

Robert J. Walls

Department of Computer Science – 100 Institute Road, Worcester, MA 01609
(508) 831-6343 • rjwalls@wpi.edu • robert.walls.ninja

Research Interests

Systems security and performance; network security and measurement; privacy; digital forensics and online crime

Professional Experience

Worcester Polytechnic Institute

Assistant Professor

Applied Logic and Security Laboratory

Worcester, MA

Aug 2016–Present

Pennsylvania State University

Postdoctoral Scholar

Systems and Internet Infrastructure Security Laboratory

University Park, PA

May 2014–May 2016

University of Massachusetts Amherst

Graduate Research Assistant

UMass Center for Forensics

Amherst, MA

Sept. 2009–May 2014

University of Texas at Arlington

Graduate Research Assistant

Information Security Laboratory

Arlington, TX

Jan. 2008–Aug. 2009

Education

University of Massachusetts Amherst

Doctor of Philosophy, Computer Science

◦ Advisor: Brian Levine

◦ Thesis title: Inference-based Forensics for Extracting Information from Diverse Sources

Amherst, MA

Sept. 2014

University of Texas at Arlington

Master of Science, Computer Science

Arlington, TX

Aug. 2009

University of Texas at Arlington

Bachelor of Science, Computer Science

Arlington, TX

Aug. 2007

Publications

- [P33] G. Gilman, S. Ogden, T. Guo, R. Walls. *Demystifying the Placement Policies of the NVIDIA GPU Thread Block Scheduler for Concurrent Kernels*. Symposium on Computer Performance, Modeling, Measurements, and Evaluation (Performance '20), November 2020 (Acceptance rate: 32/102; 31%).
- [P32] J. Grycel, R. Walls. *DRAB-LOCUS: An Area-Efficient AES Architecture for Hardware Accelerator Co-Location on FPGAs*. IEEE International Symposium on Circuits and Systems (ISCAS '20), October 2020.

- [P31] J. Zhou, Y. Du, L. Ma, ZShen, J. Criswell, R. Walls. *Silhouette: Efficient Protected Shadow Stacks for Embedded Systems*. USENIX Security, August 2020 (Acceptance rate: 157/972; 16%).
- [P30] S. Li, R. Walls, T. Guo. *Characterizing and Modeling Distributed Training with Transient Cloud GPU Servers*. IEEE International Conference on Distributed Computing Systems (ICDCS '20), July 2020 (Acceptance rate 18%).
- [P29] G. Gilman, S. Ogden, R. Walls, T. Guo. *Challenges and Opportunities of DNN Model Execution Caching*. Workshop on Distributed Infrastructures for Deep Learning (DIDL '19), December 2019.
- [P28] T. Guo, R. Walls, S. Odgen. *EdgeServe: Efficient Deep Learning Model Caching at the Edge* The Fourth ACM/IEEE Symposium on Edge Computing (SEC '19), December 2019.
- [P27] Y. Liu, M. Squires, C. Taylor, R. Walls, C. Shue. *Account Lockouts: Characterizing and Preventing Account Denial-of-Service Attacks*. 15th International Conference on Security and Privacy in Communication Networks (SecureComm), October 2019 (Acceptance rate: 25%).
- [P26] P. VanNostrand, I. Kyriazis, M. Chang, T. Guo, R. Walls. *Confidential Deep Learning: Executing Proprietary Models on Untrusted Devices*. arXiv:1908.10730.
- [P25] R. Walls, N. Brown, T. LeBaron, B. Ward, C. Shue, H. Okhravi. *Control-Flow Integrity for Real-Time Embedded Systems*. Euromirco Conference on Real-Time Systems (ECRTS), July 2019 (Acceptance rate: 27/80; 33%).
- [P24] S. Li, R. Walls, L. Xu, T. Guo. *Speeding up Deep Learning with Transient Servers*. International Conference on Autonomic Computing (ICAC), June 2019 (Acceptance rate: 16/62; 26%).
- [P23] J. Grycel, R. Walls. *ERHARD-RNG: A Random Number Generator Built from Repurposed Hardware in Embedded Systems*. Presented at New England Security Day (NESD), arXiv:1903.09365, 2019.
- [P22] K. Venkatasubramanian, A. Banerjee, S. Gupta, R. Walls. *A Cyber-Physical Approach to Trustworthy Operation of Health Monitoring Systems*. Workshop on Trusted Computing in Distributed Hybrid Systems, 2017. (Acceptance rate: Unknown).
- [P21] C. Lever, R. Walls, Y. Nadji, D. Dagon, P. McDaniel, M. Antonakakis. *Dawn of the Dead Domain: Measuring the Exploitation of Residual Trust in Domains*. IEEE Security and Privacy, 2017. (Acceptance rate: N/A).
- [P20] N. Lageman, E. Kilmer, R. Walls, P. McDaniel. *BinDNN: Resilient Function Matching Using Deep Learning* International Conference on Security and Privacy in Communication Networks (SECURECOMM), 2016.
- [P19] Z. Celik, N. Hu, Y. Li, N. Papernot, P. McDaniel, J. Rowe, R. Walls, K. Levitt, N. Bartolini, T. La Porta, and R. Chadha. *Mapping Sample Scenarios to Operational Models*. International Conference for Military Communications (MILCOM), 2016. (Acceptance rate: Unknown).

