Curriculum Vitae

Zachary N. J. Peterson

Department of Computer Science and Software Engineering
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Current Position

Associate Professor, Department of Computer Science and Software Engineering, Cal Poly, San Luis Obispo, CA

Interests

Secure Storage Systems, Applied Cryptography, Cybersecurity Education

Education

PhD 2006 The Johns Hopkins University, Computer Science
Dissertation: Toward Regulatory Compliant Storage Systems
Research: Federally compliant storage systems employing cryptography, file system versioning, secure deletion, and authentic provenance data.
Advisor: Professor Randal Burns

MS 2005 The Johns Hopkins University Information Security Institute, Security Informatics
Project: Secure Deletion for a Versioning File System
Research: Electronic record and content management policy, digital rights, intellectual property, and privacy issues.
Advisors: Professor Gerry Masson and Professor Aviel D. Rubin

MS 2002 University of California, Santa Cruz, Computer Science
Thesis: Data Placement for Copy-on-Write Using Virtual Contiguity
Research: Data placement and allocation policies, MEMS-based storage.
Advisor: Professor Darrell D. E. Long

BS 2000 University of California, Santa Cruz, Computer Engineering
Liberal arts emphasis in music.

Employment History

2016– **Cal Poly, San Luis Obispo**, *Associate Professor*, Computer Science, San Luis Obispo, CA.

2016 **University College London**, *Honorary Senior Lecturer*, Computer Science, London, England.

2013–16 **Cal Poly, San Luis Obispo**, *Assistant Professor*, Computer Science, San Luis Obispo, CA.

2013 **California State University, Monterey Bay**, *Lecturer*, Monterey, CA.

2010–13 **Naval Postgraduate School**, *Assistant Professor*, Computer Science, Monterey, CA.

2008–10 **The Johns Hopkins University**, *Assistant Research Scientist*, Computer Science, Baltimore, MD.

2006–10 **Independent Security Evaluators**, *Senior Security Analyst*, Baltimore, MD.

2008 **McDaniel College**, *Adjunct Lecturer*, Mathematics and Computer Science, Westminster, MD.

2002–06 **The Johns Hopkins University**, *Graduate Researcher*, Hopkins Storage Systems Lab, Baltimore, MD.

2000–02 **University of California, Santa Cruz**, *Graduate Researcher*, Computer Systems Lab, Santa Cruz, CA.

2000–02 **International Business Machines**, *Research Associate*, Almaden Research Center, San Jose, CA.

1999–00 **eBay Inc.**, *Software Engineering Intern*, Santa Cruz, CA.

1999–00 **Education Opportunity Program**, *Tutor*, University of California Santa Cruz, Santa Cruz, CA.

1998–99 **NetMind Technologies**, *Software Engineering Associate*, Santa Cruz, CA.

1997–98 **@Home Networks**, *Software Engineering Intern*, Redwood City, CA.

Publications

Journals

1. P. Pusey, M. Gondree, and Z. Peterson. The Outcomes of Cybersecurity Competitions and the Implications for Underrepresented Populations. *IEEE Security & Privacy*, 14(6), pp. 90-95, November-December 2016.
2. M. Gondree, Z.N.J. Peterson, and P. Pusey. Talking about Talking about Cybersecurity Games. USENIX ;login:, 41(1), pp. 36-39, Spring 2016.
3. M. Gondree, Z.N.J. Peterson, T. Denning. Security through Play. *IEEE Security & Privacy*, 11(3), pp.64-67, 2013.
4. G. Ateniese, R. Burns, R. Curtmola, J. Herring, O. Khan, L. Kissner, Z. Peterson and Dawn Song. Remote Data Checking Using Provable Data Possession. *ACM Transactions on Information and System Security* (TISSEC), 14(1), May 2011.
5. R. Burns and Z. Peterson. Security Constructs for Regulatory Compliant Storage. *Communications of the ACM*, 53(1):126-130, January 2010.
6. Z. Peterson and R. Burns. Ext3cow: A Time-Shifting File System for Regulatory Compliance. *ACM Transactions on Storage*, 1(2):190–212, May 2005.

