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Education	GEORGIA INSTITUTE OF TECHNOLOGY	<i>Atlanta, GA</i>
	Ph.D. in Computer Science. <i>Thesis: Mitigating Spam using Network-level Features</i> <i>Advisor: Prof. Nick Feamster</i>	(2005–May 2011)
	INDIAN INSTITUTE OF TECHNOLOGY MADRAS	<i>Chennai, India</i>
	B.Tech in Computer Science and Engineering.	2001–2005

Research Interests

Network and Enterprise Security, Data Loss Prevention, Operating Systems, Distributed Systems, Network Monitoring and Measurement,

Research Experience

January 2006–	Graduate Research Assistant	School of Computer Science, Georgia Tech, <i>Atlanta, GA</i>
	<i>Network-level Spam Filtering.</i> Developed algorithms [4], [5], [6], [11] and deployed real-time systems [12] to filter spam based on network-level properties.	
	<i>Enterprise Data Loss Prevention.</i> Designed and implemented a secure, leak-proof enterprise communication framework using distributed information flow control (DIFC) and traffic <i>tainting</i> , using support from end-host operating systems [14]. Our system, <i>Pedigree</i> , tracks provenance of data and has applications in authentication, exfiltration prevention, and security of data in the cloud [3].	
	<i>Network Monitoring.</i> Developed a system that can efficiently monitor selected subpopulations such as botnets, DoS traffic, etc., on high-speed links [8].	
Summer 2009	Audience Sciences Group	Yahoo! Research, <i>Santa Clara, CA</i>
	Developed unsupervised learning algorithms that identify bot activity in Yahoo! Mail, and improved existing supervised spam-filtering systems [11].	
Summer 2007	Internet and Network Systems Group	AT&T Research, <i>Florham Park, NJ</i>
	Developed a new in-network phishing detection framework and algorithms that attempt to proactively detect and mitigate phishing at the scale of backbone networks [13].	
Summer 2006	Networks Group	International Computer Science Institute (ICSI), <i>Berkeley, CA</i>
	Interned with Prof. Scott Shenker. Research included design of, and measurements for, a new Internet Addressing Scheme: Atomic IP (AIP), which is part of the NSF GENI initiative.	
2004–2005	Undergraduate Research Assistant	Indian Institute of Technology Madras, <i>Chennai, India</i>
	Research included Computer Architecture projects such as Region Constrained Routing for FPGAs, and design of a tool to implement Delay-Insensitive Globally Asynchronous Locally Synchronous Circuits.	

Industry Experience

- Summer 2004 **Software Development Intern** Intel Corporation, *Bangalore, India*
Worked in the Design Technology group on designing and implementing algorithms to identify equivalent components in circuits, to optimize Intel's production Automatic Test Pattern Generation (ATPG) tool.
- Summer 2003 **Software Development Intern** Intel Corporation, *Bangalore, India*
Worked in the Design Technology group on designing graph-theoretic algorithms to improve circuit-learning in Intel's production tool for Automatic Test Pattern Generation (ATPG).

Teaching and Advising Experience

- Fall 09/Spring 10 Advised Utkarsh Shrivastava, Masters student at Georgia Tech, on a study on statistical analysis of spamming patterns.
- Spring 2009 Teaching Assistant, Georgia Tech Course CS 6262–Network Security.
Gave lectures and developed assignments and projects for this graduate-level course on Network Security and Applied Cryptography.
- Summer 2008 Advised Hitesh Khandelwal, senior at IIT Kanpur, on the design and implementation of Spamspotter [9].
- Fall 2005 Teaching Assistant, Georgia Tech Course CS 3210–Operating System Design.
Developed and evaluated programming assignments involving hacking the Linux kernel on hand-held PCs; conducted information sessions on kernel programming and evaluated quizzes and homeworks.
- Fall/Spring 2004 Teaching Assistant, IIT Madras Course CS 110–Fundamentals of Programming.
Taught scientific programming fundamentals using C and Unix to class of freshmen.

Awards and Honors

- 2006 Best Student Paper Award, *ACM SIGCOMM 2006*, Pisa, Italy
- 2008 Research Fellowship from Algorithms and Randomness Center (ARC), Georgia Tech for Spring 2008.
- 2011 MIT \$100k Executive Summary Contest “Products and Services” winner, (Feb 2011), Georgia Tech Research Innovation Competition Finalist, (Jan 2011).

Professional Service

Reviewer for journals such as ACM Computer Communications Review (Oct 2008), IEEE Transactions on Parallel and Distributed Systems (Oct 2009), ACM Transactions on Internet Technology (Jan 2010), IEEE Transactions on Network and Service Management (March 2011).

External reviewer for conferences such as *IEEE Symposium on Security and Privacy* (2006), *WWW*, 2007, *Usenix Annual Technical Conference 2007*, *Annual Computer Security Applications Conference* (2009), etc.

Skills

- Skills Networking protocols design and implementation, UNIX internals, Linux kernel development, Machine learning.
- Languages C, C++, Perl (at least 8 years); Ruby (at least 5 years); Java, Python (at least 2 years); at least one project with various other languages (Scheme, Haskell, etc.).

Publications

THESES

- [1] Anirudh Ramachandran. *Mitigating Spam using Network-level Features*. PhD thesis, Georgia Institute of Technology, May 2011.

