

Dave Levin

Contact Info

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Academic Appointment

University of Maryland, College Park, MD USA

Assistant Professor

2017 – present

My research focus is on systems and network security. I am also Chair of the Computer Science Undergraduate Honors program. I am affiliated with UMIACS, MC2, and the Maryland-Max-Planck PhD Program.

Education

University of Maryland, College Park, Maryland USA

Ph.D., Computer Science, September 2010

- Dissertation: Systems-compatible Incentives
- Advisors: Bobby Bhattacharjee, Neil Spring, and Aravind Srinivasan

B.S., Computer Science, May 2002

B.S., Mathematics, May 2002

University of Notre Dame, Notre Dame, Indiana USA

Attended August 1997 – May 1999

Honors and Awards

- Dean's Award for Excellence in Teaching, College of Computer, Mathematical, and Natural Sciences, 2018
 - IEEE Cybersecurity Award for Innovation 2017, for *CRLite: A Scalable System for Pushing All TLS Revocations to All Browsers*
 - Distinguished paper award, USENIX Security 2017, for *A Longitudinal, End-to-End View of the DNSSEC Ecosystem*
 - Reviewer award, SIGCOMM 2012
 - Best paper, USENIX NSDI 2009, for *TrInc: Small Trusted Hardware for Large Distributed Systems*
 - Best presentation, Computer Science track of UMD Graduate Research Interaction Day, 2009
 - Microsoft Live Labs fellowship, awarded 2008
 - Dean's fellowship for excellence in research, Computer Science Dept., Univ. of Maryland, 2006
 - Outstanding undergraduate computer science teaching assistant award, Univ. of Maryland, 2002
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Refereed Publications

1. **King of the Hill: A Novel Cybersecurity Competition for Teaching Penetration Testing**

Kevin Bock, George Hughey, Dave Levin

USENIX ASE 2018 (Workshop on Advances in Security Education)

2. **Internet Anycast: Performance, Problems, and Potential**

Zhihao Li, Dave Levin, Neil Spring, Bobby Bhattacharjee

ACM SIGCOMM 2018

3. **Analysis of SSL Certificate Reissues and Revocations in the Wake of Heartbleed**

Liang Zhang, David Choffnes, Tudor Dumitras, Dave Levin, Alan Mislove, Aaron Schulman, Christo Wilson

Communications of the ACM Research Highlights, March 2018 (Vol. 61, No. 3)

4. **An End-to-End View of DNSSEC Ecosystem Management**

Taejoong Chung, Roland van Rijswijk-Deij, Balakrishnan Chandrasekaran, David Choffnes, Dave Levin, Bruce M. Maggs, Alan Mislove, Christo Wilson

USENIX ;login: Winter 2017 (Vol. 42, No. 4)

