Dave Levin

Contact Info	Email: dml@cs.umd.edu	Webpage: https://www.cs.umd.edu/~dml

Academic Appointment

University of Maryland, College Park, MD USA

Associate Professor	**2023 – present**
Assistant Professor	2017 – 2023

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

- IRTF Applied Networking Research Prize (ANRP) for *How the Great Firewall of China Detects and Blocks Fully Encrypted Traffic*, 2024
- CSAW'23 Applied Research Competition, Best Paper Award for *How the Great Firewall of China Detects and Blocks Fully Encrypted Traffic*, 2023
- FOCI Best Practical Award for *How the Great Firewall of China Detects and Blocks Fully Encrypted Traffic*, 2023
- 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

Refereed Publications

1. *Title under embargo; coming soon*
   Erik Rye, Dave Levin
   Oakland 2024 (IEEE Symposium on Security and Privacy)

2. **No Root Store Left Behind**
   James Larisch, Waqar Aqeel, Taejoong Chung, Eddie Kohler, Dave Levin, Bruce Maggs, Bryan Parno, Christo Wilson
   HotNets 2023 (ACM Workshop on Hot Topics in Networking)

3. **IPv6 Hitlists at Scale: Be Careful What You Wish For**
   Erik Rye, Dave Levin
   ACM SIGCOMM 2023

4. **Global, Passive Detection of Connection Tampering**
   Ram Sundara Raman, Louis-Henri Merino, Kevin Bock, Marwan Fayed, Dave Levin, Nick Sullivan, Luke Valenta
   ACM SIGCOMM 2023

5. **Detecting Network Interference Without Endpoint Participation**
   Sadia Nourin, Kevin Bock, Nguyen Phong Hoang, Dave Levin
   FOCI 2023 (Workshop on Free and Open Communication on the Internet)

6. **Collateral Damage of Russian Censorship**
   Aaron Ortwein, Kevin Bock, Dave Levin
   FOCI 2023 (Workshop on Free and Open Communication on the Internet)

7. **Crowdsourcing the Discovery of Server-side Censorship Evasion Strategies**
   Nhi Tran, Kevin Bock, Dave Levin
   FOCI 2023 (Workshop on Free and Open Communication on the Internet)

8. **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

9. **Blue Is the New Black (Market): Privacy Leaks and Re-Victimization from Police-Auctioned Cellphones**
   Richard Roberts, Julio Poveda, Raley Roberts, Dave Levin
   Oakland 2023 (IEEE Symposium on Security and Privacy)

10. **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

11. **Provably Avoiding Geographic Regions for Tor's Onion Services**
    Arushi Arora, Raj Karra, Dave Levin, Christina Garman
    FC 2023 (Financial Cryptography and Data Security)

12. **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)

13. **A Global Measurement of Routing Loops on the Internet**
    Abdulrahman Alaraj, Kevin Bock, Dave Levin, Eric Wustrow
    PAM 2023 (Passive and Active Measurement Conference)

14. **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

15. **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

16. **GET /out: Automated Discovery of Application-Layer Censorship Evasion Strategies**
Michael Harrity, Kevin Bock, Frederick Sell, Dave Levin
USENIX Security 2022

17. **Insights and Experiences from Monitoring Multiple P2P Botnets**
Leon Böck, Shankar Karuppayah, Max Mühlhäuser, Dave Levin
Botconf 2022 (The Botnet Fighting Conference)

18. **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)

19. **Sound Methodology for Downloading Webpages**
Soumya Indela, Dave Levin
TMA 2021 (Network Traffic Measurement and Analysis Conference)

20. **Even Censors Have a Backup: Examining the GFW's Double HTTPS Censorship System**
Kevin Bock, Gabriel Naval, Kyle Reese, Dave Levin
FOCI 2021 (ACM Workshop on Free and Open Communications on the Internet)

21. **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

22. **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

23. **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)

24. **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)

25. **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)

26. **Weaponizing Middleboxes for TCP Reflected Amplification**
Kevin Bock, Abdulrahman Alaraj, Yair Fax, Kyle Hurley, Eric Wustrow, Dave Levin
USENIX Security 2021