Refereed Conferences

1. T. Peters, M. Gondree and Z.N.J. Peterson. DEFY: Deniable Encrypted File System for YAFFS. In: *Proceedings of the Network and Distributed System Security (NDSS) Symposium*, 2015. *Acceptance rate: 15.8% (50/315).*
2. M. Gondree and Z.N.J. Peterson. Geolocation of Data in the Cloud. In: *Proceeding of the Conference on Data and Application Security and Privacy* (CODASPY), ACM, 2013. *Acceptance rate: 22% (24/107)*
3. G. Ateniese, R. Burns, R. Curtmola, J. Herring, L. Kissner, Z. Peterson and D. Song. Provable Data Possession at Untrusted Stores. In: *Proceedings of the Conference on Computer and Communication Security* (CCS), ACM, 2007. *Acceptance rate: 18% (55/303)*
4. Z.N.J. Peterson, R. Burns, G. Ateniese and S. Bono. The Design and Implementation of Audit Trails for a Versioning File System. In: *Proceedings of the Conference on File and Storage Technologies* (FAST), USENIX, 2007. *Acceptance rate: 19% (19/98)*
5. Z.N.J. Peterson, R. Burns, J. Herring, A. Stubblefield and A. Rubin. Secure Deletion for a Versioning File System. In: *Proceedings of the Conference on File and Storage Technologies* (FAST), USENIX, 2005. *Acceptance rate: 25% (20/125)*
6. B. Hong, S.A. Brandt, D.D.E. Long, E.L. Miller, K.A. Glocer and Z.N.J. Peterson. Zone-Based Shortest Positioning Time First Scheduling for MEMS-Based Storage Devices. In: *Proceedings of the International Symposium on Modeling, Analysis, and Simulation in Computer and Telecommunication Systems* (MASCOTS), IEEE, 2003. *Acceptance rate: 30%*
7. S.A. Banachowski, Z.N.J. Peterson, E.L. Miller and S.A. Brandt. Intra-File Security for a Distributed File System. In: *Proceedings of the NASA Goddard Conference on Mass Storage Systems and Technologies*, IEEE, 2002. *Acceptance rate: 35%*

Refereed Workshops and Short Papers

1. E. Lau and Z.N.J. Peterson. A Research Framework and Initial Study of Browser Security for the Visually Impaired. In: *Proceedings of the Workshop on Inclusive Privacy and Security* (WIPS), 2015.
2. M.A. Gondree and Z.N.J. Peterson. This is Not a Game: Early Observations on Using Alternate Reality Games for Teaching Security Concepts to First-Year Undergraduates. In: *Proceedings of the Workshop on Cyber Security Experimentation and Test* (CSET), USENIX, 2015. *Acceptance rate: 30.76% (8/26)*
3. M. Gondree and Z.N.J. Peterson. Valuing Security by Getting [d0x3d!]: Experiences with a network security board game. In: *Proceedings of the Workshop on Cyber Security Experimentation and Test* (CSET), USENIX, 2013. *Acceptance rate: 31% (9/29)*
4. J.A. Akinyele, M.W. Pagano, M.D. Green, C.U. Lehmann, Z.N.J. Peterson and A.D. Rubin. Securing Electronic Medical Records Using Attribute-Based Encryption On Mobile Devices. In: *Proceedings of the CCS Workshop on Security and Privacy in Mobile Devices*, ACM, 2011. *Acceptance rate: 47% (9/19)*
5. Z.N.J. Peterson, M. Gondree and R. Beverly. A Position Paper on Data Sovereignty: The Importance of Geolocating Data in the Cloud. In: *Proceedings of the Workshop on Hot Topics in Cloud Computing* (HotCloud), USENIX, 2011. *Acceptance rate: 32% (23/72)*
6. C. Miller and Z.N.J. Peterson. Analysis of Mutation and Generation-Based Fuzzing. Presented at: *DEFCON 15*, 2007.
7. Z.N.J. Peterson and R. Burns. Building Regulatory Compliant Storage Systems. In: *Proceedings of the Conference on Digital Government Research* (dg.o), ACM, 2006.
8. R. Burns, Z. Peterson, G. Ateniese and S. Bono. Verifiable Audit Trails for a Versioning File System. In: *Proceedings of the CCS Workshop on Storage Security and Survivability* (SSS), ACM, 2005.
9. Z.N.J. Peterson, R. Burns and A. Stubblefield. Limiting Liability in a Federally Compliant File System. In: *the PORTIA Workshop on Sensitive Data in Medical, Financial, and Content-Distribution Systems, Privacy, Obligations, and Rights in Technologies of Information Assessment* (PORTIA), 2004.
10. Z.N.J. Peterson and R.C. Burns. Limiting Liability in a Federally Compliant File System. A Work in Progress at: *the Conference on File and Storage Technologies* (FAST), USENIX, 2004.
11. Z.N.J. Peterson, S.A. Brandt and D.D.E. Long. Data Placement Based on the Seek Time Analysis of a MEMS-based Storage Device. A Work in Progress at: *the Conference on File and Storage Technologies* (FAST), USENIX, 2002.

