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 usable technology to secure the devices and resources that we all depend on. I believe that secure systems should not require developers and users to radically change their behavior, but should instead be secure 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 interest generally focus on 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 — *(Projected)*

University of North Carolina at Chapel Hill — Chapel Hill, NC
Doctor Of Philosophy, Computer Science, December 2011 — *(Left Program)*
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 lead 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.

Publications

14. 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 2020 IEEE Symposium on Security and Privacy*. IEEE, 2020
13. Bryan C Ward, Richard Skowyra, **Chad Spensky**, Jason Martin, and Hamed Okhravi. The leakage-resilience dilemma. In *European Symposium on Research in Computer Security*, pages 87–106. Springer, 2019
12. 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 rehosting. In *22nd International Symposium on Research in Attacks, Intrusions and Defenses (RAID 2019)*, pages 135–150, Chaoyang District, Beijing, September 2019. USENIX Association
11. Kevin Leach, Ryan Dougherty, **Chad Spensky**, Stephanie Forrest, and Westley Weimer. Evolutionary computation for improving malware analysis. In Justyna Petke, Shin Hwei Tan, William B. Langdon, and Westley Weimer, editors, *GI-2019, ICSE workshops proceedings*, Montreal, 28 May 2019. IEEE **(Best Presentation Award)**
10. 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 *2019 Network and Distributed Systems Security Symposium (NDSS)*, pages 1–15. Internet Society, 2019
9. Aravind Machiry, **Chad Spensky**, Jake Corina, Nick Stephens, Christopher Kruegel, and Giovanni Vigna. DR. CHECKER: A soundy analysis for linux kernel drivers. In *26th USENIX Security Symposium (USENIX Security 17)*, pages 1007–1024, Vancouver, BC, 2017. USENIX Association **(Facebook Internet Defense Prize Finalist)**
8. 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*, 2017
7. **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 on Privacy Enhancing Technologies*, 2016(3):96–116, 2016
6. Kevin Leach, **Chad Spensky**, Westley Weimer, and Fengwei Zhang. Towards transparent introspection. In *Software Analysis, Evolution, and Reengineering (SANER), 2016 IEEE 23rd International Conference on*, volume 1, pages 248–259. IEEE, 2016
5. **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*, 2016
4. Andrew Weinert, Hongyi Hu, **Chad Spensky**, and Benjamin Bullough. Using open-source hardware to support disadvantaged communications. In *Global Humanitarian Technology Conference (GHTC), 2015 IEEE*, pages 79–86. IEEE, 2015
3. **Chad Spensky** and Hongyi Hu. Live disk forensics on bare metal. In *Proceedings of the 5th Annual Open-source Digital Forensics Conference*. Basis Technology, 2014
2. Lujo Bauer, Yuan Liang, Michael K Reiter, and **Chad Spensky**. Discovering access-control misconfigurations: new approaches and evaluation methodologies. In *Proceedings of the second ACM conference on Data and Application Security and Privacy*, pages 95–104. ACM, 2012
1. Michael K. Reiter, Vyas Sekar, **Chad Spensky**, and Zhenghao Zhang. *Making peer-assisted content distribution robust to collusion using bandwidth puzzles*, volume 5905 LNCS of *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, pages 132–147. 2009

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 research seminar (CS595G) investigating secure computer architectures.

TerrificScientifc 2017-2018
Instructor for Master Robotics course (Grades 4-6).

PIPELINES Summer 2017
Mentored three students through a collaboration the U.S. Navy.

Wayne University 2016
Guest lecturer for CSC 6991 Topics in Computer Security.

University of California, Santa Barbara Summer 2016
I was the professor 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
We 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.

Open-Source Projects

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

CATAN MIT-LL/CATAN
A low-cost, scalable system that creates a 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 for both physical and virtual machines

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
Technology Office Challenge Winner	2014
Merit-based Bonus	2013
Ham Radio Operator (Call sign: KC1CNW)	

University of North Carolina at Chapel Hill

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

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.
Applications: Vim, PyCharm, Visual Studio, Git, IDA, Ghidra, Debian Packages, VMWare, VirtualBox, MySQL, QEMU, GDB, OllyDbg, Matlab, SolidWorks, OnShape.
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