Jisu Kwon

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Education

B.S. Electronics Engineering, *Early Graduated*, Kyungpook National University, Aug. 2019.

Current Position

B.S./M.S./Ph.D. integrated student, School of Electronic and Electrical Engineering, Kyungpook National University, Sep. 2019 - present.

Fields of Research Interest

Behavior changable neuromorphic learning/inference processor based on partial software replacement and hardware dynamic reconfiguration architecture. Ultra-low-power AI accelerator design for resource-limited embedded system. Energy-efficient/fast/low-memory-cost binary firmware replacement via firmware segmentation. Emulator-coupled Verilog RTL model runtime partial replacement framework development.

Experience

Teaching

C Programming & Practice (EECS201) [2020F] [2020S] , Teaching Assistant for Daejin Park.

Introduction to Computer Science and Engineering (ITEC201008) [2020S] , Teaching Assistant for Hohee Kim.

Logic Circuit (ELEC247) [2020W] [2021W] , Teaching Assistant for Daejin Park.

Embedded System Design (EECS420) [2021S] [2023S] , Teaching Assistant for Daejin Park.

Digital Signal Processing (ELEC701) [2023S] , Teaching Assistant for Daejin Park.

Logic Circuit Design (COMP311) [2023S] , Teaching Assistant for Daejin Park.

Project

Gwanak Analog Technologies, *SENT Interface for Automotive Connectiviry Applications*, Aug, 2021 - Nov, 2021.

LS Cable & System, *250mm CCV Digital Twin Development using IoT Sensor Network Virtualization*, Jul, 2021 - Jun, 2022.

Gwanak Analog Technologies, *DSI3 Robust Interface for Automotive Connectiviry Applications*, Apr, 2021 - Present.

ABOV Semiconductor, *Low-Power Sound Interface with Signal Processing Unit (TSMC CMOS process)*, Jan, 2021 - Apr, 2021.

Hyundai Motor Group, *Digital Twin-based Virtual Sensor Model Synthesis and Intelligent Parameter Optimization*, Oct, 2020 - Apr, 2021.

Daegu Science High School Self-Research Program, *Context-Recognition Intelligent Automatic Control Systems based on Self-Reprogramming*, Apr, 2020 - Dec, 2020.

National Research Foundation (NRF) of Korea, *Re-adaptative Runtime Synthesis and Low-Power Execution Platform of Things-Cloud Connected Software/Hardware for Lightweight Intelligent IoT Device*, 2019 - present.

Publication

International Journals

Jisu Kwon, and Daejin Park. "Sliding -Window-based Fast and Lightweight ADC Pseudo-Randomness Compensation Technique for Low-Cost ADC". *Journal of Semiconductor Technology and Science* (SCIE) (Under review)

Seungmin Lee, **Jisu Kwon**, and Daejin Park. "Optimized Replication of ADC-Based Particle Counting Algorithm with Reconfigurable Multi-Variables in Pseudo-Supervised Digital Twining of Reference Dust Sensor Systems". *Sensors*, vol. 23, no. 12, pp. 5557, Jun. 2023. (SCIE)

Seungmin Lee, **Jisu Kwon**, and Daejin Park. "Runtime Tracking-Based Replication of On-Chip Embedded Software Using Transfer Function Learning for Dust Particle Sensing Systems". *IEEE Access*, vol. 11, pp. 32167-32175, Mar. 2023. (SCIE)

Jisu Kwon, and Daejin Park. "Efficient Sensor Processing Technique using Kalman Filter-based Velocity Prediction in Large-Scale Vehicle IoT Application". *IEEE Access*, vol. 10, pp. 116735-116746, Oct. 2022. (SCIE)

Jisu Kwon, and Daejin Park. "Hardware/Software Co-Design for TinyML Voice-Recognition Application on Resource Frugal Edge Devices". *Applied Sciences*, vol. 11, no. 22, pp. 11073, Nov. 2021. (SCIE)

Jisu Kwon, Moon Gi Seok, and Daejin Park. "Low-Power Fast Partial Firmware Update Technique of On-Chip Flash Memory for Reliable Embedded IoT Microcontroller". *IEICE Transactions on Electronics*, vol. E104-C, no. 6, Jun. 2021. (SCIE)

