张杰

tel: +8619910031394 | email: jiez@pku.edu.cn

张杰博士现任北京大学计算机学院助理教授、特聘研究员、博士生导师，获得优秀青年科学基金海外项目（海外优青）、英特尔学术英才计划荣誉学者、ACM SIGCSE 新星奖、博雅青年学者。他长期从事存储系统和专用处理器的研究和设计，致力于从计算机体系结构层面出发，解决大数据和人工智能时代对于高性能存储系统的需求，突破冯诺依曼体系结构下数据迁移的瓶颈以及内存墙的限制。负责和参与科技部重点研发项目（课题负责人）、国家自然科学基金重点项目（北大负责人）、韩国自然科学基金，得到华为、江波龙、三星电子、海力士、英特尔和西部数据的资助。自 2014 年起，在计算机国际会议及期刊上发表了 50 余篇论文，包括计算机体系结构与系统顶级会议 ISCA（CCF-A，三篇）、OSDI（CCF-A）、 HPCA（CCF-A，七篇）、MICRO（CCF-A，两篇）、ASPLOS（CCF-A）、FAST（CCF-A）、DAC（CCF-A）和 Eurosys（CCF-A），是该方向发表高水平论文最多的青年学者之一。申请人的论文得到美日韩德等国家和地区的学者引用（Google Scholar 他引 609 余次）。引用源包括著名大学研究机构（如伊利诺伊大学、威斯康辛大学、加州大学圣地亚哥分校、宾州州立大学等）的国际知名学者（如 ACM/IEEE fellow）发表于顶级国际会议和期刊（如 OSDI、ISCA、HPCA、FAST、MICRO、ASPLOS 等）的重要论著。论文获 2019 年韩国计算机大会（KCC）最佳演讲论文奖和 2019 年非易失性内存研讨会（NVMW）优秀论文提名奖。在存储领域的研究成果被列为 KAIST50 年重大突破之一，并被多家新闻媒体报道。

工作经历

北京大学，北京，中国 — 助理教授，博导
计算机学院 — 2021 年 7 月–至今
KAIST, Daejeon, Korea — 博后
Electrical Engineering (Computing Division) — March 2020 年 3 月 –2021 年 5 月

教育经历

Yonsei University, Incheon, Korea — **Advisor:** Dr. Myoungsoo Jung
PhD in Engineering — August 2015 – Feb 2020
University of Texas at Dallas, Richardson, Texas — **Advisor:** Dr. Myoungsoo Jung
PhD in Computer Engineering (transfer to Korea) — August 2014 – August 2015
University of Texas at Dallas, Richardson, Texas — **Advisor:** Dr. Myoungsoo Jung
Master of Science in Electrical Engineering — August 2012 – May 2014
Nanjing University of Posts and Telecommunications, Nanjing, China
BS in Communication Engineering (computer communication) — September 2008 – July 2012

论文发表情况

2024

ISCA — **Flagger: Cooperative Acceleration for Large-Scale Cross-Silo Federated Learning Aggregation**

CCF-A 会议

*Xiurui Pan, Yuda An, Shengwen Liang, Bo Mao, Mingzhe Zhang, Qiao Li, Myoungsoo Jung, **Jie Zhang***

IEEE/ACM International Symposium on Computer Architecture

ASPLOS — **Achieving Near-Zero Read Retry for 3D NAND Flash Memory**

CCF-A 会议

*Min Ye, Qiao Li, Yina Lv, **Jie Zhang**, Tianyu Ren, Daniel Wen, Tei-Wei Kuo, Chun Jason Xue*

ACM International Conference on Architectural Support for Programming Languages and Operating Systems

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HPCA **StreamPIM: Streaming Matrix Computation in Racetrack Memory**

CCF-A 会议 *Yuda An, Yunxiao Tang, Shushu Yi, Li Peng, Xiurui Pan, Guangyu Sun, Zhaochu Luo, Qiao Li,* ***Jie Zhang***

IEEE International Symposium on High-Performance Computer Architecture

HPCA **BeaconGNN: Large-Scale GNN Acceleration with Asynchronous In-Storage Computing**

