Atsushi Koshiba

Ph.D. candidate in department of Electronic and Information Engineering,
Tokyo University of Agriculture and Technology

Nationality	Japan	**Address**	2-24-16 Nakacho, Koganei
Date of Birth	16^{th} October 1991		Tokyo, Japan
Membership	Student Member of ACM, IEEE, IPSJ	**Mobile Phone**	+8190 3451 8319
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Education

2016-2019 (expected) Ph.D. in Electronic and Information Engineering
Tokyo University of Agriculture and Technology, Tokyo, Japan
Supervisor: Mitaro Namiki

2014-2016 Master of Computer and Information Sciences
Tokyo University of Agriculture and Technology, Tokyo, Japan
Supervisor: Mitaro Namiki

2010-2014 Bachelor of Computer and Information Sciences
Tokyo University of Agriculture and Technology, Tokyo, Japan
Supervisor: Mitaro Namiki

Experience

Sep. 2017 - Jan. 2018 Microsoft Research Asia, Beijing, China
Intern

Joined Cloud & Mobile Research Group and engaged in a research concerned with Confidential Blockchain Framework.
Supervisors: Ying Yan and Yang Chen

Dec. 2016 - Mar. 2017 Tokyo University of Agriculture and Technology, Tokyo, Japan
Research Assistant

Supervised an undergraduate student and reviewed his bachelor's degree thesis.

Aug. 2016 - Sep. 2016 National Institute of Advance Industrial Science and Technology, Tsukuba, Japan
Intern

Engaged in a research project concerned with an emulator for non-volatile memory.
Supervisor: Takahiro Hirofuchi

Apr. 2015 - Mar. 2016 BUNNYHOP Inc.,
Part-time Software Engineer

Proposed IoT products and developed embedded applications/OSes for the products, and analyzed performance of real-time applications on embedded platforms.

Apr. 2014 - Feb. 2016 Tokyo University of Agriculture and Technology, Tokyo, Japan
Teaching Assistant for Undergraduate Students

Helped students with programming in C language.

Apr. 2014 - Sep. 2015 Tokyo University of Agriculture and Technology, Tokyo, Japan
Tutor for Foreign Students
Supervised two foreign students from China and Thailand.

Research Interest

My research interest is in new operating system features and middlewares for emerging hardware for future computers (e.g., hardware accelerators, non-volatile memory, and energy saving features). Particularly, I have been researching on the following three topics.

(1) OS support for pipeline parallel processing on accelerators (Publications [4]):
Pipeline processing with special-purpose accelerators improves performance of streaming applications, while traditional resource management via device drivers causes frequent user/kernel context switches that reduce the performance gain. We propose a kernel-level accelerator control model that a kernel module manages accelerators from the OS layer until all pipeline stages are done. Our model gets rid of the user/kernel interactions and improves the processing speed by up to 1.8x.

(2) Light-weight software emulator for non-volatile memory (Publications [3]):
Emulation tools of non-volatile memory (NVM) are widely used among researchers. However, existing tools are too slow to emulate large-scale workloads, or too simplistic to emulate the NVM read/write latency asymmetry. Our emulation model overcomes these issues by utilizing performance counters on cache controllers to estimate the number of cache misses that incur write-backs. Our model can emulate the write behavior of practical workloads more accurately than an existing emulation model.

(3) OS-driven dynamic fine-grained power gating control (Publications [1], [2], [7]):
A processor equipped with fine-grained power gating (FGPG) saves the energy consumption by supplying power to its circuit blocks (e.g., ALU) only when they are in use. However, the energy overhead caused by switching power on/off may increase the total energy. We propose an OS process scheduler that monitors the usage of circuit blocks and disables FGPG of a block whose energy overhead is estimated to be high. Out scheduler reduces the power consumption of circuits by up to 17.2%.

