

Jurn Gyu Park

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Assistant Professor in Computer Science
School of Science and Technology
Nazarbayev University

Research Interests

- Mobile Machine Learning and Deep Neural Networks (DNNs).
- Machine Learning enhanced Prediction Model Building Methodology for Embedded Systems
- Energy-efficient CPU-GPU Dynamic Power Management design for mobile HMPSoCs
- Parallel Programming using OpenCL/CUDA and modern heterogeneous GPGPU architectures.
- NAND Flash Storage Systems

Education

Ph.D. in Computer Science, Sep. 2017

University of California, Irvine (UCI), CA

Advisor: Professor Nikil Dutt

M.Eng. in Computer Engineering, Feb. 2012

Yonsei University, South Korea

B.S. in Mechanical and Automotive Engineering, Feb. 2001

Kookmin University, South Korea

Research Experience

UC Irvine, Center for Embedded Cyber-Physical System (CECS)

Irvine, CA

Assistant Specialist

Feb. 2018 – Jul. 2018

- **Mobile CPU-GPU Power/Performance Characterization using M.L (e.g., CNN) and VR(AR) Applications**

UC Irvine, Computer Science

Irvine, CA

Graduate Research Assistant

Sep. 2012 – Sep. 2017

- **Machine Learning Enhanced Integrated CPU-GPU DVFS Governor for Mobile Gaming (Graphics)**
 - Developed a model-tree based governor algorithm to maximize energy savings with minimal performance degradation
 - Used a M.L methodology with attribute selection techniques for building simple and high-accuracy prediction models
 - Implemented an integrated CPU-GPU DVFS governor (C modules) in Linux device driver layer
 - Paper publication in a conference, IEEE/ACM Embedded Systems for Real-Time Multimedia (ESTIMedia'17)
- **Hierarchical FSM-based and Cooperative CPU-GPU Frequency-Capping Dynamic Power Management (DPM) methodologies** (Jan. 2015 – Jul. 2016)
 - Developed energy-efficient CPU-GPU frequency-capping algorithms
 - Used adaptive models based on graphics workload characterization for power and performance trade-offs
 - Implemented C/C++ modules to profile performance monitoring units (PMU) and control frequencies
 - Paper publications in conferences, ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED'16) and ACM SIGAPP Symposium on Applied Computing (SAC'16)
- **Mobile GPU Characterization, Synergistic Memory Optimizations and DVFS Policies for Graphics-Intensive Mobile applications** (Jul. 2013 – Dec. 2015)
 - KIAT (South Korea) Global Research Project and SAMSUNG System LSI Project
 - Developed an abstracted mobile GPU pipeline for graphics workload characterization
 - Developed custom micro-benchmarks (OpenGL ES and Android SDK) designed to stress different components of the abstracted mobile GPU hardware pipeline
 - Analyzed the correlation between the platform hardware characteristics and power/performance metrics, and presented opportunities for synergistic CPU-GPU memory optimizations and mobile DVFS design
 - Paper publications in conferences, IEEE/ACM Embedded Systems for Real-Time Multimedia (ESTIMedia'14'15)
- **Design of SPMVisor Integration on an Emulator (QEMU-based VarEMU)** (Feb. 2013 – Jun. 2013)
- **Policy-driven Logical Volume Management on NAND Flash filesystem** (Sep. 2012 – Feb. 2013)

Yonsei University, Computer Engineering

Seoul, South Korea

Graduate Research Assistant

Sep. 2009 - Feb. 2012

- **Performance and Power Models for Embedded GPGPUs considering CUDA/OpenCL**
 - Studied performance and power consumption of embedded GPGPUs using CUDA/OpenCL kernel programming and PTX assembly code analysis
 - Developed analytical performance and empirical power models for Desktop and Embedded VLIW GPGPU architectures

Industry Experience

MDS Technology (curr. Hancorn MDS)