CCF-A 会议 *Yuyue Wang, Xiurui Pan, Yuda An,* ***Jie Zhang****, Glenn Reinman*

IEEE International Symposium on High-Performance Computer Architecture

HPCA **LearnedFTL: A Learning-based Page-level FTL for Reducing Double Reads in Flash-based SSDs**

CCF-A 会议 *Shengzhe Wang, Zihang Lin, Suzhen Wu, Hong Jiang,* ***Jie Zhang****, Bo Mao*

IEEE International Symposium on High-Performance Computer Architecture

HPCA **Midas Touch: Invalid-Data Assisted Reliability and Performance Boost for 3D High-Density Flash**

CCF-A 会议 *QiaoLi, Hongyang Dang, Zheng Wan, Congming Gao, Min Ye,* ***Jie Zhang****, Tei-Wei Kuo, Chun Jason Xue*

IEEE International Symposium on High-Performance Computer Architecture

2023

NVMW **Optimizations of Linux Software RAID System for Next-Generation Storage**

Shushu Yi, Yanning Yang, Yunxiao Tang, Zixuan Zhou, Junzhe Li, Yue Chen, Myoungsoo Jung, ***Jie Zhang****,*

The 14th Annual Non-volatile Memories Workshop

SAC **BcBench: Exploring Throughput Processor Designs based on Blockchain Benchmarking**

Xiurui Pan, Yue Chen, Shushu Yi, ***Jie Zhang****,*

The 38th ACM/SIGAPP Symposium on Applied Computing

CAL **Intelligent SSD Firmware for Zero-Overhead Journaling**

SCI 3 区 *Hanyeoreum Bae, Donghyun Gouk, Seungjun Lee, Jiseon Kim, Sungjoon Koh,* ***Jie Zhang****, Myoungsoo Jung,*

IEEE Computer Architecture Letters (CAL)

2022

HotStorage **ScalaRAID: Optimizing Linux Software RAID System for Next-Generation Storage**

Shushu Yi, Yanning Yang, Yunxiao Tang, Zixuan Zhou, Junzhe Li, Yue Chen, Myoungsoo Jung, ***Jie Zhang****,*

14th USENIX Workshop on Hot Topics in Storage and File Systems (HotStorage 22)

THPC **Survey on Storage-Accelerator Data Movement**

Zixuan Zhou, Shushu Yi, ***Jie Zhang****,*

CCF Transaction on High Performance Computing

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NVMW **Integrating New Photonic-Based Heterogeneous Memory into Throughput Accelerators**

Jie Zhang, Myoungsoo Jung,

The 13th Annual Non-volatile Memories Workshop

NVMW **HAMS: Hardware Automated Memory-over-Storage for Large-scale Memory Expansion**

Jie Zhang, Miryeong Kwon, Donghyun Gouk, Sungjoon Koh, Nam Sung Kim,

Mahmut Taylan Kandemir, Myoungsoo Jung

The 13th Annual Non-volatile Memories Workshop

2021

MICRO **Ohm-GPU: Integrating New Optical Network and Heterogeneous Memory into GPU**

CCF-A 会议 **Multi-Processors**

Jie Zhang, Myoungsoo Jung,

The 54th Annual IEEE/ACM International Symposium on Microarchitecture

ISCA **Revamping Storage Class Memory with Hardware Automated Memory-Over-Storage**

CCF-A 会议 **Solution**

Jie Zhang, Miryeong Kwon, Donghyun Gouk, Sungjoon Koh, Nam Sung Kim,

Mahmut Kandemir, Myoungsoo Jung,

The IEEE/ACM International Symposium on Computer Architecture

NVMW **Architecting Throughput Processors with New Flash**

Jie Zhang, Myoungsoo Jung,

The 12th Annual Non-volatile Memories Workshop

NVMW **DRAM-less Accelerator for Energy Efficient Data Processing**

Jie Zhang, Gyuyoung Park, David Donofrio, John Shalf, Myoungsoo Jung

The 12th Annual Non-volatile Memories Workshop

NVMW **Manycore-Based Scalable SSD Architecture Towards One and More Million IOPS**

Jie Zhang, Miryeong Kwon, Michael Swift, Myoungsoo Jung,

The 12th Annual Non-volatile Memories Workshop

2020

ISCA **ZnG: Architecting GPU Multi-Processors with New Flash for Scalable Data Analysis**

