# Prateek Saxena

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## Academic Profile

- Associate Professor, **National University of Singapore**
  Computer Science Department, 2019 –
- Assistant Professor, **National University of Singapore**
  Computer Science Department, 2012 – 2019
- Ph.D., **University of California, Berkeley, CA, USA**
  Computer Science, 2007 – 2012
- M.S., **Stony Brook University, NY, USA**
  Computer Science, 2005 – 2007
- B.E., **University of Pune, India**,
  Computer Engineering, 2000 – 2004.

## Professional Service

- Area Chair for "ML Security" on the Program Committee of ACM CCS 2020 and 2021.
- Served on the Program Committee for Usenix Security (2013,2014,2015,2017, 2019), IEEE Symposium on Security & Privacy (2014, 2015, 2016, 2018, 2020)

## Awards & Fellowships

- Google Security and Privacy Research Award, 2018.
- MIT TR35 Top 10 Innovators Under 35, Asia, 2017.
- NUS Young Research Award, 2017.
- Received the David J. Sakrison Memorial Award for *outstanding doctoral research* from the EECS Department, UC Berkeley, 2012.
- Best Paper Awards at W2SP 2014, ICECCS 2014, ACM ASIACCS 2021.
- Symantec Research Lab Graduate Fellowship & Winner of Intern Project Competition, 2011.
- AT&T Best Applied Security Research Paper Award, 2010.
- Multiple national awards for senior year project – LIZARD: GDB-Replay Debugger, 2004

## All Publications

1. Bo Wang, Ruishi Li, Mingkai Li, and Prateek Saxena.
   TransMap: Pinpointing Mistakes in Neural Code Translation.
   In Proceedings of the *ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (**ESEC/FSE**), Dec 2023*.

2. Teodora Baluta, Ivica Nikolic, Racchit Jain, Divesh Aggarwal, and Prateek Saxena.
   Unforgeability in Stochastic Gradient Descent.
   In Proceedings of the *ACM Conference on Computer and Communications Security (**CCS**), Nov 2023*.

3. Bo Wang, Aashish Kolluri, Ivica Nikolic, Teodora Baluta, and Prateek Saxena.
   User-customizable Transpilation for Scripting Languages.
   In Proceedings of the *ACM SIGPLAN Conference on Object-Oriented Programming Systems, Languages, and Applications (**OOPSLA 2023**)*.

4. Jason Zhijingcheng Yu, Conrad Watt, Aditya Badole, Trevor Carlson, and Prateek Saxena.
   CAPSTONE: A Capability-based Foundation for Trustless Secure Memory Access.
   In Proceedings of the $32^{nd}$ *Usenix Security Symposium (**Usenix Security**), Aug 2023*.

5. Jinhua Cui, Shweta Shinde, Satyaki Sen, Prateek Saxena, and Pinghai Yuan.
   Dynamic Binary Translation for SGX Enclaves.
   In Proceedings of the *ACM Transactions on Privacy and Security (**TOPS 2022**)*.

6. Aashish Kolluri, Teodora Baluta, Bryan Hooi, and Prateek Saxena.
   LPGNet: Link Private Graph Networks for Node Classification.
   In Proceedings of the *ACM Conference on Computer and Communications Security (**CCS**

***2022***).

7. Teodora Baluta, Shiqi Shen, S. Hitarth, Shruti Tople, and Prateek Saxena.
   Membership Inference Attacks and Generalization: A Causal Perspective.
   In Proceedings of the *ACM Conference on Computer and Communications Security (**CCS 2022**)*.

8. Kaihang Ji, Jun Zeng, Yuancheng Jiang, Zhenkai Liang, Zheng Leong Chua, Prateek Saxena, and Abhik Roychoudhury.
   FlowMatrix: GPU-Assisted Information-Flow Analysis through Matrix-Based Representation.
   In Proceedings of the *Usenix Security Symposium (**Usenix Security 2022**)*.

9. Ruomu Hou, Haifeng Yu, and Prateek Saxena.
   Using Throughput-Centric Byzantine Broadcast to Tolerate Malicious Majority in Blockchains.
   In Proceedings of the *IEEE Symposium on Security and Privacy (**IEEE S&P 2022**)*.

10. Jason Zhijingcheng Yu, Shweta Shinde, Trevor Carlson, and Prateek Saxena.
    ELASTICLAVE: An Efficient Memory Model for Enclaves.
    In Proceedings of the $31^{st}$ *Usenix Security Symposium (**Usenix Security2022**)*.

