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BIOGRAPHICAL INFORMATION

Education

Princeton University, Department of Computer Science, 1999–2005
Doctor of Philosophy, Awarded in 2005.
Master of Arts, Awarded in 2001.

Tsinghua University, Department of Computer Science, China, 1994–1999.
Bachelor of Engineering in Computer Science (with distinction), Awarded in 1999.
Bachelor of Economics, Awarded in 1999.

Professional experience

Pennsylvania State University, University Park, PA. Associate Prof. of Computer Science & Engineering. Tenured. 1/2016–present. Also affiliated with Institute for CyberScience.

Intelligent Automation, Inc., Rockville, MD. Consultant. 4/2016–8/2017 and 4/2013–9/2014.

Lehigh University, Bethlehem, PA. Associate Prof. of Computer Science & Engineering. Tenured. 6/2015–12/2015.

Lehigh University, Bethlehem, PA. Assistant Prof. of Computer Science & Engineering. 8/2008–5/2015.

Microsoft Research, Redmond, WA. Consulting Researcher. 6/2007–6/2008.

Boston College, Chestnut Hill, MA. Asst. Prof. of Computer Science. 9/2005–6/2008.

NEC Labs America, Princeton, NJ. Research summer intern. 2004.

Microsoft Research, Redmond, WA. Research summer intern. 2002.

RESEARCH INTERESTS

Software security, programming languages, formal methods, software engineering.

HONORS AND AWARDS

- Ruth and Joel Spira Excellence in Teaching Award, Penn State, 2018.
- Distinguished Reviewer Award, 39th IEEE Symposium on Security and Privacy (Oakland), 2018.

- Outstanding Paper Award, From Debugging-Information Based Binary-Level Type Inference to CFG Generation, 8th ACM Conference on Data and Application Security and Privacy (CODASPY), 2018.
- Best Demo Award, Sensitive Information Tracking in Commodity IoT, Florida Institute of Cybersecurity Research Annual Conference on Cybersecurity, 2018.
- James F. Will Career Development Professorship, Pennsylvania State University, 2016-2018.
- National Science Foundation Career Award, 2012.
- Google Faculty Research Award, 2010 and 2012.
- Faculty Fellowship, Boston College, 2008.
- Francis Upton Graduate Fellowship, Princeton Univ., 1999 – 2003.
- Tsinghua University Scholarship, 1995, 1996 and 1998.
- HSBC Bank Scholarship, 1997.
- Lenovo Cup Computer Programming Contest, First Prize, 1995.
- China National Olympic Contest on Information Science, First Prize, 1993.

Awards won by my students

- Ben Niu, ACM SIGSAC Doctoral Dissertation Award Runner-Up, 2016.
- Matthew Kilgore, Honorable Mention in CRA's Outstanding Undergraduate Award, 2015.
- Jason Croft, Honorable Mention in CRA's Outstanding Undergraduate Award, 2009.

RESEARCH FUNDING

Competitively awarded external research grants

- DARPA (Defense Advanced Research Projects Office) N6600117C4052: Automatic Generation of Anti-Specifications from Exploits for Scalable Program Hardening. As subcontractor to Virginia Tech, \$190,000, 2017–2018.
- NSF CCF-1723571: Lightweight Abstract Memory Features. Principal Investigator. Collaborative research with Mike Spear and Xiaochen Guo at Lehigh, and Aviral Shrivastava at Arizona State. Jointly supported by NSF and Intel. \$2,000,000. My group's portion: \$500,000. 2017–2020.
- ONR (Office of Naval Research) N00014-17-1-2539: Semantics-Directed Binary Reverse Engineering and Transformation Validation, Principal Investigator, \$500,000, 2017–2020.
- NSF CNS-1408826: Retrofitting Software for Defense-in-Depth. Principal Investigator. Collaborative research with Trent Jaeger at Penn State, Vinod Ganapathy at Rutgers, and Christian Skalka at U. of Vermont. \$1,200,000. My group's portion: \$300,000. 2014–2018.
- AFRL (Air Force Research Laboratory) FA8750-14-C-0179: SLICE: Secure Lightweight Cloud Computing Environment, Subcontract from Intelligent Automation Inc., \$30,000, 2014–2015.

- NSF CCF-1217710: Reusable Tools for Formal Modeling of Machine Code. Principal Investigator. Collaborative research with Greg Morrisett at Harvard. \$477,495. My group’s portion: \$258,785. 2012–2015. REU supplement: \$16,000.
- NSF CAREER CCF-1149211: User-Space Protection Domains for Compositional Information Security. Principal Investigator, NSF, \$483,125, 2012–2017.
- Google Research Award: A Fully Certified Native Client Verifier. Principal Investigator, \$50,100, 2012–2013.
- Google Research Award: Native Client with Trustworthy Verifier and Stronger Security. Principal Investigator, \$60,000, 2010–2011.
- NSF CCF-0915157: Securing Multilingual Software Systems. Principal Investigator. Collaborative research with Greg Morrisett at Harvard. CCF-0915157. \$480,131. My group’s portion: \$265,048. 2009–2012. REU supplement: \$16,000.
- NSF IIS-0854606: Structuring, Reasoning, and Querying in a Very Large Medical Image Database. Principal Investigator. Collaborative Research with Xiaolei Huang and Dan Lopresti at Lehigh, and George Nagy at RPI. \$392,000. My group’s portion: \$54,464. 2008–2011.