- [P18] C. Lever, R. Walls, Y. Nadji, D. Dagon, P. McDaniel, M. Antonakakis. *Domain-Z: 28 Registrations Later*. IEEE Symposium on Security and Privacy, 2016. (Acceptance rate: 55/400; 14%).
- [P17] R. Walls, E. Kilmer, N. Lageman, P. McDaniel. *Measuring the Impact and Perception of Acceptable Advertisements*. Internet Measurement Conference (IMC), 2015. (Acceptance rate: 44/169; 26%).
- [P16] R. Walls, Y. Brun, M. Liberatore, B. Levine. *Discovering Specification Violations in Networked Software Systems*. IEEE International Symposium on Software Reliability Engineering, 2015. (Acceptance rate: 55/172; 32%).
- [P15] N. Papernot, P. McDaniel, R. Walls. *Enforcing Agile Access Control Policies in Relational Databases using Views*. International Conference for Military Communications (MILCOM), 2015. (Acceptance rate: Unknown).
- [P14] B. Celik, R. Walls, P. McDaniel, A. Swami. *Malware Traffic Detection using Tamper Resistant Features*. International Conference for Military Communications (MILCOM), 2015. (Acceptance rate: Unknown).
- [P13] A. Oltramari, L. Cranor, R. Walls, P. McDaniel. *Computational Ontology of Network Operations*. International Conference for Military Communications (MILCOM), 2015. (Acceptance rate: Unknown).
- [P12] P. McDaniel, R. Walls. *Estimating Attack Intent and Mission Impact from Detection Signals*. Workshop on Cyber Attack Detection, Forensics and Attribution for Assessment of Mission Impact, 2015. (Acceptance rate: Unknown).
- [P11] S. Varma, R. Walls, B. Lynn, B. Levine. *Efficient Smart Phone Forensics Based on Relevance Feedback*. ACM Workshop on Security and Privacy in Smartphones and Mobile Devices (SPSM), 2014. (Acceptance rate: 11/29; 38%).
- [P10] A. Oltramari, L. Cranor, R. Walls, P. McDaniel. *Building an Ontology of Cyber Security*. Intl. Conference on Semantic Technologies for Intelligence, Defense, and Security (STIDS), 2014. (Acceptance rate: Unknown). *Runner-up for Best Paper*.
- [P9] P. McDaniel, T. Jaeger, T. La Porta, N. Papernot, R. Walls, A. Kott, L. Marvel, A. Swami, P. Mohapatra, S. Krishnamurthy, I. Neamtiu. *Security and Science of Agility*. ACM Workshop on Moving Target Defense (MTD), 2014. (Acceptance rate: Unknown).
- [P8] R. Walls. *Inference-based Forensics for Extracting Information from Diverse Sources*. Ph.D. thesis, August 2014.
- [P7] R. Hurley, S. Prusty, H. Soroush, R. Walls, J. Albrecht, E. Cecchet, B. Levine, M. Liberatore, B. Lynn. *Measurement and Analysis of Child Pornography Trafficking on P2P Networks*. World Wide Web Conference (WWW), 2013. Student authors listed in alphabetical order. (Acceptance rate: 122/831; 15%). *Nominated for Best Paper award*.
- [P6] R. Walls, S. Clark, B. Levine. *Functional Privacy or Why Cookies are Better with Milk*. USENIX Workshop on Hot Topics in Security, 2012. (Acceptance rate: 11/39; 28%)

