Daejun Park

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Research Interests

Practical formal methods for improving software quality, reliability, and security.

Professional Experience

Director of Formal Verification, Runtime Verification, Inc., IL 2021 – Present
Technical Lead for Formal Verification, Runtime Verification, Inc., IL 2019 – 2021
Research Intern, Runtime Verification, Inc., IL 2018

- *Formal verification* of blockchain smart contracts and consensus protocols security.

Research Intern, Microsoft Research, WA Summer 2017

- Designed a *verifiable computing* scheme towards secure deep neural network training.

Technical Lead, Sparrow, Ltd., South Korea 2008 – 2011

- Designed and implemented *a static program analysis tool* detecting memory safety errors and security vulnerabilities in embedded systems software.

Education

Ph.D., Computer Science, University of Illinois at Urbana-Champaign, IL 2019
M.S., Electrical Engineering and Computer Science, Seoul National University, South Korea 2008
B.S., Computer Science and Engineering, Seoul National University, South Korea 2006

Publications

[1] **Language-Parametric Compiler Validation with Application to LLVM**.
Theodoros Kasampalis, *Daejun Park*, Zhengyao Lin, Vikram S. Adve, and Grigore Rosu. *Proceedings of the Twenty-Sixth International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS'21)*, 2021.

[2] **A Learning-Based Approach to Synthesizing Invariants for Incomplete Verification Engines**.
Daniel Neider, P. Madhusudan, Shambwaditya Saha, Pranav Garg, and *Daejun Park*. *Journal of Automated Reasoning*, Vol.64, No.7, Oct 2020.

[3] **End-to-End Formal Verification of Ethereum 2.0 Deposit Smart Contract**.
Daejun Park, Yi Zhang, and Grigore Rosu. *Proceedings of the 32nd International Conference on Computer-Aided Verification (CAV'20)*, 2020.

[4] **A Complete Formal Semantics of x86-64 User-Level Instruction Set Architecture**.
Sandeep Dasgupta, *Daejun Park*, Theodoros Kasampalis, Vikram S. Adve, and Grigore Rosu. *Proceedings of the 40th ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI'19)*, 2019.

[5] **Logistic Regression on Homomorphic Encrypted Data at Scale**.
Kyoohyung Han, Seungwan Hong, Jung Hee Cheon, and *Daejun Park*. *Proceedings of the Thirty-First AAAI Conference on Innovative Applications of Artificial Intelligence (IAAI'19)*, 2019.

[6] **A Language-Independent Approach to Smart Contract Verification**.
Xiaohong Chen, *Daejun Park*, and Grigore Rosu. *Proceedings of the 8th International Symposium on Leveraging Applications of Formal Methods, Verification and Validation (ISoLA'18)*, 2018.

[7] **A Formal Verification Tool for Ethereum VM Bytecode**.
Daejun Park, Yi Zhang, Manasvi Saxena, Philip Daian, and Grigore Rosu. *Proceedings of the 2018 26th ACM SIGSOFT International Symposium on Foundations of Software Engineering (FSE'18)*, 2018.

[8] **KEVM: A Complete Formal Semantics of the Ethereum Virtual Machine**.
Everett Hildenbrandt, Manasvi Saxena, Nishant Rodrigues, Xiaoran Zhu, Philip Daian, Dwight Guth, *Daejun Park*, Yi Zhang, Brandon Moore and Grigore Rosu. *Proceedings of the 2018 IEEE Computer Security Foundations Symposium (CSF'18)*, 2018.

[9] **Invariant Synthesis for Incomplete Verification Engines**.
Daniel Neider, P. Madhusudan, Pranav Garg, Shambwaditya Saha, and *Daejun Park*. *Proceedings of the 24th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS'18)*, 2018.

[10] **Semantics-Based Program Verifiers for All Languages**.
Andrei Stefanescu, *Daejun Park*, Shijiao Yuwen, Yilong Li, and Grigore Rosu. *Proceedings of the 2016 ACM SIGPLAN International Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA'16)*, 2016. **Distinguished Paper Award**.

[11] **KJS: A Complete Formal Semantics of JavaScript**.
Daejun Park, Andrei Stefanescu, and Grigore Rosu. *Proceedings of the 36th ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI'15)*, 2015.

[12] **Global Sparse Analysis Framework**.
Hakjoo Oh, Kihong Heo, Wonchan Lee, Woosuk Lee, *Daejun Park*, Jeehoon Kang, and Kwangkeun Yi. *ACM Transactions on Programming Languages and Systems (TOPLAS)*, Vol.36, No.3, Sep 2014.

Awards

Feng Chen Memorial Award, University of Illinois at Urbana-Champaign, IL	2017
Distinguished Paper Award, OOPSLA'16, ACM SIGPLAN	2016
Bronze Medal in National Mathematics Competition, South Korea	2000

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