11. Jinhua Cui, Jason Zhijingcheng Yu, Shweta Shinde, Prateek Saxena, and Zhiping Cai.
    SmashEx: Smashing SGX Enclaves Using Exceptions.
    In the Proceedings of the $23^{rd}$ *ACM Conference on Computer and Communications Security (**CCS**), Oct 2021*.

12. Aashish Kolluri, Teodora Baluta, and Prateek Saxena. Private Hierarchical Clustering in Federated Networks. In the Proceedings of the $28^{th}$ *ACM Conference on Computer and Communications Security (**CCS**), Oct 2021*.

13. Teodora Baluta, Zheng Leong Chua, Kuldeep S. Meel, and Prateek Saxena.
    Scalable Quantitative Verification For Deep Neural Networks.
    In the Proceedings of the $43^{rd}$ *International Conference on Software Engineering (**ICSE**), 2021*.

14. Bo Wang, Teodora Baluta, Aashish Kolluri, and Prateek Saxena. SynGuar: Guaranteeing Generalization in Programming by Example. In Proceedings of the $26^{th}$ *ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering (**ESEC/FSE**), 2021*.

15. Ivica Nikolic, Radu Mantu, Shiqi Shen, and Prateek Saxena.
    Refined Grey-Box Fuzzing with SIVO.
    In Proceedings of the *Detection of Intrusions and Malware & Vulnerability Assessment (**DIMVA 2021**)*.

16. Shiqi Shen, Aashish Kolluri, Zhen Dong, Prateek Saxena, and Abhik Roychoudhury.
    Localizing Vulnerabilities Statistically From One Exploit.
    In Proceedings of the *ACM Asia Conference on Computer and Communications Security (**AsiaCCS 2021**)*.

17. Yaoqi Jia, Shruti Tople, Tarik Moataz, Deli Gong, Prateek Saxena, and Zhenkai Liang.
    Robust P2P Primitives Using SGX Enclaves.
    In Proceedings of the *International Symposium on Research in Attacks, Intrusions and Defenses (**RAID 2020**)*.

18. BesFS: A POSIX Filesystem for Enclaves with a Mechanized Safety Proof.
    Shweta Shinde, Shengyi Wang, Pinghai Yuan, Aquinas Hobor, Abhik Roychoudhury, Prateek Saxena.
    In Proceedings of the *Usenix Security Symposium (**Usenix Security 2020**)*.

19. Haifeng Yu, Ivica Nikolic, Ruomu Hou, Prateek Saxena.
    OHIE: Blockchain Scaling Made Simple.

In Proceedings of the *IEEE Symposium on Security and Privacy (**Oakland 2020**)*.

20. Quantitative Verification of Neural Networks and Its Security Applications.
Teodora Baluta, Shiqi Shen, Shweta Shinde, Kuldeep S. Meel, Prateek Saxena.
In the Proceedings of the $26^{th}$ *ACM Conference on Computer and Communications Security (**CCS 2019**)*.

21. Aashish Kolluri, Ivica Nikolic, Ilya Sergey, Aquinas Hobor, Prateek Saxena.
Exploiting the laws of order in smart contracts.
In the Proceedings of the *ACM SIGSOFT International Symposium on Software Testing and Analysis (**ISSTA 2019**)*.

22. Deli Gong, Muoi Tran, Shweta Shinde, Hao Jin, Vyas Sekar, Prateek Saxena, Min Suk Kang.
Practical Verifiable In-network Filtering for DDoS defense.
In the Proceedings of the *IEEE International Conference on Distributed Computing Systems (**ICDCS 2019**)*.

23. Shiqi Shen, Shweta Shinde, Soundarya Ramesh, Abhik Roychoudhury, Prateek Saxena. Neuro-Symbolic Execution: Augmenting Symbolic Execution with Neural Constraints. In Proceedings of the $26^{th}$ *Network and Distributed System Security Symposium (**NDSS**), Feb 2019*.
One Engine To Serve'em All: Inferring Taint Rules Without Architectural Semantics Zheng Leong Chua, Yanhao Wang, Teodora Baluta, Prateek Saxena, Zhenkai Liang, Purui Su Network and Distributed System Security Symposium (NDSS 2019)

24. Shruti Tople, Soyeon Park, Min Suk Kang, and Prateek Saxena. VeriCount: Verifiable Resource Accounting Using Hardware and Software Isolation. In Proceedings of the *International Conference on Applied Cryptography and Network Security (**ACNS**)*, Jul 2018.

