Chad Samuel Spensky

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Biography

I am a researcher, educator, and entrepreneur on a mission to make the world a better place by creating technology to secure the devices that our society depends on. I believe that secure systems should not require developers and users to radically change their behavior, but should instead be secure and usable by design. I began my career in my teens as a black hat hacker am still an active participant on the Shellphish capture the flag (CTF) team, which helps keep my attacker mentality sharp when designing novel defenses.

Research Interests

My research interests revolve around embedded systems and low-level security mechanisms. Recently, my research has focused on: trusted execution environments, smartcard security, hardware introspection techniques, hardware-induced faults, firmware analysis and re-hosting, untrusted foundries, tagged architectures, and usable, ubiquitous authentication.

Education

University of California, Santa Barbara — Santa Barbara, CA
Doctor Of Philosophy, Computer Science, June 2020 — *IBM PhD Fellowship*
Ph.D. Thesis: *Analyzing and Securing Embedded Systems*

University of North Carolina at Chapel Hill — Chapel Hill, NC
Master of Science, Computer Science, December 2010
M.S. Thesis: *Practical Misconfiguration Identification in Access-Control Systems*

University of Pittsburgh — Pittsburgh, PA
Bachelor of Science, Computer Science *(Honors)* and Mathematics, April 2008 — GPA: 3.7
Minor, Economics — Magna Cum Laude

University of Virginia — Southeast Asia
Semester at Sea, Study Abroad, Summer 2006

Experience

Allthenticate, Inc. — *November 2019 – Present*
Founder and CEO — Santa Barbara, CA
Allthenticate provides a ubiquitous authentication solution for enterprises.

MIT Lincoln Laboratory — *September 2015 – Present*
External Consultant — Lexington, MA
I consult on various research projects in support of the United State's national security.

IBM Research — *June 2019 – August 2019*
Research Intern — Yorktown Heights, NY
We examined hardware glitching attacks and developed a novel software-based defense.

MIT Lincoln Laboratory — *January 2012 – September 2015*
Associate Staff — Lexington, MA
I led numerous research projects related to: hardware-based introspection, malware analysis, semantic gap reconstruction, smart card security, communications for disaster relief, privacy on mobile devices, and novel authentication mechanisms.

MIT Lincoln Laboratory — *May 2011 – August 2011*
Research Intern — Lexington, MA
We investigated novel techniques to re-host the web in offline cyber ranges.

University of Pittsburgh — July 2007 – July 2008
Lead Web Developer — Pittsburgh, PA
I was the lead developer for the Center for Modeling Pulmonary Immunity.