CCF-A 会议 *Jie Zhang, Myoungsoo Jung,*

The IEEE/ACM International Symposium on Computer Architecture

FAST **Scalable Parallel Flash Firmware for Many-core Architectures**

CCF-A 会议 *Jie Zhang, Miryeong Kwon, Michael Swift, Myoungsoo Jung,*

The 18th USENIX Conference on File and Storage Technologies

HPCA **DRAM-less: Hardware Acceleration of Data Processing with New Memory**

CCF-A 会议 *Jie Zhang, Gyuyoung Park, David Donofrio, John Shalf, Myoungsoo Jung*

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26th IEEE International Symposium on High-Performance Computer Architecture

ISPASS **Data Direct I/O Characterization for Future I/O System Exploration**

CCF-C 会议 *Mohammad Alian, Yifan Yuan, **Jie Zhang**, Ren Wang, Myoungsoo Jung, Nam Sung Kim*

The IEEE International Symposium on Performance Analysis of Systems and Software

CAL **FastDrain: Removing Page Victimization Overheads in NVMe Storage Stack**

SCI-3 区 *__Jie Zhang__, Miryeong Kwon, Sanghyun Han, Nam Sung Kim, Mahmut Kandemir and Myoungsoo Jung*

IEEE Computer Architecture Letters (CAL)

2019

HPCA **FUSE: Fusing STT-MRAM into GPUs to Alleviate Off-Chip Memory Access Overheads**

CCF-A 会议 *__Jie Zhang__, Myoungsoo Jung, Mahmut Kandemir,*

25th IEEE International Symposium on High-Performance Computer Architecture

IISWC **Faster than Flash: An In-Depth Study of System Challenges for Emerging Ultra-Low Latency SSDs**

Sungjoon Koh, Junkyeok Jang, Changrim Lee, Miryeong Kwon, __Jie Zhang__, Myoungsoo Jung,

The 2019 IEEE International Symposium on Workload Characterization

DAC **FlashGPU: Placing New Flash Next to GPU Cores**

CCF-A 会议 *__Jie Zhang__, Miryeong Kwon, Hyojong Kim, Hyesoon Kim, Myoungsoo Jung,*

The 56th Design Automation Conference (DAC)

TPDS **Exploring Fault-Tolerant Erasure Codes for Scalable All-Flash Array Clusters**

CCF-A 期刊 *Sungjoon Koh, __Jie Zhang__, Miryeong Kwon, Jungyeon Yoon, David Donofrio, Nam Sung Kim, Myoungsoo Jung,*

IEEE Transactions on Parallel and Distributed Systems (TPDS)

NVMW **Addressing Fast-Detrapping for Reliable 3D NAND Flash Design**

Mustafa Shihab, __Jie Zhang__, Myoungsoo Jung, Mahmut Kandemir,

10th Annual Non-Volatile Memories Workshop -- Nominated as Memorable Paper Award

KCC **Maximizing GPU Cache Utilization with Adjustable Cache Line Management**

__Jie Zhang__, Myoungsoo Jung,

Korean Computer Congress (KCC), 2019 -- Nominated as Excellent Paper Award

2018

OSDI **FlashShare: Punching Through Server Storage Stack from Kernel to Firmware for Ultra-Low Latency SSDs**

CCF-A 会议

__Jie Zhang__, Miryeong Kwon, Donghyun Gouk, Changlim Lee, Mohammad Alian, Myoungjun Chun, Mahmut Kandemir, Nam Sung Kim, Jihong Kim, Myoungsoo Jung,

13th USENIX Symposium on Operating Systems Design and Implementation

MICRO **Amber: Enabling Precise Full-System Simulation with Detailed Modeling of All SSD Resources**

CCF-A 会议

*Donghyun Gouk, Miryeong Kwon, **Jie Zhang**, Sungjoon Koh, Wonil Choi, Nam Sung Kim, Mahmut Kandemir, Myoungsoo Jung,*

The 51st Annual IEEE/ACM International Symposium on Microarchitecture

TACO **ReveNAND: A Fast-Drift Aware Resilient 3D NAND Flash Design**

CCF-B 期刊

*Mustafa Shihab, **Jie Zhang**, Myoungsoo Jung, Mahmut Kandemir,*

ACM Transactions on Architecture and Code Optimization (TACO), 2018

Eurosys **FlashAbacus: A Self-governing Flash-based Accelerator for Low-power Systems**