University internal research grants

- Lehigh Collaborative Research Opportunity (CORE) Grant. Principal Investigator (with Co-PI Parv Venkitasubramaniam from the ECE department). Quantitative Information Flow for Security and Privacy in Software Systems, \$36,770, 2014–2015.

PROFESSIONAL MEMBERSHIP

ACM member; IEEE senior member.

PUBLICATIONS AND CREATIVE ACTIVITIES

Journal papers and book chapters

- Tan, G. and Niu, B. (2018). Protecting dynamic code. In P. Larsen and A.-R. Sadeghi, editors, *The Continuing Arms Race*, chapter 2, pages 25–60
- Fan, Y., Liu, S., Tan, G., and Lin, X. (2018a). CSCAC: one constant-size CPABE access control scheme in trusted execution environment. *International Journal of Computational Science and Engineering*
- Fan, Y., Liu, S., Tan, G., and Qiao, F. (2018b). Fine-grained access control based on trusted execution environment. *Future Generation Computer Systems*
- Tan, G. and Morrisett, G. (2018). Bidirectional grammars for machine-code decoding and encoding. *Journal of Automated Reasoning*, **60**(3), 257–277. [\[paper\]](#)
- Tan, G. (2017). Principles and implementation techniques of software-based fault isolation. *Foundations and Trends in Privacy and Security*, **1**(3), 137–198. [\[paper\]](#)

- Tian, K., Yao, D., Rider, B., Tan, G., and Peng, G. (2017a). Detection of repackaged Android malware with code-heterogeneity features. *IEEE Transactions on Dependable and Secure Computing*, page To appear. [\[paper\]](#)
- Yin, J., Tan, G., Bai, X., and Hu, S. (2015). WebC: Toward a portable framework for deploying legacy code in web browsers. *Science China Information Sciences*, **58**(7), 1–15. [\[paper\]](#)
- Tan, G. (2015). JNI Light: an operational model for the core JNI. *Mathematical Structures in Computer Science*, **25**(4), 805–840. [\[paper\]](#)
- Li, S. and Tan, G. (2014a). Exception analysis in the Java Native Interface. *Science of Computer Programming*, **89**, 273–297. [\[paper\]](#)
- Sun, M., Tan, G., Siefers, J., Zeng, B., and Morrisett, G. (2013). Bringing Java’s wild native world under control. *ACM Transactions on Information and System Security (TISSEC)*, **16**(3), 9:1–9:28. [\[paper\]](#)
- Bai, S., Yin, J., Tan, G., Wang, Y., and Hu, S. (2011). FDTL: a unified flash memory and hard disk translation layer. *IEEE Transactions on Consumer Electronics*, **57**(4), 1719–1727. [\[paper\]](#)
- Kim, E., Huang, X., and Tan, G. (2011). Markup SVG: An online content-aware image abstraction and annotation tool. *IEEE Transactions on Multimedia*, **13**(5), 993–1006. [\[paper\]](#)
- Tan, G., Shao, Z., Feng, X., and Cai, H. (2011). Weak updates and separation logic. *New Generation Computing*, **29**(1), 3–29. [\[paper\]](#)
- Ahmed, A., Appel, A., Richards, C., Swadi, K., Tan, G., and Wang, D. (2010). Semantic foundations for typed-assembly languages. *ACM Transactions on Programming Languages and Systems (TOPLAS)*, **32**(3), 1–67. [\[paper\]](#)
- Jiang, M., Zhu, X., Gielen, G. G. E., Drábek, E., Xia, Y., Tan, G., and Bao, T. (2002). Braille to print translations for Chinese. *Information & Software Technology*, **44**(2), 91–100. [\[paper\]](#)

Refereed conference and workshop papers

- Muntean, P., Fischer, M., Tan, G., Lin, Z., Grossklags, J., and Eckert, C. (2018). tauCFI: Type-assisted control flow integrity for x86-64 binaries. In *International Symposium on Research in Attacks, Intrusions and Defenses (RAID)*, page To appear
- Celik, Z. B., Babun, L., Sikder, A. K., Aksu, H., Tan, G., McDaniel, P., and Uluagac, A. S. (2018a). Sensitive information tracking in commodity IoT. In *27th Usenix Security Symposium*, page To appear
- Celik, Z. B., McDaniel, P., and Tan, G. (2018b). Soteria: Automated IoT safety and security analysis. In *USENIX Annual Technical Conference (ATC)*, page To appear
- Fan, Y., Liu, S., Tan, G., Lin, X., Zhao, G., and Bai, J. (2018c). One secure access scheme based on trusted execution environment. In *17th IEEE International Conference On Trust, Security And Privacy In Computing And Communications (TrustCom)*, page To appear
- Zeng, D. and Tan, G. (2018). From debugging-information based binary-level type inference to cfg generation. In *8th ACM Conference on Data and Application Security and Privacy (CODASPY)*, pages 366–376. **Outstanding paper award.** [\[paper\]](#)
- Liu, S., Tan, G., and Jaeger, T. (2017). PtrSplit: Supporting general pointers in automatic program partitioning. In *24th ACM Conference on Computer and Communications Security (CCS)*, pages 2359–2371. [\[paper\]](#)

