Virag Shah

The University of Texas at Austin
Electrical and Computer Engineering
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Research Interests

- System optimization and algorithm design under uncertainty, reliability, security and privacy constraints, and for sustainability.
- Large scale stochastic models and mean field.
- Engineering of scalable complex networks, e.g., Cloud and Internet of Things.

Education

Ph.D. in Electrical and Computer Engineering 2015
The University of Texas at Austin, USA

Master of Engineering in Telecommunications 2009
Indian Institute of Science (IISc), Bangalore, India

Bachelor of Engineering in Electronics 2007
Sardar Patel College of Engineering, Mumbai, India

Awards

- **Best Paper Award** at *IEEE INFOCOM*, 2014 at Toronto, Canada. One of two papers selected from the 1650 papers submitted, and 313 papers accepted to the conference.
- **Best Paper Award** at *National Conf. on Comm.* (NCC), 2010 at IIT Madras, India in communications track. 250 papers submitted, and 105 accepted in conference.
- **MCD Fellowship** at The University of Texas at Austin, 2010-11. Awarded to about top 1% applicants by the graduate school.

Research Experience

The University of Texas at Austin 2010 - 2015
High performance and robustness in content delivery networks (CDNs)
MCD Fellow, Research Assistant
Advisor: Prof. Gustavo de Veciana

- We show that allowing servers to collaborate in servicing file download jobs offers substantial gains in download speeds while achieving robustness to load variations without requiring complex caching strategies.

- We provide a scalable performance model for CDNs which enables disciplined engineering and study of performance-energy-reliability tradeoffs.
- With enough content diversity, we show that large systems exhibit a concentration property where several worst-case scenarios become unlikely, thus reducing the need for over-provisioning.

The University of Texas at Austin 2010 - present
Discovering files/objects in distributed privacy preserving P2P networks
MCD Fellow, Research Assistant
Advisor: Prof. Gustavo de Veciana

- We provided a new approach towards discovering files/objects which achieves stability under query resolution QoS constraints while accounting for various heterogeneity in file demands, altruism of super-peers, file placement, etc.

Alcatel-Lucent Bell Labs, New Jersey 2013
Location oblivious low latency data access in data centers
Summer Research Intern
Advisors: Dr. Murali Kodialam and Dr. T. V. Lakshman

- We provided a data storage architecture that guarantees a fixed low latency for data access, irrespective of the location of the request, by distributing data among the different memory locations such that network bottlenecks are avoided.
- We formulated the design of such systems as a linear program and developed a fast primal-dual algorithm which is faster than generic LP solvers.

Indian Institute of Technology, Bombay, 2009 - 2010
In-network function computation via network flows
Research Fellow
Advisors: Prof. D. Manjunath and Prof. Bikash K. Dey

- We developed fast algorithms for distributed function computations over networks with service constraints at nodes and capacity constraints at interconnecting links.
- Applications include throughput optimization in sensor networks and cloud computing systems.

Indian Institute of Science, Bangalore, 2007 - 2009
Distributed algorithms for wireless relay selection
Masters Research Project
Advisor: Prof. Neelesh B. Mehta

- We developed and optimized distributed algorithms for wireless cooperative relay selection and demonstrated an order of magnitude performance improvement over the state of the art in several scenarios.
- We optimized tradeoffs between resource allocation for selection and for data transmission, and demonstrated robustness of our algorithms.

Journal Publications

- V. Shah and G. de Veciana, "High Performance Centralized Content Delivery Infrastructure: Models and Asymptotics," *IEEE/ACM Trans. on Networking* (ToN), to appear.
- V. Shah and G. de Veciana "Asymptotic independence of servers' utilization in queuing systems with limited resource pooling," *Queuing Systems* (QUESTA), submitted
- V. Shah, G. de Veciana, and G. Kesidis "A Stable Approach for Routing Queries in Unstructured P2P Networks," *IEEE/ACM Trans. on Networking* (ToN), submitted.
- V. Shah, B. K. Dey, and D. Manjunath, "Network flows for functions," *IEEE J. on Selected Areas in Comm.* (JSAC) Special Issue on In-Network Computation, Mar. 2013.
- V. Shah, N. B. Mehta, and R. Yim, "Optimal timer based selection schemes," *IEEE Trans. on Comm.* (TCOM), June 2010.
- V. Shah, N. B. Mehta, and R. Yim, "Splitting algorithms for fast relay selection: Generalizations, analysis, and a unified view," *IEEE Trans. on Wireless Comm.* (TWC), Apr. 2010.
- V. Shah, N. B. Mehta, and R. Yim, "The Relay selection and transmission trade-off in cooperative communication systems," *IEEE Trans. on Wireless Comm.* (TWC), Aug. 2010.

Peer-reviewed Conference Publications

- V. Shah and G. de Veciana "Impact of fairness and heterogeneity on delays in large-scale content delivery networks," in ACM SIGMETRICS, June 2015.
- V. Shah and G. de Veciana "Performance evaluation and asymptotics for content delivery networks," in IEEE INFOCOM, Apr. 2014. **(Best Paper Award)**
- V. Shah, G. de Veciana, and G. Kesidis, "Learning to route queries in unstructured P2P networks: Achieving throughput optimality subject to query resolution constraints," in IEEE INFOCOM, Mar. 2012.
- V. Shah, B. K. Dey, and D. Manjunath, "Network flows for functions," in IEEE International Symposium of Information Theory (ISIT), Aug. 2011.
- V. Shah, B. K. Dey, and D. Manjunath, "Efficient flow allocation algorithms for in-network function computation," in IEEE GLOBECOM, Dec. 2011.
- V. Shah, N. B. Mehta, and R. Yim, "A complete characterization of an optimal timer based selection scheme," in IEEE International Conference on Communications (ICC), May 2010.

- A. S. Teertha, N. B. Mehta, V. Shah, "On optimal timer-based distributed selection for rate-adaptive multi-user diversity systems," National Conference on Communications (NCC), India, Jan. 2010. **(Best Paper Award)**
- V. Shah, N. B. Mehta, and R. Yim, "Analysis, insights and generalization of a fast decentralized relay selection mechanism," in IEEE International Conference on Communications (ICC), June 2009.
- V. Shah, N. B. Mehta, and R. Yim, "Relay selection and data transmission throughput tradeoff in cooperative systems," in IEEE GLOBECOM, Dec. 2009.

Graduate Course Work

Engineering Courses
Analysis & Design of Comm. Networks,
Digital Communication, Wireless Networks,
Systems Theory, Detection and Estimation Theory,
Adv. Prob.: Learning, Inference and Networks.

Mathematical Courses
Stochastic Processes & Queuing Theory,
Convex Analysis and Optimization,
Theory of Probability, Matrix Theory,
Information Theory, Randomized Algorithms

Teaching Experience

Probability and Stochastic Processes Fall 2013
Teaching Assistant
Instructor: Prof. Gustavo de Veciana

Other Interests/Hobbies

- House plants, cooking, reading

References

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