Duseok Kang

Email: kangds0829@gmail.com ● Phone: 010–2653–9945
Online CV: https://duseok.github.io ● LinkedIn: https://www.linkedin.com/in/duseok-kang-417359141

EDUCATION

Seoul National University, Seoul, Republic of Korea

- Combined M.S./Ph.D. in Computer Science and Engineering   Mar 2014 — Feb 2021
  - Thesis: Hardware-Aware Software Optimization Techniques for Convolutional Neural Networks on Embedded Systems
  - Adviser: Prof. Soonhoi Ha
  - GPA overall: 3.91/4.3

Sungkyunkwan University, Seoul, Republic of Korea

- B.S. in Semiconductor Systems Engineering   Mar 2010 — Feb 2014
  - Thesis: Data compression in host-based FTL
  - Adviser: Prof. Jinsoo Kim
  - GPA overall (Major): 4.06/4.5

PUBLICATIONS

International Conference & Journal

1. Duseok Kang, Donghyun Kang, Soonhoi Ha, "Multi-Bank On-chip Memory Management Techniques for CNN Accelerators," IEEE Transaction on Computers (Accept).

2. Jaesung Lee, Duseok Kang, Soonhoi Ha, "S3NAS: Fast NPU-aware Neural Architecture Search Methodology," Arxiv preprint, Sep, 2020. (Under Review)

3. Duseok Kang, Jinwoo Oh, Jongwoo Choi, Youngmin Yi, Soonhoi Ha, "Scheduling of Deep Learning Applications onto Heterogeneous Processors in an Embedded Device," IEEE Access, Mar, 2020.

4. Duseok Kang, Euiseok Kim, Inpyo Bae, Bernhard Egger, Soonhoi Ha, "C-GOOD: C-code Generation Framework for Optimized On-device Deep Learning," International Conference on Computer-Aided Design (ICCAD), Nov, 2018.

5. Duseok Kang, Jintaek Kang, Donghyun Kang, Sungjoo Yoo, Soonhoi Ha, "Joint Optimization of Speed, Accuracy, and Energy for Embedded Image Recognition Systems," Design Automation and Test in Europe (DATE), Mar, 2018.

6. Barend Harris, Mansureh S. Moghaddam, Duseok Kang, Inpyo Bae, Euiseok Kim, Hyemi Min, Hansu Cho, Sukjin Kim, Bernhard Egger, Soonhoi Ha, Kiyoung Choi, "Architectures and Algorithms for User Customization of CNNs," Asia and South Pacific Design Automation Conference (ASP-DAC), Jan, 2018.

7. Mansureh S. Moghaddam , Barend Harris, Duseok Kang, Inpyo Bae, Euiseok Kim, Hyemi Min, Hansu Cho, Bernhard Egger, Soonhoi Ha, Kiyoung Choi, "Work-in-Progress: Incremental Training of CNNs for User Customization," CASES: International Conference on Compilers, Architecture, and Synthesis for Embedded Systems, Oct, 2017.

8. EunJin Jeong, Namgoo Lee, Jinhan Kim, Duseok Kang, Soonhoi Ha, "FIFA: A Kernel-Level Fault Injection Framework for ARM-based Embedded Linux System," IEEE International Conference on Software Testing, Verification and Validation, Mar, 2017.

9. Bernhard Egger, Hochan Lee, Duseok Kang, Mansureh S. Moghaddam, Youngchul Cho, Yeonbok Lee, Sukjin Kim, Soonhoi Ha, Kiyoung Choi, "A Space- and Energy-Efficient Code Compression/Decompression Technique for Coarse-Grained Reconfigurable Architectures," International Symposium on Code Generation and Optimization (CGO), Feb, 2017.

10. Shin-haeng Kang, Duseok Kang, Hoeseok Yang, and Soonhoi Ha, "Real-Time Co-Scheduling of Multiple Dataflow Graphs on Multi-Processor Systems," Design Automation Conference (DAC), Jun, 2016.

Domestic Conference & Journal

1. Jongwoo Choi, Duseok Kang, Jinwoo Oh, Soonhoi Ha, "Task-Processor ILP Scheduling for CNN on Heterogeneous Computing environment Embedded Device," Korea Software Congress, Dec, 2018.

2. Duseok Kang, Shin-haeng Kang, Hoeseok Yang, Soonhoi Ha, "Co-scheduling Technique of Dataflow Applications with Shared Processor Allocation," KIISE Transactions on Computing Practices, Jan, 2016.