- Tan, G. and Jaeger, T. (2017). CFG construction soundness in control-flow integrity. In *ACM SIGSAC Workshop on Programming Languages and Analysis for Security (PLAS)*, pages 3–13. [\[paper\]](#)
- Tian, K., Tan, G., Yao, D., and Ryder, B. (2017b). ReDroid: Prioritizing data flows and sinks for app security transformation. In *ACM Workshop on Forming an Ecosystem Around Software Transformation (FEAST)*, pages 35–41. [\[paper\]](#)
- Tan, G. and Morrisett, G. (2016). Bidirectional grammars for machine-code decoding and encoding. In *8th International Conference on Verified Software: Theories, Tools, and Experiments (VSTTE)*, pages 73–89. [\[paper\]](#)
- Guo, X., Shrivastava, A., Spear, M., and Tan, G. (2016). Languages must expose memory heterogeneity. In *Second International Symposium on Memory Systems (MEMSYS)*, pages 251–256. [\[paper\]](#)
- Tian, K., Yao, D., Ryder, B. G., and Tan, G. (2016). Analysis of code heterogeneity for high-precision classification of repackaged malware. In *Workshop on Mobile Security Technologies (MoST)*, pages 262–271. [\[paper\]](#)
- Niu, B. and Tan, G. (2015). Per-input control-flow integrity. In *22nd ACM Conference on Computer and Communications Security (CCS)*, pages 914–926. [\[paper\]](#). [\[webpage\]](#)
- Muthukumaran, D., Talele, N., Jaeger, T., and Tan, G. (2015). Producing hook placements to enforce expected access control policies. In *7th International Symposium on Engineering Secure Software and Systems (ESSoS)*, pages 178–195. [\[paper\]](#)
- Ganapathy, V., Jaeger, T., Skalka, C., and Tan, G. (2014). Assurance for defense-in-depth via retrofitting. In *8th Layered Assurance Workshop (LAW)*. [\[paper\]](#)
- Niu, B. and Tan, G. (2014b). RockJIT: Securing just-in-time compilation using modular control-flow integrity. In *21st ACM Conference on Computer and Communications Security (CCS)*, pages 1317–1328. [\[paper\]](#)
- Li, S. and Tan, G. (2014b). Finding reference-counting errors in Python/C programs with affine analysis. In *European Conference on Object-Oriented Programming (ECOOP)*. [\[paper\]](#)
- Sun, M. and Tan, G. (2014). NativeGuard: Protecting Android applications from third-party native libraries. In *7th ACM Conference on Security & Privacy in Wireless and Mobile Networks (WiSec)*, pages 165–176. [\[paper\]](#)
- Niu, B. and Tan, G. (2014a). Modular control-flow integrity. In *ACM Conference on Programming Language Design and Implementation (PLDI)*, pages 577–587. [\[paper\]](#). [\[webpage\]](#)
- Niu, B. and Tan, G. (2013b). Monitor integrity protection with space efficiency and separate compilation. In *20th ACM Conference on Computer and Communications Security (CCS)*. [\[paper\]](#)
- Zeng, B., Tan, G., and Erlingsson, Ú. (2013). Strato: A retargetable framework for low-level inlined-reference monitors. In *22nd Usenix Security Symposium*, pages 369–382. [\[paper\]](#)
- Niu, B. and Tan, G. (2013a). Efficient user-space information flow control. In *8th ACM Symposium on Information, Computer and Communications Security (ASIACCS)*, pages 131–142. [\[paper\]](#)
- Su, X., Chuah, M.-C., and Tan, G. (2012). Smartphone dual defense protection framework: Detecting malicious applications in Android markets. In *8th International Conference on Mobile Ad-hoc and Sensor Networks*, pages 153–160. [\[paper\]](#)

- Li, S., Liu, D. Y., and Tan, G. (2012). JATO: Native code atomicity for Java. In *Asian Symposium on Programming Languages and Systems (APLAS)*, pages 2–17. [\[paper\]](#)
- Sun, M. and Tan, G. (2012). JVM-portable sandboxing of Java’s native libraries. In *17th European Symposium on Research in Computer Security (ESORICS)*, pages 842–858. [\[paper\]](#). [\[webpage\]](#)
- Niu, B. and Tan, G. (2012). Enforcing user-space privilege separation with declarative architectures. In *Proceedings of the Sixth ACM Workshop on Scalable Trusted Computing (STC)*, pages 9–20. [\[paper\]](#)
- Morrisett, G., Tan, G., Tassarotti, J., Tristan, J.-B., and Gan, E. (2012). Rocksalt: Better, faster, stronger SFI for the x86. In *ACM Conference on Programming Language Design and Implementation (PLDI)*, pages 395–404. [\[paper\]](#). [\[webpage\]](#)
- Zeng, B., Tan, G., and Morrisett, G. (2011). Combining control-flow integrity and static analysis for efficient and validated data sandboxing. In *18th ACM Conference on Computer and Communications Security (CCS)*, pages 29–40. [\[paper\]](#)
- Li, S. and Tan, G. (2011). JET: Exception checking in the Java Native Interface. In *ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA)*, pages 345–358. [\[paper\]](#)
- Fedynyshyn, G., Chuah, M. C., and Tan, G. (2011). Detection and classification of different botnet C&C channels. In *8th International Conference on Autonomic and Trusted Computing (ATC)*, pages 228–242. [\[paper\]](#)
- Tan, G. (2010). JNI Light: An operational model for the core JNI. In *Asian Symposium on Programming Languages and Systems (APLAS)*, pages 114–130. [\[paper\]](#)
- Kim, E., Huang, X., Tan, G., Long, L. R., and Antani, S. K. (2010). A hierarchical SVG image abstraction layer for medical imaging. In *SPIE Medical Imaging: Advanced PACS-based Imaging Informatics and Therapeutic Applications*, volume 7628. [\[paper\]](#)
- Siefers, J., Tan, G., and Morrisett, G. (2010). Robusta: Taming the native beast of the JVM. In *17th ACM Conference on Computer and Communications Security (CCS)*, pages 201–211. [\[paper\]](#). [\[webpage\]](#). [\[slides\]](#)
- Tan, G., Shao, Z., Feng, X., and Cai, H. (2009). Weak updates and separation logic. In *Asian Symposium on Programming Languages and Systems (APLAS)*, pages 178–193. [\[paper\]](#)
- Lopresti, D. P., Zhou, X., Huang, X., and Tan, G. (2009). Document analysis support for the manual auditing of elections. In *10th International Conference on Document Analysis and Recognition (ICDAR)*, pages 733–737
- Li, S. and Tan, G. (2009). Finding bugs in exceptional situations of JNI programs. In *16th ACM Conference on Computer and Communications Security (CCS)*, pages 442–452. [\[paper\]](#)
- Appel, A. W., Ginsburg, M., Hursti, H., Kernighan, B. W., Richards, C. D., Tan, G., and Venetis, P. (2009). The New Jersey voting-machine lawsuit and the AVC advantage DRE voting machine. In *Conference on Electronic Voting Technology/Workshop on Trustworthy Elections (EVT/WOTE)*. [\[paper\]](#)
- Tan, G. and Croft, J. (2008). An empirical security study of the native code in the JDK. In *17th Usenix Security Symposium*, pages 365–377. [\[paper\]](#). [\[slides\]](#). [\[tech report\]](#)