5. **Stick a fork in it: Analyzing the Ethereum network partition**
Lucianna Kiffer, Dave Levin, Alan Mislove
HotNets 2017 (ACM Workshop on Hot Topics in Networking)
6. **Understanding the Role of Registrars in DNSSEC Deployment**
Taejoong Chung, Roland van Rijswijk-Deij, David Choffnes, Alan Mislove, Christo Wilson, Dave Levin, Bruce M. Maggs
ACM IMC 2017 (Internet Measurement Conference) Long paper
7. **unCaptcha: A Low-Resource Defeat of reCaptcha’s Audio Challenge**
Kevin Bock, Daven Patel, George Hughey, Dave Levin
USENIX WOOT 2017 (Workshop on Offensive Technologies)
8. **DeTor: Provably Avoiding Geographic Regions in Tor**
Zhihao Li, Stephen Herwig, Dave Levin
USENIX Security 2017
9. **A Longitudinal, End-to-End View of the DNSSEC Ecosystem**
Taejoong Chung, Roland van Rijswijk-Deij, Balakrishnan Chandrasekaran, David Choffnes, Dave Levin, Bruce M. Maggs, Alan Mislove, Christo Wilson
USENIX Security 2017
10. **CRLite: A Scalable System for Pushing All TLS Revocations to All Browsers**
James Larisch, David Choffnes, Dave Levin, Bruce M. Maggs, Alan Mislove, Christo Wilson
IEEE Symposium on Security and Privacy 2017
11. **Measuring and Applying Invalid SSL Certificates: The Silent Majority**
Taejoong Chung, Yabing Liu, David Choffnes, Dave Levin, Bruce M. Maggs, Alan Mislove, Christo Wilson
ACM IMC 2016 (Internet Measurement Conference) Long paper
12. **Measurement and Analysis of Private Key Sharing in the HTTPS Ecosystem**
Frank Cangialosi, Taejoong Chung, David Choffnes, Dave Levin, Bruce M. Maggs, Alan Mislove, Christo Wilson
ACM CCS 2016 (Conference on Computer and Communications Security)
13. **Build It, Break It, Fix It: Contesting Secure Development**
Andrew Ruef, Michael Hicks, James Parker, Dave Levin, Michelle Mazurek, Piotr Mardziel
ACM CCS 2016 (Conference on Computer and Communications Security)
14. **Picocenter: Supporting long-lived, mostly-idle applications in cloud environments**
Liang Zhang, James Litton, Frank Cangialosi, Theophilus Benson, Dave Levin, Alan Mislove
EuroSys 2016 (European Conference on Computer Systems)
15. **Anomaly Detection on D-root**
Zhihao Li, Dave Levin, Bobby Bhattacharjee, Neil Spring
DINR Workshop 2016 (DNS and Internet Naming Research Directions)
16. **DNSql: Processing Massive DNS Collections**
Stephen Herwig, Dave Levin, Bobby Bhattacharjee, Neil Spring
DINR Workshop 2016 (DNS and Internet Naming Research Directions)
17. **Ting: Measuring and Exploiting Latencies Between All Tor Nodes**
Frank Cangialosi, Dave Levin, Neil Spring
ACM IMC 2015 (Internet Measurement Conference) Long paper
18. **An End-to-End Measurement of Certificate Revocation in the Web’s PKI**
Yabing Liu, Will Tome, Liang Zhang, David Choffnes, Dave Levin, Bruce Maggs, Alan Mislove, Aaron Schulman, Christo Wilson
ACM IMC 2015 (Internet Measurement Conference) Long paper

19. **Alibi Routing**
Dave Levin, Youndo Lee, Luke Valenta, Zhihao Li, Victoria Lai, Cristian Lumezanu, Neil Spring, Bobby Bhattacharjee
ACM SIGCOMM 2015
20. **Build It Break It: Measuring and Comparing Development Security**
Andrew Ruef, Michael Hicks, James Parker, Dave Levin, Atif Memon, Jan Plane, Piotr Mardziel
CSET 2015 (Workshop on Cyber Security Experimentation and Test)
21. **Programming Slick Network Functions**
Bilal Anwer, Theophilus Benson, Nick Feamster, Dave Levin
SOSR 2015 (Symposium on SDN Research)
22. **UAv6: Alias Resolution in IPv6 Using Unused Addresses**
Ramakrishna Padmanabhan, Zhihao Li, Dave Levin, Neil Spring
PAM 2015 (Passive and Active Measurement Conference)
23. **RevCast: Fast, Private Certificate Revocation over FM Radio**
Aaron Schulman, Dave Levin, Neil Spring
ACM CCS 2014 (Conference on Computer and Communications Security)
24. **Analysis of SSL Certificate Reissues and Revocations in the Wake of Heartbleed**
Liang Zhang, Dave Choffnes, Tudor Dumitras, Dave Levin, Alan Mislove, Aaron Schulman, Christo Wilson
ACM IMC 2014 (Internet Measurement Conference) Long paper
25. **D-mystifying the D-root Address Change**
Matthew Lentz, Dave Levin, Jason Castonguay, Neil Spring, Bobby Bhattacharjee
ACM IMC 2013 (Internet Measurement Conference) Short paper
26. **A Slick Control Plane for Network Middleboxes**
Bilal Anwer, Theophilus Benson, Nick Feamster, Dave Levin, Jennifer Rexford
Poster at HotSDN 2013 (Hot Topics in Software Defined Networking), and paper at ONS 2013 (Open Network Summit)
27. **SDX: A Software Defined Internet Exchange**
Josh Bailey, Russ Clark, Nick Feamster, Dave Levin, Jennifer Rexford, Scott Shenker
ONS 2013 (Open Network Summit)
28. **Making Currency Cheap with iOwe**
Dave Levin, Aaron Schulman, Katrina LaCurts, Neil Spring, Bobby Bhattacharjee
NetEcon 2011 (Workshop on the Economics of Networks, Systems, and Computation)
29. **Secure Sharing in Distributed Information Management Applications: Problems and Directions**
Piotr Mardziel, Adam Bender, Michael Hicks, Dave Levin, Mudhakar Srivatsa, Jonathan Katz
ACITA 2010 (Annual Conference of the International Technology Alliance)
30. **Don't Love Thy Nearest Neighbor**
Cristian Lumezanu, Dave Levin, Bo Han, Neil Spring, Bobby Bhattacharjee
IPTPS 2010 (International Workshop on Peer-to-Peer Systems)
31. **Stay or go? Participation in Under-Provisioned Video Streams**
Dave Levin, Daniel Malter, Neil Spring, Bobby Bhattacharjee
NetEcon 2009 (Workshop on the Economics of Networks, Systems, and Computation)
32. **TrInc: Small Trusted Hardware for Large Distributed Systems**
Dave Levin, John R. Douceur, Jacob R. Lorch, and Thomas Moscibroda
NSDI 2009 (USENIX Symposium on Networked Systems Design and Implementation)