Conference Publications

13. **Chad Spensky**, Aravind Machiry, Marcel Busch, Kevin Leach, Rick Housley, Christopher Kruegel, and Giovanni Vigna. TRUST.IO: Protecting Physical Interfaces on Cyber-physical Systems. In *Proceedings of the 8th IEEE Conference on Communications and Network Security (CNS)*, 2020 *(to appear)*
12. Nilo Redini, Aravind Machiry, Ruoyu Wang, **Chad Spensky**, Andrea Continella, Yan Shoshitaishvili, Christopher Kruegel, and Giovanni Vigna. KARONTE: Detecting Insecure Multi-binary Interactions in Embedded Firmware. In *Proceedings of the 41st IEEE Symposium on Security and Privacy (Oakland)*, 2020 *(to appear)*
11. Bryan C Ward, Richard Skowyra, **Chad Spensky**, Jason Martin, and Hamed Okhravi. The Leakage-Resilience Dilemma. In *Proceedings of the 24th European Symposium on Research in Computer Security (ESORICS)*, 2019
10. Eric Gustafson, Marius Muench, **Chad Spensky**, Nilo Redini, Aravind Machiry, Yanick Fratantonio, Davide Balzarotti, Aurélien Francillon, Yung Ryn Choe, Christophe Kruegel, and Giovanni Vigna. Toward the Analysis of Embedded Firmware through Automated Re-hosting. In *Proceedings of the 22nd International Symposium on Research in Attacks, Intrusions and Defenses (RAID)*, 2019
9. Dokyung Song, Felicitas Hetzelt, Dipanjan Das, **Chad Spensky**, Yeoul Na, Stijn Volckaert, Giovanni Vigna, Christopher Kruegel, Jean-Pierre Seifert, and Michael Franz. PeriScope: An Effective Probing and Fuzzing Framework for the Hardware-OS Boundary. In *Proceedings of the Network and Distributed Systems Security Symposium (NDSS)*, 2019
8. Aravind Machiry, **Chad Spensky**, Jake Corina, Nick Stephens, Christopher Kruegel, and Giovanni Vigna. DR. CHECKER: A Soundy Analysis for Linux Kernel Drivers. In *Proceedings of the 26th USENIX Security Symposium (SEC)*, 2017 **(Facebook Internet Defense Prize Finalist)**
7. Aravind Machiry, Eric Gustafson, **Chad Spensky**, Christopher Salls, Nick Stephens, Ruoyu Wang, Antonio Bianchi, Yung Ryn Choe, Christopher Kruegel, and Giovanni Vigna. BOOMERANG: Exploiting the Semantic Gap in Trusted Execution Environments. In *Proceedings of the Network and Distributed System Security Symposium (NDSS)*, 2017
6. **Chad Spensky**, Jeffrey Stewart, Arkady Yerukhimovich, Richard Shay, Ari Trachtenberg, Rick Housley, and Robert K Cunningham. SoK: Privacy on Mobile Devices–It's Complicated. *Proceedings of the Annual Privacy Enhancing Technologies Symposium (PoPETS)*, 2016
5. Kevin Leach, **Chad Spensky**, Westley Weimer, and Fengwei Zhang. Towards Transparent Introspection. In *Proceedings of the 23rd International Conference on Software Analysis, Evolution, and Reengineering (SANER)*, 2016
4. **Chad Spensky**, Hongyi Hu, and Kevin Leach. LO-PHI: Low-Observable Physical Host Instrumentation for Malware Analysis. In *Proceedings of the Network and Distributed System Security Symposium (NDSS)*, 2016
3. Andrew Weinert, Hongyi Hu, **Chad Spensky**, and Benjamin Bullough. Using Open-source Hardware to Support Disadvantaged Communications. In *Proceedings of the Global Humanitarian Technology Conference (GHTC)*, 2015
2. Lujo Bauer, Yuan Liang, Michael K Reiter, and **Chad Spensky**. Discovering Access-Control Misconfigurations: New Approaches and Evaluation Methodologies. In *Proceedings of the 2nd ACM Conference on Data and Application Security and Privacy (CODASPY)*, 2012
1. Michael K Reiter, Vyas Sekar, **Chad Spensky**, and Zhenghao Zhang. Making Peer-Assisted Content Distribution Robust to Collusion Using Bandwidth Puzzles. In *Proceedings of the International Conference on Information Systems Security (ICISS)*, 2009

Workshops

3. Aaron Mills, Donato Kava, Alice Lee, **Chad Spensky**, Stephen Eng, and Michael Vai. Trust, Assurance, and Protection for Microelectronics. In *Proceedings of the Government Microcircuit Applications & Critical Technology Conference (GOMACTech)*, 2020
2. Kevin Leach, Ryan Dougherty, **Chad Spensky**, Stephanie Forrest, and Westley Weimer. Evolutionary Computation for Improving Malware Analysis. In *Proceedings of the 6th International Workshop on Genetic Improvement (ICSE GI)*, 2019 **(Best Presentation)**

1. **Chad Spensky** and Hongyi Hu. Live Disk Forensics on Bare Metal. In *Proceedings of the 5th Annual Open-source Digital Forensics Conference (OSDFCon)*, 2014

Patents

Systems and Methods for Single Device Authentication January 2019
US Patent #10182040

Teaching & Mentoring

University of California, Santa Barbara 2016 – Present
I mentored various undergraduate interns during my tenure at UCSB.

University of California, Santa Barbara Winter Quarter 2019
I co-led a research seminar (CS595G) investigating secure computer architectures.

TerrificScientific 2017-2018
I was the instructor for the Master Robotics course (Grades 4-6).

PIPELINES Summer 2017
I mentored three community college students through a collaboration with the U.S. Navy.

Wayne University 2016
I was a guest lecturer for CSC 6991: Topics in Computer Security.

