

# Dave Levin

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## 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.

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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

- Best Paper Honorable Mention, ACM CCS 2022, for *Hammurabi: A Framework for Pluggable, Logic-based X.509 Certificate Validation Policies*
  - Facebook/USENIX Internet Defense Prize (3rd place), for *Weaponizing Middleboxes for TCP Reflected Amplification*, 2021
  - Distinguished paper award, USENIX Security 2021, for *Weaponizing Middleboxes for TCP Reflected Amplification*
  - IRTF Applied Networking Research Prize (ANRP) for *Come as You Are: Helping Unmodified Clients Bypass Censorship with Server-side Evasion*, 2021
  - NCWIT (National Center for Women & Information Technology) Undergraduate Research Mentoring Award, 2020
  - NSF CAREER Award, 2020
  - IRTF Applied Networking Research Prize (ANRP) for *Understanding the Role of Registrars in DNSSEC Deployment*, 2019
  - 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. **How the Great Firewall of China Detects and Blocks Fully Encrypted Traffic**  
Mingshi Wu, Jackson Sippe, Danesh Sivakumar, Jack Burg, Peter Anderson, Xiaokang Wang, Kevin Bock, Amir Houmansadr, Dave Levin, Eric Wustrow  
USENIX Security 2023

2. *Title currently under embargo*  
Richard Roberts, Julio Poveda, Raley Roberts, Dave Levin  
Oakland 2023 (IEEE Symposium on Security and Privacy)
3. **Measuring and Evading Turkmenistan’s Internet Censorship**  
Sadia Nourin, Van Tran, Xi Jiang, Kevin Bock, Nick Feamster, Nguyen Phong Hoang, Dave Levin  
The Web Conference 2023
4. **Provably Avoiding Geographic Regions for Tor’s Onion Services**  
Arushi Arora, Raj Karra, Dave Levin, Christina Garman  
FC 2023 (Financial Cryptography and Data Security)
5. **How to Count Bots in Longitudinal Datasets of IP Addresses**  
Leon Böck, Dave Levin, Ramakrishna Padmanabhan, Christian Doerr, Max Mühlhäuser  
NDSS 2023 (Network and Distributed System Security Symposium)
6. **A Global Measurement of Routing Loops on the Internet**  
Abdulrahman Alaraj, Kevin Bock, Dave Levin, Eric Wustrow  
PAM 2023 (Passive and Active Measurement Conference)
7. **A Comparative Analysis of Certificate Pinning in Android & iOS**  
Amogh Pradeep, Muhammad Talha Paracha, Protick Bhowmick, Ali Davanian, Abbas Razaghpanah,  
Taejoong Chung, Martina Lindorfer, Narseo Vallina-Rodriguez, Dave Levin, David Choffnes  
ACM IMC 2022 (Internet Measurement Conference) Long paper
8. **Hammurabi: A Framework for Pluggable, Logic-based X.509 Certificate Validation Policies**  
James Larisch, Waqar Aqeel, Michael Lum, Zachary Hanif, Yaelle Goldschlag, Kasra Torshizi, Leah  
Kannan, Yujie Wang, Taejoong Chung, Dave Levin, Bruce M. Maggs, Alan Mislove, Bryan Parno, Christo  
Wilson  
ACM CCS 2022
9. **GET /out: Automated Discovery of Application-Layer Censorship Evasion Strategies**  
Michael Harrity, Kevin Bock, Frederick Sell, Dave Levin  
USENIX Security 2022
10. **Insights and Experiences from Monitoring Multiple P2P Botnets**  
Leon Böck, Shankar Karuppayah, Max Mühlhäuser, Dave Levin  
Botconf 2022 (The Botnet Fighting Conference)
11. **Investigating Influencer VPN Ads on YouTube**  
Omer Akgul, Richard Roberts, Moses Namara, Dave Levin, Michelle L. Mazurek  
Oakland 2022 (IEEE Symposium on Security and Privacy)
12. **Sound Methodology for Downloading Webpages**  
Soumya Indela, Dave Levin  
TMA 2021 (Network Traffic Measurement and Analysis Conference)
13. **Even Censors Have a Backup: Examining the GFWs Double HTTPS Censorship System**  
Kevin Bock, Gabriel Naval, Kyle Reese, Dave Levin  
FOCI 2021 (ACM Workshop on Free and Open Communications on the Internet)
14. **Bento: Safely Bringing Network Function Virtualization to Tor**  
Michael Reininger, Arushi Arora, Stephen Herwig, Nicholas Francino, Jayson Hurst, Christina Garman,  
Dave Levin  
ACM SIGCOMM 2021
15. **The Ties that un-Bind: Decoupling IP from web services and sockets for robust addressing agility  
at CDN-scale**  
Marwan Fayed, Lorenz Bauer, Vasileios Giotsas, Sami Kerola, Marek Majkowski, Pavel Odinstov, Jakub