- Tan, G. and Morrisett, G. (2007). ILEA: Inter-language analysis across Java and C. In *ACM Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA)*, pages 39–56. [\[paper\]](#). [\[slides\]](#)
- Tan, G., Chen, Y., and Jakubowski, M. H. (2006a). Delayed and controlled failures in tamper-resistant software. In *8th International Workshop on Information Hiding (IH)*, pages 216–231. [\[paper\]](#). [\[slides\]](#)
- Tan, G., Appel, A., Chakradhar, S., Raghunathan, A., Ravi, S., and Wang, D. (2006b). Safe Java Native Interface. In *IEEE International Symposium on Secure Software Engineering*, pages 97–106. [\[paper\]](#). [\[slides\]](#)
- Tan, G. and Appel, A. (2006). A compositional logic for control flow. In *International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI)*, pages 80–94. [\[paper\]](#). [\[slides\]](#)
- Marino, D., Chin, B., Millstein, T., Tan, G., Simmons, R. J., and Walker, D. (2006). Mechanized metatheory for user-defined type extensions. In *Workshop on Mechanizing Metatheory*
- Ou, X., Tan, G., Mandelbaum, Y., and Walker, D. (2004). Dynamic typing with dependent types. In *Proceedings of IFIP 3rd International Conference on Theoretical Computer Science*, pages 437–450. [\[paper\]](#)
- Tan, G., Appel, A., Swadi, K., and Wu, D. (2004). Construction of a semantic model for a typed assembly language. In *International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI)*, pages 30–43. [\[paper\]](#). [\[slides\]](#)
- Tan, G., Ou, X., and Walker, D. (2003). Enforcing resource usage protocols via scoped methods. In *Proceedings of 10th International Workshop on Foundations of Object-Oriented Languages (FOOL)*. [\[paper\]](#)
- Jiang, M., Zhu, X., Xia, Y., Tan, G., Yuan, B., and Tang, X. (2000). Segmentation of mandarin braille word and braille translation based on multi-knowledge. In *5th International Conference on Signal Processing (ICSP)*, pages 2070–2073. [\[paper\]](#)

Other papers

- K. Tian, D. Yao, G. Tan. Android-Application Rewriting with Quantitative Information Flow Analysis. Poster at the 2016 Network and Distributed System Security Symposium (NDSS), Feb., 2016.
- B. Niu and G. Tan. Chobham: Taming JIT-ROP Attacks. Poster at the 2015 Network and Distributed System Security (NDSS) Symposium, Feb., 2015.
- B. Niu and G. Tan. uPro: A Compartmentalization Tool Supporting Fine-Grained and Flexible Security Configuration. Poster at the 18th ACM Conference on Computer and Communication Security (CCS), Oct. 2011.
- A. Appel, M. Ginsburg, H. Hursti, B. Kernighan, C. Richards, and G. Tan. Insecurities and Inaccuracies of the Sequoia AVC Advantage 9.00H DRE Voting Machine. Redacted version of expert report submitted in *Gusciora v. Corzine*, September 2008.
- J. Croft and G. Tan. Security Analysis of the Native Code in Sun’s JDK. In 23rd Annual Computer Security Applications Conference (ACSAC), work-in-progress session, Dec. 2007.

- G. Tan. A Compositional Logic for Control Flow and its Application in Foundational Proof-Carrying Code, Princeton University Ph.D. Thesis, July 2005.
- G. Tan, A. Appel, S. Chakradhar, A. Raghunathan, S. Ravi and D. Wang. Safe Heterogeneous Applications: Curing the Java Native Interface. Princeton University Technical Report, TR-715-04, Oct. 2004.
- G. Tan and A. Appel. A Typed Calculus for Machine Instructions and its Semantics in Higher-order Logic. Princeton University Technical Report, March 2004.
- X. Ou, G. Tan, Y. Mandelbaum and D. Walker. Dynamic Typing with Dependent Types (Extended Version). Princeton University Technical Report TR-695-04, April 2004.
- G. Tan and A. Appel. Semantics of Machine Instructions at Multiple Levels of Abstraction. Short paper at the 16th Symposium on Logic in Computer Science (LICS), 2001.

