# Abhigyan Sharma

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**RESEARCH INTERESTS**

Networking and distributed systems. Sub-areas: network function virtualization, software defined networking, network service chaining, ISP traffic engineering, content delivery networks, network architecture, peer-to-peer networks.

**EDUCATION**

**University of Massachusetts Amherst**, USA

- Doctor of Philosophy (Ph.D.) in Computer Science — Sep 2008 – Aug 2015
  - Thesis: Content Placement as a Key to a Content-Dominated, Highly Mobile Internet
  - *UMass Amherst Computer Science Outstanding Dissertation Award Winner 2016*
  - Advisor: Prof. Arun Venkataramani, Co-Advisor: Prof. Ramesh Sitaraman
  - Cumulative GPA: 3.9 / 4.0
- Master of Science (M.S.) in Computer Science — Sep 2008 – Aug 2011
  - Cumulative GPA: 3.97 / 4.00

**Indian Institute of Technology (IIT) Kharagpur**, India

- Bachelor of Technology (Honors) in Computer Science and Engineering — Jul 2004 – Jul 2008
  - Cumulative GPA: 8.4 / 10.0

**EXPERIENCE**

**AT&T Labs Research**, Cloud Technologies and Services

- Senior Inventive Scientist — Aug 2015 – Present
  - Project lead on Switchboard – the first wide-area architecture for chaining of network functions in Tier-1 ISPs. Led the design and prototyping of Switchboard, demonstrated its scalability in experiments and filed patent.
  - Project lead on FastPaaS – a high-performance and secure operating system for software network functions. Native (C/C++) apps in FastPaaS have up to 100× better latency than their deployment in separate containers.
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**Rutgers University**, Department of Electrical Engineering

- Part-Time Lecturer — Jan 2017 – May 2017
  - Taught the graduate-level Communication Networks II course in the Spring 2017 term.
  - Received student ratings of 4.54/5 for the course. Students' comments: "The mininet assignments and hand-on work was awesome.","Instructor is enthusiastic and involved in the course."

**University of Massachusetts Amherst**, Computer Science

- Research Assistant — Sep 2008 – Aug 2015
  - Designed a global name-to-address resolution service for enabling support for mobility in the Internet architecture. Showed significant latency and cost advantages over existing solutions including DNS.
  - Conducted the first study on Network (Telco) CDNs based on Akamai CDN & ISP datasets. Evaluated importance of placement vs. routing optimization, joint vs. independent optimization, planned vs. unplanned schemes.
  - Conducted a novel application-centric comparison of traffic engineering (TE) schemes in ISPs. Showed that application adaptation blurs the difference among TE scheme in application performance & network capacity.
  - Designed new content-aware and network-aware energy optimization techniques in content datacenters. Quantified energy vs. performance tradeoff based on Akamai CDN traces.
  - Developed a new model-based approach for allocating server bandwidth in CDNs that use a hybrid of peer-to-peer and client-server techniques. Demonstrated lower bandwidth costs and faster downloads than existing approaches.
- Teaching Assistant — Sep 2008 – Dec 2008
  - For an undergraduate Digital Forensics course, held weekly discussion sessions regarding course assignments, assisted during lab sessions, prepared quizzes, and graded exams.

**Microsoft Research India**, Network, Mobility and Systems

- Research Intern — Jun 2011 – Sep 2011
  - Developed an application to compute pickup/drop-off schedules on shared cab rides for people commuting to work. Showed that application can reduce cab rides by 30% over an expert human taxi operator.

**Microsoft India Development Center**

- Sofware Intern — May 2007 – Jun 2007
  - Identified module dependencies between Windows CE, a mobile OS, and Visual Studio IDE. Added new features to the core connectivity module between Windows CE and Visual Studio.