CCF-A 会议

***Jie Zhang**, Myoungsoo Jung,*

The European Conference on Computer Systems (EuroSys), 2018

IPDPS **CIAO: Cache Interference-Aware Throughput-Oriented Architecture and Scheduling for GPUs**

CCF-B 会议

***Jie Zhang**, Shuwen Gao, Nam Sung Kim, Myoungsoo Jung,*

32nd IEEE International Parallel & Distributed Processing Symposium (IPDPS), 2018

2017

CAL **SimpleSSD: Modeling Solid State Drive for Holistic System Simulation**

SCI-3 区

*Myoungsoo Jung, **Jie Zhang**, Ahmed Abulila, Miryeong Kwon, Narges Shahidi, John Shalf, Nam Sung Kim and Mahmut Kandemir,*

IEEE Computer Architecture Letters (CAL), 2017

IISWC **Understanding System Characteristics of Online Erasure Coding on Scalable, Distributed and Large-Scale SSD Array Systems**

*Sungjoon Koh, **Jie Zhang**, Miryeong Kwon, Jungyeon Yoon, David Donofrio, Nam Sung Kim, Myoungsoo Jung,*

IEEE International Symposium on Workload Characterization (IISWC), 2017

IISWC **TraceTracker: Hardware/Software Co-Evaluation for Large-Scale I/O Workload Reconstruction**

*Miryeong Kwon, **Jie Zhang**, Gyuyoung Park, Wonil Choi, David Donofrio, John Shalf, Mahmut Kandemir, Myoungsoo Jung,*

IEEE International Symposium on Workload Characterization (IISWC), 2017

NPC **An In-depth Performance Analysis of Many-Integrated Core for Communication Efficient Heterogeneous Computing**

CCF-C 会议

***Jie Zhang**, Myoungsoo Jung,*

IFIP International Conference on Network and Parallel Computing (NPC), 2017

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NPC/IJPP **Enabling Realistic Logical Device Interface and Driver for NVM Express Enabled Full System Simulations**

CCF-C 会议

*Donghyun Gouk, **Jie Zhang**, Myoungsoo Jung,*

IFIP International Conference on Network and Parallel Computing (NPC) and Invited for International Journal of Parallel Programming (IJPP), 2017

2016

HPCA **DUANG: Fast and Lightweight Page Migration in Asymmetric Memory Systems**

CCF-A 会议

*Hao Wang, **Jie Zhang**, Gieseo Park, Sharmila Shridhar, Myoungsoo Jung, Nam Sung Kim,*

IEEE Symposium on High Performance Computer Architecture (HPCA), 2016

ASBD **A Study for Block-level I/O Trace Reconstruction on All-Flash Arrays**

*Miryeong Kwon, **Jie Zhang**, Gyuyoung Park, Myoungsoo Jung,*

Workshop on Architectures and Systems for Big Data (ASBD@ISCA), 2016

NVMSA **An In-Depth Study of Next Generation Interface for Emerging Non-Volatile Memories**

*Wonil Choi, **Jie Zhang**, Shuwen Gao, Jaesoo Lee, Myoungsoo Jung, Mahmut Kandemir,*

IEEE Non-Volatile Memory Systems and Applications Symposium (NVMSA), 2016

INFLOW **ROSS: A Design of Read-Oriented STT-MRAM Storage for Energy-Efficient Non-Uniform Cache Architecture**

Jie Zhang, Miryeong Kwon, Chanyoung Park, Myoungsoo Jung, Songkuk Kim,

USENIX Workshop on Interactions of NVM/Flash with Operating Systems and Workloads

INFLOW **Couture: Tailoring STT-MRAM for Persistent Main Memory**

*Mustafa Shihab, **Jie Zhang**, Shuwen Gao, Josep Sloan, Myoungsoo Jung,*

USENIX Workshop on Interactions of NVM/Flash with Operating Systems and Workloads

2015

ASBD **CoDEN: A Hardware/Software CoDesign Emulation Platform for SSD-Accelerated Near Data Processing**

