

Joonwon Choi

Formal Verification Engineer at Apple
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Current Position

Formal Verification Engineer, Apple 03/15/2021 – Current
I have worked on formally verifying memory subsystems in various Apple products. Reasoning about memory subsystems is challenging due to its complex mechanism to allow concurrent executions of memory requests. Our team employs formal-methods tools to provide a mathematical guarantee that the systems behave correctly.

Education

Massachusetts Institute of Technology 09/01/2016 – 02/17/2021
Doctor of Philosophy in Electrical Engineering and Computer Science
- Graduate Cumulative GPA: 5.0 (on a 5.0 scale)

Massachusetts Institute of Technology 09/01/2014 – 06/03/2016
Master of Science in Electrical Engineering and Computer Science
- Graduate Cumulative GPA: 5.0 (on a 5.0 scale)

Seoul National University 03/01/2006 – 02/26/2013
Bachelor of Science in Computer Science and Engineering
Double major in Mathematical Sciences
- Graduated with honors (*summa cum laude*)

Selected Publications

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- [1] **Hemiola: A DSL and Verification Tools to Guide Design and Proof of Hierarchical Cache-Coherence Protocols.**
Joonwon Choi, Adam Chlipala, Arvind.
CAV'22 (regular paper, *Proceedings of the International Conference on Computer-Aided Verification*).
 - [2] **Structural Design and Proof of Hierarchical Cache-Coherence Protocols.**
Joonwon Choi
PhD Thesis in Electrical Engineering and Computer Science, Massachusetts Institute of Technology.
 - [3] **Integration Verification Across Software and Hardware for a Simple Embedded System.**
Andres Erbsen, Samuel Gruetter, *Joonwon Choi*, Clark Wood, Adam Chlipala.
PLDI'21 (*Proceedings of the ACM SIGPLAN Conference on Programming Language Design and Implementation*).
 - [4] **EverCrypt: A Fast, Verified, Cross-Platform Cryptographic Provider.**
Jonathan Protzenko, Bryan Parno, Aymeric Fromherz, Chris Hawblitzel, Marina Polubelova, Karthikeyan Bhargavan, Benjamin Beurdouche, *Joonwon Choi*, Antoine Delignat-Lavaud, Cédric Fournet, Natalia Kulatova, Tahina Ramananandro, Aseem Rastogi, Nikhil Swamy, Christoph M. Wintersteiger, and Santiago Zanella-Beguelin.
SP'20 (*IEEE Symposium on Security and Privacy*).
 - [5] **Crellvm: Verified Credible Compilation for LLVM.**
Jeehoon Kang, Yoonseung Kim, Youngju Song, Juneyoung Lee, Sanghoon Park, Mark Dongyeon Shin, Yonghyun Kim, Sungkeun Cho, *Joonwon Choi*, Chung-Kil Hur, and Kwangkeun Yi.
PLDI'18 (*Proceedings of the ACM SIGPLAN Conference on Programming Language Design and Implementation*).

- [6] **Kami: A Platform for High-Level Parametric Hardware Specification and its Modular Verification.**
Joonwon Choi, Muralidaran Vijayaraghavan, Benjamin Sherman, Adam Chlipala, Arvind.
ICFP'17 (*Proceedings of the ACM SIGPLAN International Conference on Functional Programming*).
- [7] **An Inlining Approach to Formal Hardware Semantics.**
Joonwon Choi
MS Thesis in Electrical Engineering and Computer Science, Massachusetts Institute of Technology.

Working Experience

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| Apple, United States Formal Verification Engineer | 03/15/2021 – Current |
| Microsoft Research Cambridge, United Kingdom Research Intern | 07/02/2018 – 09/21/2018 |
| allm Games, Korea Software Engineer (Skilled Industry Personnel as alternative military service) | 04/13/2009 – 09/12/2011 |
| Google, Korea Software Engineering Intern (SWE Intern) | 01/05/2009 – 04/03/2009 |

Honors & Awards

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| Kwanjeong Educational Fellowship | Sep 2014 – May 2019 |
| MIT Emerson Scholarship for Private Music Study | Sep 2014 – May 2018 |
| Top Honor (<i>summa cum laude</i>) Certification Seoul National University | Feb 2013 |
| Presidential Science Scholarship | Mar 2006 – Feb 2013 |

Teaching Experience

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| MIT 6.887: Formal Reasoning About Programs Teaching Assistant | Spring 2017 |
| SNU 4190.310: Programming Languages Teaching Assistant | Fall 2013 |

Last updated: August 13, 2022