27. **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)

28. **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)

29. **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 Pogosian, Dave Levin
ACM SIGCOMM 2020

30. **.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

31. **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)

32. **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)

33. **Achieving Keyless CDNs with Conclaves**
Stephen Herwig, Christina Garman, Dave Levin
USENIX Security 2020

34. **Geneva: Evolving Censorship Evasion Strategies**
Kevin Bock, George Hughey, Dave Levin
ACM CCS 2019 (Conference on Computer and Communications Security)

35. **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)

36. **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

37. **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

38. **Measuring TLS key exchange with post-quantum KEM**
Krzysztof Kwiatkowski, Nick Sullivan, Adam Langley, Dave Levin, Alan Mislove
NIST Second PQC Standardization Conference 2019

39. **Residential Links Under the Weather**
Ramakrishna Padmanabhan, Aaron Schulman, Dave Levin, Neil Spring
ACM SIGCOMM 2019

40. **Automatically Learning How to Evade Censorship**
Dave Levin
USENIX ScAINet 2019 (Security and AI Networking Conference)

41. **How to find correlated Internet failures**
Ramakrishna Padmanabhan, Aaron Schulman, Alberto Dainotti, Dave Levin, Neil Spring
PAM 2019 (Passive and Active Measurement Conference)

42. **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)

43. **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

44. **Analyzing Ethereum's Contract Topology**
Lucianna Kiffer, Dave Levin, Alan Mislove
ACM IMC 2018 (Internet Measurement Conference) Short paper

45. **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)

46. **Internet Anycast: Performance, Problems, and Potential**
Zhihao Li, Dave Levin, Neil Spring, Bobby Bhattacharjee
ACM SIGCOMM 2018

47. **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)

48. **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)

49. **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)

50. **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

51. **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)

52. **DeTor: Provably Avoiding Geographic Regions in Tor**
Zhihao Li, Stephen Herwig, Dave Levin
USENIX Security 2017

53. **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

54. **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)

55. **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

56. **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)

57. **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)

58. **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)

59. **Anomaly Detection on D-root**
Zhihao Li, Dave Levin, Bobby Bhattacharjee, Neil Spring
DINR Workshop 2016 (DNS and Internet Naming Research Directions)

60. **DNSql: Processing Massive DNS Collections**
Stephen Herwig, Dave Levin, Bobby Bhattacharjee, Neil Spring
DINR Workshop 2016 (DNS and Internet Naming Research Directions)

61. **Ting: Measuring and Exploiting Latencies Between All Tor Nodes**
Frank Cangialosi, Dave Levin, Neil Spring
ACM IMC 2015 (Internet Measurement Conference) Long paper

62. **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

63. **Alibi Routing**
Dave Levin, Youndo Lee, Luke Valenta, Zhihao Li, Victoria Lai, Cristian Lumezanu, Neil Spring, Bobby Bhattacharjee
ACM SIGCOMM 2015

64. **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)

65. **Programming Slick Network Functions**
Bilal Anwer, Theophilus Benson, Nick Feamster, Dave Levin
SOSR 2015 (Symposium on SDN Research)

66. **UAv6: Alias Resolution in IPv6 Using Unused Addresses**
Ramakrishna Padmanabhan, Zhihao Li, Dave Levin, Neil Spring
PAM 2015 (Passive and Active Measurement Conference)

67. **RevCast: Fast, Private Certificate Revocation over FM Radio**
Aaron Schulman, Dave Levin, Neil Spring
ACM CCS 2014 (Conference on Computer and Communications Security)

68. **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

69. **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

70. **A Slick Control Plane for Network Middleboxes**
Bilal Anwer, Theophilus Benson, Nick Feamster, Dave Levin, Jennifer Rexford
ONS 2013 (Open Network Summit)

71. **SDX: A Software Defined Internet Exchange**
Josh Bailey, Russ Clark, Nick Feamster, Dave Levin, Jennifer Rexford, Scott Shenker
ONS 2013 (Open Network Summit)