## PUBLICATIONS

### CONFERENCE PUBLICATIONS

- **Abhigyan Sharma**, Xiaozheng Tie, Hardeep Uppal, Arun Venkataramani, David Westbrook, and Aditya Yadav. A Global Name Service for a Highly Mobile Internetwork. *Proceedings of the 2014 ACM conference on SIGCOMM (Special Interest Group on Data Communications), 2014, Pages 247-258.*
  - *Flagship ACM conference of computer networking.*
  - *18% acceptance rate. 32 citations.*
  - *Paper studied in graduate courses at UMichigan, UNC-Chapel Hill, U of Kentucky*
- **Abhigyan Sharma**, Antonio A. A. Rocha, Arun Venkataramani. Pros and Cons of Model-Based Bandwidth Control for Client-assisted Content Delivery. *2014 Sixth International Conference on Communication Systems and Networks (COMSNETS), 2014, Pages 1-8.*
  - *17% acceptance rate. 12 citations.*
- **Abhigyan Sharma**, Arun Venkataramani, Ramesh Sitaraman. Distributing Content Simplifies ISP Traffic Engineering, *Proceedings of the 2013 ACM SIGMETRICS International Conference on Measurement and Modeling of Computer Systems, 2013, Pages 229-242.*
  - *Flagship ACM conference on systems performance evaluation.*
  - *14% acceptance rate. 56 citations.*
  - *2nd most cited paper from SIGMETRICS 2013.*
- **Abhigyan Sharma**, Aditya Mishra, Vikas Kumar, Arun Venkataramani. Beyond MLU: An Application-Centric Comparison of Traffic Engineering Schemes. *Proceedings of the 2011 IEEE International Conference on Computer Communications (INFOCOM), 2011, Pages 721-729.*
  - *Top-tier conference in computer networking.*
  - *16% acceptance rate. 14 citations.*
  - *Paper studied in graduate course at Carelton Univ., Canada*
- **Abhigyan Sharma**, Joydeep Chandra, Niloy Ganguly. A Bandwidth-Aware Topology Generation Mechanism for Peer-to-Peer based Publish-Subscribe Systems. *2008 IEEE Region 10 and the Third International Conference on Industrial and Information Systems (ICIIS), Kharagpur, 2008, Pages 1-6.*

### INVITED PAPER

- Arun Venkataramani, **Abhigyan Sharma**, Xiaozheng Tie, David Westbrook, Hardeep Uppal, Jim Kurose, Dipankar Raychaudhuri. Design Guidelines for a Global Name Service for a Mobility-Centric, Trustworthy Internetwork. *2013 Fifth International Conference on Communication Systems and Networks (COMSNETS), 2013, Pages 1-9.*
  - *20 citations.*

### POSTER PUBLICATIONS

- Wei Zhang, **Abhigyan Sharma**, Kaustubh Joshi, Timothy Wood. Towards an OS for the Network Data Plane *Proceedings of the Symposium on SDN Research (SOSR) 2017, Pages 195-196.*
- **Abhigyan Sharma**, Arun Venkataramani, Ramesh Sitaraman. Shrink: Quantifying and Leveraging Energy-Performance Tradeoff in Content Datacenters. *12th USENIX Symposium on Networked Systems Design and Implementation (NSDI) 2015, Poster Session.*
- **Abhigyan Sharma**, Arun Venkataramani. Leveraging Location Diversity to Simplify Traffic Engineering. *6th USENIX Symposium on Networked Systems Design and Implementation (NSDI) 2009, Poster Session.*

### TECHNICAL REPORTS

- **Abhigyan Sharma**, Yoji Ozawa, Kaustubh Joshi, Richard Schlichting, Matti Hiltunen. Switchboard: A Split-Control NFV Architecture for Wide-Area Service Chaining. *AT&T Labs Research, Technical Documents ID: 101738, 2016*
- **Abhigyan Sharma**, Arun Venkataramani, Ramesh Sitaraman. Quantifying Energy-Performance Tradeoffs in Content Datacenters. *UMass Computer Science Technical Report, UM-CS-2017-007, 2017*
- Aditya Yadav, **Abhigyan Sharma**, Arun Venkataramani, E. Cecchet. msocket: System Support for Developing Seamlessly Mobile, Multipath, and Middlebox-Agnostic Applications. *UMass Computer Science Technical Report, UM-CS-2016-010, 2016*

## TECHNICAL TALKS

### CONFERENCE TALKS

- A Global Name Service for a Highly Mobile Internetwork.
  - ACM SIGCOMM. Chicago, USA. Aug 2014
- Pros and Cons of Model-Based Bandwidth Control for Client-Assisted Content Delivery
  - COMSNETS. Bangalore, India. Jan 2014
- Distributing Content Simplifies ISP Traffic Engineering
  - ACM SIGMETRICS. Pittsburgh, USA. Jun 2013
- Beyond MLU: An Application Centric Comparison of Traffic Engineering Schemes
  - IEEE INFOCOM. Shanghai, China. Apr 2011

### INVITED TALKS

- Content Placement as a Key to Leveraging Geo-Distributed Infrastructures
  - AT&T Labs Research, USA. Feb 2015
  - Pennsylvania State University, USA. Feb 2015
  - Microsoft Research Cambridge, UK. Mar 2015
  - NEC Laboratories Princeton, USA. Mar 2015
- Shrink: A Cluster Manager for Greening Content Datacenters
  - New England System & Networking Day, Boston University, USA Oct 2014
- Distributing Content Simplifies ISP Traffic Engineering
  - Indian Institute of Technology Patna, India. Jan 2014
- Beyond MLU: An Application Centric Comparison of Traffic Engineering Schemes
  - Indian Institute of Technology Kharagpur, India Aug 2010

## PATENTS

### FILING IN-PROGRESS

- **Abhigyan Sharma**, Kaustubh Joshi, Richard Schlichting, Matti Hiltunen, Yoji Ozawa. Creating Cross-Service Chains of Virtual Network Functions in a Wide Area Network. File No: 60027.5939US01.