3. Duseok Kang, Shin-haeng Kang, Hoeseok Yang, Soonhoi Ha, "Co-Scheduling of Multiple Concurrent SDF Applications with Arbitrary Periods and Offsets," The Korean Institute of Information Scientists and Engineers, Jun, 2015.

RESEARCH EXPERIENCE

Seoul National University, Seoul, Republic of Korea

■ **Postdoctoral Researcher**, Codesign and Parallel Processing Laboratory
  ● **Future Proof Embedded NPU System Design – Samsung Advanced Institute of Technology (SAIT)**
  Feb 2021 — Present
    - NPU structure to support non-convolutional layer efficiently
    - Embedded Multi-NPU system structure design and simulator development
    - Development of embedded NPU core for training
  ● **Quantization for NPU** Apr 2021 — Present
    - Power-of-two symmetric quantization for NPU

■ **Student Researcher**, Codesign and Parallel Processing Laboratory   Jan 2014 — Feb 2021
  ● **Future Proof Embedded NPU System Design – SAIT** Feb 2021 — Present
    - NPU structure to support non-convolutional layer efficiently
    - Embedded Multi-NPU system structure design and simulator development
    - Development of embedded NPU core for training
  ● **Neural processor simulation and software optimization for edge devices – SAIT** Oct 2018 — Oct 2020
    - Neural processor compiler
    - On-chip multi-bank SPM management technique
    - Off-chip memory access size reduction and latency optimization study
    - CNN dataflow optimization
  ● **System-level deep learning inference optimization technique for mobile platforms with heterogeneous processing elements – Samsung DS** Apr 2018 — Mar 2019
    - Methodology for scheduling CNN applications on mobile devices with heterogeneous processing elements
  ● **Embedded DNN Optimization for Autonomous Driving (YOLO) – SKT** Dec 2017 — Apr 2018
    - Study on optimizing object detection CNN application for autonomous vehicles
  ● **Next-generation SRP (Samsung Reconfigurable Processor) Architecture – Samsung Research**
  Nov 2015 — Sep 2017
    - SRP simulator implementation and verification
    - SRP memory structure optimization
    - Development of CNN applications in embedded devices
    - On-device learning system development for speaker recognition
  ● **Fault Injection based Hardware Fault Reproduction and Detection – Samsung R&D Center**
  Aug 2015 — Nov 2015
    - Fault injection method at Linux kernel level using KGDB

AWARDS

■ **2018 Low-Power Image Recognition Challenge** Jun 2018
  - Organization: IEEE Rebooting Computing
  - Track 2: 1st Prize, Track 3: 2nd Prize
  - Author: Duseok Kang, Donghyun Kang, Soonhoi Ha

■ **2017 Embedded Deep Learning Design Contest** Oct 2017
  - Organization: Embedded Systems Research Center (ESRC), Seoul National University
  - Track A: 1st Prize, Track B: 1st Prize
  - Author: Duseok Kang, Jintaek Kang, Soonhoi Ha

■ **2017 Low-Power Image Recognition Challenge** Jul 2017
  - Organization: IEEE Rebooting Computing
  - 1st Prize
  - Author: Duseok Kang, Jintaek Kang, Donghyun Kang, Soonhoi Ha

■ **2017 Embedded System Design Contest** Feb 2017
  - Organization: Embedded Systems Research Center (ESRC), Seoul National University
  - HW/SW Co-design Track: 1st Prize
  - Author: Duseok Kang, Jintaek Kang, Soonhoi Ha

■ **2015 Korea Computer Congress** Jul 2015
  - Organization: Korean Institute of Information Scientists and Engineers
  - Computer System Track: Best Presentation Award
  - Author: Duseok Kang, Shin-haeng Kang, Hoeseok Yang, Soonhoi Ha

SKILLS

Programming Languages (Advanced || Experienced)
C, Python (Adv.) || C++, Shell script, Go, Java, Lua, Ruby, OCaml, Visual Basic (Exp.)

Programming and Build Tools (Advanced || Experienced)
Vim, Visual Studio Code (Adv.) || CMake, automake, Eclipse, makefile (Exp.)

Developing Environments and Platforms (Advanced || Experienced)
Ubuntu (Adv.) || CentOS, Android, Tizen (Exp.)

Deep Learning Platforms and Library (Experienced)
C-GOOD (implemented using ARM Compute Library, cuDNN, and cuBlas), Darknet, PyTorch, Tensorflow

Hardware Platforms (Experienced)
NVIDIA Jetson TX1/TX2, Samsung Galaxy S9, Hikey970, Raspberry Pi 3 B+, ODROID-XU4, Arduino UNO, LEGO Mindstorm NXT

[CV compiled on 2021-06-10]