Sitnicki, Taejoong Chung, Dave Levin, Alan Mislove, Christopher A. Wood, Nick Sullivan  
ACM SIGCOMM 2021

16. **Your Censor is My Censor: Weaponizing Censorship Infrastructure for Availability Attacks**  
Kevin Bock, Pranav Bharadwaj, Jasraj Singh, Dave Levin  
WOOT 2021 (IEEE Workshop on Offensive Technologies)
17. **Measurement and Analysis of Automated Certificate Reissuance**  
Olamide Omolola, Richard Roberts, Ishtiaq Ashiq, Taejoong Chung, Dave Levin, Alan Mislove  
PAM 2021 (Passive and Active Measurement Conference)
18. **Under the Hood of the Ethereum Gossip Protocol**  
Lucianna Kiffer, Asad Salman, Dave Levin, Alan Mislove, Cristina Nita-Rotaru  
FC 2021 (Financial Cryptography and Data Security)
19. **Weaponizing Middleboxes for TCP Reflected Amplification**  
Kevin Bock, Abdulrahman Alaraj, Yair Fax, Kyle Hurley, Eric Wustrow, Dave Levin  
USENIX Security 2021
20. **Detecting and Evading Censorship-in-Depth: A Case Study of Iran's Protocol Whitelister**  
Kevin Bock, Yair Fax, Kyle Reese, Jasraj Singh, Dave Levin  
FOCI 2020 (USENIX Workshop on Free and Open Communications on the Internet)
21. **Assertion-Carrying Certificates**  
Waqar Aqeel, Zachary Hanif, James Larisch, Olamide Omolola, Taejoong Chung, Dave Levin, Bruce Maggs, Alan Mislove, Bryan Parno, Christo Wilson  
FCS 2020 (Workshop on Foundations of Computer Security)
22. **Come as You Are: Helping Unmodified Clients Bypass Censorship with Server-side Evasion**  
Kevin Bock, George Hughey, Louis-Henri Merino, Tania Arya, Daniel Liscinsky, Regina Pogolian, Dave Levin  
ACM SIGCOMM 2020
23. **.how .you .spot .whoswho .online .sucks: Deceiving Users with Generic Top-Level Domains**  
Richard Roberts, Rachel Walter, Daniela Lulli, Dave Levin  
ConPro 2020 (Workshop on Technology and Consumer Protection) Accepted Talk
24. **A Deeper Look at Web Content Availability and Consistency over HTTP/S**  
Muhammad Talha Paracha, Balakrishnan Chandrasekara, David Choffnes, Dave Levin  
TMA 2020 (Network Traffic Measurement and Analysis Conference)
25. **Build It, Break It, Fix It: Contesting Secure Development**  
James Parker, Michael Hicks, Andrew Ruef, Michelle L. Mazurek, Dave Levin, Daniel Votipka, Piotr Mardziel, Kelsey R. Fulton  
ACM TOPS March 2020 (Transactions on Privacy and Security)
26. **Achieving Keyless CDNs with Conclaves**  
Stephen Herwig, Christina Garman, Dave Levin  
USENIX Security 2020
27. **Geneva: Evolving Censorship Evasion Strategies**  
Kevin Bock, George Hughey, Dave Levin  
ACM CCS 2019 (Conference on Computer and Communications Security)
28. **You Are Who You Appear to Be: A Longitudinal Study of Domain Impersonation in TLS Certificates**  
Richard Roberts, Yaelle Goldschlag, Rachel Walter, Taejoong Chung, Alan Mislove, Dave Levin  
ACM CCS 2019 (Conference on Computer and Communications Security)