- [P5] R. Walls, E. Learned-Miller, B. Levine. *Forensic Triage for Mobile Phones with DECODE*. USENIX Security, 2011. (Acceptance rate: 35/204; 17%).
- [P4] R. Walls, B. Levine, M. Liberatore, C. Shields. *Effective Digital Forensics Research is Investigator-Centric*. USENIX Workshop on Hot Topics in Security, 2011. (Acceptance rate: 11/56; 20%)
- [P3] R. Walls, K. Kothari, M. Wright. *Liquid: A Detection-Resistant Covert Timing Channel Based on IPD Shaping*. Computer Networks Journal, 2011.
- [P2] J. Tuttle, R. Walls, E. Learned-Miller, B. Levine. *Reverse Engineering for Mobile Systems Forensics with Ares*. ACM CCS Workshop on Insider Threats, October 2010. (Acceptance rate: 7/12; 58%)
- [P1] R. Walls. *Liquid: A Detection-Resistant Covert Timing Channel Based on IPD Shaping*. Master's thesis, August 2009. *Given CSE Outstanding Master's Thesis award*.

Professional Service

Panel Member.....	
NSF Panel	2018
Organizer.....	
New England Security Day	2017
New England Security Day	2016
Session Chair.....	
New England Security Day	2019
Program Committee Member.....	
Workshop on Cyber Security Experimentation and Test	2019
Workshop on Cyber Security Experimentation and Test	2018
International Workshop on Behavioral Implications of Contextual Analytics	2016
IEEE International Conference on Network Protocols	2016
Workshop on Cyber Security Experimentation and Test	2015
Conference and Journal Reviewer.....	
Reviewer for ACM Transactions on Mobile Computing	2020
External Reviewer for IEEE European Symposium on Security and Privacy	2015
External Reviewer for IEEE/ACM International Conference on Automated Software Engineering	2014
Reviewer for IEEE Transactions on Information Forensics & Security	2013
Reviewer for IEEE Internet Computing	2012
Reviewer for IEEE Transactions on Multimedia	2012
External Reviewer for Digital Forensics Research Conference	2012
External Reviewer for Network and Distributed System Security Symposium	2011

External Reviewer for IEEE Symposium on Security and Privacy	2011
External Reviewer for IEEE/ACM Transactions on Networking	2010

Service to WPI

Service to Department.....	
MQP Coordinator	2017–2020
Faculty Recruiting	2017–2018
Graduate Council	2016–2017
Service to the Students.....	
Advisor for Embedded CTF Team	2017–2020
Advisor for Cybersecurity Club	2018–2020
Host for ACM Coffee House	2018

Talks

<i>The Role of CS in Supporting Lawful Investigation.</i> Invited Talk, Hamilton College.	Fall 2018
<i>Panel: Exciting New Research Directions in Cybersecurity.</i> Great Lakes Security Day, Rochester Institute of Technology.	Fall 2018
<i>Everything You Always Wanted to Know About Digital Forensics But Were Afraid to Ask.</i> Invited Talk, Rochester Institute of Technology.	Fall 2016
<i>Measuring the Impact and Perception of Acceptable Advertisements.</i> Internet Measurement Conference, Keio University.	Fall 2015
<i>Discovering Specification Violations in Networked Software Systems.</i> ISSRE, National Institute of Standards and Technology.	Fall 2015
<i>Efficient Smart Phone Forensics Based on Relevance Feedback.</i> Workshop of Security and Privacy in Smartphones and Mobile Devices, Scottsdale, Arizona.	Fall 2014
<i>Forensic Triage for Mobile Phones.</i> Systems Reading Group, Brown University.	Fall 2013
<i>Forensic Triage for Mobile Phones.</i> Computer Science Colloquium, The Pennsylvania State University.	Fall 2013
<i>Measurement and Analysis of Child Pornography Trafficking on P2P Networks.</i> International World Wide Web Conference, Rio de Janeiro, Brazil.	Spring 2013
<i>Function Privacy or Why Cookies are Better with Milk.</i> Workshop on Hot Topics in Security, Bellevue, Washington.	Fall 2012
<i>Forensic Triage for Mobile Phones with DECODE.</i> USENIX Security Symposium, San Francisco, California.	Fall 2011
<i>Effective Digital Forensics Research is Investigator-Centric.</i> Workshop on Hot Topics in Security, San Francisco, California.	Fall 2011
<i>Reverse Engineering for Mobile Systems Forensics with Ares.</i> Workshop on Insider Threats, Chicago, Illinois,	Fall 2010

The Privacy and Forensics of Mobile Devices.

Summer 2010

Research Experience for Undergraduates program, University of Massachusetts Amherst.