25. Ruomu Hou, Irvan Jahja, Loi Luu, Prateek Saxena, and Haifeng Yu. Randomized View Reconciliation in Permissionless Distributed Systems. In Proceedings of the *IEEE International Conference on Computer Communications (**INFOCOM**), Apr 2018*.

26. Amrit Kumar, Clément Fischer, Shruti Tople, and Prateek Saxena. A Traceability Analysis of Monero's Blockchain. In Proceedings of the *European Symposium on Research in Computer Security (**ESORICS**), Sep 2017*.

27. SmartPool: Practical Decentralized Pooled Mining. Loi Luu, Yaron Velner, Jason Teutsch and Prateek Saxena. In Proceedings of the *Usenix Security Symposium (**Usenix Security**), Aug 2017*.
*** See project at the SmartPool web page**

28. Neural Nets Can Learn Function Type Signatures From Binaries. Zheng Leong Chua, Shiqi Shen, Prateek Saxena, Zhenkai Liang. In Proceedings of the *Usenix Security Symposium (**Usenix Security**), Aug 2017*.

29. On the Trade-Offs in Oblivious Execution Techniques. Shruti Tople and Prateek Saxena. In the Proceedings of the *Detection of Intrusions and Malware & Vulnerability Assessment (**DIMVA**), July 2017*.

30. Shweta Shinde, Dat Tien Le, Shruti Tople, and Prateek Saxena. Panoply: Low-TCB Linux Applications With SGX Enclaves. In Proceedings of the $24^{th}$ *Network and Distributed System Security Symposium (**NDSS**), Feb 2017*.

31. Shiqi Shen, Shruti Tople, and Prateek Saxena AUROR: Defending Against Poisoning Attacks in Collaborative Deep Learning Systems. In the Proceedings of the $32^{nd}$ *Annual Computer Security Applications Conference (**ACSAC**), Dec 2016*.

32. Loi Luu, Duc-Hiep Chu, Hrishi Olickel, Prateek Saxena, Aquinas Hobor. Making Smart Contracts Smarter. In the Proceedings of the $23^{rd}$ *ACM Conference on Computer and Communications Security (**CCS**), Oct 2016*.

*** See discussion on Reddit, and open-source release.**

33. Loi Luu, Viswesh Narayanan, Chaodong Zheng, Kunal Baweja, Seth Gilbert, Prateek Saxena. A Secure Sharding Protocol For Open Blockchains. In the Proceedings of the $23^{rd}$ *ACM Conference on Computer and Communications Security (**CCS**), Oct 2016.*
    *** Deployed at the Zilliqa public blockchain**
34. Yaoqi Jia, Zheng Leong Chua, Hong Hu, Shuo Chen, Prateek Saxena, Zhenkai Liang. The Web/Local Boundary Is Fuzzy — A Security Study of Chrome's Process-based Sandboxing. In the Proceedings of the $23^{rd}$ *ACM Conference on Computer and Communications Security (**CCS**), Oct 2016.*
35. Yaoqi Jia, Guangdong Bai, Prateek Saxena, and Zhenkai Liang. Anonymity in Peer-assisted CDNs: Inference Attacks and Mitigation. In the Proceedings of the *Privacy Enhancing Technologies (**PETS**), Aug 2016.*
36. Yaoqi Jia, Tarik Moataz, Shruti Tople, and Prateek Saxena. OblivP2P: An Oblivious Peer-to-Peer Content Sharing System. In the Proceedings of the $25^{th}$ *Usenix Security Symposium (**Usenix Security**), Aug 2016.*
37. Hong Hu, Shweta Shinde, Sendroiu Adrian, Zheng Leong Chua, Prateek Saxena, and Zhenkai Liang. Data-Oriented Programming: On the Expressiveness of Non-Control Data Attacks. In the Proceedings of the $37^{th}$ *IEEE Symposium on Security and Privacy (**IEEE S&P**), May 2016.*
38. Shweta Shinde, Zheng Leong Chua, Viswesh Narayanan, and Prateek Saxena. Preventing Page Faults from Telling your Secrets. In the Proceedings of the $11^{th}$ *ACM Asia Conference on Computer and Communications Security (**AsiaCCS**), May 2016.*
39. Jason Teutsch, Sanjay Jain and Prateek Saxena. When Cryptocurrencies Mine Their Own Business. In the Proceedings of the $20^{th}$ *Financial Cryptography and Data Security (**FC**), Feb 2016.*
40. Kyle Croman, Christian Decker, Ittay Eyal, Adem Efe Gencer, Ari Juels, Ahmed Kosba, Andrew Miller, Prateek Saxena, Elaine Shi, Emin Gun Sirer, Dawn Song, and Roger Wattenhofer. On Scaling Decentralized Blockchains (A Position Paper). In the Proceedings of the $3^{rd}$ *Workshop on Bitcoin Research (**BITCOIN**), 2016.*
41. Loi Luu, Jason Teutsch, Raghav Kulkarni, and Prateek Saxena. Demystifying Incentives in the Consensus Computer. In the Proceedings of the $22^{nd}$ *ACM Conference on Computer and Communications Security (**CCS**) 2015.*
42. Pratik Soni, Enrico Budianto, and Prateek Saxena. The SICILIAN Defense: Signature-based Whitelisting of Web JavaScript. In the Proceedings of the $22^{nd}$ *ACM Conference on Computer and Communications Security (**CCS**) 2015.*
43. Hong Hu, Zheng Leong Chua, Zhenkai Liang, and Prateek Saxena. Identifying Arbitrary Memory Access Vulnerabilities in Privilege-Separated Software. In the Proceedings of the $20^{th}$ *European Symposium on Research in Computer Security (**ESORICS**), Sep 2015.*
44. Behnaz Hassanshahi, Yaoqi Jia, Roland Yap, Prateek Saxena, and Zhenkai Liang. Web-to-Application Injection Attacks on Android: Characterization and Detection. In the Proceedings of the $20^{th}$ *European Symposium on Research in Computer Security (**ESORICS**), Sep 2015.*
45. Yaoqi Jia, Yue Chen, Xinshu Dong, Prateek Saxena, Jian Mao, and Zhenkai Liang. Man-in-the-Browser-Cache: Persisting HTTPS Attacks via Browser Cache Poisoning In the Proceedings of *Journal of Computers and Security (**JCS**), 2015.*
46. Hong Hu, Zheng Leong Chua, Sendroiu Adrian, Prateek Saxena, and Zhenkai Liang. Automatic Generation of Data-Oriented Exploits. In the Proceedings of the $24^{rd}$ *Usenix Security Symposium (**Usenix Security**), Aug 2015.*
47. Anh Dinh, Prateek Saxena, Chang Ee-chien, Chungwang Zhang, and Beng Chin Ooi. M2R:

Enabling Stronger Privacy in MapReduce Computation. In the Proceedings of the $24^{rd}$ *Usenix Security Symposium (**Usenix Security**), Aug 2015*.

48. Inian Parameshwaran, Enrico Budianto, Shweta Shinde, Hung Dang, Atul Sadhu, and Prateek Saxena. Auto-Patching DOM-based XSS At Scale. In the Proceedings of the *Foundations of Software Engineering (**FSE**), 2014*.

49. Loi Luu, Ratul Saha, Inian Parameshwaran, *Prateek Saxena*, Aquinas Hobor. On Power Splitting Games in Distributed Computation: The Case of Bitcoin Pooled Mining. To Appear at the $28^{th}$ *IEEE Computer Security Foundations Symposium (**CSF**), July 2015*.

50. Mattia Fazzini, *Prateek Saxena*, and Alessandro Orso. AUTOCSP: Automatically Retrofitting CSP to Web Applications. In the Proceedings of the $37^{th}$ *International Conference on Software Engineering (**ICSE**), May 2015*.

51. Stevens Le Blond, Adina Uritesc, Cedric Gilbert, Zheng Leong Chua, *Prateek Saxena*, and Engin Kirda. A Look at Targeted Attacks Through the Lense of an NGO. In the Proceedings of the $23^{rd}$ *Usenix Security Symposium (**Usenix Security**), Aug 2014*.

52. Enrico Budianto, Yaoqi Jia, Xinshu Dong, *Prateek Saxena*, and Zhenkai Liang. You Can't Be Me: Enabling Trusted Paths & User Sub-Origins in Web Browsers. In the Proceedings of the $17^{th}$ *Symposium on Research in Attacks, Intrusions and Defenses (**RAID**), Sep 2014*.

53. Loi Luu, Shweta Shinde, *Prateek Saxena* and Brian Demsky. A Model Counter for Constraints Over Unbounde Strings. In the Proceedings of the $35^{th}$ *International Symposium on Programming Language Design and Implementation (**PLDI**), June 2014*.

54. Yaoqi Jia, Xinshu Dong, Zhenkai Liang and *Prateek Saxena*. I Know Where You've Been: Geo-Inference Attacks via the Browser Cache In the Proceedings of the *Web 2.0 Security and Privacy 2014 (**W2SP**), May 2014)*
Journal version: In IEEE *Internet Computing*, Jan 2015.