33. **Symbiotic Relationships in Internet Routing Overlays**
Cristian Lumezanu, Randy Baden, Dave Levin, Neil Spring, and Bobby Bhattacharjee
NSDI 2009 (USENIX Symposium on Networked Systems Design and Implementation)
34. **BitTorrent is an Auction: Analyzing and Improving BitTorrent's Incentives**
Dave Levin, Katrina LaCurts, Neil Spring, and Bobby Bhattacharjee.
ACM SIGCOMM 2008
35. **Motivating Participation in Internet Routing Overlays**
Dave Levin, Randolph Baden, Cristian Lumezanu, Neil Spring, and Bobby Bhattacharjee
NetEcon 2008 (Workshop on the Economics of Networks, Systems, and Computation)
36. **On the Fidelity of 802.11 Packet Traces**
Aaron Schulman, Dave Levin and Neil Spring.
PAM 2008 (Passive and Active Measurement Conference)
37. **Capacity of Asynchronous Random-Access Scheduling in Wireless Networks**
Deepti Chafekar, Anil Kumar, Dave Levin, Madhav Marathe, Srinivasan Parthasarathy and Aravind Srinivasan.
INFOCOM 2008 (IEEE Conference on Computer Communications)
38. **PeerWise Discovery and Negotiation of Faster Paths**
Cristian Lumezanu, Dave Levin and Neil Spring.
HotNets 2007 (ACM Workshop on Hot Topics in Networks)
39. **Backbone Construction in Selfish Wireless Networks**
Seungjoon Lee, Dave Levin, Vijay Gopalakrishnan and Bobby Bhattacharjee.
SIGMETRICS 2007 (ACM Int'l. Conference on Measurement and Modeling of Computer Systems)
40. **Boycotting and Extorting Nodes in an Internetwork**
Dave Levin, Adam Bender, Cristian Lumezanu, Neil Spring and Bobby Bhattacharjee.
NetEcon+IBC 2007 (Workshop on the Econ. of Networked Systems / Incentive-Based Computing)
41. **Accountability as a Service**
Adam Bender, Neil Spring, Dave Levin and Bobby Bhattacharjee.
SRUTI 2007 (Workshop on Steps to Reducing Unwanted Traffic in the Internet)
42. **Punishment in Selfish Wireless Networks: A Game Theoretic Analysis**
Dave Levin.
NetEcon 2006 (Workshop on the Economics of Networked Systems)
43. **Fair File Swarming with FOX**
Dave Levin, Rob Sherwood and Bobby Bhattacharjee.
IPTPS 2006 (International Workshop on Peer-to-Peer Systems)
44. **ProofRite: A Paper-Augmented Word Processor**
Kevin Conroy, Dave Levin and François Guimbretière.
UIST 2004 Demonstration (ACM Symposium on User Interface Software and Technology)
45. **Nurikabe: Private yet Accountable Online Advertising**
Dave Levin, Bobby Bhattacharjee, John R. Douceur, Jacob R. Lorch, James Mickens, and Thomas Moscibroda
46. **Incentive-Compatible Bootstrapping**
Dave Levin, Katrina LaCurts, Aaron Schulman, Neil Spring, and Bobby Bhattacharjee
47. **A Secure DHT via the Pigeonhole Principle**
Randy Baden, Adam Bender, Dave Levin, Rob Sherwood, Neil Spring and Bobby Bhattacharjee.
48. **Paranoia: An Anonymous, Censorship-Resistant File Store**
Dave Levin and Bobby Bhattacharjee.

