

1. Meddle: Middleboxes for Increased Transparency and Control of Mobile Traffic. <u>Ashwin Rao</u>, Justine Sherry, Arnaud Legout, Arvind Krishnamurthy, Walid Dabbous, and David Choffnes. In Proc. of ACM CoNEXT 2012 Student Workshop. *Chosen as one of the best papers.*

2. Experimental Assessment of BitTorrent Completion Times in Heterogeneous uTP/TCP swarms. Claudio Testa, Dario Rossi, <u>Ashwin Rao</u>, and Arnaud Legout. In Proc. of TMA 2012 Workshop.

3. Secure V2V Communication: Performance Impact of Computational Overheads. Arvind Iyer, Arzad Kherani, <u>Ashwin Rao</u>, and Aditya Karnik. In Proc. of IEEE Infocom 2008 MoVE Workshop.

4. Secure V2V Communication with Certificate Revocation. <u>Ashwin Rao</u>, Ashish Sangwan, Arzad Kherani, Anitha Varghese, Bhargav Bellur, and Rajeev Shorey. In Proc. of IEEE Infocom 2007 MoVE Workshop.

Technical Reports

1. Floor the Ceil & Ceil the Floor: Revisiting AIMD Evaluation. <u>Ashwin Rao</u>, Arnaud Legout, Bruno Cessac, and Walid Dabbous. Inria Technical Report (hal-00733890), 2012.

Work Experience

PhD/Post-Doctoral Candidate at Inria, Sophia Antipolis   *(from September 2009)*

I built systems, performed measurements, and conducted large scale experiments to analyze and improve the performance of mobile systems, HTTP video streaming, and the BitTorrent protocol. I also contributed in the analysis of the Twitter social graph.

Research Intern at University of Washington, Seattle   *(July 2012 to December 2012)*

Under the supervision of David Choffnes and Arvind Krishnamurthy, I designed and built Meddle, a system that enables end-users to monitor and control mobile data traffic without any operating system modifications. Meddle uses Virtual Private Networks to tunnel mobile traffic through software middleboxes for the purpose of analysis and interposition. Meddle thus provides an ideal vantage point to evaluate mobile systems and to deploy user-centric in-network services. It is currently deployed in USA, France, and China and has served more than 100 users.

Technical Consultant at SplashGain Technologies Pvt. Ltd., Pune   *(May 2009 to July 2009)*

I provided consultancy on Internet marketing and product deployment to Splashgain Technologies for epravesh.com, their online admission portal.

Manager of Engineering at Axonize Inc., Pune   *(August 2008 to April 2009)*

Axonize was a startup (now defunct) founded in 2008 whose flagship product provided the Internet visibility of an organization to its marketing personnel. My work included the research and development of this product that mined, analyzed, and monitored the online visibility of client organizations. I built a significant portion of its backend software using Amazon Web Services and the Google App Engine.

Research Intern at General Motors Lab., Bangalore   *(January 2008 to April 2008)*

I participated in building a mathematical model and performing simulations to quantify the impact of the delays to blacklist a misbehaving vehicle on the security performance of vehicular networks.

Research Intern at General Motors Lab., Bangalore   *(May 2007 to July 2007)*

I participated in building a mathematical model and performing simulations to evaluate the impact of the delays incurred by the cryptographic operations mandated to secure vehicular networks.

Member of Technical Staff at Airtight Networks Inc., Pune   *(July 2004 to July 2006)*

AirTight Networks, founded in 2004, provides products for wireless intrusion prevention, wireless

LAN monitoring, and radio frequency management. My work involved the design and development of features, such as automatic detection and quarantine of rogue devices, for their wireless intrusion prevention system called SpectraGuard. I also imparted training on attack tools to new recruits.

Other Professional Experience

- **Service as External Reviewer.**
  IEEE Transactions on Multimedia (2013), IEEE Network (2013), Computer Networks (2013), IEEE Workshop on Traffic Monitoring and Analysis (2013), Hot Topics in Peer-to-Peer and Online Social Networking (2012), and IEEE JSAC Special Issue on Vehicular Networks (2007).

- **Teaching Assistant, Indian Institute of Technology Delhi.** *January 2007 to April 2007*
  I was a teaching assistant for the *Introduction to Computers and Programming* course.

- **Undergraduate Project.**
  With three other undergraduates, I designed and implemented QuickSilver, a Linux kernel module that delayed swapping of memory pages by defragmenting the RAM. This project was ranked fourth in the Open Software Category at Techfest 2004, an annual student project competition held at the Indian Institute of Technology Bombay, and it won the first prize in Impetus 2004 (Systems Category), an inter-college project competition held at the Pune Institute of Computer Technology.

References

1. Arnaud Legout
   Researcher, Inria, France.
   arnaud.legout@inria.fr

2. David Choffnes
   Assistant Professor, College of Computer & Information Science, Northeastern University, USA.
   choffnes@ccs.neu.edu

3. Chadi Barakat
   Researcher, Inria, France.
   chadi.barakat@inria.fr