Gayane Sargisovna Vardoyan

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Education

University of Massachusetts, Amherst   2014-present
MS/PhD-track Graduate Student

University of California, Berkeley   2008 - 2011
Bachelor of Science in Electrical Engineering and Computer Sciences

Research Experience

Research on Congestion Control and Avoidance Mechanisms   Research Assistantship
With Professor Don Towsley, UMass Amherst   Fall 2014-Present
Detailed analysis and performance evaluation of various congestion control and avoidance algorithms. Our work over the past two years resulted in a general theoretical framework for analyzing the performance of loss-based TCP variants. Currently, I am interested in analyzing the dynamics of different TCP variants (*e.g.* steady-state behavior, stability analysis), as well as the performance of a promising Automatic Repeat reQuest (ARQ) scheme.

Research on Network Intrusion Detection Systems   Undergraduate Researcher
With Professor Vern Paxson, UC Berkeley   Spring 2011 - Fall 2011
The aim of my project was to develop a framework for discerning `traceroute` traffic in `tcpdump` trace files from non-`traceroute` traffic, and to be able to do so with a sufficient degree of certainty. I used Prof. Paxson's Network Intrusion Detection System called *Bro* to detect pertinent ICMP packets (such as time-exceeded or port-unreachable packets), and to look at their properties (such as time-to-live values) to account for both incoming and outgoing `traceroute`s. By synthesizing the available information, I was able to display the IP addresses of possible `traceroute`-initiating hosts, as well as IPs of targeted hosts.

GamesCrafters – Computational Game Theory Group   Undergraduate Researcher
University of California, Berkeley   Spring 2009 - Fall 2011
Part of the research group in computational game theory at UC Berkeley, which includes developing software for Google Android phones since Fall 2009. I was the Team Lead for Game-Droid Team starting Spring 2010. Visit `gamescrafters.berkeley.edu` for more information.

Publications

Models of TCP in High-BDP Environments and Their Experimental Validation
Gayane Vardoyan, Nageswara Rao, Don Towsley
24th IEEE International Conference on Network Protocols (ICNP 2016)

High-Performance Data Flows Using Analytical Models and Measurements
Nageswara Rao, Rajkumar Kettimuthu, Ian Foster, Don Towsley, Gayane Vardoyan, Brad Settlemyer and Qiang Liu
To appear in the Workshop on Modeling & Simulation of Systems and Applications (ModSim 2016)

Sustained Wide-Area TCP Memory Transfers over Dedicated Connections
Nageswara Rao, Don Towsley, Gayane Vardoyan, Bradley Settlemyer, Ian Foster, Rajkumar Kettimuthu
High Performance Computing and Communications (HPCC), 2015

An Elegant Sufficiency: Load-Aware Differentiated Scheduling of Data Transfers
Rajkumar Kettimuthu, Gayane Vardoyan, Gagan Agrawal, P. Sadayappan, and Ian Foster
SC '15 Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis

Modeling and Optimizing Large-Scale Wide-Area Data Transfers
Rajkumar Kettimuthu, Gayane Vardoyan, Gagan Agrawal, and P. Sadayappan
14th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing, 2014

Characterizing Throughput Bottlenecks for Secure GridFTP Transfers
Gayane Vardoyan, Rajkumar Kettimuthu, Michael Link, Steven Tuecke
International Conference on Computing, Networking and Communications, 2013

Graduate Coursework	☐ Computer Networking	☐ Special Topics in Distributed Systems and Networks
	☐ Performance Evaluation	
	☐ Probabilistic Graphical Models	☐ Nonlinear Dynamics and Chaos with Applications
	☐ Advanced Algorithms	
	☐ Probability and Random Processes	☐ Coding Theory and Applications (currently enrolled)
	☐ Applied Information Theory	

Employment

Computation Institute Research Assistant
University of Chicago/Argonne National Laboratory Feb 2012 to July 2014
I worked within the Globus GridFTP project (http://www.globus.org/). In my first project, I conducted several experiments on various platforms and clusters to analyze the effects of Globus GridFTP optimization parameters on throughput. The findings are published in a paper that appeared at ICNC 2013. My next project focused on bandwidth allocation for large-scale wide-area data transfers between major data centers and compute clusters. I trained models that proved to be effective in predicting throughput based on indicators of the time-varying load in the system. We then developed an efficient algorithm that used these models to find the necessary GridFTP optimization options to achieve user-defined target throughputs (to appear in CCGrid 2014). Finally, I have implemented a preemptive scheduler that facilitates GridFTP transfers between major resources and uses decision tree models to predict transfer runtimes. The scheduler also uses the models for picking suitable transfer optimization options in order to make full use of the available bandwidth, while at the same time preventing over-saturation of the network and end systems. Findings of this projects appeared in SC15.

Cisco Systems Software Engineering Intern, STBU Network Security
San Jose, CA May - August, 2011
Designed and prototyped a safeguarding system for a dynamic hash table data structure fundamentally important on multicore ASA (Adapative Security Appliance) platforms. More specifically, the framework allows to distinguish between crashes caused by application misuse of the data structure and bugs within the data structure itself. It provides useful information in core dumps, which helps to track race conditions that are extremely difficult to reproduce. A separate project involved optimization of the dynamic hash table on a multicore ASA platform for which high performance of this data structure is crucial.

Cisco Systems Software Engineering Intern, DCSTG Business Unit
San Jose, CA May - August, 2010
Coded the passive default interface feature for IS-IS in NX-OS for both the interface level and the router level of the layer 3 datacenter switch Nexus 7000. Removed all memory leaks from IS-IS code in NX-OS and modified the memory management system to create more organization and a clearer understanding of how much memory was exactly being used by the various data structures in IS-IS. Tested the adjacency server feature for OTV in IS-IS (never previously tested before me) through building a testbed, configuring all needed interfaces and VDCs (Virtual Device Contexts) on both the Titaniums and the Nexus 7000s and thoroughly troubleshooting the network. Tested all of IPv6 for IS-IS (also never previously tested before me) through using another testbed (also built by me), configuring it, and thoroughly looking for any bugs.

Programming Languages
Knowledge of C, Java, Matlab, Python, Octave

Awards

NSF Graduate Research Fellowship Program Honorable Mention	Spring 2016
Louis and Grace Kurkjian Engineering Scholarship	Fall 2008
Boeing Engineering Scholarship Recipient	Fall 2009
Cisco Scholarship Recipient	Fall 2009

| **Outreach and Service at UMass, Amherst** | Outreach Coordinator for CS Women | 2015-2016 |
| | Graduate Student Body Treasurer | 2014-present |