Miscellanea

1. Z.N.J. Peterson. Data Placement for Copy-on-Write Using Virtual Contiguity. Master's thesis, University of California, Santa Cruz, September 2002.
2. R.C. Burns, R.M. Rees, Z.N.J. Peterson, and D.D.E. Long. Allocation and Data Placement Using Virtual Contiguity. iNIST/SSRC/01-001. 2001.

Research Artifacts

[d0x3d!]: A Network Security Game. *http://www.d0x3d.com*. *[d0x3d!]* is a non-digital board game designed to introduce high school and undergraduate students to network security terminology, attack mechanics and basic computer security constructs. In *[d0x3d!]*, two to four students take on the roles of black hat hackers working in cooperation to infiltrate and compromise a computer network, winning only when they collectively extract four valuable resources: personally-identifiable information, financial information, intellectual property and authentication credentials. The intent of *[d0x3d!]* is to engage students in computer science while removing common barriers associated with using a computer, such as feeling of isolation, lack of computer "comfort" or financial limitations. The game attempts to improve security literacy, encourage students to think adversarially, and introduce players to possible STEM career paths.

The Provable Data Possession (PDP) software libraries. *http://znjp.com/pdp*. This site makes available a collection of provable data possession software libraries that each provide cryptographically strong evidence that storage service providers meet their contractual obligations. Using PDP, users that store their data at an untrusted server can have probabilistic guarantees that the server possesses the original data. The client needs only to store his cryptographic keys and never has to retrieve the file. PDP uses homomorphic verifiable tags that minimize the amount of server computation, network traffic and block accesses while achieving a strong guarantee of data possession. More details on PDP can be found in the paper: Provable Data Possession at Untrusted Stores.

The ext3cow file system. *http://www.ext3cow.com*. Ext3cow builds upon the popular ext3 file system, the default file system for most Linux distributions, to provide continuous file versioning and file system snapshot. Ext3cow's novel time-shifting interface permits a real-time and continuous view of data in the past. Ext3cow was designed to meet the federal auditability and real-time disclosure requirements set forth in legislation such as Sarbanes-Oxley and HIPAA. It has gone on to be a foundation for developing technical solutions to a wide array of regulatory storage challenges such as: secure deletion, authenticated encryption and verifiable audit trials. Our release of ext3cow for the Linux 2.6 kernel was reported on both slashdot.org and digg.com. The software has been downloaded thousands times and has an active development community. Ext3cow is used as the basis for on-going research projects at the Johns Hopkins University, UC Berkeley, Columbia University, the University of Utah, and UC Santa Cruz. A startup even uses ext3cow as the file system in their object-based storage product.

