

# Long Lu

Associate Professor  
Khoury College of Computer Sciences  
Northeastern University  
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## EDUCATION

**Ph.D.** Aug 2008 -  
*School of Computer Science, Georgia Institute of Technology, Atlanta, GA* Aug 2013  
Thesis: Securing Systems and Software Against Attacks Targeting Unwary Users  
Advisor: Prof. Wenke Lee

**B.Sc.** Aug 2003 -  
*Shanghai Jiao Tong University, Shanghai, China* Jun 2007  
University-Wide Honor Graduate, majored in information security

## RESEARCH INTERESTS

My research aims to secure low-level software in widely deployed or critical systems. I design and build novel program analysis and hardening techniques, hardware-backed primitives for security, and trusted/confidential computing environments. My recent work has focused on embedded and IoT/CPS systems.

## PROFESSIONAL EXPERIENCE

**Tenured Associate Professor** June 2020 -  
*Khoury College of Computer Sciences, Northeastern University, Boston, MA* now

**Tenure-track Assistant Professor** Aug 2017 -  
*Khoury College of Computer Sciences, Northeastern University, Boston, MA* June 2020

**Tenure-track Assistant Professor** Aug 2013 -  
*Computer Science Department, Stony Brook University, Stony Brook, NY* Aug 2017

**Graduate Research Assistant** Aug 2008 -  
*School of Computer Science, Georgia Institute of Technology, Atlanta, GA* July 2013

**Research Intern** May 2012 -  
*Microsoft Research, Redmond, WA* Aug 2012

**Research Intern** May 2011 -  
*NEC Labs America, Princeton, NJ* Nov 2011

**Research Intern** May 2010 -  
*Microsoft Research, Redmond, WA* Aug 2010

**Research Intern**  
SRI International, Menlo Park, CA

May 2009 -  
Aug 2009

## ACADEMIC SERVICES & ACTIVITIES

### Journal Reviewer

- ACM Transactions on Information and System Security (TISSEC)
- IEEE Transactions on Information Forensics & Security (TIFS)
- ACM Transactions on Internet Technology (TOIT)

### Program Committees & Panels

- The Network and Distributed System Security Symposium (NDSS) 2021;
- *PC Co-chair*, The 5th ACM CCS Workshop on Forming an Ecosystem Around Software Transformation (FEAST), 2020;
- The 29th USENIX Security Symposium (Security) 2020;
- The Network and Distributed System Security Symposium (NDSS) 2020;
- IEEE Symposium on Security and Privacy (S&P) 2020;
- The Network and Distributed System Security Symposium (NDSS) 2019;
- IEEE Symposium on Security and Privacy (S&P) 2019;
- ACM Conference on Computer and Communications Security (CCS) 2018;
- The 27th USENIX Security Symposium (Security) 2018;
- IEEE Symposium on Security and Privacy (S&P) 2018;
- The Network and Distributed System Security Symposium (NDSS) 2018;
- The 26th USENIX Security Symposium (Security) 2017;
- NSF CNS Panel 2017;
- The 54th Design Automation Conference (DAC) 2017;
- *Shadow PC Co-chair*, ACM Symposium on Information, Computer and Communications Security (ASIACCS) 2017;
- The Network and Distributed System Security Symposium (NDSS) 2017;
- *PC Co-chair*, The 6th Annual ACM CCS Workshop on Security and Privacy in Smartphones and Mobile Devices (SPSM) 2016;
- NSF CNS Panel 2016;
- ACM Conference on Computer and Communications Security (CCS) 2016;
- Annual Computer Security Applications Conference (ACSAC) 2016;
- The 9th European Workshop on Systems Security (EuroSec) 2016;
- ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec) 2016;
- *PC Chair*, Mobile Security Technologies (MoST) 2016;
- ACM Conference on Computer and Communications Security (CCS) 2015;
- Annual Computer Security Applications Conference (ACSAC) 2015;
- The 24th USENIX Security Symposium (Security) 2015;

