

Education

MA (PhD Incomplete) in Computer Science

Princeton, New Jersey, USA

Princeton University

Apr. 2016

- Received research assistance for work on Network Performance Analysis and Home Network Security.
- Awarded STEM Chateaubriand Fellowship by the Embassy of France for work on Internet of Things (2015 - 2016).
- Advisor: Prof. Nick Feamster
- GPA: 3.8/4.0

BTech and MTech in Electronics and Communication Engineering

Roorkee, INDIA

Indian Institute of Technology, Roorkee

Dec. 2010

- Specialization in Wireless Communication.
- Thesis: Performance Evaluation of Cross-Layer Wireless Body Area Networks.
- GPA: 8.06/10.00

Skills

Programming	Python v2.7, v3.3 – v3.7, iPython v7.8, Scala v2.11, Java v12.0, PostgreSQL, C/C++, R, Matlab, Node.js
Analytics	Pandas v0.13 – v0.23, Scikit-Learn v0.21, Tensorflow v1.14.0 – v2.0.0, Apache Spark, Numpy, Scipy, Matplotlib
Networking	Wireshark/Tshark v2.0, Iperf v2.0 – v3.7, Nmap v7.8, Scapy v2.4, Urllib3, Requests, Beautiful Soup 4, Networkx
Tools	PyCharm, PyLint, IntelliJ IDEA SBT, Eclipse, Git, Linux, Adobe Photoshop, Corel Draw, MS Office, LaTeX

Work Experience

Sugandhaa Co., Ltd.

New Delhi, INDIA

Business Manager

Apr. 2018 - Present

- Leading a family owned business. Responsible for inventory, account management, directing sales and delivery.
- Proficient in interacting directly with customers and managing daily finances to ensure smooth business operations.
- **Network anomaly detection:** Designed and implemented an anomaly detection algorithm for netflow records. [Link]
- Used machine learning to extract and transform packet features and detect anomalous behavior in real-time.
- Successfully identified port scans and DoS activity using statistical, information-theoretic, and clustering based approach.
- **CDN performance analysis:** Developed a CDN estimation algorithm for websites using xcache, whois, parsing, and DNS. [Link]
- Tested reachability and performance of Alexa's top 500 websites and compared CDN page-load times across ASNs.
- **Coursework:** Earned certificate for Functional Programming Principles in Scala by EPFL. [Link]

Princeton University

Princeton, NJ, USA

Graduate Research Assistant

Jan. 2015 - Sep. 2017

- Advisers: Prof. Nick Feamster (University of Chicago) and Dr. Roya Ensafi (University of Michigan)
- **IoT fingerprinting and real-time query system:** Analyzed packets of various IoT devices in lab using pcap, extracted relevant features to identify devices and outliers. [Link]
- Simulated user behavior and captured activity periods and background traffic for 10 different IoTs.
- Developed a filtering algorithm to discard non-IoT traffic at ISP. [Link]
- Transformed network traffic using FFT and PCA, and utilized clustering techniques to successfully identify different IoT devices.
- Implemented data pipeline in Spark to cluster IoT traffic and detect outlier devices.
- **Security and privacy of the Internet of Things:** Tested multiple IoT devices in lab and exposed security and privacy issues at PrivacyCon 2016. [Link]
- Found that a digital photoframe was susceptible to eavesdroppers and fails to encrypt photographs, and nest thermostat exposed private location information of nearest weather stations to the ISP (now patched).
- **Broadband traffic analysis:** Analyzed broadband usage patterns of a user group offered higher speed broadband without their knowledge. [Link]
- Found that difference in traffic demand was higher for moderate users as compared to high-volume subscribers; Presented at CableLabs (Jul 2016) and FCC (Oct 2016).
- **Fog Networks and the Internet of Things:** Teaching Assistant for Coursera MOOC. [Link]

Comcast Cable Communications, LLC

Philadelphia, PA, USA

Research Intern

May. 2016 - Aug. 2016

- Advisers: Jason Livingood (VP, Comcast) and Nirmal Mody (Manager, Comcast)
- Customer Owned and Managed (COAM) Internet of Things (IoT) security: Used DPI to study connectivity, security, and privacy of a subset of Comcast smart homes.
- Developed script to search for PII in unencrypted IoT data and identified a malfunctioning XBOX in one of the subscribers.

