

# ADAM BATES

Assistant Professor  
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## Areas of specialization

Computer Security, Operating Systems, Data Provenance.

## Current Academic Appointment

**Assistant Professor**, Department of Computer Science, University of Illinois at Urbana-Champaign  
Aug. 2016 - *present*

**Affiliate Faculty**, Department of Electrical & Computer Engineering

**Affiliate Faculty**, Information Trust Institute

**Affiliate Faculty**, Illinois Informatics

## Education

PH.D. in Computer Science, University of Florida, Gainesville, FL, USA; May 2016;

Thesis: *Designing and Leveraging Trustworthy Provenance-Aware Architectures*

Advisor: Dr. Kevin Butler

M.S. in Computer Science, University of Oregon, Eugene, OR, USA; Sept 2012;

Thesis: *Detecting Compute Cloud Co-residency with Network Flow Watermarking Techniques*;

Advisor: Dr. Kevin Butler.

B.SC. in Computer Science, University of Maryland, College Park, MD, USA; December 2006.

B.A. in English Literature, University of Maryland, College Park, MD, USA; December 2006.

## Research Support

- **PI**, NSF CNS-2055127, “*SaTC: CORE: Medium: Principled Foundations for the Design and Evaluation of Graph-Based Host Intrusion Detection Systems*,” National Science Foundation (Total Funding: \$1,201,199, Personal Share \$602,000), 10/01/2021-09/30/2025.
- **Co-PI**, NSF CNS-1951852, “*SCC-PG: Privacy and Fairness in Planning when using Third-Party, Heterogeneous Data Sources*,” National Science Foundation (Total Funding: \$149,241, Personal Share \$51,667), 1/15/2021-12/31/2021.
- **Co-PI**, NSF CNS-1955228, “*SaTC: Frontiers: Collaborative: Security and Privacy in the Lifecycle of IoT for Consumer Environments (SPLICE)*,” National Science Foundation, (Institution Share: \$1,938,804, Personal Share: \$887,901), 10/01/2020-09/30/2025.

- **Co-PI**, *NSF DGE-1922072, “Illinois Cyber Security Scholars Program,”* National Science Foundation, \$3,080,055 (Personal Share: \$33,509), 09/01/2019-08/31/2023.
- **PI**, *NSF CNS-1750024, “CAREER: Scalable Information Flow Monitoring and Enforcement through Data Provenance Unification,”* National Science Foundation, \$528,077, 03/26/2018-03/31/2023.
- **PI**, *NSF CNS-1657534, “CRII: SaTC: Transparent Capture and Aggregation of Secure Data Provenance for Smart Devices,”* National Science Foundation, \$174,681, 03/01/2017-02/28/2019.

## Honors & Awards

**List of Teachers Ranked as Excellent**, CS 598, Spring 2021.

**List of Teachers Ranked as Excellent**, CS 461, Fall 2020.

**Doctoral Dissertation Award**, Runner-Up, ACM SIGSAC, 2017.

**Academy for Excellence in Engineering Education Collins Scholar**, University of Illinois, April 2017.

**Best Poster Award**, Florida Institute for Cybersecurity Conference, 2016.

**Student Stipend Award**, 26th USENIX Security Symposium, August 2015.

**Student Conferenceship Award**, Annual Computer Security Applications Conference, December 2014.

**Best Poster Award Honorable Mention**, Graduate Student Research Day, University of Florida, 2014.

**Student Travel Grant Award**, 21st ACM Conference on Computer and Communications Security, November 2014.

**Graduate School Fellowship**, University of Florida , 2014.

**Best Poster Award: Information & Physical Sciences**, Graduate Research Forum, University of Oregon, 2014.

**Student Travel Grant Award**, IEEE Association, May 2014.

**J. Donald Hubbard Family Scholarship**, Computer & Information Science Department, University of Oregon, 2013.

**Student Travel Grant Award**, 19th ACM Conference on Computer and Communications Security, November 2012.

**Student Stipend Award**, 21st USENIX Security Symposium, July 2010.

**J. Lee Burke Student Achievement Award**, Kappa Kappa Psi National Honorary Band Fraternity, 2008.

## Book Chapters

*Acceptance rates given when made available; citations from Google Scholar as of August 2021.*

1. Adam Bates, Devin J. Pohly, and Kevin R. B. Butler. “Secure and Trustworthy Provenance Collection for Digital Forensics.” *Digital Fingerprinting* (Springer). October 1, 2016. (Cited by 6).