72. **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)

73. **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)

74. **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)

75. **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)

76. **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)

77. **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)

78. **BitTorrent is an Auction: Analyzing and Improving BitTorrent's Incentives**
Dave Levin, Katrina LaCurts, Neil Spring, and Bobby Bhattacharjee.
ACM SIGCOMM 2008

79. **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)

80. **On the Fidelity of 802.11 Packet Traces**
Aaron Schulman, Dave Levin and Neil Spring.
PAM 2008 (Passive and Active Measurement Conference)

81. **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)

82. **PeerWise Discovery and Negotiation of Faster Paths**
Cristian Lumezanu, Dave Levin and Neil Spring.
HotNets 2007 (ACM Workshop on Hot Topics in Networks)

83. **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)

84. **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)

85. **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)

86. **Punishment in Selfish Wireless Networks: A Game Theoretic Analysis**
Dave Levin.
NetEcon 2006 (Workshop on the Economics of Networked Systems)

87. **Fair File Swarming with FOX**
Dave Levin, Rob Sherwood and Bobby Bhattacharjee.
IPTPS 2006 (International Workshop on Peer-to-Peer Systems)

88. **ProofRite: A Paper-Augmented Word Processor**
Kevin Conroy, Dave Levin and François Guimbretière.
UIST 2004 Demonstration (ACM Symposium on User Interface Software and Technology)

Posters

89. **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

90. **Mental Models of Domain Names and URLs**
Richard Roberts, Daniela Lulli, Abolee Raut, Kelsey Fulton, Dave Levin
SOUPS 2020 (Symposium On Usable Privacy and Security) Poster

91. **Detecting IoT Malware with Power Measurements**
Rebecca Gelles, Kelsey Fulton, Rachel Walter, Dave Levin
ACM IMC 2018 (Internet Measurement Conference) Poster

92. **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

93. **Target-Embedding Domain Impersonation in HTTPS Certificates**
Richard Roberts, Yaelle Goldschlag, Dave Levin
ACM IMC 2018 (Internet Measurement Conference) Poster

94. **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

95. **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	96. **Nurikabe: Private yet Accountable Online Advertising** Dave Levin, Bobby Bhattacharjee, John R. Douceur, Jacob R. Lorch, James Mickens, and Thomas Moscibroda
	97. **Incentive-Compatible Bootstrapping** Dave Levin, Katrina LaCurts, Aaron Schulman, Neil Spring, and Bobby Bhattacharjee
	98. **A Secure DHT via the Pigeonhole Principle** Randy Baden, Adam Bender, Dave Levin, Rob Sherwood, Neil Spring and Bobby Bhattacharjee.
	99. **Paranoia: An Anonymous, Censorship-Resistant File Store** Dave Levin and Bobby Bhattacharjee.
	100. **DDoS Detection in Multi-Homed Stub Domains** Chris Kommareddy, Dave Levin, Bobby Bhattacharjee, Richard La, Mark Shayman and Vahid Tabatabaee.
	101. **Hoodnets: Mobile Users Bonding over Auctions** Dave Levin, Robert Kiefer, Kevin McGehee, Kristin Stephens, Koyel Mukherjee, Neil Spring, and Bobby Bhattacharjee
Invited Papers	102. **Systems-Compatible Incentives** Dave Levin, Neil Spring, and Bobby Bhattacharjee GameNets 2009 (International Conference on Game Theory for Networks)

- 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: |

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

Current students:
- Richard Roberts (PhD CS)
- Erik Rye (PhD CS)
- Julio Poveda (PhD CS)
- Sridevi Suresh (PhD CS)
- Kyle Hurley (PhD CS)
- Sadia Nourin (MS CS)
- Breakerspace undergraduates (5):
  - Rayna Livingston
  - Luke Griffith
  - Akshat Parikh
  - Aman Chaturvedi
  - Nathan Pan

