



# Youngbin Kim

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## Education

### Yonsei University

M.S - PH.D. INTEGRATED COURSE IN COMPUTER SCIENCE

Seoul, Korea

Mar. 2012 - Present

- Ph.D. Thesis: Software-controlled Memory Management Optimizations
- Advisor: Prof. Kyoungwoo Lee
- GPA: 4.21/4.3

### Yonsei University

B.S. IN COMPUTER SCIENCE

Seoul, Korea

Mar. 2008 - Feb. 2012

- GPA: 3.46/4.3 (3.96/4.3 for classes in computer science)

## Research Interests

### Dataflow Accelerators for Deep Learning

RELEVANT PUBLICATIONS: C6, J3 / RELEVANT PROJECTS: P5

- Optimizing execution of DNN applications on dataflow accelerators using compilation techniques
- Relevant tools: TVM (deep learning compiler stack / Python, C++)

### Software-controlled Memory Management

RELEVANT PUBLICATIONS: C5, C4, C3, J2 / RELEVANT PROJECTS: P3, P5

- Compiler optimizations for architectures deploying software-controlled memory
- Relevant tools: LLVM (compiler framework / C++)

### Reliable Computing

RELEVANT PUBLICATIONS: CC2, C1, J1, R1 / RELEVANT PROJECTS: P1, P2, P4

- Mitigating effects of soft errors on memories using software techniques
- Relevant tools: gem5 (architectural simulator / Python, C++)

## Experience

### GLOBAL RESEARCH EXPERIENCE

#### Arizona State University

COLLABORATE RESEARCHER

Tempe, AZ, USA

Feb. 2019 - May. 2019

- Developed a framework to optimize DNN executions on dataflow accelerators
- Relevant publications: J3, C6

COLLABORATE RESEARCHER

Nov. 2015 - May. 2016

- Developed compiler optimization techniques for more efficient code management on scratchpad memory
- Relevant publications: C5, C4, C3

COLLABORATE RESEARCHER

Jan. 2013 - Feb. 2013

- Developed system-wide soft error vulnerability evaluation framework based on cycle-accurate system simulator
- Conducted a research on accurate cache vulnerability calculation model and its effective implementation
- Relevant publications: C1, C2, J1

#### University of California at Irvine

VISITING STUDENT

Irvine, CA, USA

Jun. 2012 - Aug. 2012

- Conducted a research on cache soft error vulnerability with various cache configuration and protection techniques

### ACADEMIC SERVICES

## LECTURER

- Engineering Information Processing (ENG1108)
- Computer I (SCI2001) - score: 4.48/5, response: 88.4%
- Computer I (SCI2001) - score: 4.45/5, response: 94.9%

Fall 2014

Summer 2014

Winter 2014

## TEACHING ASSISTANT

- Engineering Information Processing (ENG1108)
- Computer Architecture (CSI3102)
- Computer System (CSI2107)
- Logic Circuit Design (CSI2111)

Fall 2018

Spring 2017

Fall 2013, Fall 2012

Spring 2013, Spring 2012

## Publications

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### CONFERENCE PROCEEDINGS

- C6 Shail Dave, Aviral Shrivastava, **Youngbin Kim**, Sasikanth Avancha and Kyoungwoo Lee. "dMazeRunner: Optimizing Convolutions on Dataflow Accelerators". *ICASSP 2020-2020 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP). 45th International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*. IEEE, 2020
- C5 **Youngbin Kim**, Kyoungwoo Lee and Aviral Shrivastava. "Static Function Prefetching for Efficient Code Management on Scratchpad Memory". *2019 IEEE 37th International Conference on Computer Design (ICCD)*. IEEE, 2019
- C4 Jian Cai, Yooseong Kim, **Youngbin Kim**, Aviral Shrivastava and Kyoungwoo Lee. "Reducing code management overhead in software-managed multicores". *Proceedings of the Conference on Design, Automation & Test in Europe (DATE)*. European Design and Automation Association, 2017.
- C3 **Youngbin Kim**, Jian Cai, Yooseong Kim, Kyoungwoo Lee and Aviral Shrivastava. "Splitting functions in code management on scratchpad memories". *Computer-Aided Design (ICCAD), 2016 IEEE/ACM International Conference on*. IEEE, 2016.
- C2 Yohan Ko, Reiley Jeyapaul, **Youngbin Kim**, Kyoungwoo Lee and Aviral Shrivastava. "Guidelines to design parity protected write-back L1 data cache". *Design Automation Conference (DAC), 2015 52nd ACM/EDAC/IEEE*. IEEE, 2015.
- C1 Yohan Ko, Reiley Jeyapaul, **Youngbin Kim**, Kyoungwoo Lee and Aviral Shrivastava. "Accurate cache vulnerability modeling in presence of protection techniques". *1st International ESWEEK Workshop on Resiliency in Embedded Electronic Systems*, 2015.