## Journal Publications

2. Adam Bates and Wajih Ul Hassan. “Can Data Provenance Put an End to the Data Breach?.” IEEE Security and Privacy Magazine. July 9, 2019. (Cited by 7).
3. Deepak Kumar, Riccardo Paccagnella, Paul Murley, Eric Hennenfent, Joshua Mason, Adam Bates, and Michael Bailey. “Emerging Threats in IoT Voice Services.” IEEE Security and Privacy Magazine. July 9, 2019. (Cited by 9).
4. Bradley Reaves, Jasmine Bowers, Nolen Scaife, Adam Bates, Arnav Bhartiya, Patrick Traynor, and Kevin R.B. Butler. “Mo(bile) Money, Mo(bile) Problems: Analysis of Branchless Banking Applications.” ACM Transactions on Privacy and Security: Volume 20, Issue 3. August 1, 2017. (Cited by 119).
5. Adam Bates, Dave (Jing) Tian, Grant Hernandez, Thomas Moyer, Kevin R. B. Butler, and Trent Jaeger. “Taming the Costs of Trustworthy Provenance through Policy Reduction.” ACM Transactions on Internet Technology (TOIT). September 1, 2017. (Cited by 7).
6. Adam Bates, Kevin Butler, Micah Sherr, Clay Shields, Patrick Traynor, and Dan Wallach. “Accountable Wiretapping -or- I Know They Can Hear You Now.” Journal of Computer Security: Volume 23, Issue 2, Pages 167-195. January 1, 2015. (Cited by 15).
7. Adam Bates, Ben Mood, Joe Pletcher, Hannah Pruse, Masoud Valafar, and Kevin Butler. “On Detecting Co-Resident Cloud Instances Using Network Flow Watermarking Techniques.” International Journal of Information Security: Volume 13, Issue 2, pg. 171-189. April 1, 2014. (Cited by 67).

## Conference Publications

8. Jason Liu, Anant Kandikuppa, and Adam Bates. “Transparent DIFC: Harnessing Innate Application Event Logging for Fine-Grained Decentralized Information Flow Control.” 7th IEEE European Symposium on Security and Privacy . Genoa, Italy. June 6, 2022. (Acceptance rate=29.8%.)
9. Pubali Datta, Isaac Polinsky, Muhammad Adil Inam, Adam Bates, and Will Enck. “ALASTOR: Reconstructing the Provenance of Serverless Intrusions.” 31st USENIX Security Symposium (Security’22). Boston, MA, USA. August 10, 2022.
10. Jaron Mink, Amanda Rose Yuile, Uma Pal, Adam Aviv, and Adam Bates. “Users Can Deduce Sensitive Locations Protected by Privacy Zones on Fitness Tracking Apps.” ACM CHI Conference on Human Factors in Computing Systems (CHI’22). New Orleans, LA, USA. April 30, 2022.
11. Muhammad Adil Inam, Wajih Ul Hassan, Ali Ahad, Adam Bates, Rashid Tahir, Tianyin Xu, and Fareed Zaffar. “Forensic Analysis of Configuration-based Attacks.” 29th ISOC Network and Distributed System Security Symposium (NDSS’22). San Diego, CA, USA. February 27, 2022.
12. Carter Yagemann, Mohammad Nouredine, Wajih Ul Hassan, Simon Chung, Adam Bates, and Wenke Lee. “Validating the Integrity of Audit Logs Against Execution Repartitioning Attacks.” 28th ACM Conference on Computer and Communications Security (CCS’21). Seoul, South Korea. November 15, 2021. (Acceptance rate=22.3%.)
13. Nick Roessler, Lucas Atayde, Imani Palmer, Derrick McKee, Jai Pandey, Vasileios P. Kemerlis, Mathias Payer, Adam Bates, Jonathan M. Smith, Andre DeHon, and Nathan Dautenhahn. “muS-