Publications

International Journal (Referred)

[1] Atsushi Koshiba, Ryuichi Sakamoto, Mikiko Sato, Kimiyoshi Usami, Hideharu Amano, Masaaki Kondo, Hiroshi Nakamura, and Mitaro Namiki: "An Operating System Guided Fine-Grained Power Gating Control Based on Runtime Characteristics of Applications," IEICE TRANSACTIONS on Electronics, Vol.E99-C, No.8, pp.926-935, 2016.
[2] Atsushi Koshiba, Motoki Wada, Ryuichi Sakamoto, Mikiko Sato, Tsubasa Kosaka, Kimiyoshi Usami, Hideharu Amano, Masaaki Kondo, Hiroshi Nakamura, and Mitaro Namiki: "A Fine-grained Power Gating Control on Linux Monitoring Power Consumption of Processor Functional Units," IEICE TRANSACTIONS on Electronics, Vol.E98-C, No.7, pp.559-568, 2015.

International Conference (Referred)

[3] Atsushi Koshiba, Takahiro Hirofuchi, Soramichi Akiyama, Ryousei Takano, Mitaro Namiki: "Towards Write-back Aware Software Emulator for Non-Volatile Memory," The 6th IEEE Non-Volatile Memory Systems and Applications Symposium (NVMSA 2017), 6 pages, Aug. 2017.
[4] Atsushi Koshiba, Ryuichi Sakamoto, Mitaro Namiki: "Operating System Support for Fine-grained Pipeline Parallelism on Heterogeneous Multicore Accelerators," The European Conference on Computer Systems (EuroSys'17), poster, Apr. 2017.
[5] Shinsuke Hamada, Atsushi Koshiba, Mitaro Namiki: "Basic Design of OS Scheduler for SOTB CPU "GC-SOTB" to Reduce Power Consumption," IEEE Symposium on Low-Power and High-Speed Chips (COOLChips 20), poster, Apr. 2017.
[6] Atsushi Koshiba, Linzhan Guo, Mikiko Sato, Mitaro Namiki: "Energy-saving Control based on Dynamic Prediction with Exponential Smoothing on KVM Virtualized Environment," IEEE Symposium on Low-Power and High-Speed Chips (COOLChips) XIX, poster, Apr. 2016.

[7] Atsushi Koshiba, Jun Tsukamoto, Motoki Wada, Ryuichi Sakamoto, Mikiko Sato, Tsubasa Kosaka, Kondo Usami, Hideharu Amano, masaaki Kondo, Hiroshi Nakamura, Mitaro Namiki: "A Fine-grained Power Gating Control using Leakage Monitor by Linux Process Scheduler," IEEE Symposium on Low-Power and High-Speed Chips (COOLChips) XVII, poster, Apr. 2014.

Skills

- **Expertise**

  Operating systems, Linux device drivers, databases, Intel SGX, FPGA, embedded applications/OSes for ARM and MIPS, KVM/QEMU

- **Software Programming Skills**

  C/C++, Python, Java, JavaScript

- **Hardware Development Skills**

  Verilog-HDL, SystemVerilog, FPGA development tools (Xilinx ISE Design Suite, Vivado Design Suite, Quartus Prime)

- **Platforms**

  Windows, Linux, Mac

- **Languages**

  Japanese (native), English (fluent, TOEIC Score 825/990 in Mar. 2016)

Awards and Honors

- **Award of Excellence for Stars of Tomorrow Internship Program**

  Awarded by Cloud & Mobile research group at Microsoft Research Asia (Jan. 2018)

- **Best Research Award**

  Awarded by Department of Computer and Information Sciences at Tokyo University of Agriculture and Technology (Mar. 2016)
  One student was awarded out of 51 graduate students.

- **Outstanding Research Award**

  Awarded by Department of Computer and Information Sciences at Tokyo University of Agriculture and Technology (Mar. 2015)

Scholarships

- **JSPS Research Fellowship for Young Scientists**

  Sponsored by Japan Society for the Promotion of Science (Apr. 2016 - Mar. 2019 (expected))
  90 students were nominated out of 413 applicants (21.8%).

- **Scholarship Repayment Exemption Based on Outstanding Achievements**

  Sponsored by Japan Student Services Organization (Apr. 2015 - Mar. 2016)

- **Outstanding Student Scholarship**

  Sponsored by Tokyo University of Agriculture and Technology (Mar. 2015)