Patents

- G. Tan and B. Niu. Methods for Enforcing Control Flow of Computer Programs. US Patent No. 9,361,102, filed in Jun 2015, awarded in Jun 2016.
- Y. Chen and G. Tan. Tamper Response Mechanism. US Patent No. 7818799, filed in May 2006, awarded in Oct 2010.

Publicly released software

- MCFI: a low-overhead CFI implementation with support for dynamic library loading and just-in-time compilation. We released it in 2015 at <https://github.com/mcfi>.
- Robusta: a framework that allows JVM administrators to constrain native code with different trust levels, similar to how the security of Java code is configured. We released it in 2011 under the BSD license at <http://www.cse.psu.edu/~gxt29/projects/gonative/>
- RockSalt: a new machine-code verifier for Google's Native Client, with a formal correctness proof mechanized in Coq. We released it in 2012 under the GPL license at <http://www.cse.psu.edu/~gxt29/projects/gonative/>.

PRESENTATIONS

Invited talks at summer schools and professional conferences

- **Invited talk.** Bidirectional and executable specifications of machine code decoding and encoding. Invited talk at the Fifth Workshop on Language-Theoretic Security (LangSec), San Francisco, May 2018.
- **Keynote talk.** Protecting dynamic code by modular control-flow integrity. International Workshop on Modularity Across the System Stack (MASS 2016), Mar. 2016.
- **Invited talk.** Reusable tools for formal modeling of machine code. Invited talk at the Principles in Practice (PiP) workshop associated with the 2014 POPL conference, San Diego, Jan. 2014.
- **Invited lecture.** 2012 summer school on cryptography and principles of software security, Binary-Level Software Security, Penn State University, May 2012.

Invited talks at university colloquiums and seminars

- A Compiler-Centric Approach to Software Security. Penn State. Apr. 2015.
- Control Flow Integrity: Efficiency and Modularity. Virginia Tech. Oct. 2014.
- Modular Control Flow Integrity. Zhejiang University, Jul 2014.
- Reusable Tools for Formal Modeling of Machine Code. Chinese Institute of Software, Jul 2014.
- Software Security at the Binary Level. Center for the Advancement of Research and Education at Rochester Institute of Technology, May 2012. Also at Peking University, Jun 2012. Also at Intelligent Automation, Inc. Jan 2013.
- Towards Verifiably Safe Machine Code. CyLab at Carnegie Mellon University, Mar. 2012.
- GoNative: Safe Native Code for Safe Languages. USTC-Yale Joint Research Center, Suzhou, China, Dec. 2010.
- Protecting Java from Native Code. IBM's T.J. Watson research center in Hawthorne, Feb. 2009. Also at Department of Computer Science and Technology, Tsinghua University, May 2009.
- Language-Based Security for Java-C Interoperation. UCLA Seminar, Jul. 2008.
- Interface Safety in Multilingual Software. Northeastern Programming Languages Seminar, Feb. 2008.
- Security Analysis of the Native Code in the JDK. Princeton University Computer-Science Security Lunch Seminar, Nov. 2007.
- Inter-Language Analysis across Java and C. Boston University Computer-Science Colloquium, Oct. 2007.
- Towards Reliable and Secure Software. Lehigh University Colloquium, Apr. 2006.
- Safe Java Native Interface. Triforce seminar, Harvard University, Mar. 2006.
- A Compositional Logic for Control Flow. The Church Project Seminar, Boston University, Oct. 2005.
- Reliable and Secure Software through Static Verification and Dynamic Checking. NEC Labs America. Apr. 2005.
- Structured Verification of Unstructured Machine Code. Toyota Technological Institute at Chicago. Feb. 2005.
- Construction of a Semantic Model for a Typed Assembly Language. Ottawa Carleton Logic Seminar, University of Ottawa, Nov. 2003.
- Protection Against Untrusted Code. Microsoft Research, Feb. 2002.

Paper presentations at professional conferences

- CFG Construction Soundness in Control-Flow Integrity. In ACM SIGSAC Workshop on Programming Languages and Analysis for Security (PLAS), Oct 2017.
- Bidirectional Grammars for Machine-Code Decoding and Encoding. In 8th Working Conference on Verified Software: Theories, Tools, and Experiments (VSTTE), Jul. 2016. Also in Deep Spec Workshop, May 2016.