- COPE: A Methodology for Analyzing Least-Privilege Compartmentalization in Large Software Artifacts.” 24th International Symposium on Research in Attacks, Intrusions and Defenses (RAID’21). Donostia / San Sebastian, Spain. October 6, 2021. (Acceptance rate=23.2%.)
14. Benjamin E. Ujcich, Samuel Jero, Richard Skowyra, Adam Bates, William H. Sanders, and Hamed Okhravi. “Causal Analysis for Software-Defined Networking Attacks.” 30th USENIX Security Symposium (Security’21). The Internet. August 13, 2021. (Acceptance rate=18.8%. Cited by 1.)
  15. Isaac Polinsky, Pubali Datta, Adam Bates, and Will Enck. “SCIFFS: Enabling Secure Third-Party Security Analytics using Serverless Computing.” ACM Symposium on Access Control Models and Technologies (SACMAT’21). The Internet. June 18, 2021. (Acceptance rate=28.6%.)
  16. Wajih Ul Hassan, Ding Li, Kangkook Jee, Xiao Yu, Kexuan (Klaus) Zou, Dawei Wang, Zhengzhang Chen, Zhichun Li, Junghwan Rhee, Jiaping Gui, and Adam Bates. “This is Why We Can’t Cache Nice Things: Lightning-Fast Threat Hunting using Suspicion-Based Hierarchical Storage.” 36th Annual Computer Security Applications Conference. The Internet. December 7, 2020. (Acceptance rate=23.2%. Cited by 1.)
  17. Noor Michael, Jaron Mink, Jason Liu, Sneha Gaur, Wajih Ul Hassan, and Adam Bates. “On the Forensic Validity of Approximated Audit Logs.” 36th Annual Computer Security Applications Conference. The Internet. December 7, 2020. (Acceptance rate=23.2%. Cited by 1.)
  18. Arnav Sankaran, Pubali Datta, and Adam Bates. “Workflow Integration Alleviates Identity and Access Management in Serverless Computing.” 36th Annual Computer Security Applications Conference. The Internet. December 7, 2020. (Acceptance rate=23.2%. Cited by 3.)
  19. Riccardo Paccagnella, Kevin Liao, Dave (Jing) Tian, and Adam Bates. “Logging to the Danger Zone: Race Condition Attacks and Defenses on System Audit Frameworks.” 27th ACM Conference on Computer and Communications Security (CCS’20). The Internet. November 9, 2020. (Acceptance rate=16.9%. Cited by 1.)
  20. Benjamin E. Ujcich, Adam Bates, and William H. Sanders. “Provenance for Intent-Based Networking.” 2020 IEEE Conference on Network Softwarization (NetSoft ’20). The Internet. June 29, 2020. (Cited by 6.)
  21. Wajih Ul Hassan, Adam Bates, and Daniel Marino. “Tactical Provenance Analysis for Endpoint Detection and Response Systems.” 41st IEEE Symposium on Security and Privacy (Oakland’20). The Internet. May 18, 2020. (Acceptance rate=12.3%. Cited by 21.)
  22. Pubali Datta, Prabuddha Kumar, Tristan Morris, Michael Grace, Amir Rahmati, and Adam Bates. “Valve: Securing Function Workflows on Serverless Computing Platforms.” The Web Conference (WWW’20). Taipei, Taiwan. April 20, 2020. (Acceptance rate=19.2%. Cited by 12.)
  23. Riccardo Paccagnella, Pubali Datta, Wajih Ul Hassan, Adam Bates, Christopher Fletcher, Andrew Miller, and Dave Tian. “CUSTOS: Practical Tamper-Evident Auditing of Operating Systems Using Trusted Execution.” 27th ISOC Network and Distributed System Security Symposium (NDSS’20). San Diego, CA, USA. February 23, 2020. (Acceptance rate=17.4%. Cited by 17.)
  24. Wajih Ul Hassan, Mohammad Ali Nouredine, Pubali Datta, and Adam Bates. “OmegaLog: High-Fidelity Attack Investigation via Transparent Multi-layer Log Analysis.” 27th ISOC Network and Distributed System Security Symposium (NDSS’20). San Diego, CA, USA. February 23, 2020. (Acceptance rate=17.4%. Cited by 20.)
  25. Benjamin E. Ujcich, Samuel Jero, Richard Skowyra, Steven R. Gomez, Adam Bates, William H.

- Sanders, and Hamed Okhravi. “Automated Discovery of Cross-Plane Event-Based Vulnerabilities in Software-Defined Networking.” 27th ISOC Network and Distributed System Security Symposium (NDSS’20). San Diego, CA, USA. February 23, 2020. (*Acceptance rate=17.4%. Cited by 5.*)
26. Xueyuan Han, Thomas Pasquier, Adam Bates, James Mickens, and Margo Seltzer. “UNICORN: Runtime Provenance-Based Detector for Advanced Persistent Threats.” 27th ISOC Network and Distributed System Security Symposium (NDSS’20). San Diego, CA, USA. February 23, 2020. (*Acceptance rate=17.4%. Cited by 36.*)
  27. Qi Wang, Pubali Datta, Wei Yang, Si Liu, Carl Gunter, and Adam Bates. “Charting the Attack Surface of Trigger-Action IoT Platforms.” 26th ACM Conference on Computer and Communications Security (CCS’19). London, UK. November 11, 2019. (*Acceptance rate=16.2%. Cited by 48.*)
  28. Wajih Ul Hassan, Shengjian Guo, Ding Li, Zhengzhang Chen, Kangkook Jee, Zhichun Li, and Adam Bates. “NoDoze: Combatting Threat Alert Fatigue with Automated Provenance Triage.” 26th ISOC Network and Distributed System Security Symposium (NDSS’19). San Diego, CA, USA. February 24, 2019. (*Acceptance rate=17.1%. Cited by 64.*)
  29. Thomas Pasquier, Xueyuan Han, Thomas Moyer, Adam Bates, Olivier Hermant, David Eysers, Jean Bacon, and Margo Seltzer. “Runtime Analysis of Whole-System Provenance.” 25th ACM Conference on Computer and Communications Security (CCS’18). Toronto, Ontario, Canada. October 15, 2018. (*Acceptance rate=16.6%. Cited by 41.*)
  30. Benjamin E. Ujcich, Samuel Jero, Anne Edmundson, Qi Wang, Richard Skowyra, James Landry, William H. Sanders, Christina Rita-Notaru, and Hamed Okhravi. “Cross-App Poisoning in Software-Defined Networking.” 25th ACM Conference on Computer and Communications Security (CCS’18). Toronto, Ontario, Canada. October 15, 2018. (*Acceptance rate=16.6%. Cited by 29.*)
  31. Wajih Ul Hassan, Saad Hussain, and Adam Bates. “Analysis of Privacy Protections in Fitness Tracking Social Networks -or- You can run, but can you hide?.” 27th USENIX Security Symposium (Security’18). Baltimore, MD, USA. August 16, 2018. (*Acceptance rate=19.1%. Cited by 17.*)
  32. Deepak Kumar, Riccardo Paccagnella, Paul Murley, Eric Hennenfent, Joshua Mason, Adam Bates, and Michael Bailey. “Skill Squatting Attacks on Amazon Alexa.” 27th USENIX Security Symposium (Security’18). Baltimore, MD, USA. August 15, 2018. (*Acceptance rate=19.1%. Cited by 94.*)
  33. Tianyuan Liu, Avesta Hojjati, Adam Bates and Klara Nahrstedt. “AliDrone: Enabling Trustworthy Proof-of-Alibi for Commercial Drone Compliance.” 38th IEEE International Conference on Distributed Computing Systems (ICDCS’18). Vienna, Austria. July 5, 2018. (*Acceptance rate=20.0%. Cited by 10.*)
  34. Dave (Jing) Tian, Nolen Scaife, Deepak Kumar, Michael Bailey, Adam Bates, and Kevin R. B. Butler. “SoK: ‘Plug and Pray’ Today – Understanding USB Insecurity in Versions 1 through C.” 39th IEEE Symposium on Security and Privacy (Oakland’18). San Francisco, CA, USA. May 23, 2018. (*Acceptance rate=11.5%. Cited by 26.*)
  35. Wajih Ul Hassan, Mark Lemay, Nuraini Aguse, Adam Bates, and Thomas Moyer. “Towards Scalable Cluster Auditing through Grammatical Inference over Provenance Graphs.” 25th ISOC Network and Distributed System Security Symposium (NDSS’18). San Diego, CA, USA. February 17, 2018. (*Acceptance rate=21.0%. Cited by 66.*)

