Atsushi Koshiba, Ph.D.

RESEARCH GROUP LEADER

Chair of Computer Systems, Technical University of Munich (TUM)

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Research interests

Operating systems, computer architectures, heterogeneous computing, hardware accelerators, cloud computing, secure and trusted systems, distributed/disaggregated systems

Education

Tokyo University of Agriculture and Technology *Tokyo, Japan*
PH.D. IN ELECTRONIC AND INFORMATION ENGINEERING *Apr. 2016 - Mar. 2019*
- Advisor: Prof. Mitaro Namiki
- My Ph.D. thesis was **endorsed by IPSJ SIG-OS**.

Tokyo University of Agriculture and Technology *Tokyo, Japan*
MSc DEGREE IN COMPUTER AND INFORMATION SCIENCES *Apr. 2014 - Mar. 2016*
- Advisor: Prof. Mitaro Namiki
- I received **Best Research Award (2016)** from the department.
- I received **Outstanding Research Award (2015)** from the department.

Tokyo University of Agriculture and Technology *Tokyo, Japan*
BSc DEGREE IN COMPUTER AND INFORMATION SCIENCES *Apr. 2010 - Mar. 2014*
- Advisor: Prof. Mitaro Namiki

Research Experience

Technical University of Munich (TUM) *Munich, Germany*
RESEARCH GROUP LEADER/POSTDOC *Feb. 2021 - Present*
- Chair of Computer Science, PI: Prof. Pramod Bhatotia

RIKEN R-CCS *Kobe, Japan*
POSTDOCTORAL RESEARCHER *Apr. 2019 - Jan. 2021*
- Processor Research Team, PI: Dr. Kentaro Sano

Microsoft Research Asia (MSRA) *Beijing, China*
INTERNSHIP *Sep. 2017 - Jan. 2018*
- Advisor: Dr. Ying Yan
- I received **Award of Excellence for Stars** of Tomorrow Internship Program.

National Institute of Advanced Industrial Science and Technology (AIST) *Tsukuba, Japan*
RESEARCH TRAINEE *Apr. 2017 - Mar. 2019*
- Advisor: Dr. Takahiro Hirofuchi

National Institute of Advanced Industrial Science and Technology (AIST) *Tsukuba, Japan*
INTERNSHIP *Aug. 2016 - Sep. 2016*
- Advisor: Dr. Takahiro Hirofuchi

Japan Society for the Promotion of Science (JSPS) *Japan*
JSPS RESEARCH FELLOW (DC1) *Apr. 2016 - Mar. 2019*
- Advisor: Prof. Mitaro Namiki

Publications

International Conferences

A. Koshiba, F. Gust, J. Pritzi, A. Vahldiek-Oberwagner, N. Santos, P. Bhatotia: "Trusted Heterogeneous Disaggregated Architectures," Proceedings of the 14th ACM SIGOPS Asia-Pacific Workshop on Systems (**APSys 2023**), pp.72-79, Aug. 2023.

K. Sano, **A. Koshiba**, T. Miyajima, and T. Ueno: "ESSPER: Elastic and Scalable FPGA-Cluster System for High-Performance Reconfigurable Computing with Supercomputer Fugaku," Proceedings of the International Conference on High Performance Computing in Asia-Pacific Region (**HPC Asia 2023**), pp.140-150, Feb. 2023.

A. Koshiba, T. Hirofuchi, S. Akiyama, R. Takano, and M. Namiki: "Towards Write-back Aware Software Emulator for Non-Volatile Memory," The 6th IEEE Non-Volatile Memory Systems and Applications Symposium (**NVMSA 2017**), oral, Aug. 2017.

Journal Papers

A. Koshiba, T. Hirofuchi, R. Takano, and M. Namiki: "A Software-based NVM Emulator Supporting Read/Write Asymmetric Latencies," IEICE TRANSACTIONS on Electronics, Vol.E102-D, No.12, pp.2377-2388, 2019.

A. Koshiba, R. Sakamoto, M. Sato, K. Usami, H. Amano, M. Kondo, H. Nakamura, and M. 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.

A. Koshiba, M. Wada, R. Sakamoto, M. Sato, T. Kosaka, K. Usami, H. Amano, M. Kondo, H. Nakamura, and M. 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.