Course Instruction

F14, W16–17	Cal Poly, San Luis Obispo, *Instructor*, CSC323: Cryptography Engineering.
F14–16	Cal Poly, San Luis Obispo, *Instructor*, CPE123: Introduction to Computing Through Security.
S14	Cal Poly, San Luis Obispo, *Preceptor*, CPE485: Defense Against the Dark Arts.
W14–16	Cal Poly, San Luis Obispo, *Instructor*, CPE321: Introduction to Computer Security.
F13, S15–16	Cal Poly, San Luis Obispo, *Instructor*, CPE453: Operating Systems.
W13	California State University, Monterey Bay, *Instructor*, CST312: Network Security.
W13	Naval Postgraduate School, *Instructor*, CS3600: Introduction to Computer Security.
F12	Naval Postgraduate School, *Instructor*, CY4650: "Big Data" for Cyber Operations.
Su12	Naval Postgraduate School, *Instructor*, CS4614: Advanced Topics in Computer Security.
W, Su, F 11	Naval Postgraduate School, *Instructor*, CS3600: Introduction to Computer Security.
Su11	Naval Postgraduate School, *Co-Instructor*, CS2140: Low-Level Programming.
2010–11	Naval Postgraduate School, *Invited Lecturer*, CS4900: Technology and Transformation.
2009–10	The Johns Hopkins University, *Invited Lecturer*, 650.445: Practical Cryptographic Systems.
S08	McDaniel College, *Instructor*, CSC-3365: Topics in Secure Systems.
2007–10	The Johns Hopkins University, *Invited Lecturer*, 650.442: Security and Privacy in Computing.
2007	The Johns Hopkins University, *Invited Lecturer*, 600.419: Storage Systems.
2006	The Johns Hopkins University, *Co-Lecturer*, 600.419: Storage Systems.
2005	The Johns Hopkins University, *Teaching Assistant*, 600.107: Introduction to Programming in Java.
2004–05	The Johns Hopkins University, *Invited Lecturer*, 600.105: Freshman Experience.
2002	The Johns Hopkins University, *Teaching Assistant*, 600.419: Storage Systems.

Grants

NSF Secure and Trustworthy Cyberspace Education (SaTC EDU). *Re-energizing K-12 Extramural Programs with Security Activities*. Award #1628726, $299,782. Zachary N. J. Peterson (PI). Co-PI: Zoe Wood. 3/2016 – 5/2017.

Google Computer Science Engagement Award. $5,000. Zachary N. J. Peterson (PI), 2015

Intel-NSF-Georgia Tech Information Security Center Security Education Micro-grant Program. *Teaching Computer Security Concepts in a First Year Course* $5,000. Zachary N. J. Peterson (PI). 2014

NSF Secure and Trustworthy Cyberspace Education (SaTC EDU). *This is Not a Game—Using ARGs for Teaching Security Concepts to First-Year Undergraduates*. Award #1419318, $196,073. Zachary N. J. Peterson (PI). 10/2014 – 9/2016.

NSF Federal Cyber Service: Scholarship for Service (SFS). *Monarch II: Cyber Corps Through Transformation*. Award #1241432, $1,964,754. Cynthia Irvine (PI). Co-PIs: Zachary N. J. Peterson, Mark Gondree, Ted Huffmire. 2013

NSF Transforming Undergraduate Education: *Collaborative Research: Teaching Computer Security Concepts Through Interactive (Non-Digital) Games*. Award #1140561, $196,594. Zachary N. J. Peterson (PI). Co-PIs: Mark Gondree (NPS), Kate Lockwood (CSU Monterey Bay), Joe Welch (Hartnell Community College). 9/2012 – 8/2014

National Reconnaissance Office. *Cloud Technologies for Automated Tagging and Cryptographic Binding*. $437,996. Craig Martell (PI). Co-PIs: Mark Gondree and Zachary N. J. Peterson. 11/2011 – 9/2012.