- The 24th International World Wide Web Conference (WWW) 2015;
- Mobile Security Technologies (MoST) 2015;
- ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec) 2015;
- The Network and Distributed System Security Symposium (NDSS) 2015;
- ACM Conference on Computer and Communications Security (CCS) 2014;
- Annual Computer Security Applications Conference (ACSAC) 2014;
- Mobile Security Technologies (MoST) 2014;
- ACM Conference on Security and Privacy in Wireless and Mobile Networks (WiSec) 2014;
- The Network and Distributed System Security Symposium (NDSS) 2014;
- Annual Computer Security Applications Conference (ACSAC) 2013;

### Teaching

- Computer System Security (CY 5130 / CY 3740), *Northeastern University, Fall 2020*;
- Special Topics on Advanced Systems Security (CS 7775), *Northeastern University, Spring 2020*;
- Computer System Security (CY 5130 / CY 3740), *Northeastern University, Fall 2019*;
- Networks and Distributed Systems (CS 3700), *Northeastern University, Fall 2018*;
- Systems Security (CS 3740), *Northeastern University, Spring 2018*;
- Special Topics on Advanced Systems Security (CS 7775), *Northeastern University, Fall 2017*;
- Computer Security Fundamentals (CSE 331), *Stony Brook University, Fall 2016*;
- Introduction to Computer Security (ISE 331), *Stony Brook University, Spring 2016*;
- Network Security (CSE 408), *Stony Brook University, Spring 2015*;
- Systems Security (CSE509), *Stony Brook University, Fall 2014*;
- Network Security (CSE508), *Stony Brook University, Spring 2014*;
- Advanced Computer Security (CSE608), *Stony Brook University, Fall 2013*;

### Ph.D. Advising

- Yaohui Chen, *Northeastern University, 2014–2019* (first employment: Facebook);
- Zhichuang Sun, *Northeastern University, 2015–2021* (expected);
- Bo Feng, *Northeastern University, 2015–2021* (expected);
- Reza Mirzazade farkhani, *Northeastern University, 2017–2022* (expected);
- Alejandro Mera, *co-advised with Prof. Engin Kirda, Northeastern University, 2017–2022* (expected);
- Ryan Williams, *Northeastern University, 2018–2023* (expected);
- Changming Liu, *Northeastern University, 2019–2024* (expected);

### M.S. Advising

- Sebassujeen Reymondjohnson, *Stony Brook University, 2014–2016* (first employment: Apple);
- Saman Jafari, *Northeastern University, 2017–2018* (first employment: Box);
- Brandon Dudley, *Northeastern University, 2020–2021* (expected);

### Postdoc Supervising

- Dr. Mansour Ahmadi, *Northeastern University, 2018–2020*;

- Dr. Ruimin Sun, *Northeastern University, 2019–2021*;

### HONORS & AWARDS

Google ASPIRE Award, 2020  
Google ASPIRE Award, 2019  
ACM VEE Best Paper Award, 2019  
NSF CAREER Award, 2017  
U.S. Air Force Research Lab Summer Faculty Fellowship, 2016  
Georgia Tech nomination for Google Research Fellowship, 2012  
AT&T Best Applied Security Paper Award Finalist, 2011  
Microsoft Trustworthy Computing Fellowship, 2008  
University-Wide Honor Graduate from Shanghai Jiao Tong University, 2007