36. Qi Wang, Wajih Ul Hassan, Adam Bates, and Carl Gunter. "Fear and Logging in the Internet of Things." 25th ISOC Network and Distributed System Security Symposium (NDSS'18). San Diego, CA, USA. February 17, 2018. (*Acceptance rate=21.0%. Cited by 133.*)
37. Benjamin E. Ujcich, Andrew Miller, Adam Bates, and William H. Sanders. "Towards an Accountable Software-Defined Networking Architecture." 3rd IEEE Conference on Network Softwarization. Bologna, Italy. July 4, 2017. (*Acceptance rate=20.0%. Cited by 8.*)
38. Adam Bates, Wajih Ul Hassan, Kevin Butler, Alin Dobra, Bradley Reaves, Patrick Cable, Thomas Moyer, and Nabil Schear. "Transparent Web Service Auditing via Network Provenance Functions." 26th World Wide Web Conference (WWW'17). Perth, Australia. April 6, 2017. (*Acceptance rate=17.0%. Cited by 31.*)
39. Thomas Moyer, Patrick Cable, Karishma Chada, Robert Cunningham, Nabil Schear, Warren Smith, Adam Bates, Kevin Butler, Frank Capobianco, and Trent Jaeger. "Leveraging Data Provenance to Enhance Cyber Resilience." 1st IEEE Cybersecurity Development Conference (SecDev'16). Boston, MA, USA. November 4, 2016. (*Acceptance rate=38.6%. Cited by 7.*)
40. Dave (Jing) Tian, Adam Bates, Kevin R. B. Butler, and Raju Rangaswami. "ProvUSB: Block-level Provenance-Based Data Protection for USB Storage Devices." 23rd ACM Conference on Computer and Communications Security (CCS'16). Vienna, Austria. October 25, 2016. (*Acceptance rate=15.3%. Cited by 17.*)
41. Dave (Jing) Tian, Nolen Scaife, Adam Bates, Kevin R. B. Butler, and Patrick Traynor. "Making USB Great Again with USBFILTER." 2016 USENIX Security Symposium (Security'16). Austin, TX, USA. August 11, 2016. (*Acceptance rate=15.5%. Cited by 38.*)
42. Dave (Jing) Tian, Adam Bates, and Kevin R.B. Butler. "Defending Against Malicious USB Firmware with GoodUSB." 31st Annual Computer Security Applications Conference (ACSAC'15). Los Angeles, California, USA. December 7, 2015. (*Acceptance rate=24.3%. Cited by 70.*)
43. Adam Bates, Dave Tian, Kevin R.B. Butler, and Thomas Moyer. "Trustworthy Whole-System Provenance for the Linux Kernel." 24th USENIX Security Symposium (Security'15). Washington D.C., USA. August 13, 2015. (*Acceptance rate=15.7%. Cited by 179.*)
44. Bradley Reaves, Nolen Scaife, Adam Bates, Kevin R.B. Butler, and Patrick Traynor. "Mo(bile) Money, Mo(bile) Problems: Analysis of Branchless Banking Applications in the Developing World." 24th USENIX Security Symposium (Security'15). Washington D.C., USA. August 12, 2015. (*Acceptance rate=15.7%. Cited by 119.*)
45. Bradley Reaves, Ethan Shernan, Adam Bates, Hank Carter, and Patrick Traynor. "Boxed Out: Blocking Cellular Interconnect Bypass Fraud at the Network Edge." 24th USENIX Security Symposium (Security'15). Washington D.C., USA. August 14, 2015. (*Acceptance rate=15.7%. Cited by 28.*)
46. Adam Bates, Joe Pletcher, Tyler Nichols, Braden Hollembaek, Jing (Dave) Tian, Abdulrahman Alkhelaihi, and Kevin R.B. Butler. "Securing SSL Certificate Validation through Dynamic Linking." 21st ACM Conference on Computer and Communications Security (CCS'14). Scottsdale, AZ, USA. November 5, 2014. (*Acceptance rate=19.4%. Cited by 44.*)
47. Adam Bates, Joe Pletcher, Tyler Nichols, Braden Hollembaek, and Kevin R.B. Butler. "Forced Perspectives: Evaluating an SSL Trust Enhancement at Scale." 14th ACM SIGCOMM Conference on Internet Measurement (IMC'14). Vancouver, BC, Canada. November 5, 2014. (*Acceptance*