BOOK CHAPTERS

- [2] Wenke Lee, Cliff Wang, and David Dagon. *Botnets: Countering The Largest Security Threat*, pages 131–142. Springer, first edition, 2008.

PEER-REVIEWED

Network Security

- [3] Yogesh Mundada, Anirudh Ramachandran, and Nick Feamster. Silverline: Data and Network Isolation for Cloud Services. In *2nd USENIX Workshop on Hot Topics in Cloud Computing*, Portland, OR, 2011.
- [4] Anirudh Ramachandran, Nick Feamster, and Santosh Vempala. Filtering Spam With Behavioral Blacklisting. In *Proc. Fourteenth ACM Conference on Computer and Communications Security*, Alexandria, VA, November 2007.
- [5] Anirudh Ramachandran and Nick Feamster. Understanding the Network-Level Behavior of Spammers. In *Proc. ACM SIGCOMM*, Pisa, Italy, August 2006. **Best Student Paper Award.**
- [6] Anirudh Ramachandran, Nick Feamster, and David Dagon. Revealing Botnet Membership with DNSBL Counter-Intelligence. In *2nd USENIX Workshop on Steps to Reducing Unwanted Traffic on the Internet (SRUTI)*, San Jose, CA, July 2006.
- [7] Anirudh Ramachandran, David Dagon, and Nick Feamster. Can DNSBLs Keep Up with Bots? In *3rd Conference on Email and Anti-Spam (CEAS)*, Mountain View, CA, July 2006.

Network Monitoring and Design

- [8] Anirudh Ramachandran, Srinivasan Seetharaman, Nick Feamster, and Vijay Vazirani. Fast Monitoring For Traffic Subpopulations. In *ACM SIGCOMM/USENIX Internet Measurement Conference*, Vouliagmeni, Greece, October 2008.

Social Networking

- [9] Anirudh Ramachandran and Nick Feamster. Authenticated out-of-band communication over social links. In *1st Workshop on Online Social Networks*, Seattle, WA, August 2008.

Peer-to-Peer Systems

- [10] Anirudh Ramachandran, Atish Das Sarma, and Nick Feamster. BitStore: An Incentive-Compatible Solution for Blocked Downloads in BitTorrent. In *2nd Joint Workshop on Economics of Networked Systems and Incentive-Based Computing*, San Diego, CA, June 2007.

TECHNICAL REPORTS AND WORKS IN PROGRESS

Network Security

- [11] Anirudh Ramachandran, Anirban Dasgupta, Kilian Weinberger, and Nick Feamster. Spam or Ham? Characterizing and Detecting Fraudulent "Not Spam" Reports in Web Mail Systems. Technical Report GT-CS-GT-11-06, School of Computer Science, Georgia Tech, January 2011. In submission.
- [12] Anirudh Ramachandran, Shuang Hao, Hitesh Khandelwal, Nick Feamster, and Santosh Vempala. A Dynamic Reputation Service for Spotting Spammers, 2009. Draft available at <http://davis.gtnoise.net/~avr/tmp/spamspotter.pdf>.
- [13] Anirudh Ramachandran, Nick Feamster, Balachander Krishnamurthy, Oliver Spatscheck, and Jacobus van der Merwe. Fishing for Phishing From the Network Stream. Technical Report GT-CS-08-08, Georgia Tech, October 2008.

Traffic Classification and Enterprise Security

- [14] Anirudh Ramachandran, Yogesh Mundada, Mukarram bin Tariq, and Nick Feamster. Practical Data-Leak Prevention for Legacy Applications in Enterprise Networks. Technical Report GT-CS-11-01, Georgia Tech, January 2011. In submission.
- [15] Anirudh Ramachandran, Yogesh Mundada, Mukarram bin Tariq, and Nick Feamster. Securing Enterprise Networks Using Traffic Tainting. Technical Report GT-CS-09-15, Georgia Tech, December 2009.
- [16] Anirudh Ramachandran, Kaushik Bhandankar, Mukarram bin Tariq, and Nick Feamster. Packets With Provenance. Technical Report GT-CS-08-02, Georgia Tech, January 2008. This is an earlier version of our Enterprise Data Loss Prevention paper.

Network Monitoring and Design

- [17] Anirudh Ramachandran, Srinivasan Seetharaman, Nick Feamster, and Vijay Vazirani. Building A Better Mousetrap. Technical Report GIT-CSS-07-01, Georgia Tech, January 2007. This paper is an earlier version of our IMC 2008 paper.

PATENTS

- [18] Balachander Krishnamurthy, Oliver Spatscheck, Jacobus Van Der Merwe, and Anirudh Ramachandran. Method and apparatus for identifying phishing websites in network traffic, 2008. Patent Pending. Application number 12/156,341.
- [19] David Dagon, Nick Feamster, Wenke Lee, Robert Edmonds, Richard Lipton, and Anirudh Ramachandran. Method and system for detecting and responding to attacking networks, 2006. Patent Pending. Application number 11/538,212.
- [20] Anirudh Ramachandran, Yogesh Mundada, Muhammad Mukarram bin Tariq, and Nick Feamster. Method and System for Information Flow Control for Legacy Applications in Enterprises, 2010. US Provisional Patent Application number 61/384,475.