NSF EArly-Concept Grants for Exploratory Research (EAGER): *HealthWave–Secure, Federated Protocols for Electronic Medical Records*. Award #1143573, $92,063. Zachary N. J. Peterson (PI). 2010

Amazon Web Services in Education Grant: *Rethinking Provable Data Possession*. Zachary N. J. Peterson (PI). 2010

Identity and Database Challenges for Force Protection (Team Monterey). $109,994. Senior Personnel with Cynthia Irvine (PI). 10/2010–6/2011

NSF Trustworthy Computing: *TC: Large: Self Protecting Electronic Medical Records.* $1,733,881. Aviel D. Rubin (PI). Co-PIs: Christoph Lehmann, Matthew Green, Zachary N. J. Peterson. NSF CNS Award #1010928. 10/2010–9/2014.

Department of Health and Human Services. *Strategic Healthcare Information Technology Advanced Research Projects on Security (SHARPS)*, Research Focus Area: Security of Health Information Technology. $15,000,000 total; $1,600,399 Johns Hopkins University portion. Zachary N. J. Peterson, Senior Personnel with Carl Gunter (Director) *et al.*

Awards

2016 Cyber Security Fulbright Scholar, University College London, London, England

2014 Cal Poly ACM Professor of the Year

Patents

2010 Method and Apparatus for Limiting Access to Sensitive Data. US Patent 7,840,795. (with A. Stubblefield, S. Bono, M. Green).

Invited Talks & Panels

2016 Invited Speaker. "How Games Can Fix Computer Security Education." University College London, *Host:* Jens Groth.

2016 Invited Speaker. "How Games Can Fix Computer Security Education." Royal Holloway, University of London, *Host:* Lorenzo Cavallaro.

2016 Invited Panelist. "Cyber CSI II: Apple vs. FBI. Encryption, Privacy, and Policy." Robert E Kennedy Data Studio Presents, *Host:* Jeanine Scaramozzino.

2016 Invited Panelist. "Teaching Computer Security: Thoughts from the Field." USENIX Security Symposium, *Moderator:* Adrienne Porter-Felt.

2016 Invited Speaker. "A Million Hit Points and Infinite Charisma: How Games Can Fix Computer Security Education." USENIX Enigma Conference, *Chairs:* David Brumley and Parisa Tabriz.

2015 Invited Panelist. "Cyber CSI: Working to Solve the Data Security Crisis." Robert E Kennedy Data Studio Presents, *Host:* Jeanine Scaramozzino.

2015 Invited Speaker. "This is Not a Game: Using Alternate Realities to Teach Security Concepts to First-Year Undergraduates." Georgia Tech/Intel/National Science Foundation Security Education Workshop, *Host:* Wenke Lee.

2015 Invited Panelist. "Educating Everyone." National Science Foundation Secure and Trustworthy Cyberspace PI Meeting, *Host:* David Evans.

2014 Invited Speaker. "Valuing Security by Getting [d0x3d!]: security outreach using a network security board game." Symposium on Curriculum Development in Security and Information Assurance (CDSIA), *Host:* Sigurd Meldal.

2013 Invited Speaker. "Games for Cybersecurity Education." National Science Foundation Scholarship for Service Symposium, *Host:* Victor Piotrowski.

2012 Invited Speaker. "Cryptography for a Cloud Appliance." Nebula, Inc., *Host:* Bryan Payne.

2011 Invited Speaker. "Storage, Security and You." Hartnell Community College, *Host:* Prof. Joe Welch.

2010 Invited Panelist. Security and Privacy in Medical and Home-Care Systems (SPIMACS).

2010 Invited Speaker. "Security Constructs for Regulatory-Compliant Storage." Georgetown University, *Host:* Prof. Clay Shields.