### JOURNAL ARTICLES

- J3 Shail Dave, **Youngbin Kim**, Sasikanth Avancha, Kyoungwoo Lee and Aviral Shrivastava. "dMazeRunner: Executing Perfectly Nested Loops on Dataflow Accelerators". *ACM Transactions on Embedded Computing Systems (TECS) - Special Issue ESWEEK 2019, CASES 2019, CODES+ISSS 2019 and EMSOFT 2019*. Volume 18 Issue 5s, October 2019.
- J2 **Youngbin Kim**, Kyoungwoo Lee. "A Survey on Software Management Techniques for Scratchpad Memories". *Communications of the Korean Institute of Information Scientists and Engineers*, 35(10), 2017.10, 46-51.
- J1 Yohan Ko, Reiley Jeyapaul, **Youngbin Kim**, Kyoungwoo Lee and Aviral Shrivastava. "Protecting Caches from Soft Errors: A Microarchitect's Perspective". *ACM Transactions on Embedded Computing Systems (TECS)*, Volume 16 Issue 4, September 2017.

### POSTERS

- R1 Yohan Ko, **Youngbin Kim** and Kyoungwoo Lee. "Accurate Cache Vulnerability Estimation Based on Word-level Behaviors". *Proc. of the KIISE Korea Computer Congress, 89-91*, 2014.

## Skills

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<b>Research Frameworks</b>	TVM (compiler framework for deep learning), LLVM (compiler infrastructure), gem5 (architectural simulator)
<b>Programming</b>	Python, C/C++, bash, HTML/CSS, R, PHP, SQL, Javascript, Swift
<b>Tools</b>	git, Pandas, Django, Docker, AWS, Vim, Linux, LaTeX
<b>Languages</b>	Korean (native), English (academically fluent)

## Honors & Awards

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2018	<b>Research Grant for Excellent Achievement</b> , Department of Computer Science, Yonsei University	Seoul, Korea
2016	<b>Research Scholarship</b> , Microchip Technology	Seoul, Korea
2014	<b>Superior Presentation Winner</b> , Korea Computer Congress 2014	Korea
2012 - 2013	<b>Competitive Scholarship</b> , Department of Computer Science, Yonsei University	Seoul, Korea

# Projects

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## **[P5] A Research on Scratchpad Memory for Many-core OS Scalability**

ELECTRONICS AND TELECOMMUNICATIONS RESEARCH INSTITUTE

2016 - Present

- Research on scalable memory management techniques on accelerators and CPU architectures

## **[P4] A Study on Dependable Future Processor Systems**

NATIONAL RESEARCH FOUNDATION

2015 - 2017

- Developed a framework to evaluate reliability of different microarchitectural components of a system

## **[P3] A Research on Profiler for Many-core OS**

ELECTRONICS AND TELECOMMUNICATIONS RESEARCH INSTITUTE

2014 - 2016

- Developed a simulator to evaluate scalability of different types of applications on many-core systems

## **[P2] A study on Dependable Mobile Embedded Systems**

NATIONAL RESEARCH FOUNDATION

2012 - 2015

- Developed techniques to improve reliability against soft error on embedded mobile systems

## **[P1] Robust Software Framework for Unreliable Hardware**

LG ELECTRONICS

2012 - 2013

- Studied methods to evaluate the vulnerability of a system against soft errors