

# KUNAL MAHAJAN

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EDUCATION	<b>Columbia University, New York, NY</b> <i>Ph.D. Candidate in Computer Science</i> Advisors: Prof. Vishal Misra and Prof. Dan Rubenstein GPA: 4.19/4	Sept 2014 - Present
	<b>Columbia University, New York, NY</b> <i>M.S. in Computer Science</i> Advisor: Prof. Steven Nowick	Sept 2014 - Dec 2015
	<b>University of Pennsylvania, Philadelphia, PA</b> <i>B.S. in Computer Engineering, magna cum laude</i> Minor: Mechanical Engineering and Applied Mechanics	Sept 2010 - May 2014
INTERESTS	software-defined networking (SDN), datacenter networking, network security, analysis of algorithms, machine learning, natural language processing, databases, system-on-chip platforms, circuit design	
EXPERIENCE	<b>Turbonomic</b> <b>New York, NY</b>	
	<i>Development Intern</i>	June 2015 - Aug 2015
	<b>Columbia University, New York, NY</b> <b>Department of Computer Science</b>	
	<i>Graduate Research Assistant</i> Advisors: Vishal Misra and Dan Rubenstein	Jan 2016 - Present
	<i>Graduate Research Assistant</i> Advisor: Steven Nowick	Sept 2014 - Dec 2015
	<i>Teaching Assistant</i> for Prof. Steven Nowick Course: Advanced Logic Design	Spring 2015, Fall 2015
	<b>University of Pennsylvania, Philadelphia, PA</b> <b>Department of Electrical and Systems Engineering</b>	
	<i>Research Assistant</i> for Prof. Andre DeHon Implementation of Computation Group	May 2013 - Dec 2014
	<i>Research Assistant</i> for Prof. Katherine Kuchenbecker Haptics Lab	May 2012 - Sept 2012
	<i>Head Teaching Assistant</i> for Prof. Thomas Farmer Course: Electrical Circuits and Systems	Fall 2013

Teaching Assistant for Prof. Rahul Mangharam  
Course: Embedded Systems

Spring 2013

## AWARDS AND HONORS

**Columbia SIPA Public Policy Challenge Grant - Semifinalist** Oct 2016  
Team Hyperlocal

**Penn Engineering Excellence Service Award** May 2014  
University of Pennsylvania

**IEEE-Eta Kappa Nu Honor Society Member** Sept 2012 - May 2014  
Lambda Chapter, University of Pennsylvania

**Benjamin Franklin Honor Scholar** Sept 2010 - May 2014  
University of Pennsylvania

## PUBLICATIONS

1. Edin Kadric, **Kunal Mahajan** and Andre DeHon, *Energy Reduction through Differential Reliability and Lightweight Checking*, Proceedings of the 22nd IEEE International Symposium on Field-Programmable Custom Computing Machines (FCCM), Boston, MA, pp. 243-250, 2014.

2. Edin Kadric, **Kunal Mahajan** and Andre DeHon, *Kung Fu Data Energy - Minimizing Communication Energy in FPGA Computations*, Proceedings of the 22nd IEEE International Symposium on Field-Programmable Custom Computing Machines (FCCM), Boston, MA, pp. 214-221, 2014.

## CONFERENCES AND SUMMITS

**Google Networking Research Summit** Feb 7-8, 2017

**FPGA 2014:** ACM/SIGDA International Symposium on Field-Programmable Gate Arrays Feb 26-28, 2014

**FCCM 2014:** IEEE International Symposium on Field-Programmable Custom Computing May 11-13, 2014

## PROJECTS

### **Extreme DDoS Defense (XD3), DARPA project**

Modifying VMTorrent, scalable peer-to-peer virtual machine streaming software, to quickly transfer and boot Docker containers running user applications from attacked servers to uncompromised servers

### **Software-Defined Networking Flow Scheduler**

- Performed data analysis of datacenter packet traces
- Developed novel routing algorithm for datacenter networks based on the analysis
- Implemented the algorithm using Floodlight OpenFlow controller, Python
- Comparing flow completion times with existing routing algorithms (ECMP) on physical testbed

### **Datacenter Network Simulator**

- Developed a network simulator in Java to measure performance metrics of various routing algorithms, which included Random routing and ECMP
- Provided routing support for CLOS datacenter architecture

### **Presentation on emerging networking technologies**

- RDMA
- RoCE
- InfiniBand

**Energy Reduction using Differential Reliability and Lightweight Checking**

- Implemented window filter and FFT algorithm in Bluespec System Verilog for FPGA architecture
- Measured energy consumption for window filter and FFT algorithm using Verilog-To-Routing (VTR)
- Augmented CACTI model from HP labs to estimate area, performance and energy metrics for 7nm technology
- Modeled energy usage of Stratix IV memories and interconnect using Quartus II software from Altera

**Electronic Knee Wrap to Predict Knee Ligament Injuries**

- Gathered rotational and translational movement knee data of patients with knee ligament injuries through extensive reading of published research papers
- Implemented custom algorithm to compute risk analysis in real-time
- Designed the protocol for collecting data for healthy people to test accuracy of the Electronic Knee Wrap

**StrokeSleeve: Spatially Distributed Tactile Feedback for Stroke Rehabilitation**

- Designed wireless StrokeSleeve by using mbed and xbee modules
- Developed circuit to measure wrist rotation angle using stretch sensors

**VerroTouch: Haptic Instrument Vibration Feedback For Robotic Minimally Invasive Surgery**

- Created Graphical User Interface (GUI) for VerroTouch Project. GUI integrates force sensor and accelerometers data, performs noise filtering, analyses data and displays performance of doctors in real-time
- Planned demo for VerroTouch at Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) conference

**TECHNICAL SKILLS**

**Programming Languages:** Java, Python, C, C++, MATLAB, SQL, Verilog, VHDL  
**Mobile development:** Android, IOS  
**Software:** Eclipse, Apache, Solidworks, Mininet, OpenVSwitch, Floodlight

**OTHER ACTIVITIES****Mentoring and Advising**

*Aaron Zakem*, Columbia University M.S. researcher Fall 2016  
*Amelia Wang*, Columbia University M.S. researcher Fall 2016  
*Boyu Wang*, Columbia University M.S. researcher Spring 2017

**EXTRA-CURRICULAR****Indian Students Association at Columbia (ISAC), Columbia University**

- *Senior Mentor* Dec 2016 - Present
- *Vice-President* Oct 2015 - Nov 2016
- *Digital Media Chair* Oct 2014 - Sept 2015

**Penn Latin and Ballroom Dance, University of Pennsylvania**

*Member* Sept 2013 - Jan 2014

**Penn Alternate Spring Break, University of Pennsylvania**

Habitat for Humanity Project at Port Charlotte, FL Mar 2013

**UPenn Badminton Club, University of Pennsylvania**

- *Vice-President* Apr 2012 - Mar 2013
- *Team Manager* Apr 2011 - Mar 2012