2007 Toward Regulatory Compliant Storage Systems. McDaniel College, *Host:* Prof. Italo Simonelli.

2006 Toward Regulatory Compliant Storage Systems. The Johns Hopkins University Institute for Security Informatics, *Host:* Prof. Gerry Masson.

2002 Virtual Contiguity: Data Placement for a Versioning File System. IBM Almaden Research Center, *Host:* Bernie Lopez.

2001 Storage Technology for High Performance Computing. Lawrence Livermore National Laboratory, *Host:* Steve Louis.

Professional Activities

Workshop Founder	USENIX Advances in Security Education (ASE) USENIX Summit on Gaming, Games, and Gamification in Security Education (3GSE)
Steering Committee	USENIX Advances in Security Education (ASE) USENIX Workshop on Health Information Technologies (HealthTech) '13

Program Chair	USENIX Advances in Security Education (ASE) ‘16 USENIX Summit on Gaming, Games, and Gamification in Security Education (3GSE) ‘14, ‘15 USENIX Workshop on Health Information Technologies (HealthTech) ‘13, Co-Chair USENIX Workshop on Health Security and Privacy (HealthSec) ‘12, Co-Chair
Chair	IEEE Security & Privacy Workshops ‘16
Vice Chair	IEEE Security & Privacy Workshops ‘14, ‘15
Program Committee	ACM Special Interest Group in Computer Science Education (SIGCSE) ‘17 USENIX Enigma Conference ‘17 USENIX Security Symposium ‘14, ‘15, ‘16 Annual Computer Security Applications Conference (ACSAC) ‘13, ‘14, ‘15, ‘16 International Symposium on Research in Attacks, Intrusions and Defenses (RAID) ‘15 ACM Symposium on Information, Computer and Communication Security (ASIACCS) ‘13, ‘14, ‘15 USENIX Workshop on Cyber Security Experimentation and Test (CSET) ‘14, ‘15 International Symposium on Engineering Secure Software and Systems (ESSoS) ‘13 IEEE Symposium on Security and Privacy (Oakland) ‘12 International Workshop on Storage Security and Survivability (StorageSS) ‘06
External Reviewer	ACM Transaction on Storage ‘10, ‘14 IEEE Transactions on Dependable and Secure Computing ‘13 IEEE Transactions on Information Forensics and Security ‘10,‘11,‘12 IEEE Security and Privacy Magazine ‘10,‘11,‘12 USENIX Conference on File and Storage Technologies ‘02,‘09,‘11 IET Software ‘10 Communications of the ACM ‘06 IBM Systems Journal ‘06

Service and Outreach

2016–17	Chair, Computer Science Department Cybersecurity Faculty Search Committee, Cal Poly
2016	Selection Committee for the NCWIT Aspirations in Computing for the Central California Affiliate
2015–16	Member, Computer Science Department High Performance Computing Faculty Search Committee, Cal Poly
2014–	Permanent member, Selection Committee for Scholarships for Women Studying Information Security (SWSIS)
2014–	Co-Advisor, Cal Poly White Hat Computer Security Club, Cal Poly
2014	Instructor, Paramount Summer Academy, Cal Poly
2014–15	Chair, Computer Science Department Cybersecurity Faculty Search Committee, Cal Poly
2013–14	Member, Computer Science Department Cybersecurity Faculty Search Committee, Cal Poly
2013–	Instructor, Engineering Possibilities in College (EPIC) Summer Camp, Cal Poly
2012	Mentor, Undergraduate Research Opportunities Center (UROC), CSU Monterey Bay
2012	Mentor, Community College Catalyst (3C), Cebrowski Institute
2012	Instructor, CyberAdventurer Week, Cebrowski Institute
2012	Member, Computer Science Department Curriculum Committee, Naval Postgraduate School
2011–12	Judge, Monterey County Science and Engineering Fair, Monterey, CA
2011	Member, Computer Science Department Faculty Search Committee, Naval Postgraduate School
2011	Member, Computer Science Department Symposium Committee, Naval Postgraduate School