## ACADEMIC ACHIEVEMENTS

### AWARDS

- UMass Amherst Computer Science Outstanding Doctoral Dissertation Award Winner 2016
  - *Recent recipients of this award have gone on to hold faculty positions in Stony Brook University, University of Maryland-Baltimore County, and George Washington University and in industry-leading research labs at AT&T and Google.*
- Student Travel Grant Recipient at multiple USENIX NSDI conferences 2015, 2011, 2009
- Awarded KVPY Fellowship in Science Stream by Government of India 2002 – 2004
  - *Only 50 students in India received this prestigious fellowship that is administered by Indian Institute of Science, Bangalore*

### COMPETITIONS & STANDARDIZED EXAMS

- Achieved a perfect score of 1600/1600 on GRE General Test 2007
- All India Rank 223 (top 0.1% of >200,000 students) in Indian Institute of Technology Joint Entrance Examination 2004
- All India Rank 182 (top 0.1% of >200,000 students) in All India Engineering Entrance Examination 2004
- Rank 12 in nationwide Group Mathematics Olympiad organized by National Board for Higher Mathematics 2004
- Rank 11 in statewide Regional Mathematics Olympiad organized by National Board for Higher Mathematics 2003
- Top 0.1% of >400,000 students in Mathematics appearing for the All India Secondary School Examination 2002

## PROFESSIONAL SERVICE

### PROGRAM COMMITTEE

- ACM Asia-Pacific Workshop on Systems 2017
- IEEE International Symposium on Local and Metropolitan Area Networks (9 papers) 2017

### JOURNALS REVIEWING

- IEEE/ACM Transactions of Networking (2 papers) 2013, 2015
- IEEE Internet Computing Magazine (2 papers) 2013, 2016
- IEEE Transactions on Parallel and Distributed Systems (1 paper) 2016
- IEEE Transactions on Cloud Computing (1 paper) 2016

### SHADOW PROGRAM COMMITTEE

- ACM International Conference on Emerging Networking Experiments & Technologies (9 papers) 2015

## STUDENT MENTORING

- Bo Yan, PhD Student, New York University 2017
  - Project: High-Performance Edge Architecture for 5G Cellular Networks
- Zhaoyu Gao, PhD Student, University of Massachusetts Amherst 2017
  - Project: Stateful Load Balancing in a Stateless Network
- Wei Zhang, PhD Student, George Washington University 2016
  - Project: Memory Safety in FastPaaS
- Vijay Pasikanti, MS Student, UMass Amherst 2014
  - Project: Network-Aware Consolidation in Content Datacenters

## GRADUATE COURSES

### SEMINARS & OTHER COURSES

Content-Oriented Networking
Readings in Big Data Systems
Cognitive Radios and Wireless Networks
Green Computing
Mathematical Statistics

### CORE COURSES

Advanced Computer Architecture
Advanced Computer Networking
Distributed Operating Systems
Machine Learning
Artificial Intelligence
Theory of Computation
Advanced Algorithms

**OTHER ACTIVITIES**

**DRAMATICS**

- Directed & acted in plays at cultural events of Indian Student Association, UMass Amherst 2009-2012
- Order of Merit for Excellence in Social and Cultural Activities, IIT Kharagpur. 2008
  - *Awarded to 2 out of 640 students*
- Acted in eight (8) gold medal winning dramatics events, IIT Kharagpur. 2005-2008
- Best Director in Inter-Hall English Dramatics, IIT Kharagpur 2008
- Best Supporting Actor at Open-IIT English Dramatics, IIT Kharagpur 2005

**ELOCUTION**

- 1st Prize Open-IIT Hindi Elocution, IIT Kharagpur 2005
- 3rd Prize (Individual) Inter Hall Hindi Elocution, IIT Kharagpur 2006
- 1st Prize (Team), 3rd Prize (Individual) Inter Hall Hindi Elocution, IIT Kharagpur 2007

**SPORTS**

- Tennis Intra-Murals participant, UMass Amherst 2010-2012
- Nehru Hall Tennis Team Member, IIT Kharagpur 2007
- Tennis NSO (National Sports Organization) member, IIT Kharagpur 2006
- National Cadet Corps member, IIT Kharagpur 2005

**REFERENCES** Available upon request.

[*CV compiled on 2017-05-16*]