### PUBLICATIONS

- [32] Mansour Ahmadi, Reza Mirzazade farkhani, Ryan Williams, and Long Lu. Finding bugs using your own code: Detecting functionally-similar yet inconsistent code. In *Proceedings of the 30th USENIX Security Symposium*, USENIX Security’21.
- [31] Reza Mirzazade farkhani, Mansour Ahmadi, and Long Lu. PTAAuth: Temporal memory safety via robust points-to authentication. In *Proceedings of the 30th USENIX Security Symposium*, USENIX Security’21.
- [30] Alejandro Mera, Bo Feng, Long Lu, Engin Kirda, and William Robertson. DICE: Automatic emulation of DMA input channels for dynamic firmware analysis. In *Proceedings of the 42nd IEEE Symposium on Security and Privacy*, S&P/Oakland’21.
- [29] Yaohui Chen, Mansour Ahmadi, Reza Mirzazade farkhani, Boyu Wang, and Long Lu. MEUZZ: Smart seed scheduling for hybrid fuzzing. In *Proceedings of the 23rd International Symposium on Research in Attacks, Intrusions and Defenses*, RAID’20.
- [28] Bo Feng, Alejandro Mera, and Long Lu. P<sup>2</sup>IM: Scalable and hardware-independent firmware testing via automatic peripheral interface modeling. In *Proceedings of the 29th USENIX Security Symposium*, USENIX Security’20.
- [27] Yaohui Chen, Peng Li, Jun Xu, Shengjian Guo, Rundong Zhou, Yulong Zhang, Tao Wei, and Long Lu. SAVIOR: Towards bug-driven hybrid testing. In *Proceedings of the 41st IEEE Symposium on Security and Privacy*, S&P/Oakland’20.
- [26] Zhichuang Sun, Bo Feng, Long Lu, and Somesh Jha. OAT: Attesting operation integrity of embedded devices. In *Proceedings of the 41st IEEE Symposium on Security and Privacy*, S&P/Oakland’20.
- [25] Stefano Cristalli, Long Lu, Danilo Bruschi, and Andrea Lanzi. Detecting (absent) app-to-app authentication on cross-device short-distance channels. In *Proceedings of the 35th Annual Computer Security Applications Conference*, ACSAC’19.
- [24] Abbas Acar, Long Lu, Uluagac Selcuk, and Engin Kirda. An analysis of malware trends in enterprise networks. In *Proceedings of the 22nd Information Security Conference*, ISC’19.
- [23] Heejin Park, Shuang Zhai, Long Lu, and Felix Lin. StreamBox-TZ: Secure stream analytics at the edge with trustzone. In *Proceedings of the 2019 USENIX Annual Technical Conference*, USENIX ATC’19.
- [22] Yaohui Chen, Dongliang Mu, Jun Xu, Wenguo Shen, Xinyu Xing, and Long Lu. Patrix: Efficient hardware-assisted fuzzing for cots binary. In *Proceedings of the 14th ACM on Asia Conference on Computer and Communications Security*, AsiaCCS’19.