*rate=22.8%. Cited by 23.)*

48. Adam Bates, Ryan Leonard, Hannah Pruse, Kevin Butler, and Daniel Lowd. “Leveraging USB to Establish Host Identity Using Commodity Devices.” 21st ISOC Network and Distributed System Security Symposium (NDSS’14). San Diego, CA, USA. February 25, 2014. (*Acceptance rate=18.6%. Cited by 30.*)
49. Adam Bates, Ben Mood, Masoud Valafar, and Kevin Butler. “Towards Secure Provenance-based Access Control in Cloud Environments.” 3rd ACM Conference on Data and Application Security and Privacy (CODASPY’13). San Antonio, TX, USA. February 19, 2013. (*Acceptance rate=31.7%. Cited by 81.*)
50. Adam Bates, Kevin Butler, Micah Sherr, Clay Shields, Patrick Traynor, and Dan Wallach. “Accountable Wiretapping -or- I Know They Can Hear You Now.” 19th ISOC Network and Distributed System Security Symposium (NDSS’12). San Diego, CA, USA. February 7, 2012. (*Acceptance rate=17.8%. Cited by 15.*)

## **Workshop Publications**

51. Benjamin E. Ujcich, Adam Bates, and William H. Sanders. “A Provenance Model for the European Union General Data Protection Regulation.” 7th International Provenance and Annotation Workshop (IPAW’18). London, UK. July 9, 2017. (Cited by 13.)
52. Adam Bates, Kevin R.B. Butler, and Thomas Moyer. “Take Only What You Need:Leveraging Mandatory Access Control Policy to Reduce Provenance Storage Costs.” 7th International Workshop on Theory and Practice of Provenance (TaPP’15). Edinburgh, Scotland. July 9, 2015. (Cited by 36.)
53. Adam Bates, Kevin Butler, Andreas Haeberlen, Micah Sherr and Wenchao Zhou. “Let SDN Be Your Eyes: Secure Forensics in Data Center Networks.” 2014 NDSS Workshop on Security of Emerging Network Technologies (SENT’14). San Diego, CA, USA. February 23, 2014. (Cited by 79.)
54. Adam Bates, Ben Mood, Joe Pletcher, Hannah Pruse, Masoud Valafar, and Kevin Butler. “Detecting Co-Residency with Active Traffic Analysis Techniques.” 2012 ACM Workshop on Cloud Computing Security (CCSW’12). Raleigh, NC, USA. October 19, 2012. (Acceptance rate=12.0%. Cited by 130.)

## **Patents**

1. Adam Bates, Wajih Ul Hassan, and Mohammad Nouredine. TRANSPARENT INTERPRETATION AND INTEGRATION OF LAYERED SOFTWARE ARCHITECTURE EVENT STREAMS. (US Provisional Application No.62,940,114)

## **Presentations & Invited Talks**

1. Efficient and Secure Approaches to Investigating System Intrusions. Tufts University, Medford, MA, April 1, 2021.

2. Efficient and Secure Approaches to Investigating System Intrusions. The Ohio State University, Columbus, OH, February 3, 2021.
3. Tactical Provenance Analysis for Endpoint Detection and Response Systems. University of Michigan, Ann Arbor, MI, October 29, 2020.
4. Threat Hunting, Evolved: Efficient and Secure Approaches to Investigating System Intrusions. University of Wisconsin, Madison, WI, October 6, 2020.
5. Charting the Attack Surface of Trigger-Action IoT Platforms. Dartmouth University, Dartmouth, NH, September 18, 2020.
6. Threat Hunting, Evolved: Efficient and Secure Approaches to Investigating System Intrusions. University of Wisconsin, Madison, WI, September 14, 2020.
7. Can Data Provenance Put an End to the Data Breach? University of Edinburgh, Edinburgh, Scotland, U.K., February 6, 2020.
8. Can Data Provenance Put an End to the Data Breach? University of Massachusetts at Amherst, Amherst, MA, November 19, 2019.
9. Can Data Provenance Put an End to the Data Breach? Georgetown University, Washington D.C., November 14, 2019.
10. Can Data Provenance Put an End to the Data Breach? Georgia Tech, Atlanta, GA, September 13, 2019.
11. Backtracking System Intrusions at Enterprise Scale. University of Michigan, Ann Arbor, MI, October 9, 2018.
12. Enabling Complete and Efficient Attack Provenance at Scale. Oregon State University, Corvallis, Oregon, February 28, 2018.
13. Enabling Trustworthy and Efficient Data Provenance in Distributed Systems. Visa Research, Palo Alto, California, May 26, 2017.
14. Enabling Trust and Efficiency in Provenance-Aware Systems. CERIAS Security Seminar, Purdue University, West Lafayette, Indiana, April 26, 2017.
15. ProvUSB: Block-level Provenance-Based Data Protection for USB Storage Devices. *CCS 2016*, Vienna, Austria, October 25, 2016.
16. Designing and Leveraging Trustworthy Provenance-Aware Architectures. *Dissertation Defense*, University of Florida, Gainesville, FL, May 2, 2016.
17. Designing and Leveraging Trustworthy Provenance-Aware Architectures. University of Waterloo, Waterloo, ON, Canada, March 28, 2016.
18. Designing and Leveraging Trustworthy Provenance-Aware Architectures. North Carolina State University, Raleigh, NC, March 14, 2016.
19. Designing and Leveraging Trustworthy Provenance-Aware Architectures. University of Minnesota, Minneapolis, MN, March 7, 2016.
20. Designing and Leveraging Trustworthy Provenance-Aware Architectures. Boston University, Boston, MA, March 3, 2016.
21. Designing and Leveraging Trustworthy Provenance-Aware Architectures. University of Illinois, Champaign-Urbana, IL, February 26, 2016.



