

Xiao Liu

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Research interest

My research focuses on program synthesis, software testing, and deep learning.

Education

- 2015–present **Ph.D. Information Sciences and Technology**, *Penn State University, University Park*.
Thesis Committee: Dinghao Wu, C. Lee Giles, Mary Beth Rosson, Danfeng Zhang. Thesis: “Neural Program Synthesis for Compiler Testing”.
- 2013–2015 **M.S. Information Sciences and Technology**, *Penn State University, University Park*.
Thesis Committee: Dinghao Wu, Mary Beth Rosson, John Yen. Thesis: “Programming in Eliza”.
- 2009–2013 **B.E. Communication and Information Engineering**, *Nanjing University of Posts and Telecommunications*.
Senior thesis advised by Longxiang Yang. Thesis: “A study on power allocation in cooperative communications”

Publication & Patent

- USENIX 19 Wang S., Bao Y., **Liu, X.**, Wang P., Zhang D., and Wu D. Identifying Cache-Based Side Channels through Secret-Augmented Abstract Interpretation.
- AAAI 19 **Liu, X.**, Li, X., Prajapati R., Wu, D. DeepFuzz: Automatic Generation of Syntax Valid C Programs for Fuzz Testing.
- HASE 19 **Liu, X.**, Jiang Y., Wu, D. A Lightweight Framework for Regular Expression Verification.
- ICSE SEET 19 **Liu, X.**, Wang, S., Wang, P., Wu, D. Automatic Grading of Programming Assignments: A Formal Semantics Based Approach.
- ISSRE 18 Jiang Y., Bao Q., Wang S. **Liu, X.**, Wu, D. RedDroid: Android Application Redundancy Customization Based on Static Analysis.
- BOOK 18 **Liu, X.**, Wu, D. From Natural Language to Programming Language.
- ICSSA 17 **Liu, X.**, Holden, B., Wu, D. Automated Synthesis of Access Control Lists.
- USENIX 17 Wang, S., Wang P., **Liu, X.**, Zhang D., Wu, D. CacheD: Analyzing Cache Differences in Production Software for Cache-Based Timing Channels.
- IJPOP 17 **Liu, X.**, Jiang Y., Wu, D., Wu, L. Natural Shell: An Assistant for End-user Scripting.
- PLDI 17 **Liu, X.** A Lightweight Framework for Regex Verification.
- Buildings 16 Jiang, Y., **Liu, X.**, Liu, F., Wu, D., Yen, J., Anumba, C. An Analysis of BIM Web Service Requirements and Design to Support Energy Efficient Building Lifecycle.
- ASE 14 **Liu, X.**, Wu, D. PiE: Programming in Eliza.
- WCSP 12 **Liu, X.**, Sun, F., Li, Z., Yang, L. A Novel Joint Data Partition and Forwarding Scheme for D2D Communications.
- ICIA 12 Lu, Y., Zhang, D., Chen, Y., **Liu, X.**, Zong, P. Improvement of LEACH in Wireless Sensor Networks based on balanced energy strategy.
- Patent 11 **Liu, X.**, Sun F., Lu, Y, Sun, H. National Patent (China): Self-Adaptive Washing Machine Rinsing System No. ZL 2011 2 0542174.2

Experience

- 2017-2019 **Research Assistant, Software-Systems-Security Lab**, *Penn State*, State College, PA.
PhD thesis: Neural Program Synthesis for Compiler Testing.
- Summer 2018 **Intern, Info Tools**, *Facebook*, Menlo Park, CA.
Built infrastructure for Facebook.
- Summer 2017 **Instructor, Start to Code**, *Summer Discovery @ Penn State*, State College, PA.
Taught an entry-level programming course based on a self-designed natural language based programming tool from my research PiE.
- 2015-2017 **Research Assistant, Software-Systems-Security Lab**, *Penn State*, State College, PA.
Developed a web-based system integrating program analysis and machine learning techniques to provide more comprehensible and detailed feedback for programming assignments on large-scale platform (MOOC).
- 2013-2016 **Research Assistant, Software-Systems-Security Lab**, *Penn State*, State College, PA.
Developed the PiE framework, an intelligent dialogue system that automatically synthesizes formal programs from natural language descriptions. Extended this framework into Natural Shell, EasyACL and RE for different applications.
- 2014-2015 **Teaching Assistant, IST 220**, *Penn State*, State College, PA.
Grade homework for IST 220 and hold office hour to teach both the Lab and in-class materials.
- Summer 2015 **Research Intern, Smeal College of Business**, *Penn State*, State College, PA.
Worked with Brent Ambrose to implement an automatic grading system for spreadsheet assignment.
- Fall 2012 **Research Intern, R&D Center for Broadband Wireless Communications**, *Chinese Academy of Sciences*, Nanjing, China.
Applied Game Theory to power allocation in orthogonal AF relay network. Derived analytical result of power allocation method subject to outage probabilities.
Simulated the performance in the orthogonal amplify forward relay network using Matlab.
Won the "Best Undergraduate Thesis" based on the results from this research intern.

Award & Honor

- 2019 Best Paper, International Conference on High Assurance Systems Engineering.
- 2019 AAAI Travel Award.
- 2018 CRA-W Scholarship.
- 2018 Facebook Women in Research Scholarship.
- 2018 Women in Cyber Security (WiCyS) Scholarship.
- 2017 Grace Hopper Scholarship Award.
- 2017 Best Paper, International Conference on Software Security and Assurance.
- 2017 Usenix Security Travel Award.
- 2017 Bronze Medal, Graduate level ACM Student Competition @ PLDI.
- 2017 GREPSEC Travel Award.
- 2017 IEEE Symposium on Security and Privacy (IEEE S&P) Travel Award.
- 2017 Programming Languages Mentoring Workshop (PLMW) Scholarship.
- 2015 Craigslist Women Grants Sponsor_Security.
- 2014 Machine Learning Summer School Scholarship.