- [21] Wenhao Li, Yubin Xia, Long Lu, Haibo Chen, and Binyu Zang. TEEv: Virtualizing trusted execution environments on mobile platforms. In *Proceedings of the 15th ACM SIGPLAN/SIGOPS International Conference on Virtual Execution Environments*, VEE’19.
- [20] Xiaohan Zhang, Yuan Zhang, Qianqian Mo, Hao Xia, Min Yang, Xiaofeng Wang, Long Lu, and Haixin Duan. An empirical study of web resource manipulation in real-world mobile applications. In *Proceedings of the 27th USENIX Security Symposium*, USENIX Security’18.
- [19] Wenhao Li, Shiyu Luo, Zhichuang Sun, Yubin Xia, Long Lu, Haibo Chen, Binyu Zang, and Haibing Guan. Vbutton: Practical attestation of user-driven operations in mobile apps. In *Proceedings of the 16th ACM International Conference on Mobile Systems, Applications, and Services*, MobiSys’18.
- [18] Hyungjoon Koo, Yaohui Chen, Long Lu, Vasileios Kemerlis, and Michalis Polychronakis. Compiler-assisted code randomization and hardening. In *Proceedings of the 39th IEEE Symposium on Security and Privacy*, S&P/Oakland’18.
- [17] Yaohui Chen, Yuping Li, Long Lu, Yueh-Hsun Lin, Hayawardh Vijayakumar, Zhi Wang, and Xinming Ou. Instaguard: Instantly deployable hot-patches for vulnerable system programs on android. In *Proceedings of the 2018 Network and Distributed System Security Symposium*, NDSS’18.
- [16] Yaohui Chen, Dongli Zhang, Ruowen Wang, Rui Qiao, Ahmed Azab, Long Lu, Hayawardh Vijayakumar, and Wenbo Shen. Norax: Enabling execute-only memory for COTS binaries on AArch64. In *Proceedings of the 38th IEEE Symposium on Security and Privacy*, S&P/Oakland’17.
- [15] Drew Davidson, Yaohui Chen, Franklin George, Long Lu, and Somesh Jha. Secure integration of web content and applications on commodity mobile operating systems. In *Proceedings of the 12th ACM on Asia Conference on Computer and Communications Security*, AsiaCCS’17.
- [14] Arash Alavi, Alan Quach, Hang Zhang, Bryan Marsh, Farhan Ul Haq, Zhiyun Qian, Long Lu, and Rajiv Gupta. Where is the weakest link? a study on security discrepancies between android apps and their website counterparts. In *International Conference on Passive and Active Network Measurement*, PAM’17.
- [13] Suwen Zhu, Long Lu, and Kapil Singh. Case: Comprehensive application security enforcement on cots mobile devices. In *Proceedings of the 14th International Conference on Mobile Systems, Applications, and Services*, MobiSys’16.
- [12] Yaohui Chen, Sebassujeen Reymondjohnson, Zhichuang Sun, and Long Lu. Shreds: Fine-grained execution units with private memory. In *Proceedings of the 37th IEEE Symposium on Security and Privacy*, S&P/Oakland’16.
- [11] Yue Chen, Zhi Wang, David Whalley, and Long Lu. Remix: On-demand live randomization. In *Proceedings of the 6th ACM Conference on Data and Application Security and Privacy*, CODASPY’16.
- [10] Christopher Neasbitt, Bo Li, Roberto Perdisci, Long Lu, Kapil Singh, and Kang Li. Webcapsule: Towards a lightweight forensic engine for web browsers. In *Proceedings of the 2015 ACM Conference on Computer and Communications Security*, CCS’15.
- [9] Byoungyoung Lee, Chengyu Song, Yeongjin Jang, Tielei Wang, Taesoo Kim, Long Lu, and Wenke Lee. Preventing use-after-free with dangling pointers nullification. In *Proceedings of the 2015 Network and Distributed System Security Symposium*, NDSS’15.
- [8] Kangjie Lu, Zhichun Li, Vasileios Kemerlis, Zhenyu Wu, Long Lu, Cong Zheng, Zhiyun Qian, Wenke Lee, and Guofei Jiang. Checking more and alerting less: Detecting privacy leakages via enhanced data-flow analysis and peer voting. In *Proceedings of the 2015 Network and Distributed System Security Symposium*, NDSS’15.
- [7] Byoungyoung Lee, Long Lu, Tielei Wang, Taesoo Kim, and Wenke Lee. From zygote to morula: Fortifying weakened aslr on android. In *Proceedings of the 35th IEEE Symposium on Security and Privacy*, S&P/Oakland’14.

- [6] Tielei Wang, Kangjie Lu, Long Lu, Simon Chong, and Wenke Lee. Jekyll on ios: When benign apps become evil. In *Proceedings of the 22nd USENIX Security Symposium*, USENIX Security’13.
- [5] Long Lu, Zhichun Li, Zhenyu Wu, Wenke Lee, and Guofei Jiang. Chex: statically vetting android apps for component hijacking vulnerabilities. In *Proceedings of the 2012 ACM Conference on Computer and Communications Security*, CCS ’12.
- [4] Christian Seifert, Jack W Stokes, Christina Colcernian, John C Platt, and Long Lu. Robust scareware image detection. In *Proceedings of the 38th International Conference on Acoustics, Speech, and Signal Processing*, ICASSP ’13.
- [3] Long Lu, Roberto Perdisci, and Wenke Lee. Surf: detecting and measuring search poisoning. In *Proceedings of the 18th ACM Conference on Computer and Communications Security*, CCS ’11.
- [2] Long Lu, Vinod Yegneswaran, Phillip Porras, and Wenke Lee. Blade: an attack-agnostic approach for preventing drive-by malware infections. In *Proceedings of the 17th ACM Conference on Computer and Communications Security*, CCS ’10.
- [1] Martim Carbone, Weidong Cui, Long Lu, Wenke Lee, Marcus Peinado, and Xuxian Jiang. Mapping kernel objects to enable systematic integrity checking. In *Proceedings of the 16th ACM Conference on Computer and Communications Security*, CCS ’09.