Invited Talks

A. Koshiba: *System Software for Leveraging Emerging Hardware Technologies (Japanese)*, Invited talk at SIG-OS workshop, remote, March 2022.

Patents

Y. Yan, Z. Guo, L. Zhou, **A. Koshiba**: "Secure dataset management," US Patent Application #20210073410, Mar 11, 2021.

Fellowships & Grants

2024-2027	**Intel Research Funds for Trustworthy Data Center of the Future (TDCoF),** **Co-PI**, *Trustworthy Disaggregated Heterogeneous Architectures*, Intel	*300K USD*
2020-2021	**Grant-in-Aid for Early-Career Scientists,** **PI**, *Light-weight and Flexible Live Migration for Cloud FPGAs*, JSPS	*4,290K JPY*
2020-2024	**Grant-in-Aid for Scientific Research (A),** **Co-I**, JSPS	*44,720K JPY*
2019-2021	**Grant-in-Aid for Research Activity start-up,** **PI**, JSPS	*2,200K JPY*
2017-2020	**Grant-in-Aid for Scientific Research (B),** **Co-I**, *Creation of non-Neumann FPGA Overlay Architecture for Innovating HPC*, JSPS	*18,720K JPY*
2016-2019	**JSPS Research Fellowship for Young Scientists (DC1),** **PI**, JSPS	*1,900K JPY*

Teaching

WS 2023	**Seminar: Accelerated Computing Systems**, Lecturer
WS 2022	**Prakticum: Computer Systems Lab**, Lecturer
SS 2022	**Seminar: Modern Data Center Systems**, Lecturer
SS 2021	**Prakticum: Advanced Systems Programming in C/Rust**, Lecturer

Mentoring

SS 2023	**Felix Gust**, MSc thesis, *Prototyping a Secure Controller for Trusted Heterogeneous Disaggregated Architectures*	*TU Munich*
SS 2023	**Anand Krishna Rallabhandi**, MSc thesis, *Heterogeneity-Aware Scheduling Algorithms for FPGA Workloads in Cloud Environments*	*TU Munich*
SS 2023	**Bruno Scheufler**, BSc thesis, *Cloud-Native Scheduling for Serverless FPGAs*	*TU Munich*
WS 2022	**Jiong Liu**, MSc thesis, *Evaluation of Data-Intensive Accelerated Functions in Computational Storage Devices*	*TU Munich*
WS 2022	**Yuan Luo**, Guided research, *A Comprehensive Study of Coyote Memory System*	*TU Munich*
WS 2022	**Zirong Cai**, MSc thesis, *Frontend Development of Distributed FPGA Management in Serverless Computing*	*TU Munich*

Service & Outreach

PC Member

2023	**ICDCS**, IEEE International Conference on Distributed Computing Systems
2023	**Middleware**, ACM/IFIP International Middleware Conference
2023	**NVMSA**, IEEE Non-Volatile Memory Systems and Applications Symposium
2022	**COOLChips**, IEEE Symposium on Low-Power and High-Speed Chips and Systems
2020	**CANDAR**, International Symposium on Computing and Networking, CSA workshop
2022-2024	**xSIG**, Cross-disciplinary Workshop on Computing Systems, Infrastructures, and Programming
2021-2023	**ComSys**, Computer Systems Symposium

Board Member

2021-2024	**SIG-OS**, Information Processing Society of Japan (IPSJ)

External Reviewer

2022	**Journal**, IEEJ Transactions on Electronics, Information and Systems
2022	**Journal**, IPSJ Transactions on Advanced Computing Systems (ACS)
2020	**Journal**, IEICE Transactions on Electronics
2019-2022	**Journal**, IEICE Transactions on Information and Systems

Skills

Expertise	OSes (Linux), Hypervisors (KVM, Xen), Unikernels (IncludeOS, Unikraft), Trusted Execution Environments (SGX), FPGA (Xilinx, Altera), Key-value stores (LevelDB), Cloud-native orchestrators (Kubernetes)
SW design	C/C++ (10+ years), Python, Java, shell script, x86/MIPS/ARM assembly
HW design	Verilog HDL (10+ years), SystemVerilog, FPGA IDEs (Vivado, Quartus)
Language	Japanese (native), English (fluent)