Georgia Institute of Technology

Graduate Research Assistant

Atlanta, GA, USA

Aug. 2012 - Dec. 2014

- Advisers: Prof. Nick Feamster (University of Chicago) and Prof. Renata Teixeira (INRIA Paris)
- **Analysis of home network availability, infrastructure, and traffic using BISmark:** Analyzed active and passive network data from multiple homes to study network availability in various countries, popular devices in homes, and traffic usage with time. [Link]
- Found most home traffic is exchanged from a few devices to a small number of popular domains.
- **HTPT:** Built and deployed an HTTP pluggable transport protocol to avoid censorship and detection for Tor. [Link]
- Responsibilities included parallelizing code, implementing framing buffers, and unit testing the system (team of 6).
- **QoS control using SDN for home networks:** Identified application and programmed appropriate rate shaper based on a set of filtering rules to map traffic to outgoing network flow. [Link]
- **SAZO: Constant guard for home network security:** Used bloom-filters and DPI on home routers to create a blacklist based malware identification and notification system for Comcast. [Link]
- **Analysis of end-to-end routing behavior:** Analyzed traceroute data from access networks to a variety of Internet destinations and examined route persistence and prevalence. Presented talk at AIMS, CAIDA.

INRIA

Research Intern

Paris, FRANCE

May. 2014 - Sep. 2014

- Advisers: Prof. Renata Teixeira (INRIA Paris) and Dr. Christian Kreibich (ICSI Berkley).
- Home network diagnosis for performance bottleneck detection: Tested uplink and downlink broadband performance from devices to detect if bottleneck is in the local wireless network or at the edge router.

LIP6, UPMC

Research Intern

Paris, FRANCE

Jun. 2013 - Sep. 2013

- Adviser: Prof. Renata Teixeira (INRIA Paris).
- Home network troubleshooting platform using Fathom and BISmark: Programmed active traceroute test on bismark router and analyzed latency and throughput performance from routers.

North Carolina State University

Research Scholar

Raleigh, NC, USA

Dec. 2011 - Apr. 2012

- Adviser: Prof. Injong Rhee (VP - IoT, Google).
- Indoor Localization for Samsung Smartphones using Radio: Implemented FM/AM transceiver systems on GNURadio to utilize RDS information for indoor localization.

Indian Institute of Science

Junior Research Fellow

Bangalore, INDIA

Apr. 2011 - Dec. 2011

- Adviser: Prof. Anurag Kumar (Director, IISc Bangalore).
- **WSNs for Societal Needs and Disaster Management:** Prepared work-plan proposal for submission to the Department of Science and Technology (DST), Govt of India.
- Computed closed-formed expressions for network reliability, and evaluated information theoretic bounds for random hybrid networks.
- Studied tessellation algorithm for WSN drop and placement to ensure end-to-end connectivity in the wild.
- **SmartConnect: DIT-ASTEC WSN Project:** Deployment of industrial wireless sensor networks, project demonstrations and experimental data analysis.

Selected Publications

A Case Study of Traffic Demand Response to Broadband Service-Plan Upgrades

Sarthak Grover, Roya Ensafi, and Nick Feamster

Proceedings of 17th International Conference on Passive and Active Measurement (PAM), 2016, Heraklion, Greece

The Internet of Unpatched Things

Sarthak Grover and Nick Feamster

Proceedings of FTC PrivacyCon, 2016, Washington, DC, USA

Facade: High-Throughput, Deniable Censorship Circumvention Using Web Search

Ben Jones, Sam Burnett, Nick Feamster, Sean Donovan, Sarthak Grover, Sathya Gunasekaran, and Karim Habak

4th USENIX Workshop on Free and Open Communications on the Internet (FOCI), 2014, San Diego, CA, USA

Panoptes: Detecting Malware Activity in Home Networks

Sarthak Grover and Nick Feamster

HomeSys: Workshop on Design, Technology, Systems and Applications for the Home (UbiComp), 2013, Zurich, Switzerland

Peeking Behind the NAT: An Empirical Study of Home Networks

Sarthak Grover, Mi Seon Park, Srikanth Sundaresan, Sam Burnett, Hyojoon Kim, Bharath Ravi, and Nick Feamster

Proceedings of the ACM Internet Measurement Conference (IMC), 2013, Barcelona, Spain