

## Bryan S. Kim

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Institute of Computer Technology  
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### Research Interests

- Storage system and architecture in general; flash memory-based storage in particular
- Scheduling for QoS performance in storage systems and devices
- Storage interface and host-device co-optimization
- Key-value stores and data-intensive applications

### Education

- **Seoul National University** Seoul, South Korea  
*Doctor of Philosophy in Computer Science & Engineering* *Sep. 2014 - Feb. 2018*
  - Advisor: Sang Lyul Min
  - Thesis: An Autonomic SSD Architecture
- **University of California, San Diego** San Diego, USA  
*Graduate Program in Computer Science & Engineering* *Sep. 2009 - Dec. 2012*
  - Advisor: Tajana Šimunić Rosing (2009-2011), Steven James Swanson (2012)
- **Seoul National University** Seoul, South Korea  
*Master of Science in Electrical Engineering & Computer Science* *Sep. 2007 - Aug. 2009*
  - Advisor: Sang Lyul Min
  - Thesis: Efficient Flash Memory Read Request Handling Based on Split Transactions
- **University of California, Berkeley** Berkeley, USA  
*Bachelor of Science in Electrical Engineering & Computer Science* *Sep. 2002 - May. 2006*

### Work Experience

- **Institute of Computer Technology, Seoul National University** Seoul, South Korea  
*Research scientist* *Mar. 2018 - present*
  - Study QoS performance in flash memory-based storages
  - Study performance-reliability tradeoffs in flash memory-based storages
- **SK Telecom** Seong-nam, South Korea  
*Manager (Engineer)* *Apr. 2013 - Sep. 2015*
  - Developed high-performance flash memory controllers for enterprise-class storages.
  - Managed and collaborated with outsource developers for various projects.
  - Participated in M&A due diligences for technical evaluations of assets.
- **Oracle Corporation** Santa Clara, USA  
*Research Intern* *Jun. 2011 - Sep. 2011*
  - Investigated online thread characterization techniques for scheduling with a focus on identifying transient properties as short-lived high-priority tasks can adversely affect the performance of others.
- **Samsung Advanced Institute of Technology** Yong-in, South Korea  
*Research Intern* *Jul. 2010 - Sep. 2010*
  - Modeled, simulated, and analyzed performance, energy, and area characteristics of memory hierarchy and organization based on emerging non-volatile memories.

- **n&k Technology Inc.** San Jose, USA  
*Application Engineer* *Jul. 2006 - Jul. 2007*
  - Collected, modeled, and analyzed semiconductor wafer scatterometry data.
  - Developed prototype metrology system that integrates data from scatterometry and atomic force microscopy.
  - Interacted with global customers as a field engineer and technical support for sales representatives.

## Published Journals and Articles

1. Eyee Hyun Nam, **Bryan S. Kim**, Hyeonsang Eom, and Sang Lyul Min. Ozone (O3): An Out-of-Order Flash Memory Controller Architecture. *IEEE Transactions on Computers*, 60(5): 653-666, 2011.
2. Jin Hyuk Yoon, Eyee Hyun Nam, Yoon Jae Seong, Hongseok Kim, **Bryan S. Kim**, Sang Lyul Min, and Yookun Cho. Chameleon: A High Performance Flash/FRAM Hybrid Solid State Disk Architecture. *IEEE Computer Architecture Letters*, 7(1): 17-20, 2008

## Conference and Workshop Presentations

1. **Bryan S. Kim**. Utilitarian Performance Isolation in Shared SSDs. To appear in *USENIX Workshop on Hot Topics in Storage and File Systems*, 2018
2. **Bryan S. Kim**, Hyun Suk Yang, and Sang Lyul Min. AutoSSD: an Autonomic SSD Architecture. To appear in *USENIX Annual Technical Conference*, 2018
3. **Bryan S. Kim**, Yonggun Lee, and Sang Lyul Min. Framework for Efficient and Flexible Scheduling of Flash Memory Operations. In *IEEE Non-Volatile Memory Systems and Applications*, 2017: 1-5
4. **Bryan S. Kim** and Sang Lyul Min. QoS-aware Flash Memory Controller. In *IEEE Real-Time and Embedded Technology and Applications Symposium*, 2017: 51-62
5. **Bryan S. Kim**, Eyee Hyun Nam, Yoon Jae Seong, Hang Joon Min, and Sang Lyul Min. Efficient Flash Memory Read Request Handling Based on Split Transactions. In *International Workshop on Software Support for Portable Storage*, 2009
6. Joon Ho Um, **Bryan S. Kim**, Sung Gab Lee, Eyee Hyun Nam, and Sang Lyul Min. Flash Memory-Based Development Platform for Homecare Devices. In *IEEE International Conference on Systems, Man, and Cybernetics*, 2008: 2259-2263