Technical
Reports

49. **DDoS Detection in Multi-Homed Stub Domains**
Chris Kommareddy, Dave Levin, Bobby Bhattacharjee, Richard La, Mark Shayman and Vahid Tabatabaee.
50. **Hoodnets: Mobile Users Bonding over Auctions**
Dave Levin, Robert Kiefer, Kevin McGehee, Kristin Stephens, Koyel Mukherjee, Neil Spring, and Bobby Bhattacharjee
- Invited Papers 51. **Systems-Compatible Incentives**
Dave Levin, Neil Spring, and Bobby Bhattacharjee
GameNets 2009 (International Conference on Game Theory for Networks)

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- Funding
- AWS Cloud Credits for Research **Building a Science-as-a-Service Cloud Platform with Process Migration**, \$25,000. November 2017–2018.
 - NSF CNS-1735563 **Student Travel to the Cornell, Maryland, Max Planck Pre-Doctoral Research School**, \$50,000. June 2017–2018. Co-Primary Investigator, joint with Bobby Bhattacharjee (PI).
 - NSF CNS-1564143 **TWC: Medium: Collaborative: Measuring and Improving the Management of Today's PKI**, \$1.2M (total) \$600,000 (UMD). July 2016–2020. Primary Investigator, joint with Tudor Dumitras (UMD), Alan Mislove (Northeastern University), David Choffnes (NEU), and Christo Wilson (NEU).
 - E-VERIFY: LTS DO 0026 **DNS and External Data Fusion Research**, \$649,374. March 2016–2018. Co-Primary Investigator, joint with Bobby Bhattacharjee (PI) and Neil Spring.
 - NSF CNS-1619048 **NeTS: Small: Residential Network Outage Detection**, \$366,000. October 2016–2019. Co-Primary Investigator, joint with Neil Spring (PI).
 - University of Maryland Partnership with the Laboratory for Telecommunications Sciences (LTS), **DNS and External Data Fusion Research**, \$344,593, Co-Primary Investigator, joint with Bobby Bhattacharjee and Neil Spring.
 - NSF CNS-1409249 **CSR: Medium: Collaborative Research: Towards Finer-grained Cloud Computing**, \$1.2M (total) \$400,000 (UMD). August 2014–2018. Primary Investigator, joint with Alan Mislove (Northeastern University) and Theophilus Benson (Duke University).
 - University of Maryland Partnership with the Laboratory for Telecommunications Sciences (LTS), **Securing Critical Network Infrastructure**, \$197,999, Co-Primary Investigator, joint with Bobby Bhattacharjee and Neil Spring.
 - University of Maryland Partnership with the Laboratory for Telecommunications Sciences (LTS), **Bitcoin: Detecting and Characterizing Attacks**, \$149,820, Co-Primary Investigator, joint with Bobby Bhattacharjee and Neil Spring.
 - NSF SaTC EDU-1319147 **EDU: Competing to Build Secure Systems**, \$300,000. September 2013–2015. Co-Primary Investigator, joint with Michael Hicks (PI), Atif Memon, and Jandelyn Plane.