29. **When Certificate Transparency Is Too Transparent: Analyzing Information Leakage in HTTPS Domain Names**  
Richard Roberts, Dave Levin  
WPES 2019 (Workshop on Privacy in the Electronic Society) Short paper
30. **RPKI is Coming of Age: A Longitudinal Study of RPKI Deployment and Invalid Route Origins**  
Taejoong Chung, Emile Aben, Tim Bruijnzeels, Balakrishnan Chandrasekaran, David Choffnes, Dave Levin, Bruce M. Maggs, Alan Mislove, Roland van Rijswijk-Deij, John P. Rula, Nick Sullivan  
ACM IMC 2019 (Internet Measurement Conference) Long paper
31. **Measuring TLS key exchange with post-quantum KEM**  
Krzysztof Kwiatkowski, Nick Sullivan, Adam Langley, Dave Levin, Alan Mislove  
NIST Second PQC Standardization Conference 2019
32. **Residential Links Under the Weather**  
Ramakrishna Padmanabhan, Aaron Schulman, Dave Levin, Neil Spring  
ACM SIGCOMM 2019
33. **Automatically Learning How to Evade Censorship**  
Dave Levin  
USENIX ScAI Net 2019 (Security and AI Networking Conference)
34. **How to find correlated Internet failures**  
Ramakrishna Padmanabhan, Aaron Schulman, Alberto Dainotti, Dave Levin, Neil Spring  
PAM 2019 (Passive and Active Measurement Conference)
35. **Measurement and Analysis of Hajime, a Peer-to-peer IoT Botnet**  
Stephen Herwig, Katura Harvey, George Hughey, Richard Roberts, Dave Levin  
NDSS 2019 (Network and Distributed System Security Symposium)
36. **Is the Web Ready for OCSP Must Staple?**  
Taejoong Chung, Jay Lok, Balakrishnan Chandrasekaran, David Choffnes, Dave Levin, Bruce Maggs, Alan Mislove, John Rula, Nick Sullivan, Christo Wilson  
ACM IMC 2018 (Internet Measurement Conference) Long paper
37. **Analyzing Ethereum's Contract Topology**  
Lucianna Kiffer, Dave Levin, Alan Mislove  
ACM IMC 2018 (Internet Measurement Conference) Short paper
38. **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)
39. **Internet Anycast: Performance, Problems, and Potential**  
Zhihao Li, Dave Levin, Neil Spring, Bobby Bhattacharjee  
ACM SIGCOMM 2018
40. **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)
41. **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)
42. **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)

43. **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
44. **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)
45. **DeTor: Provably Avoiding Geographic Regions in Tor**  
Zhihao Li, Stephen Herwig, Dave Levin  
USENIX Security 2017
46. **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
47. **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  
Oakland 2017 (IEEE Symposium on Security and Privacy)
48. **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
49. **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)
50. **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)
51. **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)
52. **Anomaly Detection on D-root**  
Zhihao Li, Dave Levin, Bobby Bhattacharjee, Neil Spring  
DINR Workshop 2016 (DNS and Internet Naming Research Directions)
53. **DNSql: Processing Massive DNS Collections**  
Stephen Herwig, Dave Levin, Bobby Bhattacharjee, Neil Spring  
DINR Workshop 2016 (DNS and Internet Naming Research Directions)
54. **Ting: Measuring and Exploiting Latencies Between All Tor Nodes**  
Frank Cangialosi, Dave Levin, Neil Spring  
ACM IMC 2015 (Internet Measurement Conference) Long paper
55. **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
56. **Alibi Routing**  
Dave Levin, Youndo Lee, Luke Valenta, Zhihao Li, Victoria Lai, Cristian Lumezanu, Neil Spring, Bobby

Bhattacharjee  
ACM SIGCOMM 2015

57. **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)
58. **Programming Slick Network Functions**  
Bilal Anwer, Theophilus Benson, Nick Feamster, Dave Levin  
SOSR 2015 (Symposium on SDN Research)
59. **UAv6: Alias Resolution in IPv6 Using Unused Addresses**  
Ramakrishna Padmanabhan, Zhihao Li, Dave Levin, Neil Spring  
PAM 2015 (Passive and Active Measurement Conference)
60. **RevCast: Fast, Private Certificate Revocation over FM Radio**  
Aaron Schulman, Dave Levin, Neil Spring  
ACM CCS 2014 (Conference on Computer and Communications Security)
61. **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
62. **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
63. **A Slick Control Plane for Network Middleboxes**  
Bilal Anwer, Theophilus Benson, Nick Feamster, Dave Levin, Jennifer Rexford  
ONS 2013 (Open Network Summit)
64. **SDX: A Software Defined Internet Exchange**  
Josh Bailey, Russ Clark, Nick Feamster, Dave Levin, Jennifer Rexford, Scott Shenker  
ONS 2013 (Open Network Summit)
65. **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)
66. **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)
67. **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)
68. **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)
69. **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)
70. **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)