22. Designing and Leveraging Trustworthy Provenance-Aware Architectures. Vanderbilt University, Knoxville, TN, February 22, 2016.
23. Designing and Leveraging Trustworthy Provenance-Aware Architectures. Arizona State University, Tempe, AZ, February 18, 2016.
24. Designing and Leveraging Trustworthy Provenance-Aware Architectures. University of Arizona, Tucson, AZ, February 16, 2016.
25. Designing and Leveraging Trustworthy Provenance-Aware Architectures. University of Tennessee, Knoxville, TN, February 12, 2016.
26. Designing and Leveraging Trustworthy Provenance-Aware Architectures. Louisiana State University, Baton Rouge, LA, February 4, 2016.
27. Designing and Leveraging Trustworthy Provenance-Aware Architectures. Ohio State University, Columbus, OH, February 2, 2016.
28. Designing and Leveraging Trustworthy Provenance-Aware Architectures. Florida State University, Tallahassee, FL, February 1, 2016.
29. Designing and Leveraging Trustworthy Provenance-Aware Architectures. Marquette University, Milwaukee, WI, January 27, 2016.
30. Designing and Leveraging Trustworthy Provenance-Aware Architectures. Kansas State University, Manhattan, KS, January 21, 2016.
31. Designing and Leveraging Trustworthy Provenance-Aware Architectures. Pennsylvania State University, State College, PA, October 21, 2015.
32. Trustworthy Whole-System Provenance for the Linux Kernel. *USENIX Security 2015*, Washington D.C., USA, August 2015.
33. Take Only What You Need: Leveraging Mandatory Access Control Policy to Reduce Provenance Storage Costs. *TAPP 2015*, Edinburgh, Scotland, July 2015.
34. Designing and Leveraging a Trustworthy Provenance Stack. *Dissertation Proposal Defense*, University of Florida, Gainesville, FL, April 2015.
35. Practical Trust Advancements in the SSL/TLS Ecosystem. Carleton University, Ottawa, ON, Canada, January 9, 2015.
36. Securing SSL Certificate Validation through Dynamic Linking. *CCS 2014*, Scottsdale, AZ, November 2014.
37. Leveraging USB to Establish Host Identity Using Commodity Devices. *NDSS 2014*, San Diego, CA, February 2014.
38. Let SDN Be Your Eyes: Secure Forensics in Data Center Networks. *SENT 2014*, San Diego, CA, February 2014.
39. Linux Provenance Modules: Secure Provenance Collection for the Linux Kernel. *Directed Research Project Defense*, University of Oregon, Eugene, OR, December 2013.
40. Towards a Usable Provenance Reference Monitor. *MIT Lincoln Laboratory*, Lexington, MA, September 2013.
41. Towards Secure Provenance-based Access Control in Cloud Environments. *CODASPY 2013*, San Antonio, TX, February 2013.

42. Detecting Co-Residency with Active Traffic Analysis Techniques. *CCSW 2012*, Raleigh, NC, USA, October 2012.
43. Detecting Compute Cloud Co-residency with Network Flow Watermarking Techniques. *Masters Thesis Defense, University of Oregon*, Eugene, OR, June 2012.
44. Accountable Wiretapping -or- I Know They Can Hear You Now. *NDSS 2012*, San Diego, CA, USA, August 2011.