#### PATENTS

US 20140059690 Method for Scalable Analysis of Android Applications for Security Vulnerability  
 US 20120030760 Method and Apparatus for Combating Web-Based Surreptitious Binary Installations  
 US 20120159620 Scareware Detection

#### RESEARCH GRANTS AND GIFTS

- *Google ASPIRE Award* (2020.10–2021.10), PI: Long Lu, Sponsor: Google, Amount: \$130,000
- *Rethinking Fuzzing for Security* (2020.10–2024.10), PI: Long Lu (in collaboration with Stevens), Sponsor: National Science Foundation, Amount: \$600,000 (Lu’s portion)
- *Google ASPIRE Award* (2019.8–2020.8), PI: Long Lu, Sponsor: Google, Amount: \$80,000
- *Automated Protocol Specialization and Diversification for Individualized Defense* (2018.8–2023.8), PI: Long Lu, Sponsor: Office of Naval Research, Amount: \$1,200,000 (Lu’s portion) / \$3,092,379 (total including subcontracts to Wisconsin, WPI, and SRI)
- *Multi-layer Software Transformation for Attack Surface Reduction and Shielding* (2017.9–2022.9), PI: R. Sekar, Co-PI: Michalis Polychronakis, Long Lu (subcontract from Stony Brook), Sponsor: Office of Naval Research, Amount: \$600,373 (Lu’s portion)
- *Enabling Secure Integration of Web and Mobile: A Principled Multi-Level Approach* (2018.2–2021.2), PI: Long Lu, Co-PI: Somesh Jha, Sponsor: Army Research Office, Amount: \$570,000
- *CAREER: Rethinking Mobile Security in the New Age of App-as-a-Platform* (2017.3–2022.3), PI: Long Lu, Sponsor: National Science Foundation, Amount: \$500,543
- *ReARM: Protecting ARM Binaries via Load-time Reduction and Run-time Read-Protection* (2017.3–2020.3), PI: Long Lu, Co-PI: Radu Sion, Sponsor: Office of Naval Research, Amount: \$800,000
- *MALDIVES: Developing a Comprehensive Understanding of Malware Delivery Mechanisms* (2015.9–2019.3), PI: Long Lu (in collaboration with SRI and UIC), Sponsor: National Science Foundation, Amount: \$399,593 (Lu’s portion)

- *Cross-application and Cross-platform Tracking of Web Users: Techniques and Countermeasures* (2015.9–2018.8), PI: Nick Nikiforakis, Co-PI: Long Lu, Sponsor: National Science Foundation, Amount: \$245,000 (Lu’s portion)
- *Software Diversification for Attack Prevention and Forecasting* (2015.7–2018.6), PI: Michalis Polychronakis, Co-PIs: Long Lu and R. Sekar, Sponsor: Office of Naval Research, Amount: \$263,012 (Lu’s portion)
- *Enabling Secure and Trustworthy Compartments in Mobile Applications* (2014.8–2017.08), PI: Long Lu, Sponsor: National Science Foundation, Amount: \$499,932
- *A Static Approach to Vetting Vulnerable Android Apps* (2013.10–2014.10), PI: Long Lu, Sponsor: Air Force Research Laboratory, Amount: \$10,000

Total amount: \$5,898,453