Previous students:
- Kevin Bock (PhD CS, 2022), now at Amazon
- Stephen Herwig (PhD CS, 2021), now Assistant Professor at William and Mary
- Soumya Indela (PhD ECE, 2021), now Assistant Teaching Professor at Arizona State University
- Victoria Lai (BS 2013), now at Palintir
- Luke Valenta (BS 2014), (PhD: UPenn), now at Cloudflare
- Frank Cangialosi (BS 2015), (PhD: MIT)
- 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 (72): Tania Arya; Shoubhit Babu; Pranav Bharadwaj; Jack Burg; Josephine Chow (BS/MS 2019), now at Cloudflare; Jacob Cohen; Anna Dai; Quinton Davidson; Emily Dunham; Yair Fax (BS 2020); Sabrina Field; Josh Fleming (BS 2019), now at Booz Allen; Nick Francino (BS/MS 2020); Priyal Garg; Yaelle Goldschlag; Vanya Gorbachev; Michael Harrity; Nathan Hayes; Peter Heppenstall (BS 2019), now at Activision; Melissa Hoff; George Hughey (BS 2019), now at Microsoft; Kyle Hurley; Jayson Hurst; Mitchell Kager (BS/MS 2020); Leah Kannan; Blue Keleher (BS 2019), now at Samsara;

Daniel Kootz; Lauren Kosub (BS 2020); Noah Labruna; Sash Lamba; Angela Lambert; Amanda Li; Daniel Liscinsky; Julianna Long (BS 2020); Daniela Lulli; Michael Lum; Anna Mazzanati; Brendan McMahan; Alexis Mejia; Louis-Henri Merino (BS 2019), now at EPFL; Azeem Mohammed; Sai Naraharisetti; Ha Phan Nguyen; Aaron Ortwein (BS/MS 2023), now at UMich Dakshita Pal; Avi Passy (BS 2020); Regina Pogosian (BS 2019), now at ManTech; Shraddha Ramesh; Sree Ramireddygari; Vikram Rao (BS 2019), now at Amazon; Abolee Raut; Kyle Reese (BS 2020); Michael Reininger (BS/MS 2020); Sadena Rishindran; Michael Roberts; Alden Schmid; Vaishnavi Sesetty; Krushi Shah; Kevin Shen; Jasraj Singh (BS 2020); Nathan Stiff; Chris Tharratt; Preston Tong (MS 2020); Kasra Torshizi; Wendy Tu; Johan Vandegriff; Shrikar Vasisht; Anjali Viramgama; Rachel Walter (BS 2020), now at Amazon; Josh Wang (HS 2023), now at GaTech; Yujie Wang; Claude Zou

PhD Committees	• Defense: Omer Akgul (2023), Erica Blum (2023), Ramakrishna Padmanabhan (2018), Benjamin Bengfort (2018), Andrew Ruef (2018), Youndo Lee (2017), Liang Zhang (2016; Northeastern University) • Proposal: Ruoxi Li (2022), Matthew Lentz (2018), Ramakrishna Padmanabhan (2017), Andrew Ruef (2017), Benjamin Bengfort (2016)
Classes Taught	• CMSC 614 (formerly CMSC 818O) (Graduate Computer and Network Security) • Fall 2023, Fall 2022, Spring 2021, Fall 2019, Fall 2018, Fall 2017, Spring 2017 • CMSC 414 (Computer and Network Security) • Spring 2024, Fall 2021, Fall 2020, Spring 2020, Spring 2019, Spring 2018, Spring 2016, Spring 2015, Spring 2014 • CMSC 396H (Computer Science Honors Seminar) • Spring 2024, Fall 2023, Fall 2022, Fall 2021, Spring 2021, Fall 2020, Spring 2020, Fall 2019, Spring 2019, Spring 2018, Fall 2017, Spring 2017, Spring 2016 • CMSC 499A (Independent Study) • A user study-driven evaluation of web privacy (Spring 2024) • Design and implementation of a web privacy browser extension (Fall 2023) • Evading censorship detection with voice emulation (Fall 2023) • Measuring transit censorship (Fall 2023) • Measuring censorship without endhost participation (Spring 2023) • Distributed training of server-side censorshipe vasion (Spring 2023) • Evading censorship of fully encrypted traffic (Fall 2022) • Detecting VPN usage with latencies ($3\times$ Fall 2022) • Towards programmable Tor middleboxes (Spring 2022) • Spring 2021 • Application-layer censorship evasion (Winter 2021) • Towards programmable Tor middleboxes (Fall 2020) • Detectin IoT malware with side channels (Fall 2020) • Evading nation-state censors (Spring 2020) • User perception of domain impersonation (Spring 2020) • Secure process migration (Spring 2018) • Towards a blockchain-based PKI (Spring 2018) • Side-channel defenses (Spring 2018) • Reverse-engineering a peer-to-peer botnet (Fall 2017) • Analyzing CDNs' Roles in the Web's PKI (Fall 2015) • Obfuscated Communication through Skype Video (Fall 2015) • Anonymous DTN Routing (Spring 2014) • Provable Route Avoidance using Alibi Routing (Spring 2013) • HACS 479 (Independent Study) • Detecting transit censorship (Spring 2022) • Detecting IoT malware with side-channels (Spring 2022, Fall 2021, Spring 2020)