Jisu Kwon, Moon Gi Seok, and Daejin Park. "GPU-Based ECC Decode Unit for Efficient Massive Data Reception Acceleration". *Journal of Information Systems*, vol. 16, no. 6, pp. 1359-1371, Dec. 2020. (SCOPUS)

Domestic Journals

Jisu Kwon, and Daejin Park. "Collaborative Streamlined On-Chip Software Architecture on Heterogenous Multi-Cores for Low-Power Reactive Control in Automotive Embedded Processors". *IEMEK Journal of Embedded Systems and Applications*, vol. 17, no. 6, pp. 375-382, Dec. 2022. (KCI)

Jongheon Baek, Jiwoong Jung, Minsung Kim, **Jisu Kwon**, and Daejin Park. "Low-Power Metamorphic MCU using Partial Firmware Update Method for Irregular Target Systems Control". *Journal of Korea Institute of Information and Communication Engineering*, vol. 25, no. 2, pp. 301-307, Feb. 2021. (KCI)

Jisu Kwon, and Daejin Park. "Velocity and Distance Estimation-based Sensing Data Collection Interval Control Technique for Vehicle Data-Processing Overhead Reduction". *Journal of Korea Institute of Information and Communication Engineering*, vol. 24, no. 12, pp. 1697-1703, Dec. 2020. (KCI)

Jisu Kwon, and Daejin Park. "Acceleration of ECC Computation for Robust Massive Data Reception under GPU-based Embedded Systems". *Journal of Korea Institute of Information and Communication Engineering*, vol. 24, no. 7, pp. 956-962, Jul. 2020. (KCI)

Jisu Kwon, Jeonghun Cho, and Daejin Park. "Efficient Flash Memory Access Power Reduction Techniques for IoT-Driven Rare-Event Logging Application". *IEMEK Journal of Embedded Systems and Applications*, vol. 14, no. 2, pp. 87-96, Apr. 2019. (KCI)

Conferences

Jisu Kwon, and Daejin Park. "Work-in-Progress: Micro-Accelerator-in-the-Loop Framework for MCU Integrated Accelerator Peripheral Fast Prototyping", *International Conference on Embedded Software (EMSOFT)*, Hamburg, Germany, Sep. 2023. (Under review)

Jisu Kwon, and Daejin Park. "Efficient Partial Weight Update Techniques for Lightweight On-Device Learning on Tiny Flash-Embedded MCUs", *International Conference on Embedded Software (EMSOFT)*, Hamburg, Germany, Sep. 2023. (Under review)

Jisu Kwon, and Daejin Park. "Hardware Accelerator Processing Element Unit Dynamic Pruning using Runtime RTL Simulation Reconfiguration", *IEEE International Midwest Symposium on Circuits and Systems (MWSCAS)*, Arizona, USA, Aug. 2023.

Jisu Kwon, Moon Gi Seok, and Daejin Park. "Neural Network-based Approximate Quality Prediction for Parameter Exploration in Industrial Manufacturing", *International Symposium on Intelligent Signal Processing and Communication Systems (ISPACS)*, Penang, Malaysia, Nov. 2022.

Jisu Kwon, and Daejin Park. "Lightweighted AI-based Inference Unit using Deterministic Randomness Compenstation Techniques for Long-Term ADC Resolution Enhancement", *IEEE International SoC Design Conference (ISOCC)*, Gangneung, South Korea, Oct. 2022.

Jisu Kwon, Sejong Oh, and Daejin Park. "Metamorphic Edge Processor Simulation Framework Using Flexible Runtime Partial Replacement of Software-Embedded Verilog RTL Models". *IEEE Symposium on Circuits and Systems (ISCAS)*, Daegu, South Korea, May. 2021.

Jisu Kwon, and Daejin Park. "Toward Data-Adaptable TinyML using Model Partial Replacement for Resource Frugal Edge Device". *International Conference on High Performance Computing in Asia-Pacific Region (HPC Asia)*, Jeju, South Korea, Jan. 2021.