55. Xiaolei Li, Hong Hu, Guangdong Bai, Yaoqi Jia, Zhenkai Liang, and *Prateek Saxena*. DroidVault: A Trusted Data Vault for Android Devices. In the Proceedings of the $19^{th}$ *Intl. Conference on Engineering of Complex Computer Systems (**ICECCS**), May 2014*.

56. Shruti Tople, Shweta Shinde, Zhaofeng Chen, and *Prateek Saxena*. AUTOCRYPT: Enabling Homomorphic Computation on Servers To Protect Sensitive Web Content. In the Proceedings of the $20^{th}$ *ACM Conference on Computer and Communications Security (**CCS**), Oct 2013*.

57. Xinshu Dong, Zhaofeng Chen, Hossein Siadati, Shruti Tople, *Prateek Saxena*, and Zhenkai Liang. Protecting Sensitive Web Content from Client-side Vulnerabilities with CRYPTONS. In the Proceedings of the $20^{th}$ *ACM Conference on Computer and Communications Security (**CCS**), Oct 2013*.

58. Akshay Narayan and *Prateek Saxena*. The Curse of 140 Characters: Evaluating The Efficacy of SMS Spam Detection on Android. In the Proceedings of the $3^{rd}$ ACM CCS Workshop on Security and Privacy in Smartphones and Mobile Devices (**SPSM**), Oct 2013.

59. Xinshu Dong, Hong Hu, *Prateek Saxena*, and Zhenkai Liang. A Quantitative Evaluation of Privilege Separation in Web Browser Designs. In the Proceedings of the $18^{th}$ *European Symposium on Research in Computer Security (**ESORICS**), Sep 2013*.

60. Devdatta Akhawe, Frank Li, Warren He, *Prateek Saxena*, Dawn Song. Data-confined HTML5 Applications. In the Proceedings of the $18^{th}$ *European Symposium on Research in Computer Security (**ESORICS**), Sep 2013*.

61. Guangdong Bai, Jike Lei, Guozhu Meng, Sai Sathyanarayan Venkatraman, *Prateek Saxena*, Jun Sun, Yang Liu, and Jin Song Dong. AUTHSCAN: Automatic Extraction of Web Authentication Protocols from Implementations. In the Proceedings of the $20^{th}$ *Network and Distributed System Security Symposium (**NDSS**), Feb 2013*.

62. Devdatta Akhawe, *Prateek Saxena*, and Dawn Song. Privilege Separation in HTML5 Applications.

In the Proceedings of the $21^{st}$ *Usenix Security Symposium (**Usenix Security**), Aug 2012.*
*** See Dropbox's deployment of the proposed privilege separation in 2015**
*** This research influenced the design of Google Store Apps.**

63. Mike Samuel, *Prateek Saxena*, Dawn Song. Context-Sensitive Auto-Sanitization in Web Templating Languages Using Type Qualifiers. In the Proceedings of the $18^{th}$ *ACM Conference on Computer and Communications Security (**CCS**), Oct 2011.*
*** Deployed in the Google Closure compiler, which protects Google+ and other apps**

64. Pieter Hooimeijer, Ben Livhsits, David Molnar, *Prateek Saxena*, Margus Veanes. (*Authors listed alphabeltically*). Fast and Precise Sanitizer Analysis with BEK. In the Proceedings of the *20th Usenix Security Symposium (**Usenix Security**), Aug 2011.*
*** Available online at Microsoft Research Rise4Fun Portal**

65. *Prateek Saxena*, David Molnar, Benjamin Livshits. SCRIPTGARD: Automatic Context-Sensitive Sanitization for Large-Scale Legacy Web Applications. In the Proceedings of the $18^{th}$ *ACM Conference on Computer and Communications Security (**CCS**), Oct 2011.*

66. Joel Weinberger, *Prateek Saxena*, Devdatta Akhawe, Matthew Finifter, Richard Shin, Dawn Song. A Systematic Analysis of XSS Sanitization in Web Application Frameworks. In Proceedings of *European Symposium on Research in Computer Security (**ESORICS**), Sep 2011.*

67. *Prateek Saxena*, Devdatta Akhawe, Steve Hanna, Stephen McCamant, Feng Mao, Dawn Song. A Symbolic Execution Framework for JavaScript. In Proceedings of the $31^{st}$ *IEEE Symposium on Security and Privacy (**IEEE S&P**), May 2010.*
*** Awarded the AT&T Award for Best Applied Security Research Paper 2010**