Seoul, South Korea

System Software Engineer - Technical Lecturer-Planning and Sales Engineer

Nov. 2002 – Feb. 2011

System Software Engineer

(Jan. 2006 – Feb. 2011)

- Performed tasks including board bring-ups (porting), debugging/trouble-shooting and software development on Firmware, RTOS, Linux Kernel/Device Driver and Android Board Support Packages (BSPs) for ARM-based SAMSUNG mobile SoCs
- **Android:** Designed and developed customized Android services (C/C++ modules) in Android HAL and Middleware layers: *Audio Flinger, Surface Flinger, Camera, Multimedia and custom services*
- **Linux Kernel:** Ported boot-loader (u-boot) and Linux Kernel with troubleshooting on ARM-based multiple mobile platforms with packaging skills (*Root file system, Ramdisk and MTD file systems* etc)
- **Linux Device Driver:** Developed Linux platform device drivers: *Misc, UART, Input (Keypad and Touch), LCD, Audio* etc
- **RTOS:** Analyzed core modules of MDS's NEOS RTOS (interrupt handler, ARM coprocessor interactions, mutex/semaphore synchronization APIs and memory management unit)
- **Firmware:** Implemented new firmware software and made improvements to existing code: *GPIO, UART, Timers, Interrupt and Memory controllers, MMU, DMA, Bus Interfaces (I2C, I2S), ADC/DAC, LCD, Audio and Camera*
- **Application:** Developed multi-threaded user space applications using MDS's NEOS RTOS and Linux POSIX APIs
- Performed hardware/software unit level tests and/or functional integration tests
- Developed boot loader packages and experienced JTAG (Trace32) debugging techniques involving firmware, OS kernel and user space components

Technical Lecturer

(Jan. 2006 – Feb. 2011)

- Instructed **Computer Architecture** (ARM RISC Architectures), **Firmware Programming, Operating Systems** (Embedded RTOS, Embedded Linux Kernel (2.6.x) and Linux Device Driver), **Android Systems and Analysis** mainly to **Samsung** and **LG** engineers for more than five years, composed of intensive 32-40 hours (4-5 days) per course
- Performed foreign lectures in VIETNAM (SAMSUNG SEC Hanoi Research Group) – *Linux/Android System (Mar. 2012)*, in INDIA (SAMSUNG SEC Delhi Engineer Technical Training) – *Android System (Feb. 2011)*, and in CHINA (North Korea Engineer Technical Training) – *Linux System (May, 2010, 2009)*
- Wrote textbooks for lectures: *ARM Device Programming, Linux Kernel and Device Driver, Android System and Analysis, Android Multimedia System*

Technical Planning and Sales Engineer

(Nov. 2002 – Dec. 2005)

- Led planning, technical design and sales of Car Navigation System (CNS), Portable Multimedia Player (PMP) and Home Network System (HNS) package solutions
- Led technical sales of 8/16-bit In-Circuit Emulators (ICE) and 32-bit JTAG debuggers with technical support arrangement

Mobile Welcome

Seoul, South Korea

Technical Support Engineer

Sep. 2001 – Jun. 2002

- Configured, troubleshot and provided technical support for CMDA extension module of Compaq PDA