71. **BitTorrent is an Auction: Analyzing and Improving BitTorrent's Incentives**  
Dave Levin, Katrina LaCurts, Neil Spring, and Bobby Bhattacharjee.  
ACM SIGCOMM 2008
72. **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)
73. **On the Fidelity of 802.11 Packet Traces**  
Aaron Schulman, Dave Levin and Neil Spring.  
PAM 2008 (Passive and Active Measurement Conference)
74. **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)
75. **PeerWise Discovery and Negotiation of Faster Paths**  
Cristian Lumezanu, Dave Levin and Neil Spring.  
HotNets 2007 (ACM Workshop on Hot Topics in Networks)
76. **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)
77. **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)
78. **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)
79. **Punishment in Selfish Wireless Networks: A Game Theoretic Analysis**  
Dave Levin.  
NetEcon 2006 (Workshop on the Economics of Networked Systems)
80. **Fair File Swarming with FOX**  
Dave Levin, Rob Sherwood and Bobby Bhattacharjee.  
IPTPS 2006 (International Workshop on Peer-to-Peer Systems)
81. **ProofRite: A Paper-Augmented Word Processor**  
Kevin Conroy, Dave Levin and François Guimbretière.  
UIST 2004 Demonstration (ACM Symposium on User Interface Software and Technology)
82. **Bento: Bringing Network Function Virtualization to Tor**  
Michael Reininger, Arushi Arora, Stephen Herwig, Nicholas Francino, Christina Garman, Dave Levin  
ACM CCS 2020 (Conference on Computer and Communications Security) Poster
83. **Mental Models of Domain Names and URLs**  
Richard Roberts, Daniela Lulli, Abole Raut, Kelsey Fulton, Dave Levin  
SOUPS 2020 (Symposium On Usable Privacy and Security) Poster
84. **Detecting IoT Malware with Power Measurements**  
Rebecca Gelles, Kelsey Fulton, Rachel Walter, Dave Levin  
ACM IMC 2018 (Internet Measurement Conference) Poster
85. **Measurement and Analysis of Hajime, a Peer-to-peer IoT Botnet**  
Stephen Herwig, Katura Harvey, George Hughey, Richard Roberts, Dave Levin  
ACM IMC 2018 (Internet Measurement Conference) Poster

Posters

86. **Target-Embedding Domain Impersonation in HTTPS Certificates**  
Richard Roberts, Yaelle Goldschlag, Dave Levin  
ACM IMC 2018 (Internet Measurement Conference) Poster
87. **Measuring Last-Mile Internet Reliability During Severe Weather**  
Ramakrishna Padmanabhan, Ramakrishnan Sundara Raman, Reethika Ramesh, Aaron Schulman, Dave Levin, Neil Spring.  
ACM IMC 2017 (Internet Measurement Conference) Poster
88. **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)
- Technical Reports
89. **Nurikabe: Private yet Accountable Online Advertising**  
Dave Levin, Bobby Bhattacharjee, John R. Douceur, Jacob R. Lorch, James Mickens, and Thomas Moscibroda
90. **Incentive-Compatible Bootstrapping**  
Dave Levin, Katrina LaCurts, Aaron Schulman, Neil Spring, and Bobby Bhattacharjee
91. **A Secure DHT via the Pigeonhole Principle**  
Randy Baden, Adam Bender, Dave Levin, Rob Sherwood, Neil Spring and Bobby Bhattacharjee.
92. **Paranoia: An Anonymous, Censorship-Resistant File Store**  
Dave Levin and Bobby Bhattacharjee.
93. **DDoS Detection in Multi-Homed Stub Domains**  
Chris Kommareddy, Dave Levin, Bobby Bhattacharjee, Richard La, Mark Shayman and Vahid Tabatabaee.
94. **Hoodnets: Mobile Users Bonding over Auctions**  
Dave Levin, Robert Kiefer, Kevin McGehee, Kristin Stephens, Koyel Mukherjee, Neil Spring, and Bobby Bhattacharjee
- Invited Papers
95. **Systems-Compatible Incentives**  
Dave Levin, Neil Spring, and Bobby Bhattacharjee  
GameNets 2009 (International Conference on Game Theory for Networks)
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- Funding
- Facebook, **Internet Defense Prize**, \$40,000 (Total), \$20,000 (UMD). Joint with Eric Wustrow (CU Boulder).
  - Google exploreCSR, **Tech+Research Research Hackathon**, \$18,000. 2020-2021.
  - NSF CNS-1943240 **CAREER: Automatically Learning to Evade Internet Censorship**, \$499,628. October 2020–2025. Primary Investigator.
  - OTF Internet Freedom Fund **Evolving Censorship Evasion Strategies**, \$125,000. August 2019–2020. Primary Investigator.
  - NSF CNS-1901325 **CNS Core: Large: Collaborative Research: Towards an Evolvable Public Key Infrastructure**, \$2M (Total), \$617,561 (UMD). June 2019–2022. Primary Investigator, joint with Alan Mislove and Christo Wilson (Northeastern University), Bruce Maggs (Duke University), Bryan Parno (Carnegie Mellon University), Taejoong Chung (Rochester Institute of Technology).
  - NSF CNS-1902304 **Tech+Research: Welcoming Women to Computing Research, Hackathon Style**, \$40,000. December 2018–2019. Primary Investigator.
  - NSF CNS-1816802 **SaTC: CORE: Small: Collaborative: Building Sophisticated Services with Programmable Anonymity Networks**, \$500,000 (total) \$250,000 (UMD). September 2018–2021. Primary Investigator, joint with Christina Garman (Purdue University).
  - 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.