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- Advising
- Post-docs:
- Christina Garman (2017), now Asst. Prof. at Purdue University

- Current students:
- Katura Harvey (PhD CS), Co-advised with Deepak Garg (MPI-SWS)
 - Stephen Herwig (PhD CS)
 - Richard Roberts (PhD CS), Co-advised with Peter Druschel (MPI-SWS)
 - Soumya Indela (PhD ECE), Co-advised with Tudor Dumitras (UMD ECE)
 - Kevin Bock (MS)
 - Ivan Petrov (MS)
 - George Hughey (BS)
 - Blue Keleher (BS)

Previous students:

- Frank Cangialosi (BS 2015), now at MIT (PhD)
- Luke Valenta (BS 2014), now at UPenn (PhD)
- Victoria Lai (BS 2013), now at Palintir

PhD Committees

- Defense: Youndo Lee (2017), Liang Zhang (2016; Northeastern University)
- Proposal: Ramakrishna Padmanabhan (2017), Benjamin Bengfort (2016)

Classes Taught

• CMSC 414 (Computer and Network Security).	Spring 2018
• CMSC 396H (Computer Science Honors Seminar).	”
• CMSC 389R (Introduction to Ethical Hacking). <i>Student-led class</i> .	”
• HACS 479 (Independent Study: Server-side detection of VPN connections).	”
• CMSC 499A (Independent Study: Secure process migration).	”
• CMSC 499A (Independent Study: Towards a blockchain-based PKI).	”
• CMSC 499A (Independent Study: Side-channel defenses).	”
• CMSC 818O (Graduate Computer and Network Security).	Fall 2017
• CMSC 396H (Computer Science Honors Seminar).	”
• CMSC 389O (The Coding Interview). <i>Student-led class</i> .	”
• CMSC 499A (Independent Study: Reverse-engineering a peer-to-peer botnet).	”
• CMSC 818O (Graduate Computer and Network Security).	Spring 2017
• CMSC 396H (Computer Science Honors Seminar).	”
• CMSC 414 (Computer and Network Security).	Spring 2016
• CMSC 396H (Computer Science Honors Seminar).	”
• CMSC 499A (Independent Study: Analyzing CDNs’ Roles in the Web’s PKI).	Fall 2015
• CMSC 499A (Independent Study: Obfuscated Communication through Skype Video).	”
• CMSC 414 (Computer and Network Security).	Spring 2015
• CMSC 414 (Computer and Network Security).	Spring 2014
• CMSC 499A (Independent Study: Anonymous DTN Routing).	”
• CMSC 330 (Organization of Programming Languages).	Spring 2013
• CMSC 499A (Independent Study: Provable Route Avoidance using Alibi Routing).	”
• CMSC 818F (Securing and Monetizing the Internet).	”

Service Activities

Program committee member:

- IEEE Security & Privacy (Oakland) 2019
- IMC 2016, 2018 (ACM Internet Measurement Conference)
- CSET 2016, 2017 (USENIX Workshop on Cyber Security Experimentation and Test)
- NetEcon 2011, 2013, 2014, 2015, 2016, 2017 (Workshop on the Economics of Networks, Systems, and Computation)
- SOSR 2016, 2017 (Symposium on SDN Research)
- SIGCOMM 2012, 2013 (ACM Conference on Applications, Technologies, Architectures, and Protocols for Computer Communications), *Winner, best reviewer award (2012)*
- NSDI 2013 (USENIX Symposium on Networked Systems Design and Implementation)
- ICNP 2012 (IEEE International Conference on Network Protocols)
- DIALM-POMC 2010 (ACM International Workshop on Foundations of Mobile Computing)

General chair:

- SOSR 2017 (ACM Symposium on SDN Research)
- HotNets 2013 (ACM Workshop on Hot Topics in Networks)

National Science Foundation panelist:

- NSF CSR 2016 (Computer Systems Research)

- NSF SaTC 2015 (Secure and Trustworthy Cyberspace)