## Patents

1. **Bryan S. Kim** and Sang Lyul Min. Semiconductor Device for Scheduling Tasks for Memory Device and System Including the Same. China Patent Application 2018-1-0298334.X; filed Apr. 2018
2. **Bryan S. Kim** and Sang Lyul Min. Semiconductor Device for Scheduling Tasks for Memory Device and System Including the Same. U.S. Patent Application 15/914915; filed Mar. 2018
3. **Bryan S. Kim** and Sang Lyul Min. Semiconductor Device for Scheduling Tasks for Memory Device and System Including the Same. Korea Patent Application 10-2017-0153547; filed Nov. 2017
4. **Bryan S. Kim** and Eyee Hyun Nam. Memory Apparatus and Control Method Thereof. Korea Patent 10-1564574; filed Nov. 2013 and issued Oct. 2015
5. Hongseok Kim, **Bryan S. Kim**, and Eyee Hyun Nam. Memory Apparatus and Control Method Thereof. Korea Patent 10-1531965; filed Nov. 2013 and issued Jun. 2015

6. Jinhyuk Kim, Donggi Lee, Taesung Jung, Byeongse So, Duckhyun Chang, Sang Lyul Min, **Bryan S. Kim**. Memory Device and Program Method Thereof. U.S. Patent 8,493,782; filed Oct 2009 and issued July 2013
7. Jinhyuk Kim, Donggi Lee, Taesung Jung, Byeongse So, Duckhyun Chang, Sang Lyul Min, **Bryan S. Kim**. Memory Device and Program Method Thereof. China Patent 101727983; filed Oct 2009 and issued Jun. 2016
8. Sang Lyul Min, **Bryan S. Kim**, Jinhyuk Kim, Donggi Lee, Taesung Jung, Byeongse So, Duckhyun Chang. Memory Device and Program Method Thereof. Korea Patent 10-1544607; filed Oct. 2008 and issued Aug. 2015

## Research Projects

- **PF-class Heterogeneous High Performance Computer**  
*National Research Foundation of Korea* *Nov. 2016 - present*
  - Design and implement a QoS-aware storage subsystem for burst buffers used in super computers.
- **DRAM-less Flash Memory Storage Device**  
*SK Hynix* *Dec. 2015 - present*
  - Design and implement a fair scheduler for guaranteeing host performance.
  - Implement and evaluate using a combination of simulation based on DiskSim and emulation based ZC706 development board.
- **Variability Expedition**  
*National Science Foundation* *Apr. 2012 - Dec. 2012*
  - Developed a fault injection platform based on OpenSPARC CPU that boots Linux for testing error-resilient software system running on top of error-prone hardware.
- **Heterogenous Memory System**  
*Qualcomm* *Oct. 2009 - Apr. 2011*
  - Explored memory design space using different memory technologies to optimize performance and energy under thermal constraints for embedded processors.
  - Design space explored using M5 system scaled simulator, McPAT power simulator, and SPEC benchmark suite.
- **High Performance Flash Memory SSD Controller**  
*Mtron Corp.* *Oct. 2008 - Aug. 2009*
  - Design and implemented a high-performance flash memory controller based on out-of-order execution.
  - Designed in Verilog RTL, simulated using ModelSim, and implemented and evaluated on a Xilinx Virtex 4 FPGA-based development board.
- **Flash Memory-based Embedded Multimedia Software**  
*IT R&D Program of Korea* *Sep. 2007 - Feb. 2009*
  - Analyzed host system workload and devised experimental methodologies for evaluating Flash-FRAM hybrid architecture.
- **Verification of Flash File System Reliability**  
*LG Electronics* *Sep. 2007 - Feb. 2008*
  - Verified software system integrity of mobile phones under sudden power fluctuations.
  - Designed a NI DAQ-compatible custom PCB for emulating power fluctuations.

## Talks

- **NVM-based Storage Systems for HPC I/O Nodes** Won-ju, Korea  
*SIG on Heterogenous Computing and Storage* Jan. 2018
- **DRAM-less Flash Memory Storage Device** Seong-nam, Korea  
*SK Hynix* Nov. 2017
- **Efficient and Flexible Flash Memory Operation Scheduling** Hsinchu, Taiwan  
*NVMSA* Aug. 2017
- **QoS-aware Flash Memory Controller** Pittsburg, USA  
*RTAS* Apr. 2017

## Mentoring

- **Yonggun Lee (M.S. student)** Seoul National University  
*Programmable Flash Interface and Its Application* Spring 2017

## Teaching Experience

- **Computer Concept and Practice (undergrad)** Seoul National University  
*Lecturer* Spring 2018
- **Computer Concept and Practice (undergrad, online)** Seoul National University  
*Teaching assistant* Spring 2017
- **Digital Systems Design (undergrad)** University of California, San Diego  
*Teaching assistant (rating: 4.75/5.00)* Winter 2012
- **Computer Architecture (graduate)** University of California, San Diego  
*Teaching assistant (rating: 4.51/5.00)* Fall 2011
- **Computer Architecture (undergrad)** Seoul National University  
*Teaching assistant* Spring 2008

## Activities

- **Student Volunteer**  
*International Symposium on Computer Architecture* 2016

## Awards, Honors, and Certifications

- **R&D Strategic Planning** Level 3 certification  
*Strategy and Technology Management Institute* 2014
- **Humantech Paper Award** Silver medal  
*Samsung* 2010
- **NATCAR: Autonomous Vehicle Racing** 3rd place  
*UC Davis & National Semiconductor* 2006

## Additional Information

- U.S. citizen
- Languages: Fluent in English and Korean
- Membership: Member of the IEEE, ACM, and USENIX