

Joonwon Choi

Formal Verification Engineer at Apple
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Current Position

Formal Verification Engineer, Apple	03/15/2021 – Current
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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 Doctor of Philosophy in Electrical Engineering and Computer Science - Graduate Cumulative GPA: 5.0 (on a 5.0 scale)	09/01/2016 – 02/17/2021
Massachusetts Institute of Technology Master of Science in Electrical Engineering and Computer Science - Graduate Cumulative GPA: 5.0 (on a 5.0 scale)	09/01/2014 – 06/03/2016
Seoul National University Bachelor of Science in Computer Science and Engineering Double major in Mathematical Sciences - Graduated with honors (<i>summa cum laude</i>)	03/01/2006 – 02/26/2013

Selected Publications

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- [1] **Formal Semantics of Verilog, Revisited for Deductive Verification: A Coq-Embedded Verification Framework as a Use Case.**
Joonwon Choi.
submitted.
 - [2] **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*).
 - [3] **Structural Design and Proof of Hierarchical Cache-Coherence Protocols.**
Joonwon Choi
PhD Thesis in Electrical Engineering and Computer Science, Massachusetts Institute of Technology.
 - [4] **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*).
 - [5] **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*).

- [6] **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*).
- [7] **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*).
- [8] **An Inlining Approach to Formal Hardware Semantics.**
Joonwon Choi
MS Thesis in Electrical Engineering and Computer Science, Massachusetts Institute of Technology.

Working Experience

Apple, United States Formal Verification Engineer	03/15/2021 – Current
Microsoft Research Cambridge, United Kingdom Research Intern	07/02/2018 – 09/21/2018
ROSAEC, Korea Research Associate	Mar 2013 – Jul 2014
Google, Korea Software Engineering Intern (SWE Intern)	01/05/2009 – 04/03/2009

Honors & Awards

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

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

Last updated: July 31, 2023