#### Advising

##### Post-docs:

- Christina Garman (2017), now Asst. Prof. at Purdue University

##### Current students:

- Kevin Bock (PhD CS; *advanced to candidacy*)
- Richard Roberts (PhD CS)
- Erik Rye (PhD CS)
- Breakerspace undergraduates (38): Tania Arya, Pranav Bharadwaj, Quinton Davidson, Emily Dunham, Sabrina Field, Yaelle Goldschlag, Michael Harrity, Priyal Garg, Vanya Gorbachev, Nathan Hayes, Melissa Hoff, Kyle Hurley, Jayson Hurst, Leah Kannan, Noah Labruna, Amanda Li, Daniel Liscinsky, Daniela Lulli, Michael Lum, Anna Mazzanati, Brendan McMahan, Azeem Mohammed, Sai Naraharisetti, Sree Ramireddygar, Abole Raut, Sadena Rishindran, Michael Roberts, Alden Schmidt Krushi Shah, Kevin Shen, Nathan Stiff, Chris Tharratt, Kasra Torshizi, Johan Vandegriff, Shrikar Vasisht, Josh Wang, Yujie Wang, Claude Zou

##### Previous students:

- Stephen Herwig (PhD CS, 2021)
- Soumya Indela (PhD ECE, 2021)
- Victoria Lai (BS 2013), now at Palintir
- Luke Valenta (BS 2014), (PhD: UPenn), now at Cloudflare
- Frank Cangialosi (BS 2015), now at MIT (PhD)
- Katrina LaCurts (BS 2008; grad student mentor), (PhD: MIT), now at MIT EECS (Senior Lecturer, Undergraduate Officer)
- Ivan Petrov (MS 2018), now at Google
- Katura Harvey (MS 2018), now at Cisco
- Rebecca Gelles (MS 2019)

- Zachary Hanif (MS 2020)
- Breakerspace students (15): Josephine Chow (BS/MS 2019), now at Cloudflare; Jacob Cohen; Yair Fax (BS 2020); Josh Fleming (BS 2019), now at Booz Allen; Nick Francino (BS/MS 2020); Peter Heppenstall (BS 2019), now at Activision; George Hughey (BS 2019), now at Microsoft; Mitchell Kager (BS/MS 2020); Blue Keleher (BS 2019), now at Samsara; Lauren Kosub (BS 2020); Angela Lambert; Julianna Long (BS 2020); Alexis Mejia; Louis-Henri Merino (BS 2019), now at EPFL; Avi Passy (BS 2020); Regina Pogolian (BS 2019), now at ManTech; Vikram Rao (BS 2019), now at Amazon; Michael Reininger (BS/MS 2020); Kyle Reese (BS 2020); Vaishnavi Sesity; Jasraj Singh (BS 2020); Preston Tong (MS 2020); Anjali Viramgama; Rachel Walter (BS 2020), now at Amazon