## Media Coverage

1. David Mercer. "Hassan's NoDoze Brings Triage to security; PhD Student Presents Paper at NDSS Symposium." 18 February 2019. <https://cs.illinois.edu/news/hassan-s-nodoze-brings-triage-security-phd-student-presents-paper-ndss-symposium>
2. Jesus Diaz. "Alexa's Alarming New Security Hole May Not Have a Fix." *Tom's Guide*. 31 August 2018. <https://www.tomsguide.com/us/alexa-skill-squatting-hackers,news-27946.html>
3. Sean Gallagher. "Researchers show Alexa 'skill squatting' could hijack voice commands." *Ars Technica*. 30 August 2018. <https://arstechnica.com/information-technology/2018/08/researchers-show-alexa-skill-squatting-could-hijack-voice-commands/>
4. Jodi Heckel. "Fitness trackers not the safest route." *The News-Gazette*. 28 August 2018. <http://www.news-gazette.com/blogs/starting-line/2018-08/fitness-trackers-not-the-safest-route.html>
5. Heather Schlitz. "Researchers, police caution sharing exercise routes online." *The Daily Illini*. 27 August 2018. <https://dailyillini.com/news/2018/08/27/researchers-police-caution-sharing-exercise-routes-online/>
6. Joseph Astrouski. "U of I researchers find, fix fitness app security flaws." *WAND-TV*. 20 August 2018. <http://www.wandtv.com/story/38923296/u-of-i-researchers-find-fix-fitness-app-security-flaws>
7. Patrick Traynor and Kevin Butler. "Mobile money in developing countries: study reveals security flaws in apps." *The Guardian*. 24 September 2015. <https://www.theguardian.com/global-development-professionals-network/2015/sep/24/mobile-money-apps-security-flaws-study-reveals>
8. Richard Hanford. "Survey finds security holes in mobile money apps." *Mobile World Live*. 13 August 2015. <https://www.mobileworldlive.com/money/news-money/survey-finds-security-holes-in-mobile-money-apps/>
9. Jeremy Kirk. "Mobile banking apps in developing nations have weak security." *PCWorld*. 11 August 2015. <https://www.pcworld.com/article/2970092/mobile-banking-apps-in-developing-nations-have-weak-security.html>
10. Jennifer Valantino-DeVries. "Researchers Find Security Flaws in Developing-World Money Apps." *The Wall Street Journal*. 11 August 2015. <https://blogs.wsj.com/digits/2015/08/11/researchers-find-security-flaws-in-developing-world-money-apps/>

## Service

### *Broadening Participation in Computing*

- Co-Organizer, “Equity & Inclusion” Book Club for Security & Privacy Research at Illinois, December 2020 – Present
- **Mentor and job talk panelist, EECS Rising Stars**, October 2020
- Member, Broadening Participation in Computing Committee, *SaTC: Frontiers: Security and Privacy in the Lifecycle of IoT for Consumer Environments*; October 2020 – Present
- Hosted workshop for Illinois security researchers on Implicit Bias, Privilege, and Bystander Intervention from the UIUC Office of Inclusion & Intercultural Relations, September 2020
- **Facilitated #ShutDownStem Consciousness-Raising Demonstration**, July 2020;
- Onboarding training for advisees, 2016 – Present
  - Maintaining and inclusive and respectful lab culture
  - Expectations of work-life balance (incl. explicit discouragement of overwork)
  - Employee rights and graduate labor union resources
  - Mental health resources

### *Conference Organization*

- Publicity Chair, Annual Computer Security Applications Conference, 2020
- Steering Committee, Midwest Security Workshop, 2018–2020
- Steering Committee, Workshop on the Theory & Practice of Provenance, 2017–2020
- Publicity Chair, Network & Distributed Systems Symposium, 2019
- **Chair, Midwest Security Workshop**, 2018
- Publicity Chair, IEEE Symposium on Security & Privacy, 2018
- **Program Co-Chair, Workshop on the Theory & Practice of Provenance**, 2017
- Publicity Chair, IEEE Symposium on Security & Privacy, 2017
- Web Chair, IEEE Symposium on Security & Privacy, 2016

### *Program Committees or Journal Reviewer*

- **ACM Conference on Computer and Communications Security (CCS)**, 2017, 2020
- ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec), 2018
- Annual Computer Security Applications Conference (ACSAC), 2015, 2016, 2017
- European Workshop on Usable Security (EuroUSEC), 2017
- **IEEE Symposium on Security & Privacy (Oakland)**, 2019–2020
- International Conference for Military Communications (MILCOM), 2016
- International Workshop on Mobile Computing Security (MCS), 2015
- **ISOC Network and Distributed System Security Symposium (NDSS)**, 2017–2021
- Transactions on Information Forensics & Security (TIFS), 2016
- USENIX Annual Technical Conference (ATC), 2017
- **USENIX Security (Security)**, 2018–2022
- Workshop on the Theory & Practice of Provenance (TaPP), 2019
- Workshop on Usable Security and Privacy (USEC), 2018

### *External Reviewer*

- International AAAI Conference on Web and Social Media (ICWSM), 2020

- ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2018
- ACM Symposium on Information, Computer and Comm. Security (ASIACCS), 2014, 2015
- ACM Symposium on Computer and Communications Security (CCS), 2013, 2014, 2016
- Annual Computer Security Applications Conference (ACSAC), 2013
- European Symposium on Research in Computer Security (ESORICS), 2012, 2014
- IEEE European Symposium on Security and Privacy (Euro S&P), 2015
- IEEE Symposium on Security and Privacy (S&P), 2012
- International Conference on Privacy, Security and Trust (PST), 2013
- EAI International Conference on Security & Privacy in Comm. Networks (SecureComm): 2011
- Privacy Enhancing Technologies Symposium (PETS), 2015
- USENIX Security Symposium, 2014, 2015
- USENIX Workshop on the Theory and Practice of Provenance (TaPP), 2016