- Software Security: A Compiler-Based Perspective. School of Electrical Engineering and Computer Science Industrial and Professional Advisory Council (IPAC) meeting, Mar. 2016. Also at the 2016 Silicon Happy Valley conference.
- Modular control-flow integrity. At the Dagstuhl Seminar “The Continuing Arms Race: Code-Reuse Attacks and Defenses”, Dagstuhl, July, 2015.
- Modular Control Flow Integrity. In the ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI), Edinburgh, UK, Jun. 2014.
- Monitor Integrity Protection with Space Efficiency and Separate Compilation. In 20th ACM Conference on Computer and Communications Security (CCS), Berlin, Germany, Nov. 2013.
- Towards Safe Language Interoperation. Pre-Program-Committee-Meeting Workshop of OOPSLA. University of California at Irvine, May 2013.
- JATO: Native Code Atomicity for Java. Tenth Asian Symposium on Programming Languages and Systems (APLAS 2012), Kyoto, Japan, Dec. 2012.
- JNI Light: An Operational Model for the Core JNI. Eighth Asian Symposium on Programming Languages and Systems (APLAS 2010), Shanghai, China, Dec. 2010.
- Weak updates and separation logic. New Jersey Programming Languages Seminar, Apr. 2010.
- Weak updates and separation logic. Seventh Asian Symposium on Programming Languages and Systems (APLAS 2009), Seoul, South Korea, Dec. 2009.
- An Empirical Security Study of the Native Code in the JDK. Seventeenth USENIX Security Symposium (Security '08), San Jose, CA, Jul. 2007.
- ILEA: Inter-Language Analysis across Java and C. Twenty-second ACM Conference on Object-Oriented Programming, Systems, Languages & Applications (OOPSLA '07), Research Paper Track, Montreal, Canada, Oct. 2007.
- Delayed and Controlled Failures in Tamper-Resistant Software. Eighth Information Hiding (IH '07), Old Town Alexandria, Virginia, USA, Jul. 2006.
- Safe Java Native Interface. IEEE International Symposium on Secure Software Engineering (ISSSE 06), McLean, Virginia, USA, Mar. 2006.
- A Compositional Logic for Control Flow. Seventh International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI '06), Charleston, South Carolina, USA, Jan. 2006.
- Construction of a Semantic Model for a Typed Assembly Language. Fifth International Conference on Verification, Model Checking, and Abstract Interpretation (VMCAI '04), Venice, Italy, Jan. 2004.
- Enforcing Resource Usage Protocols via Scoped Methods. Tenth International Workshop on Foundations of Object-Oriented Languages (FOOL '03), New Orleans, Louisiana, USA, Jan. 2003.
- Semantics of Machine Instructions at Multiple Levels of Abstraction. NJ Programming Languages and Systems Seminars, AT&T Research, May 2001.

TEACHING AND ADVISING

Courses taught (unless noted otherwise, all courses are 3-credit courses)

- Spring 2018. CMPSC 461. Programming Language Concepts. 153 students; evaluation on quality of instructor: 6.7/7.
- Spring 2017. CMPSC 461. Programming Language Concepts. 139 students; evaluation on quality of instructor: 6.5/7.
- Fall 2016. CSE 597. Special topics on theorem proving and static analysis. 5 students; evaluation on quality of instructor : 7/7.
- Spring 2016. CMPSC 443. Introduction to Computer and Network Security. 58 students; evaluation on quality of instructor: 6.4/7.
- Fall 2015. CSE 262. Programming Languages.
- Fall 2015. CSE 411. Advanced Programming Techniques.
- Spring 2015. CSE 262. Programming Languages.
- Fall 2014. CSE 262. Programming Languages. 94 students.
- Fall 2014. CSE 411. Advanced Programming Techniques. 29 students.
- Spring 2014. CSE 262. Programming Languages. 30 students; evaluation: 4.71/5.
- Fall 2013. CSE 262. Programming Languages. 69 students; evaluation: 4.29/5
- Fall 2013. CSE 411. Advanced Programming Techniques. 28 students; evaluation: 4.79/5
- Spring 2013. CSE 262. Programming Languages. 32 students; evaluation: 4.58/5.
- Fall 2012. CSE 262. Programming Languages. 49 students; evaluation: 4.56/5.
- Fall 2012. CSE 334/434. Software System Security. 19 students; evaluation: 4.79/5.
- Spring 2012. CSE 262. Programming Languages. 54 students; evaluation: 4.5/5.
- Fall 2011. CSE 262. Programming Languages. 28 students; evaluation: 4.90/5.
- Fall 2011. CSE 497. Advanced Programming Languages. 13 students; evaluation: 4.31/5.
- Fall 2010. CSE 262. Programming Languages. 18 students; evaluation: 4.85/5.
- Fall 2010. CSE 397/497. Software System Security. 21 students; evaluation: 4.93/5.
- Spring 2010. CSE 216. Software Engineering. 30 students; evaluation: 4.04/5.
- Fall 2009. CSE 397/497. Programming Language Design & Analysis. 8 students; evaluation: 5/5.
- Spring 2009. CSE 216. Software Engineering. 31 students; evaluation: 4.43/5.
- Fall 2008. CSE 397/497. Software System Security. 7 students; evaluation: 4.83/5.
- Fall 2007. CS361. Information Security. Boston College.
- Spring 2007. CS366. Principles of Programming Languages. Boston College.
- Fall 2006. CS390. Information Security. Boston College.
- Fall 2005. CS383. Algorithms. Boston College.

Current Ph.D. students

- Shen Liu (Ph.D. student, fall 2013–now).
- Dongrui Zeng (Ph.D. student, fall 2014–now).
- Robert Brotzman Smith (Ph.D. student, fall 2015–now).
- Sun Hyoung Kim (Ph.D. student, fall 2017–now).
- Michael Norris (Ph.D. student, fall 2017–now).

Current PostDocs

- Zhen Huang, Ph.D. from U. of Toronto.