- PhD Committees
- Defense: Ramakrishna Padmanabhan (2018), Benjamin Bengfort (2018), Andrew Ruef (2018), Youndo Lee (2017), Liang Zhang (2016; Northeastern University)
  - Proposal: Matthew Lentz (2018), Ramakrishna Padmanabhan (2017), Andrew Ruef (2017), Benjamin Bengfort (2016)

- Classes Taught
- CMSC 414 (Computer and Network Security). Fall 2020
  - CMSC 396H (Computer Science Honors Seminar). "
  - CMSC 414 (Computer and Network Security). Spring 2020
  - CMSC 396H (Computer Science Honors Seminar). "
  - CMSC 499A (Independent Study: Evading nation-state censors). "
  - CMSC 499A (Independent Study: User perception of domain impersonation). "
  - HACS 479 (Independent Study: Detecting IoT malware with side-channels). "
  - CMSC 818O (Graduate Computer and Network Security). Fall 2019
  - CMSC 396H (Computer Science Honors Seminar). "
  - CMSC 389R (Introduction to Ethical Hacking). *Student-led class*. "
  - CMSC 414 (Computer and Network Security). Spring 2019
  - CMSC 396H (Computer Science Honors Seminar). "
  - CMSC 389R (Introduction to Ethical Hacking). *Student-led class*. "
  - CMSC 818O (Graduate Computer and Network Security). Fall 2018
  - CMSC 396H (Computer Science Honors Seminar). "
  - CMSC 389R (Introduction to Ethical Hacking). *Student-led class*. "
  - CMSC 414 (Computer and Network Security). Spring 2018
  - CMSC 396H (Computer Science Honors Seminar). "
  - CMSC 389R (Introduction to Ethical Hacking). *Student-led class*. "
  - 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). *Student-led class*. "
  - 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). ”
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Service Activities Member:

- National Academies Forum on Cyber-resilience (2021 – Present)

Program Committee chair:

- FOCI 2021 (ACM Workshop on Free and Open Communications on the Internet)
- PAM 2021 (Passive and Active Measurement Conference)

General chair:

- IMC 2021 (ACM Internet Measurement Conference)
- SOSR 2017 (ACM Symposium on SDN Research)
- HotNets 2013 (ACM Workshop on Hot Topics in Networks)

Chair:

- ACM SIGCOMM Doctoral Dissertation Award Committee, 2016

Program committee member:

- ACM SIGCOMM 2012, 2013, 2020, 2021, 2022 *Winner, best reviewer award (2012)*
- IEEE Security & Privacy (Oakland) 2019, 2020, 2023
- USENIX Security 2021
- Computing Innovation Fellows 2020
- CCS 2020 (ACM Conference on Computer and Communications Security)
- PAM 2020 (Passive and Active Measurement Conference)
- IMC 2016, 2018, 2019, 2020, 2022 (ACM Internet Measurement Conference)
- CSET 2016, 2017, 2019 (USENIX Workshop on Cyber Security Experimentation and Test)
- CoNEXT 2018 (Conference on emerging Networking EXperiments and Technologies)
- NetEcon 2011, 2013, 2014, 2015, 2016, 2017 (Workshop on the Economics of Networks, Systems, and Computation)
- SOSR 2016, 2017 (Symposium on SDN Research)
- 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)