- Detecting phishing websites (Fall 2021)
- Weaponizing censorship middleboxes (Spring 2021)
- Towards programmable Tor middleboxes (Spring 2021)
- Application-layer censorship evasion (Fall 2020)
- Server-side detection of VPN connections (Spring 2018)
- CMSC 388U (formerly CMSC 389R) (Introduction to Ethical Hacking) *Student-led class*
  - Fall 2022, Spring 2022, Fall 2021, Spring 2021, Fall 2019, Spring 2019, Spring 2018
- CMSC 389O (The Coding Interview) *Student-led class*
  - Fall 2017
- CMSC 330 (Organization of Programming Languages)
  - Spring 2013
- CMSC 818F (Securing and Monetizing the Internet)
  - Spring 2013

Service Activities

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

Program Committee chair:
- IMC 2024 (ACM Internet Measurement Conference)
- FOCI 2021 (ACM Workshop on Free and Open Communications on the Internet)
- PAM 2021 (Passive and Active Measurement Conference)

Steering committee:
- FOCI (Free and Open Communications on the Internet)

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
- FOCI (Workshop on Free and Open Communication on the Internet) 2021, 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

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.

Invited Talks

Weaponizing Censorship Infrastructure
- Rightscon 2021 Conference (With Kevin Bock) — June 2021

Automatically Learning How to Evade Censorship
- US Dept. of State Global Engagement Center. (With Kevin Bock) — March 2021
- Cornell CS Colloquium. Hosted by Fred Schneider. — October 2020
- Pluggable Transports Implementers Meeting. — October 2020
- USENIX ScAINet Conference — August 2019
- Laboratory for Telecommunication Sciences (LTS) Symposium — July 2019
- Harvard University — July 2019

Combatting Nation-state Censorship
- University of Iowa. Hosted by Omar Chowdhury. — September 2020

The Evolution of (Anti-)Censorship
- Georgetown Center for Security and Emerging Technology. Hosted by Rebecca Gelles. — July 2020

Automatically Learning How to Evade Censorship
- USENIX ScAINet Conference — August 2019
- Laboratory for Telecommunication Sciences (LTS) Symposium — July 2019
- Harvard University — July 2019

Three Ugly Truths about the Web's PKI (and How We Might Fix it)
- Cornell, Maryland, Max Planck Pre-doctoral Research Summer School (CMMRS) — August 2019
- Virginia Tech. Hosted by Ing-Ray Chen — October 2018
- Georgetown University. Hosted by Micah Sherr — September 2018
- Laboratory for Telecommunication Sciences (LTS) Symposium — March 2017

Revocations Are Dead, Long Live Revocations
- Georgia Tech. Hosted by Maria Konte — January 2018
- UCSD. Hosted by Geoff Voelker and Kirill Levchenko — 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 International's 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
- SIGCOMM Conference   August 2008

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.