68. *Prateek Saxena*, Steve Hanna, Pongsin Poosankam, Dawn Song. FLAX: Systematic Discovery of Client-side Validation Vulnerabilities in Rich Web Applications. In Proceedings of the *17th Annual Network and Distributed System Security Symposium (**NDSS**), Feb 2010.*

69. Adam Barth, Adrienne Porter Felt, *Prateek Saxena*, and Aaron Boodman. Protecting Browsers from Extension Vulnerabilities. In Proceedings of the *17th Annual Network and Distributed System Security Symposium (**NDSS**), Feb 2010.*
*** Deployed as the Google Chrome Extensions Platform**

70. Steve Hanna, Richard Shin, Devdatta Akhawe, Arman Boehm, *Prateek Saxena*, Dawn Song. The Emperors New APIs: On the (In)Secure Usage of New Client Side Primitives. In Proceedings of the *4th Web 2.0 Security and Privacy Workshop (**W2SP**), Oakland, May 2010.*

71. *Prateek Saxena*, Pongsin Poosankam, Stephen McCamant, Dawn Song. Loop-Extended Symbolic Execution on Binary Programs. In Proceedings of the *18th International Symposium on Software Testing and Analysis (**ISSTA**), Jul 2009.* (Supercedes TR No. UCB/EECS-2009-34, EECS Department UC, Berkeley).

72. Yacin Nadji, *Prateek Saxena*, Dawn Song. Document Structure Integrity: A Robust Basis for Cross-site Scripting Defense. In Proceedings of the *16th Annual Network and Distributed System Security Symposium (**NDSS**), Feb 2009.*

73. Lorenzo Cavallaro, *Prateek Saxena*, R. Sekar. On the Limits of Information Flow Techniques for Malware Analysis and Containment. In Proceedings of the *Detection of Intrusions and Malware & Vulnerability Assessment (**DIMVA**), Jul 2008.*

74. *Prateek Saxena*, R. Sekar, Varun Puranik. Efficient fine-grained binary instrumentation with applications to taint-tracking. In Proceedings of the *International Symposium on Code Generation and Optimization (**CGO**), Apr 2008.*

75. Dawn Song, David Brumley, Heng Yin, Juan Caballero, Ivan Jager, Min Gyung Kang, Zhenkai Liang, James Newsome, Pongsin Poosankam, *Prateek Saxena*. BITBLAZE: A New

Approach to Computer Security via Binary Analysis. In Proceedings of the *International Conference on Information Systems Security (*Invited paper) (**ICISS**), Dec 2008.*

## PATENTS

- ELASTICO: A Secure Sharding-Based Architecture For Open Blockchains.
  Loi Luu, Prateek Saxena, Seth Gilbert. Filed in September 2016.
- Trusted Data Service.
  Tien Tuan Anh Dinh, Prateek Saxena, Ee-Chien CHANG, Beng Chin OOI, Chunwang ZHANG. Filed in March 2015.
- SCRIPTGARD: Automatic Context-Sensitive Sanitization.
  Filed with David Molnar, Patrice Godefroid, Benjamin Livshits, Microsoft Research. Filed in Dec 2010.
- BEK: String Operations with Transducers
  Filed with David Molnar, Benjamin Livshits, Pieter Hooimeijer, Margus Veanes, Microsoft Research. Filed in Dec 2010. Renewed in 2015.

## RESEARCH GRANTS

- Crystal Center NUS, funded by multiple industrial research grants. (Director & PI 2018-now)
- A Hybrid Approach to Automatic Programming, funded by MOE - Singapore (PI, 2020-now)
- Algorithmic Advances For Program Fuzzing, funded by MOE - Singapore (PI, 2021-now)
- Deep Learning for Binary Reverse Engineering, funded by DSO National Labs, Singapore (PI, 2017-2021)
- WEBINSPECT: A Security Architecture for Web Applications with Auditability Guarantees, funded by NUS ODPRT (PI, 2012-2015)
- Privicols: Practical Protocols for Private Computation, funded by MOE - Singapore (2014-2017)
- A Fast and Secure Web Platform, funded by Intel University Grant (PI, 2015 and 2016)
- New Trusted Computing Primitives, funded by Symantec Research Grant (PI, 2013)
- TSUNAMi: Trustworthy Systems from UN-trusted component AMalgamations, funded by NRF-Singapore (CoPI, 2017-2021)