Joonwon Choi

Senior 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 and fabrics in Apple silicon. Reasoning about memory subsystems and fabrics is challenging due to the many optimizations involved in increasing system performance. Our team employs formal-methods tools to provide mathematical guarantees that the system is both safe and live.

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

[1] **Revamping the Formal Semantics of Verilog for Efficient, Modular, and Foundational Verification**.
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_).

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)	

Teaching Experience

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

Academic Services

Program Committee: VSTTE 2024, PLDI 2024, CAV 2020 AE

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

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