

# Dave Levin

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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.

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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

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Honors and Awards      • 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. **Analysis of SSL Certificate Reissues and Revocations in the Wake of Heartbleed**  
    Liang Zhang, David Choffnes, Tudor Dumitra, Dave Levin, Alan Mislove, Aaron Schulman, Christo Wilson  
    Communications of the ACM Research Highlights, March 2018 (Vol. 61, No. 3)  
    2. **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)  
    3. **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)  
    4. **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  
    5. **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)

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6. **DeTor: Provably Avoiding Geographic Regions in Tor**  
Zhihao Li, Stephen Herwig, Dave Levin  
USENIX Security 2017
7. **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
8. **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
9. **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
10. **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)
11. **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)
12. **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)
13. **Anomaly Detection on D-root**  
Zhihao Li, Dave Levin, Bobby Bhattacharjee, Neil Spring  
DINR Workshop 2016 (DNS and Internet Naming Research Directions)
14. **DNSql: Processing Massive DNS Collections**  
Stephen Herwig, Dave Levin, Bobby Bhattacharjee, Neil Spring  
DINR Workshop 2016 (DNS and Internet Naming Research Directions)
15. **Ting: Measuring and Exploiting Latencies Between All Tor Nodes**  
Frank Cangialosi, Dave Levin, Neil Spring  
ACM IMC 2015 (Internet Measurement Conference) Long paper
16. **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
17. **Alibi Routing**  
Dave Levin, Youndo Lee, Luke Valenta, Zhihao Li, Victoria Lai, Cristian Lumezanu, Neil Spring, Bobby Bhattacharjee  
ACM SIGCOMM 2015
18. **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)
19. **Programming Slick Network Functions**  
Bilal Anwer, Theophilus Benson, Nick Feamster, Dave Levin  
SOSR 2015 (Symposium on SDN Research)

20. **UAv6: Alias Resolution in IPv6 Using Unused Addresses**  
Ramakrishna Padmanabhan, Zhihao Li, Dave Levin, Neil Spring  
PAM 2015 (Passive and Active Measurement Conference)
21. **RevCast: Fast, Private Certificate Revocation over FM Radio**  
Aaron Schulman, Dave Levin, Neil Spring  
ACM CCS 2014 (Conference on Computer and Communications Security)
22. **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
23. **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
24. **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)
25. **SDX: A Software Defined Internet Exchange**  
Josh Bailey, Russ Clark, Nick Feamster, Dave Levin, Jennifer Rexford, Scott Shenker  
ONS 2013 (Open Network Summit)
26. **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)
27. **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)
28. **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)
29. **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)
30. **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)
31. **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)
32. **BitTorrent is an Auction: Analyzing and Improving BitTorrent's Incentives**  
Dave Levin, Katrina LaCurts, Neil Spring, and Bobby Bhattacharjee.  
ACM SIGCOMM 2008
33. **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)

34. **On the Fidelity of 802.11 Packet Traces**  
Aaron Schulman, Dave Levin and Neil Spring.  
PAM 2008 (Passive and Active Measurement Conference)
35. **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)
36. **PeerWise Discovery and Negotiation of Faster Paths**  
Cristian Lumezanu, Dave Levin and Neil Spring.  
HotNets 2007 (ACM Workshop on Hot Topics in Networks)
37. **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)
38. **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)
39. **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)
40. **Punishment in Selfish Wireless Networks: A Game Theoretic Analysis**  
Dave Levin.  
NetEcon 2006 (Workshop on the Economics of Networked Systems)
41. **Fair File Swarming with FOX**  
Dave Levin, Rob Sherwood and Bobby Bhattacharjee.  
IPTPS 2006 (International Workshop on Peer-to-Peer Systems)
42. **ProofRite: A Paper-Augmented Word Processor**  
Kevin Conroy, Dave Levin and François Guimbretière.  
UIST 2004 Demonstration (ACM Symposium on User Interface Software and Technology)
43. **Nurikabe: Private yet Accountable Online Advertising**  
Dave Levin, Bobby Bhattacharjee, John R. Douceur, Jacob R. Lorch, James Mickens, and Thomas Moscibroda
44. **Incentive-Compatible Bootstrapping**  
Dave Levin, Katrina LaCurts, Aaron Schulman, Neil Spring, and Bobby Bhattacharjee
45. **A Secure DHT via the Pigeonhole Principle**  
Randy Baden, Adam Bender, Dave Levin, Rob Sherwood, Neil Spring and Bobby Bhattacharjee.
46. **Paranoia: An Anonymous, Censorship-Resistant File Store**  
Dave Levin and Bobby Bhattacharjee.
47. **DDoS Detection in Multi-Homed Stub Domains**  
Chris Kommareddy, Dave Levin, Bobby Bhattacharjee, Richard La, Mark Shayman and Vahid Tabatabaee.
48. **Hoodnets: Mobile Users Bonding over Auctions**  
Dave Levin, Robert Kiefer, Kevin McGehee, Kristin Stephens, Koyel Mukherjee, Neil Spring, and Bobby Bhattacharjee
49. **Systems-Compatible Incentives**  
Dave Levin, Neil Spring, and Bobby Bhattacharjee  
GameNets 2009 (International Conference on Game Theory for Networks)

