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 are safe. Particularly, I have achieved verifying several memory components so we have better confidence in the safety of those components.

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)

Publications

[1] Hemiola: A DSL and Verification Tools to Guide Design and Proof of Hierarchical Cache-Coherence Protocols.
Joonwon Choi, Adam Chlipala, Arvind.
To appear in International Conference on Computer-Aided Verification (CAV'22).
August 2022.

[2] Structural Design and Proof of Hierarchical Cache-Coherence Protocols. thesis
Joonwon Choi
Ph.D. Thesis in Electrical Engineering and Computer Science. Massachusetts Institute of Technology.
Thesis Supervisor: Adam Chlipala and Arvind

[3] Integration Verification Across Software and Hardware for a Simple Embedded System. paper
Andres Erbsen, Samuel Gruetter, **Joonwon Choi**, Clark Wood, Adam Chlipala.
Proceedings of the ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI'21).

[4] Kami: A Platform for High-Level Parametric Hardware Specification and its Modular Verification. paper
Joonwon Choi, Muralidaran Vijayaraghavan, Benjamin Sherman, Adam Chlipala, Arvind.
Proceedings of the ACM SIGPLAN International Conference on Functional Programming (ICFP'17).
September 2017.

[5] EverCrypt: A Fast, Verified, Cross-Platform Cryptographic Provider. paper
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.
IEEE Symposium on Security and Privacy (SP'20). May 2020.

[6] Crellvm: Verified Credible Compilation for LLVM. paper
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.
Proceedings of the ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI'18). June 2018.

[7] An Inlining Approach to Formal Hardware Semantics. thesis
Joonwon Choi
M.S. Thesis in Electrical Engineering and Computer Science. Massachusetts Institute of Technology.
Thesis Supervisor: Arvind

Honors & Awards

Kwanjeong Educational Fellowship Sep 2014 – May 2019

MIT Emerson Scholarship for Private Music Study Sep 2014 – May 2018

Top Honor (summa cum laude) Certification Feb 2013
Seoul National University

Presidential Science Scholarship Mar 2006 – Feb 2013

Teaching Experience

MIT 6.887: Formal Reasoning About Programs Spring 2017
Teaching Assistant

SNU 4190.310: Programming Languages Fall 2013
Teaching Assistent

Working Experience

Apple, United States 03/15/2021 – Current
Formal Verification Engineer

Microsoft Research Cambridge, United Kingdom 07/02/2018 –09/21/2018
Research Intern

allm Games, Korea 04/13/2009 –09/12/2011
Software Engineer (Skilled Industry Personnel as alternative military service)

Google, Korea 01/05/2009 –04/03/2009
Software Engineering Intern (SWE Intern)

Last updated: May 18, 2022