Computing Research Association (CRA) Congressional Fly-in, 2015

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- Departmental Activities
- Chair, Computer Science Honors Program, 2016 – present.
 - Co-founder of GTRG, a game theory reading group for the Computer Science Department (see <https://www.cs.umd.edu/~dml/gtrg.html>).
 - Elected member of the Computer Science Department’s Education Committee, 2005 – 2006.
 - President of the Executive Council, the graduate student governing body for promoting interaction among students and faculty in the computer science department, 2004 – 2005.
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- Invited Talks
- Revocations Are Dead, Long Live Revocations*
- Georgia Tech. Hosted by Maria Konte January 2018
 - UCSD. Hosted by Geoff Voelker December 2017
- Securing the Internet by Proving the Impossible*
- University of Jordan. Hosted by Khair Eddin September 2016
- Key Mismanagement in the Web’s PKI*
- CloudFlare. Hosted by Nick Sullivan August 2016
 - NEC Labs. Hosted by Cristian Lumezanu July 2016
- The Ugly Truth about Certificate Revocation*
- Maryland Cybersecurity Center Symposium December 2015
 - ICF Internationals CyberSci Summit October 2015
 - Duke University. Hosted by Theo Benson August 2014
- Alibi Routing*
- SIGCOMM Conference August 2015
- Maritime Cybersecurity*
- National Maritime Electronics Association (NMEA) Conference October 2015
- Analysis of SSL Certificate Reissues and Revocations in the Wake of Heartbleed*
- NANOG 62 (Security track). Baltimore, MD October 2014
- D-mystifying the D-root Address Change*
- NANOG 62 (DNS track). Baltimore, MD October 2014
- Tune-in to Tune-out: Using FM radio to revoke certificates*
- Maryland Cybersecurity Center Symposium May 2014
- Avoiding Censors by Proving the Impossible*
- Laboratory for Telecommunication Sciences (LTS) Symposium March 2014
- Proving the Impossible with Alibi Protocols*
- Maryland Cybersecurity Center (MC2) Symposium May 2013
- Systems without Cooperation*
- William and Mary College. April 2013
 - Stanford University Networking Seminar. July 2009
 - Georgia Tech. Hosted by Nick Feamster. December 2008
 - University of Wisconsin-Madison. Hosted by Suman Banerjee. December 2008
- Making Currency Cheap with iOwe*
- NetEcon Workshop July 2011
- Stay or Go? Participation in Under-provisioned Multicast Systems*

- NetEcon Workshop July 2009
- Systems-Compatible Incentives*
- GameNets Conference May 2009
- TrInc: Small Trusted Hardware for Large Distributed Systems*
- NSDI Conference April 2009
- BitTorrent Is an Auction: Analyzing and Improving BitTorrent's Incentives*
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- Motivating Participation in Internet Routing Overlays*
- NetEcon Workshop August 2008
- Boycotting and Extorting Nodes in an Internetwork*
- NetEcon Workshop June 2007
- Punishment in Selfish Wireless Networks*
- NetEcon Workshop June 2006
- Fair File Swarming with FOX*
- IPTPS Workshop February 2006
- University of Delaware. Hosted by Paul Amer. September 2005

Prior Professional Experience **University of Maryland**, College Park, MD USA

Assistant Research Scientist **2012 – 2017**
 Performed and advised research in a wide range of networked systems and security I also taught undergraduate and graduate courses, typically on computer security. Served as a co-chair of the Computer Science Undergraduate Honors program since Fall 2015.

Hewlett Packard Labs, Palo Alto, California USA

Researcher **2010 – 2012**
 Worked in the Social Computing Group with Bernardo Huberman, with a focus on building systems that allow users to share network resources while addressing incentives, security, and usability concerns.

Microsoft Research, Redmond, Washington USA

Researcher; Summer Intern **2008 – 2009**
 Worked in the Distributed Systems and Security group with John Douceur, Jacob Lorch, James Mickens, and Thomas Moscibroda on the design of secure and incentive-compatible protocols. The two summers resulted in a best paper at NSDI 2009 and a submission to NSDI 2010.

Hewlett Packard Labs, Palo Alto, California USA

Researcher; Summer Intern **2006**
 Worked in Bernardo Huberman's Information Dynamics Lab. Worked closely with Kevin Lai on a source-initiated multicast protocol. Collaborated with other researchers on topics ranging from social networking to decentralized digital markets.

Space/Ground System Solutions, La Plata, Maryland USA

Software Engineer **2002 – 2003**
 Designed, developed, and supported application-level device drivers in C. Ported some of the code from legacy Fortran on a VAX.

TIPS Technology, Crofton, Maryland USA

Software Developer **2001**

Designed, developed, and supported myriad web-based applications in Perl, MySQL, and Java.

Motorola, Arlington Heights, Illinois USA

Software Engineer; Summer Intern

1999 – 2000

Aided in design, coding, and testing of embedded software responsible for communication between 3G cell phones and base stations.

U.S. Department of Defense, Dahlgren, Virginia USA

Systems Administrator; Summer Intern

1996 – 1998

Administered a lab consisting of SGI, Sun, and Windows machines.