Technical  
Reports

Invited Papers

## 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

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## PhD Committees

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

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## Classes Taught

- CMSC 414 (Computer and Network Security). Spring 2018
- CMSC 396H (Computer Science Honors Seminar). ”
- CMSC 389R (Introduction to Ethical Hacking). *Student-led class*. ”

- CMSC 8180 (Graduate Computer and Network Security). Fall 2017
- CMSC 396H (Computer Science Honors Seminar). ”
- CMSC 3890 (The Coding Interview). *Student-led class*. ”
- CMSC 499A (Independent Study: Reverse-engineering a peer-to-peer botnet). ”
- CMSC 8180 (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) 2018
  - 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)
  - IMC 2016 (ACM Internet Measurement Conference)
  - 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

- 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.

- Invited Talks
- Revocations Are Dead, Long Live Revocations*
- Georgia Tech. Hosted by Maria Konte January 2018
  - UCSD. Hosted by Geoff Voelker December 2017

<i>Securing the Internet by Proving the Impossible</i>	
• University of Jordan. Hosted by Khair Eddin	September 2016
<i>Key Mismanagement in the Web's PKI</i>	
• CloudFlare. Hosted by Nick Sullivan	August 2016
• NEC Labs. Hosted by Cristian Lumezanu	July 2016
<i>The Ugly Truth about Certificate Revocation</i>	
• Maryland Cybersecurity Center Symposium	December 2015
• ICF Internationals CyberSci Summit	October 2015
• Duke University. Hosted by Theo Benson	August 2014
<i>Alibi Routing</i>	
• SIGCOMM Conference	August 2015
<i>Maritime Cybersecurity</i>	
• National Maritime Electronics Association (NMEA) Conference	October 2015
<i>Analysis of SSL Certificate Reissues and Revocations in the Wake of Heartbleed</i>	
• NANOG 62 (Security track). Baltimore, MD	October 2014
<i>D-mystifying the D-root Address Change</i>	
• NANOG 62 (DNS track). Baltimore, MD	October 2014
<i>Tune-in to Tune-out: Using FM radio to revoke certificates</i>	
• Maryland Cybersecurity Center Symposium	May 2014
<i>Avoiding Censors by Proving the Impossible</i>	
• Laboratory for Telecommunication Sciences (LTS) Symposium	March 2014
<i>Proving the Impossible with Alibi Protocols</i>	
• Maryland Cybersecurity Center (MC2) Symposium	May 2013
<i>Systems without Cooperation</i>	
• 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
<i>Making Currency Cheap with iOwe</i>	
• NetEcon Workshop	July 2011
<i>Stay or Go? Participation in Under-provisioned Multicast Systems</i>	
• NetEcon Workshop	July 2009
<i>Systems-Compatible Incentives</i>	
• GameNets Conference	May 2009
<i>TrInc: Small Trusted Hardware for Large Distributed Systems</i>	
• NSDI Conference	April 2009
<i>BitTorrent Is an Auction: Analyzing and Improving BitTorrent's Incentives</i>	
• SIGCOMM Conference	August 2008
<i>Motivating Participation in Internet Routing Overlays</i>	
• NetEcon Workshop	August 2008
<i>Boycotting and Extorting Nodes in an Internetnetwork</i>	
• NetEcon Workshop	June 2007

*Punishment in Selfish Wireless Networks*

- NetEcon Workshop

June 2006

*Fair File Swarming with FOX*

- IPTPS Workshop
- University of Delaware. Hosted by Paul Amer.

February 2006  
September 2005

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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.