***Jie Zhang**, Damian Szmulewicz, Erick Macias, Myoungsoo Jung,*

The 5th Workshop on Architecture and System for Big Data (ASBD), 2015

PACT **NVMMU: Direct Solid State Disk Access for GPU-Accelerated Data Processing**

CCF-B 会议

***Jie Zhang**, David Donofrio, John Shalf, Myoungsoo Jung,*

The 24th International Conference on Parallel Architecture and Compilation Techniques

ICCD **OpenNVM: An Open-Sourced FPGA-based NVM Controller for Low Level Memory Characterization**

CCF-B 会议

***Jie Zhang**, Gieseo Park, David Donofrio, Mustafa Shihab, John Shalf and Myoungsoo Jung,*

The 33rd International Conference on Computer Design (ICCD), 2015

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PACT-SRC **Integrating 3D Resisteive Memory Cache into GPGPU for Energy-Efficient Data Processing**

***Jie Zhang**, David Donofrio, John Shalf and Myoungsoo Jung,*

International Conference on parallel Architecture and Compilation Techniques (PACT) – ACM SRC 2nd Runner Award, 2015

FAST-WiP **Shared Non-Volatile Mmeory Cache for Energy-Efficient High Throughput GPU Computing**

***Jie Zhang** and Myoungsoo Jung,*

USENIX Conference on File and Storage Technologies Working in Progress (FAST WiP), 2015

2014

HotStorage **Power, Energy, and Thermal Considerations in SSD-Based I/O Acceleration**

***Jie Zhang**, Myoungsoo Jung,*

6th USENIX Workshop on Hot Topics in Storage and File Systems (HotStorage 14), 2014

专利发表情况

- “Memory controlling device and computing device including the same”, Myoungsoo Jung, Donghyun Gouk, Miryeong Kwon, Sungjoon Koh, Jie Zhang, America (US20190171566A1)
- “Flash-based accelerator and computing device including the same”, Myoungsoo Jung, Jie Zhang, America (US10824341B2, US20180321859, US20170285968)
- “基于闪存的加速器和包含其的计算设备”, Myoungsoo Jung, Jie Zhang, China (CN107291424)
- “基于闪存的加速器及包括该加速器的计算设备”, Myoungsoo Jung, Jie Zhang, China (CN109460369)
- “Resistance switching memory-based accelerator”, Myoungsoo Jung, Gyuyoung PARK, Jie Zhang, America (US20180321880A1)
- “PARALLEL PROCESSING UNIT, COMPUTING DEVICE INCLUDING THE SAME, AND THREAD SCHEDULING METHOD”, Jie Zhang, Myoungsoo Jung, America (WO2018021620)
- “MEMORY CONTROL APPARATUS AND COMPUTING DEVICE INCLUDING SAME”, JUNG MYOUNGSOO, GOUK DONGHYUN, KWON MIRYEONG, KOH SUNGJOON, 정명수, JIE ZHANG, 국동현, 권미령, 고성준 장지에, Korea (KR1020180126267)
- “COMPUTING DEVICE, METHOD OF PROCESSING INPUT/OUTPUT REQUEST, AND RECORDING MEDIUM”, Jie Zhang, Myoungsoo Jung, Donghyun Gouk, Miryeong Kwon, Sungjoon Koh, America (pending)
- “FLASH-BASED COPROCESSOR”, Jie Zhang, Myoungsoo Jung, America (pending)
- “FLASH STORAGE DEVICE AND METHOD OF SCHEDULING PAGE VICTIMIZATION”, Jie Zhang, Myoungsoo Jung, America (pending)

研究经历

Research Assistant, Computer Architecture and Memory System Lab **2013 年 9 月 – 2021 年 5 月**

- Cache and memory system optimization in GPGPU and multi-core system.
- Non-volatile memory (including Spin-transfer torque magnetic random-access memory and Phase Change Random Access Memory) characterization and optimization.
- Performance, power and thermal optimizations of Solid State Disk (SSD).