Minsung Kim, Jongheon Baek, Jiwwong Jung, **Jisu Kwon**, and Daejin Park. "Segmented Polynomial Approximation for Controlled System Characteristic Estimation on Lightweight Edge Device". *IEEE/IEIE International Conference on Consumer Electronics Asia (ICCE-Asia)*, Busan, South Korea, Nov. 2020.

Jisu Kwon, Moon Gi Seok, and Daejin Park. "User sensible Sliding Firmware Update Technique for Flash-Area/Time Cost Reduction toward Low-Power Embedded Software Replacement". *IEEE Symposium on Low-Power and High-Speed Chips and Systems (COOLChips 23)*, Web-fashion, Apr. 2020.

Jisu Kwon, and Daejin Park. "Efficient Massive Data Reception Using GPU-based ECC Decoding Operation Acceleration". *World IT Congress 2020 (WITC 2020)*, Seoul, South Korea, Feb. 2020. * Recommended to SCOPUS-index Journal (JIPS).

Jisu Kwon, and Daejin Park. "Implementation of Computation-Efficient Sensor Network for Kalman Filter-based Intelligent Position-Aware". *International Conference on Artificial Intelligence in Information and Communication (ICAIIC)*, Fukuoka, Japan, Feb. 2020.

Jisu Kwon, Jeonghun Cho, and Daejin Park. "Function Block-Based Robust Firmware Update Technique for Additional Flash-Area/Energy-Consumption Overhead Reduction". *International Symposium on Intelligent Signal Processing and Communication Systems (ISPACS)*, Beitou, Taipei, Dec. 2019.

Jisu Kwon, Jeonghun Cho, and Daejin Park. "Efficient Flash Memory Access Power Reduction Techniques for IoT-Driven Rare-Event Logging Application". *IEEE Symposium on Low-Power and High-Speed Chips and Systems (COOLChips 22)*, Yokohama, Japan, Apr. 2019. * Poster session.

Patents

Daejin Park, and **Jisu Kwon**. **Memory Connection System and Memory Connection Method for Acceleration of Operation** in Korea Patent and Trademark Office, Dec. 2022, Korea Patent Pending.

Daejin Park, and **Jisu Kwon**. **Self-Repgoramming-based Software Mal-function Fix Method of Firmware Configured by Control Flow and Parameters** in Korea Patent and Trademark Office, Nov. 2021, Korea Patent Pending.

Daejin Park, and **Jisu Kwon**. **Firmware Update Method using QR Code Image and Electronic Device Performing Same** in Korea Patent and Trademark Office, Apr. 2022, Korea Patent KR102391306B1. [link]

Daejin Park, and **Jisu Kwon**. **Firmware Update Device and Update Method** in Korea Patent and Trademark Office, Mar. 2022, Korea Patent KR20220019940A. [link]

Daejin Park, and **Jisu Kwon**. **Code Insertion Module and Method for Dividing Storage of Firmware Segment** in Korea Patent and Trademark Office, Apr. 2022, Korea Patent KR102391312B1. [link]

Miscellaneous

Domestic Software Program Copyrights

Daejin Park, and **Jisu Kwon**. "Multi-core Collaborative Digital Signal Distributed Processing Program" in Korea Copyright Commission [C-2022-047989], Nov. 2022.

Daejin Park, and **Jisu Kwon**. "Manufacturing Quality Prediction Neural Network Training and Inference Program" in Korea Copyright Commission [C-2022-047264], Nov. 2022.

Daejin Park, and **Jisu Kwon**. "Inverse matrix calculation program" in Korea Copyright Commission [C-2022-047263], Nov. 2022.

Daejin Park, and **Jisu Kwon**. "Embedded System Firmware Partial Update Program" in Korea Copyright Commission [C-2021-043262], Nov. 2021.

Daejin Park, and **Jisu Kwon**. "Atypical Sensor ADC Data Compensate Dust Particle PM Calculating Binary Firmware" in Korea Copyright Commission [C-2021-043261], Nov. 2021.

Last updated: June 26, 2023