## **Student Advising**

### *PhD Alumni:*

- Wajih Ul Hassan (2021) – Assistant Professor, University of Virginia
- Benjamin E. Ujcich (co-advised, 2020) – Assistant Professor, Georgetown University

### *M.S. Alumni:*

- Anant Kandikuppa (w/ Thesis, Spring 2021) – Software Engineer, Amazon
- Noor Michael (w/ Thesis, Spring 2020) – Software Engineer, Citadel
- Riccardo Paccagnella (w/ Thesis, Spring 2019) – UIUC PhD Program
- Saad Hussain (w/ Thesis, Spring 2018) – Software Engineer, RetailMeNot
- Jai Pandey (coursework degree, Fall 2017) – System Software Engineer, NVIDIA

*Current Graduate Advisees:* Pubali Datta (PhD, expected Spring 2023), Akul Goyal (PhD, expected Spring 2024), Jason Liu (PhD, expected Spring 2024), Md Adil Inam (PhD, expected Spring 2025)

*Undergraduate Research Advising:* Uma Pal (Research Project Advisor, Fall 2020), Sneha Gaur (Research Project Advisor, Spring 2020), Noor Michael (ICSSP Project Advisor, expected Spring 2019), Joseph Dickinson (ICSSP Project Advisor, Spring 2019), Dawei Wang (Research Project Advisor, Spring 2019), Kexuan Zou (Research Project Advisor, Fall 2018), Nuraini Aguse (Research Project Advisor, Spring 2018).

*Dissertation Committees:* Zane Ma (PhD, expected Spring 2021), Tianyuan Liu (PhD, expected Summer 2020), Keywhan Chung (PhD, Expected Spring 2020), Qi Wang (PhD, Expected Spring 2020), Deepak Kumar (PhD, Expected Spring 2020), Guliz Tuncay Seray (PhD, Spring 2019), Matt Bauer (PhD, Spring 2018), Soteris Demetriou (PhD, Spring 2018), Read Sprabery (PhD, Spring 2018), Imani Palmer (PhD, Fall 2017).

## **Industry Appointments**

**Research Intern**, MIT Lincoln Laboratory, Lexington, MA, May - Aug, 2015

- Developed product for automatic capture of database workflows.

**Research Intern**, MIT Lincoln Laboratory, Lexington, MA, Jun - Sep, 2013

- Developed platform for provenance collection in the Linux kernel.

**Graduate Intern**, EMC Information Rights Management (IRM), Cambridge, MA, Jun - Sep, 2011

- Performed security audit of IRM software suite.

**Programmer**, Human Resources Incorporated, Crofton, MD, 2007 - 2009.

- Designed ASP.NET applications for customized client web content using company databases.
- Created and managed systems in SQL Server, Access, Excel and Goldmine mail.

**Summer Intern**, AAI Corp., Hunt Valley, MD, Summer 2006, 2007

- Designed software to interface Excel Spreadsheet with existing company databases.
- Assisted in creation of debugging software for a vehicle calibration product..

## **Previous Academic Appointments**

**Graduate School Fellow**, Department of Computer & Information Sciences & Engineering, University of Florida, 2014-2016

- Lead Graduate Student for the Florida Institute for Cybersecurity Research.

**Guest Lecturer**, Department of Computer & Information Sciences & Engineering, University of Florida, 2015

- *CNT5370 (Computer and Information Security)*: presented lecture on security retrofits in operating systems.

**Research Assistant**, Department of Computer & Information Science, University of Oregon, Sep. 2010 - Aug. 2014

- Funded by MIT Lincoln Labs, “Provenance-Based Enforcement Mechanisms”, Sep. 2013 - Aug. 2014, investigating security in provenance-aware systems.
- Funded by NSF grant CNS 1118046, “TC:Small:Protection Mechanisms for Portable Storage” Jan 2012 - Aug 2013.
- Assisted in writing and acquisition of Dr. Butler’s NSF CNS 1445983, “EAGER: Collaborative: Secure and Efficient Data Provenance”, National Science Foundation, \$110,075 to Oregon (\$205,000 total) (10/01/2014-03/31/2016).

**Senior Graduate Student**, Oregon Systems Infrastructure Research and Information Security (OSIRIS) Laboratory, University of Oregon, Sep. 2012 - Aug. 2014

- Administrative and logistical lead student in the OSIRIS lab. Ran weekly lab meetings, met with students individually for mentoring and development of leadership and research skills. Responsible for a variety of daily operational activities in the lab.

**Instructor**, Lundquist College of Business, University of Oregon, Jan 2010.-Dec. 2010

- Designed comprehensive web utility to aide coursework submission, grading and administration of BA240 course.
- Co-Instructor for approximately 1200 students per year.
- Planned course curriculum and designed assignments.

**Guest Lecturer**, Department of Computer Science, University of Oregon, 2005

- *CIS415 (Operating Systems)*: presented lecture on virtualization.

**Teaching Assistant**, College Park Scholars Program, University of Maryland, 2005.

- Assisted with grading and instruction of a web design course for non-majors.