Publications

- [J2] C-Y. Hsieh, **J-G. Park**, N. Dutt, S-S. Lim: "MEMCOP: Memory-Aware Co-operative Power Management Governor for Mobile Games", *Design Automation for Embedded Systems (SCIE)*, Springer, pp 1-22, March 2018
- [J1] **J-G. Park**, C-Y. Hsieh, N. Dutt, S-S. Lim: "Synergistic CPU-GPU Frequency Capping for Energy-efficient Mobile Games", *IEEE Transactions on Embedded Computing Systems (TECS - SCIE)*, Volume 17, Issue2, January 2018.
- [Dissertation] **J-G. Park**: "Cooperative CPU-GPU Dynamic Power Management Methodologies for Energy-efficient Mobile Gaming", *University of California, Irvine, 2017*
- [C5] **J-G. Park**, N. Dutt, and S-S. Lim, "ML-Gov: A Machine Learning Enhanced Integrated CPU-GPU DVFS Governor for Mobile Gaming", *proceedings of the 15th International Symposium on Embedded Systems for Real Time Multimedia (ESTIMEDIA 2017)*, Seoul, Korea, October 2017.
- [C4] **J-G. Park**, N. Dutt, H. Kim, S-S. Lim: "HiCAP: Hierarchical FSM-based Dynamic Integrated CPU-GPU Frequency Capping Governor for Energy-Efficient Mobile Gaming.", *International Symposium on Low Power Electronics and Design (ISLPED 2016)*, San Francisco, USA, Aug. 2016
- [C3] **J-G. Park**, C-Y. Hsieh, N. Dutt, S-S. Lim: "Co-Cap: energy-efficient cooperative CPU-GPU frequency capping for mobile games." *Proceedings of the 31st Annual ACM Symposium on Applied Computing (SAC 2016)*, Pisa, Italy, April 2016.
- [C2] C. Hsieh, **J-G. Park**, N. Dutt, and S-S. Lim, "Memory-aware Cooperative CPU-GPU DVFS Governor for Mobile Games", *proceedings of the 13th International Symposium on Embedded Systems for Real Time Multimedia (ESTIMEDIA 2015)*
- [C1] **J-G. Park**, C-Y. Hsieh, N. Dutt, and S-S. Lim, "Quality-aware Mobile Graphics Workload Characterization for Energy-efficient DVFS Design", *Symposium on Embedded Systems for Real Time Multimedia (ESTIMEDIA 2014)*, October 2014.

Academic Teaching and Mentoring Experience

UC Irvine, Computer Science, Teaching Assistant

Sep. 2012 – Jun. 2017

- TA for Embedded Software (17SQ): Taught and tutored lab assignments for 20 undergraduate students
- TA for Python Introduction to Programming (17WQ), Python Intermediate Programming (16SQ and 16FQ) and Python Programming Library (16WQ): Taught and tutored (bi-)weekly lab assignments
- Grader for Discrete Mathematics for CS (14WQ and 14SQ), Critical Writing (13SQ), Computer System Architecture (13WQ) and Digital Logic Design (13FQ and 12FQ): Graded (bi-)weekly homework, quizzes and exams

UC Irvine, Computer Science, I-SURF PhD Mentor

Summer 2015, 2016, 2017

- Mentored and trained 6 undergraduate students on embedded system research projects

- TA for Embedded Systems (2011 SQ): Designed course materials

Honors and Awards

Dean's Fellowship, School of Information and Computer Science at UCI (*Fall 2012 - Spring 2015*)

Graduate School of Engineering Scholarship, CE, Yonsei Univ. (*Fall 2009, Spring 2010, Fall 2010*)

College of Engineering Scholarship, AE, Kookmin Univ. (*Fall 1998*)

Skills

Technical Skills

- **Programming Languages:** ARM/PTX Assembly, C/C++, JAVA, Python, OpenGL ES, OpenCL/CUDA
- **System Software Development:** Firmware, RTOS, Linux Kernel and Device Driver, Android HAL and Middleware Framework, Android NDK and SDK
- **Other skills:** Knowledge of modern GPU HW/SW architectures, HW performance counters and application profiling, Familiarity with graphics/gaming workload suites (GFXBench, 3DMark and Antutu)

Soft Skills

- Embedded System Instructor | Training programming Implementation

Additional Information

- **Leadership Experience:** Served as the President of Department of Computer Engineering at Yonsei Univ.(Fall 2010)
- **Supplementary Education:** Completed SUN Certified Java Programmer (SCJP) Program (Mar. 2001 - Aug. 2001)
- **Challenging Experience:** Explored backpacking trip to European 12 countries by alone (May - Jun. 2000)
- **Military Service:** Discharged as a sergeant in KOREAN ARMY (Nov. 1994 - Jan. 1997)