Graduated Ph.D. students

- [Ben Niu](#). Ph.D. Graduated in December 2015. Thesis title: “Practical Control-Flow Integrity”. Current Position: Research Software Development Engineer at Microsoft Research.
- Siliang Li. Ph.D. Graduated in May 2014. Thesis title: “Improving Quality of Software with Foreign Function Interfaces using Static Analysis”.
- Elizabeth Carter. Ph.D. Graduated in May 2014. Co-advised with Glenn Blank. Thesis title: “An Intelligent Debugging Tutor For Novice Computer Science Students”.

Past Postdocs

- Suman Saha, co-supervised with Greg Morrisett, 2013; now Assistant Professor at Illinois State University.
- Zhiyuan Wan, 2015, now at Zhejiang University.

Graduated M.S. students

- Ashley Huhman, M.S., May 2018. Binary-Level Type Inference Using Datalog.
- Sheng-Hsiu Lin, M.S., May 2015. Alias Analysis in LLVM.
- Mengtao Sun, M.A., May 2012.
- Joseph Siefers, M.S., May 2010. Robusta: Taming the Native Beast of the JVM.

Member of Ph.D. thesis committees

- Berkay Celik, Penn State University.
- Peixuan Li, Penn State University.
- Eunjung Yoon, Ensuring Service Integrity in Cloud Computing Environment, Penn State University, 2018.
- Lunpin Yuan, A Study of Android Security: From User-generated Data to User-generated Code, Penn State University, 2017.
- Ke Tian, Android Security Demystified: From Malware Detection to Post-detection Rewriting, Virginia Tech, 2017.

- Xinyang Ge, Enforcing execution integrity for software systems, Penn State University, 2016.
- Yujie Liu, Crafting Concurrent Data Structures, Lehigh University, 2015.
- Wenjia Ruan, Accelerating Transactional Memory by Exploiting Platform Specificity, Lehigh University, 2015.
- Rui Shi, Types for safe resource sharing in sequential and concurrent programming, Boston University, 2007.

Undergraduate research advising

- Honors thesis advising. Corey Capooci (2018); Apurva Bhogale (2018).
- Undergraduate research assistants. Francesco Grossi (summer 2014). Sara Huser (summer 2014). Robert Brotzman and Matthew Hartman (summer 2014). Matthew Kilgore (summer 2013; **Won Honorable Mention in 2015 CRA's Outstanding Undergraduate Award**). Matthew Messersmith (summer 2013). Mark Kogan (spring, summer and fall 2012, summer 2013). Tyler Trephan (summer 2012). Alex Galakatos (summer 2011). David Stolfo (spring 2011). Evans Kosgei (summer 2010). Jason Croft (summer 2007–May 2008; **Won Honorable Mention in 2009 CRA's Outstanding Undergraduate Award**). Michael Dubinsky (summer 2006).
- Senior design projects. Irene Lau and Daniel Kramer (fall 2015). Lauren Mentzer and Lian Block (fall 2015). Rodney Christman (fall 2014). Seth Denburg and Ryan Ramirez (fall 2013).
- Independent studies. James Lamberti (fall 2014).

SERVICES

Service to the professional community

- Editor/editorial review board membership for scholarly publications
 - Associate Editor, International Journal on Cybersecurity, 2017–now.
 - Associate Editor, GSTF Journal On Computing (JoC), 2014–now.
- Conference organizing committees
 - Web Chair, 2019 International Symposium on Code Generation and Optimization, Washington DC, USA.
- Member of conference program committees
 - 27th USENIX Security Symposium, 2018.
 - 19th World Conference on Information Security Applications (WISA), 2018.
 - 39th IEEE Symposium on Security and Privacy (Oakland), 2018.
 - European Conference on Object-Oriented Programming (ECOOP), 2018.
 - 3rd IEEE Secure Development Conference (SecDev), 2018.
 - 5th Workshop on Language-Theoretic Security (LangSec), 2018.

- 9th IEEE International Conference on Cloud Computing Technology and Science (Cloud-Com), 2017.
- 20th Information Security Conference (ISC), 2017.
- 18th World Conference on Information Security Applications (WISA), 2017.
- Workshop on Forming an Ecosystem Around Software Transformation (FEAST), 2017.
- 2nd IEEE Secure Development Conference (SecDev), 2017.
- 38th IEEE Symposium on Security and Privacy (Oakland), 2017.
- 4th Workshop on Language-Theoretic Security (LangSec), 2017.
- 23rd ACM Conference on Computer and Communications Security (CCS), 2016.
- 14th International conference on Applied Cryptography and Network Security (ACNS), 2016.
- 37th IEEE Symposium on Security and Privacy (Oakland), 2016.
- 3rd Workshop on Language-Theoretic Security (LangSec), 2016.
- 10th International Conference on Emerging Security Information, Systems and Technologies (SECURWARE), 2016.
- 22nd ACM Conference on Computer and Communications Security (CCS), 2015.
- 7th IEEE International Conference on Cloud Computing Technology and Science (Cloud-Com), Security and Privacy track, 2015.
- 10th ACM Symposium on Information, Computer and Communications Security (AsiaCCS), 2015.
- 13th Asian Symposium on Programming Languages and Systems (APLAS), 2015.
- 9th International Conference on Emerging Security Information, Systems and Technologies (SECURWARE), 2015.
- International Workshop on Mobile Computing Security (MCS), 2015.
- IEEE International Symposium on Security, Privacy and Anonymity in Internet of Things (SpaIoT), 2015.
- 21st ACM Conference on Computer and Communications Security (CCS), 2014.
- 9th ACM Symposium on Information, Computer and Communications Security (AsiaCCS), 2014.
- 21st Annual Network & Distributed System Security Symposium (NDSS), 2014.
- 8th International Conference on Emerging Security Information, Systems and Technologies (SECURWARE), 2014.
- 10th IEEE International Conference on Mobile Ad-hoc and Sensor Systems (MASS), 2014.
- IEEE International Symposium on Security, Privacy and Anonymity in Internet of Things (SpaIoT), 2014.
- ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages & Applications (OOPSLA), 2013.
- 3rd International Conference on Certified Programs and Proofs (CPP), 2013.
- 11th Asian Symposium on Programming Languages and Systems (APLAS), 2013.

