

Joonwon Choi

PhD Candidate in MIT CSAIL

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Research Interests

- ▶ Formal synthesis of protocols in message-passing systems.
- ▶ Formal verification for correct hardware design and synthesis. Take a look at the [Kami](#) project page for details.
- ▶ Formal verification of realistic processors.

Current Position

PhD Candidate, MIT CSAIL

Sep 2014 – Present

Advisors: Adam Chlipala and Arvind

Education

MIT CSAIL

Sep 2014 – Jun 2016

Master of Science in Electrical Engineering and Computer Science

Seoul National University

Mar 2006 – Feb 2013

Bachelor of Science in Computer Science and Engineering

Double major in Mathematical Sciences

graduated with honors (summa cum laude)

Publications

- [1] Kami: A Platform for High-Level Parametric Hardware Specification and its Modular Verification.
Joonwon Choi, Muralidaran Vijayaraghavan, Benjamin Sherman, Adam Chlipala, and Arvind.
Proceedings of the 22nd ACM SIGPLAN International Conference on Functional Programming (ICFP'17).
September 2017. [\[pdf\]](#)
- [2] An Inlining Approach to Formal Hardware Semantics.
M.S. Thesis in Electrical Engineering and Computer Science. Massachusetts Institute of Technology. [\[pdf\]](#)
Thesis Supervisor: Arvind

Current Research Projects

Formal synthesis of protocols in message-passing systems

- ▶ We are designing a formal synthesis framework, embedded in Coq, for building proven-to-be-correct message-passing systems. The framework provides a way of specifying protocols at a high-level. A synthesizer tries to build an executable implementation that is formally proven to follow the specification. Synthesized implementations may involve a lot of interleavings, where the safety of such interleavings is automatically guaranteed by the synthesis process. As a case study, we are currently trying to synthesize various cache-coherence protocols.

Formal verification of realistic processors

- We are designing realistic processors and proving them correct, using the Kami framework. Kami is a Coq framework that supports implementing, specifying, verifying, and compiling Bluespec-style hardware components. Realistic processors are highly optimized in that various components are involved with each others and the components themselves are optimized as well. By using the modular verification framework in Kami, we aim for modular specifications and proofs of such complex processors that naturally follow modular designs.

Honors & Awards

Kwanjeong Educational Fellowship	Sep 2014 –	Current
MIT Emerson Scholarship for Private Music Study	Sep 2014 –	Current
Top Honor (summa cum laude) Certification		Feb 2013
Seoul National University		

Teaching Experience

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

Working Experience

ROSAEC, Korea	Mar 2013 –	Jul 2014
Research Associate		
allm Games, Korea	Apr 2009 –	Oct 2011
Software Engineer (Skilled Industry Personnel as alternative military service)		
Google, Korea	Jan 2009 –	Apr 2009
Software Engineering Intern (SWE Intern)		
SK Communications, Korea	Jul 2007 –	Aug 2007
Intern (Software Developer)		

Last updated: January 21, 2018
<http://joonwon.net/c/docs/cv.pdf>