学术活动情况

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Journal Paper Review/Sub-review

- IEEE Transactions on Computer
- ACM Transactions on Storage
- ACM Transactions on Architecture and Code Optimization
- ACM Transactions on Computer Systems
- IEEE Transactions on Parallel and Distributed Systems
- IEEE Computer Architecture Letters
- IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems

Conference Paper Review/Sub-review

- MICRO'24'18 '16
- ISCA'24
- HPCA'24'18 '16
- USENIX ATC'23
- ChinaSys'22
- SAC'22
- HotStorage'20
- DAC'20 '19
- NVMSA'17 '16
- ICCD'19 '18 '17 '15
- IPDPS'18 '16
- DATE'19
- ASPLOS'19 '18 '17

演讲情况

- Invited talk, "ZnG: Architecting GPU Multi-Processors with New Flash for Scalable Data Analysis", Intel Computational Storage Lab, 2020
- Presentation, "ZnG: Architecting GPU Multi-Processors with New Flash for Scalable Data Analysis", ISCA, online, 2020
- Presentation, "DRAM-less: Hardware Acceleration of Data Processing with New Memory", HPCA, San Diego, CA, 2020
- Presentation, "Scalable Parallel Flash Firmware for Many-core Architectures", FAST, Santa Clara, CA, 2020
- Presentation, "FUSE: Fusing STT-MRAM into GPUs to Alleviate Off-Chip Memory Access Overheads", HPCA, Washington DC, 2019
- Presentation, "FlashGPU: Placing New Flash Next to GPU Cores", DAC, Las Vegas, NV, 2019
- Presentation, "Maximizing GPU Cache Utilization with Adjustable Cache Line Management", Jeju, South Korea, 2019
- Presentation, "FlashShare: Punching Through Server Storage Stack from Kernel to Firmware for Ultra-Low Latency SSDs", OSDI, Carlsbad, CA, 2018
- Presentation, "FlashAbacus: A Self-governing Flash-based Accelerator for Low-power Systems", Eurosys, Porto, Portugal, 2018
- Presentation, "CIAO: Cache Interference-Aware Throughput-Oriented Architecture and Scheduling for GPUs", IPDPS, Vancouver, Canada, 2018
- Presentation, "An In-depth Performance Analysis of Many-Integrated Core for Communication Efficient Heterogeneous Computing", NPC, Anhui, China, 2017

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- Presentation, “ROSS: A Design of Read-Oriented STT-MRAM Storage for Energy-Efficient Non-Uniform Cache Architecture”, Inflow, Savannah, GA, 2016
- Presentation, “Couture: Tailoring STT-MRAM for Persistent Main Memory”, Inflow, Savannah, GA, 2016
- Presentation, “CoDEN: A Hardware/Software CoDesign Emulation Platform for SSD-Accelerated Near Data Processing”, ASBD, Portland, OR, 2015
- Presentation, “NVMMU: Direct Solid State Disk Access for GPU-Accelerated Data Processing”, PACT, San Francisco, CA, 2015
- Presentation, “Integrating 3D Resistive Memory Cache into GPGPU for Energy-Efficient Data Processing”, PACT SRC, San Francisco, CA, 2015
- Presentation, “OpenNVM: An Open-Sourced FPGA-based NVM Controller for Low Level Memory Characterization”, ICCD, New York city, NY, 2015
- Presentation, “Shared Non-Volatile Memory Cache for Energy-Efficient High Throughput GPU Computing”, FAST WiP, Santa Clara, CA, 2015
- Presentation, “Power, Energy, and Thermal Considerations in SSD-Based I/O Acceleration”, HotStorage, Philadelphia, PA, 2014

教学经历

- Computer Architecture (Fall’22)
- Introduction of Computer System (Fall’22)
- IIT 3002 Operating Systems (Fall’15, Fall’16)
- IIT 6036 Computer Organization and Design (Fall’15, Fall’16)
- IIT 7024 Advanced System Architecture (Spring’16)

获奖情况

- 2023: 英特尔学术英才计划荣誉学者
- 2022: ACM SIGCSE 新星奖
- 2021: Our storage-class memory research is selected as KAIST breakthrough 50 years
- 2020-2021: Korean BK21+ Scholarship
- 2020: HPCA travel grant
- 2019: Annual Non-Volatile Memories Workshop (NVMW) -- Nominated as Memorable Paper Award
- 2019: Korea Computer Congress (KCC) -- Best Presentation Paper Award
- 2018: OSDI travel grant
- 2015: ACM Student Research Competition 2nd Runner Award