University of California, Santa Barbara Summer 2016
I was the instructor of record for CS 16: Problem Solving with Computers.

MIT Lincoln Laboratory 2013 – 2015
I mentored various interns at MIT-LL: two Ph.D. students and one Masters student

Community Charter School of Cambridge 2015
I mentored two high-school students in the building of a Turing Machine.

Science On Saturday 2014
I presented authentication concepts to children, grades K-12.

University of North Carolina at Chapel HIll 2011
I was the teaching assistant for COMP 411: Computer Organization.

Awards & Positions

Allthenticate, Inc.

Invited panelist at MIT Enterprise Forum focused on identity 2019
Featured in UCSB Graduate Division Admissions Guide 2019
1st Place and People's Choice Winner in New Venture Competition 2019
Semi-finalist in New Venture Competition 2016

University of California, Santa Barbara

Poster Jury Member for 40th IEEE Symposium on Security and Privacy 2019
Student Program Committee for 40th IEEE Symposium on Security and Privacy 2019
IBM PhD Fellowship Award Recipient (2 years) 2018 – 2020
Computer Science Department Treasurer 2018 – 2019
Featured in Pushing the Boundaries Graduate Division Publication 2018
Faculty Recruiting Committee Member 2017 – 2018
Vice President of Academic Affairs (Graduate Student Association) 2017 – 2018
Computer Science Graduate Student Distinguished Lecture Finalist 2017
Presented research at UCSB IT Summit 2017
Semi-finalist in Grad Slam Competition 2016
Computer Science Supplemental Stipend Recipient 2015 – 2017

MIT Lincoln Laboratory

Work presented at International Conference of Crisis Mappers 2014
Presenter at Cyber and Netcentric Workshop 2013, 2014, 2015

1st Place in Technology Office Challenge 2014
Merit-based Bonus 2013

University of North Carolina at Chapel Hill

Awards & Positions (continued)

President of Computer Science Students Association (2 terms) 2010 - 2011
Graduate and Professional Student Federation Senator 2010 – 2011
Departmental Facilities and Web Committee Member 2011
Systems Tea Czar 2010
UNC Club Football 2008 – 2011

University of Pittsburgh

Dean's List Recipient 7 of 8 semesters

Open-Source Projects

Pretender UCSB-SecLab/Pretender
A framework for automatically re-hosting embedded systems in QEMU

Dr. Checker UCSB-SecLab/Dr_Checker
A static analysis tool for finding buts in Linux kernel drivers on Android devices

Boomerang UCSB-SecLab/Boomerang
Poof-of-concept exploits and proposed defense for the Boomerang TrustZone attack

CATAN MIT-LL/CATAN
A low-cost, scalable wide-area, best-effort, ad-hoc wireless network for disaster relief

LL-Smartcard MIT-LL/LL-Smartcard
A Python module for interacting with, and performing security audits, on smartcards

LL-Fuzzer MIT-LL/LL-Fuzzer
An automated, physical layer NFC fuzzing framework for Android devices

LO-PHI MIT-LL/LO-PHI
A framework for low-level introspection and semantic gap reconstruction

Computer Skills

Languages: Python, C, C++, Java, Objective C, Perl, SQL, Tcl, ARM/MIPS/x86 Assembly, LaTeX.
Web Development: HTML, CSS, JavaScript, PHP, Apache, hugo, Netlify, Jinja.
Operating Systems: Linux, Mac OSX, Android, iOS.
Hardware Experience: Soldering, Oscilloscope, Logical Analyzer, ChipWhisperer, JTagulator, BusPirate, U-boot, Xilinx Tools, PICKit, DSTREAM, SATA, UART, JTAG, SPI, I2C, PCI, CAN.

Hobbies

Beach Volleyball, Climbing, Surfing, Guitar, Dirt Biking, Hiking, Camping, Line Dancing

References

Giovani Vigna
Professor, UC Santa Barbara
vigna@cs.ucsb.edu

Christopher Kruegel
Professor, UC Santa Barbara
chris@cs.ucsb.edu

Hamed Okhravi
Senior Staff, MIT Lincoln Laboratory
hamed.okhravi@ll.mit.edu

Westley Weimer
Professor, University of Michigan
weimerw@umich.edu