- 3rd IEEE International Symposium on Security and Privacy in Internet of Things (SPIot '13), 2013.
- Open64 Workshop at PLDI'12, 2012.
- 2nd IEEE International Symposium on Security and Privacy in Internet of Things (SPIot '12), 2012.
- IEEE International Workshop on Security and Privacy in Internet of Things (SPIoT '11), 2011.
- World Wide Web Conference (WWW '11), Abuse, Security, and Privacy Track, 2011.
- Annual International Conference on Operating Systems and Programming Languages, 2011.
- New Jersey Programming Languages Seminar, Program Chair and Host, October 2009.
- Network and Information Security Symposium at CHINACOM 2009 and 2010.
- International Workshop on Distance Education Technologies (DET 2007).
- Session chairs
 - Session on Authentication in 2018 IEEE Symposium on Security and Privacy (Oakland).
 - Session on Systems Security and Authentication in 2017 IEEE Symposium on Security and Privacy (Oakland).
 - Session on Attacks Using a Little Leakage in 2016 ACM Conference on Computer and Communication Security (CCS).
 - Session on Understanding Android Apps in 2015 ACM Conference on Computer and Communication Security (CCS).
 - Session on Access Control in 2014 ACM Conference on Computer and Communication Security (CCS).
 - Session on Security and Optimization in 2013 International Conference on Object-Oriented Programming, Systems, Languages & Applications (OOPSLA).
 - Session on Trusted Computing Applications in 2012 ACM Workshop on Scalable Trusted Computing (ACM STC).
- External reviewer: Journal of Software special issue on Frontier of Programming Languages and Systems 2016; Science of Computer Programming 2016; Transactions on Dependable and Secure Computing 2015; Journal of Computer Security 2014; Applied Mathematical Sciences 2014; ACM Transactions on Computer Systems 2014; International Journal of Information Security 2014; IEEE Transactions on Computers 2013; IEEE Transactions on Parallel and Distributed Systems 2013; Higher-Order and Symbolic Computation 2012; Journal of Computer Science and Technology (JCST, 2012); PLDI 2011; POPL 2010; ESOP 2010; INFOCOM 2010; ACM Transactions on Programming Languages and Systems (TOPLAS, 2006, 2008, and 2010); Logical Methods in Computer Science (LMCS, 2010); IEEE Transactions on Software Engineering (TSE, 2007); International Journal of Foundations of Computer Science (IJFCS, 2006).
- Rapporteur, NSF, Convergence of Software Assurance Methodology and Trustworthy Semiconductor Design and Manufacture Workshop, Jan. 2013.
- NSF review panel, 2009, 2010, 2012, 2013, and 2016.

- Organized a summer high-school teacher workshop on cyber security at Lehigh in 2012. The workshop helped teachers develop lesson plans for integration into their schools' technology curriculum.
- Panelist, "Understanding and Managing Cyber Crime: the Virtual Criminal", United Nations, DPI/NGO Briefing. Feb. 2011.
- Member of a team of computer scientists in a study of the software and hardware of the Sequoia AVC Advantage Voting Machine. This is in support of a NJ voting-machine lawsuit. Jul. 2008.

Service to the CSE Department of Penn State

- Departmental Colloquium Chair. 2017–2018.
- Departmental Strategic Committee. Member. 2017–2020.
- Departmental Promotion and Tenure Committee. Member. 2017–2018.
- Departmental Faculty search committee. Member. 2016–2017.
- Departmental Curriculum committee. Member. 2016–2017.
- Security and Programming Language (SEPL) Seminar Series. Organizer, 2016.

Service to Penn State

- Engineering faculty Council. College of Engineering, Member, 2016–2019.
- Institute for CyberScience Coordinating Committee, Member, 2016–2017.
- Schreyer Honors College Application Faculty Reviewer, Member, 2016.
- Institute for CyberScience Seed Grant Reviewer, 2016–2017.

Service to Lehigh University

- RCEAS college first-year advisor for engineering students, 2013–2015.
- University facility planning committee, member, 2014–2015.
- Departmental Professor of Practice (POP) search committee. Member, 2014.
- RCEAS college faculty search committee, Smart Grid Cluster, 2013.
- RCEAS college committee for Stout Dissertation Award, 2013.
- Departmental publicity and web committee. Chair, 2011–2015. Member, 2009–2010.
- Departmental computer facilities committee. Chair, 2014–2015. Member, 2011–2014.
- Departmental graduate admission committee. Member, 2013–2014, 2008–2009.
- Departmental colloquium committee. Chair, 2009–2010.
- Departmental curriculum committee, Member, 2008–2010.
- Computer science candidates day. 2012–2013.
- Departmental benchmarking committee, Member, 2008