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 (joint with Leilani Battle Spring 2019–Spring 2021), Computer Science Honors Program, 2016 – present.
- Founded Breakerspace, a lab dedicated to group undergraduate research project (see <https://breakerspace.cs.umd.edu>).
- 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	<p><i>Weaponizing Censorship Infrastructure</i></p> <ul style="list-style-type: none"> <li>• Rightscon 2021 Conference (With Kevin Bock) <span style="float: right;">June 2021</span></li> </ul> <p><i>Automatically Learning How to Evade Censorship</i></p> <ul style="list-style-type: none"> <li>• US Dept. of State Global Engagement Center. (With Kevin Bock) <span style="float: right;">March 2021</span></li> <li>• Cornell CS Colloquium. Hosted by Fred Schneider. <span style="float: right;">October 2020</span></li> <li>• Pluggable Transports Implementers Meeting. <span style="float: right;">October 2020</span></li> <li>• USENIX ScAINet Conference <span style="float: right;">August 2019</span></li> <li>• Laboratory for Telecommunication Sciences (LTS) Symposium <span style="float: right;">July 2019</span></li> <li>• Harvard University <span style="float: right;">July 2019</span></li> </ul> <p><i>Combatting Nation-state Censorship</i></p> <ul style="list-style-type: none"> <li>• University of Iowa. Hosted by Omar Chowdhury. <span style="float: right;">September 2020</span></li> </ul> <p><i>The Evolution of (Anti-)Censorship</i></p> <ul style="list-style-type: none"> <li>• Georgetown Center for Security and Emerging Technology. Hosted by Rebecca Gelles. <span style="float: right;">July 2020</span></li> </ul> <p><i>Automatically Learning How to Evade Censorship</i></p> <ul style="list-style-type: none"> <li>• USENIX ScAINet Conference <span style="float: right;">August 2019</span></li> <li>• Laboratory for Telecommunication Sciences (LTS) Symposium <span style="float: right;">July 2019</span></li> <li>• Harvard University <span style="float: right;">July 2019</span></li> </ul> <p><i>Three Ugly Truths about the Web's PKI (and How We Might Fix it)</i></p> <ul style="list-style-type: none"> <li>• Cornell, Maryland, Max Planck Pre-doctoral Research Summer School (CMMRS) <span style="float: right;">August 2019</span></li> <li>• Virginia Tech. Hosted by Ing-Ray Chen <span style="float: right;">October 2018</span></li> <li>• Georgetown University. Hosted by Micah Sherr <span style="float: right;">September 2018</span></li> <li>• Laboratory for Telecommunication Sciences (LTS) Symposium <span style="float: right;">March 2017</span></li> </ul> <p><i>Revocations Are Dead, Long Live Revocations</i></p> <ul style="list-style-type: none"> <li>• Georgia Tech. Hosted by Maria Konte <span style="float: right;">January 2018</span></li> <li>• UCSD. Hosted by Geoff Voelker and Kirill Levchenko <span style="float: right;">December 2017</span></li> </ul> <p><i>Securing the Internet by Proving the Impossible</i></p> <ul style="list-style-type: none"> <li>• University of Jordan. Hosted by Khair Eddin <span style="float: right;">September 2016</span></li> </ul> <p><i>Key Mismanagement in the Web's PKI</i></p> <ul style="list-style-type: none"> <li>• CloudFlare. Hosted by Nick Sullivan <span style="float: right;">August 2016</span></li> <li>• NEC Labs. Hosted by Cristian Lumezanu <span style="float: right;">July 2016</span></li> </ul> <p><i>The Ugly Truth about Certificate Revocation</i></p> <ul style="list-style-type: none"> <li>• Maryland Cybersecurity Center Symposium <span style="float: right;">December 2015</span></li> <li>• ICF Internationals CyberSci Summit <span style="float: right;">October 2015</span></li> <li>• Duke University. Hosted by Theo Benson <span style="float: right;">August 2014</span></li> </ul> <p><i>Alibi Routing</i></p> <ul style="list-style-type: none"> <li>• SIGCOMM Conference <span style="float: right;">August 2015</span></li> </ul> <p><i>Maritime Cybersecurity</i></p> <ul style="list-style-type: none"> <li>• National Maritime Electronics Association (NMEA) Conference <span style="float: right;">October 2015</span></li> </ul> <p><i>Analysis of SSL Certificate Reissues and Revocations in the Wake of Heartbleed</i></p> <ul style="list-style-type: none"> <li>• NANOG 62 (Security track). Baltimore, MD <span style="float: right;">October 2014</span></li> </ul>
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<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 Internetwork</i>		
• NetEcon Workshop		June 2007
<i>Punishment in Selfish Wireless Networks</i>		
• NetEcon Workshop		June 2006
<i>Fair File Swarming with FOX</i>		
• IPTPS Workshop		February 2006
• University of Delaware. Hosted by Paul Amer.		September 2005

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Prior Professional Experience	<b>University of Maryland</b> , College Park, MD USA	<b>2012 – 2017</b>
	<i>Assistant Research Scientist</i>	
	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.	
	<b>Hewlett Packard Labs</b> , Palo Alto, California USA	<b>2010 – 2012</b>
	<i>Researcher</i>	
	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.	
	<b>Microsoft Research</b> , 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.