

## Bryan S. Kim

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## Research Interests

- Flash and non-volatile memory-based systems
- Data storage systems
- File systems and key-value stores

## Employment History

- **Assistant Professor** Aug. 2019 – present  
*Department of Electrical Engineering & Computer Science* *Syracuse University*
- **Postdoctoral Researcher** Mar. 2018 – June 2019  
*Institute of Computer Technology* *Seoul National University*
- **Manager at Storage Technology Lab** Apr. 2013 – Sep. 2015  
*SK Telecom* *Seongnam, South Korea*
- **Research Intern at Solaris Kernel Team** June 2011 – Sep. 2011  
*Oracle Corporation* *Santa Clara, USA*
- **Research Intern at Semiconductor Lab** July 2010 – Sep. 2010  
*Samsung Advanced Institute of Technology* *Yongin, South Korea*
- **Application Engineer** July 2006 – July 2007  
*n&k Technology Inc.* *San Jose, USA*

## Education

- **Seoul National University**  
*Ph.D. in Computer Science & Engineering* *Feb. 2018*
  - Advisor: the late Prof. Sang Lyul Min
  - Thesis: An Autonomic SSD Architecture
- **Seoul National University**  
*M.S. in Electrical Engineering & Computer Science* *Aug. 2009*
  - Advisor: the late Prof. Sang Lyul Min
  - Thesis: Efficient Flash Memory Read Request Handling Based on Split Transactions
- **University of California, Berkeley**  
*B.S. in Electrical Engineering & Computer Science* *May 2006*

## Funding & Grants

- Bryan S. Kim. **Dynamically-Provisioned SSDs for Container-Native Storage.** Funded by *Samsung through ASIC*, 2021 *Samsung \$100,000*
- Bryan S. Kim. **CNS Core: Small: CPR for Flash-Based Storage Systems.** Funded by *National Science Foundation*, 2020 *NSF \$488,277*

## Publications

- Manoj P. Saha, Adnan Maruf, Bryan S. Kim, and Janki Bhimani. **KV-SSD: What Is It Good For?** To appear in *Design Automation Conference*, 2021 DAC'21
- Hyeongyu Lee, Juwon Lee, Minwook Kim, Donghwa Shin, Sungjin Lee, Bryan S. Kim, Eunji Lee, Sang Lyul Min **SpartanSSD: a Reliable SSD under Capacitance Constraints** In *ACM/IEEE International Symposium on Low Power Electronics and Design*, 2021 ISLPED'21
- Junsu Im, Jooyoung Song, Juhyung Park, Eunji Lee, Bryan S. Kim, and Sungjin Lee. **Modernizing File System through In-Storage Indexing.** In *USENIX Symposium on Operating Systems Design and Implementation*, 2021 OSDI'21
- Jeseong Yeon, Leeju Kim, Youil Han, Hyeon Gyu Lee, Eunji Lee, and Bryan S. Kim. **JellyFish: A Fast Skip List with MVCC.** In *ACM/IFIP International Middleware Conference*, 2020 Middleware'20
- Youil Han, Bryan S. Kim, Jeseong Yeon, Sungjin Lee, and Eunji Lee. **TeksDB: Weaving Data Structures for a High-Performance Key-Value Store.** In *ACM International Conference on Measurement and Modeling of Computer Systems*, 2019 SIGMETRICS'19
- Bryan S. Kim, Eunji Lee, Sungjin Lee, and Sang Lyul Min. **CPR for SSDs.** In *ACM SIGOPS Workshop on Hot Topics in Operating Systems*, 2019 HotOS'19
- Youil Han, Bryan S. Kim, Jeseong Yeon, Sungjin Lee, and Eunji Lee. **TeksDB: Weaving Data Structures for a High-Performance Key-Value Store.** In *Proceedings of the ACM on Measurement and Analysis of Computing Systems*, 3(1): 8:1–8:23, 2019 POMACS'19
- Bryan S. Kim, Jongmoo Choi, and Sang Lyul Min. **Design Tradeoffs for SSD Reliability.** In *USENIX Conference on File and Storage Technologies*, 2019: 281–294 FAST'19
- Bryan S. Kim. **The Human Manual.** In *ACM Crossroads Student Magazine*, 25(1): 34–37, 2018 XRDS'18
- Geonhee Lee, Hyeon Gyu Lee, Juwon Lee, Bryan S. Kim\* and Sang Lyul Min. **An Empirical Study on NVM-based Block I/O Caches.** In *ACM SIGOPS Asia-Pacific Workshop on Systems*, 2018 APSys'18
- Bryan S. Kim, Hyun Suk Yang, and Sang Lyul Min. **AutoSSD: an Autonomic SSD Architecture.** In *USENIX Annual Technical Conference*, 2018: 677–689 ATC'18
- Bryan S. Kim. **Utilitarian Performance Isolation in Shared SSDs.** In *USENIX Workshop on Hot Topics in Storage and File Systems*, 2018 HotStorage'18
- 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 NVMSA'17

- 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 RTAS'17
- Eyee Hyun Nam, Bryan S. Kim, Hyeonsang Eom, and Sang Lyul Min. **Ozone (O3): An Out-of-Order Flash Memory Controller Architecture**. In *IEEE Transactions on Computers*, 60(5): 653–666, 2011 TC'11
- Bryan S. Kim, Eyee Hyun Nam, Yoon Jae Seong, Hang Jun 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 IWSSPS'09
- 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 SMC'08
- 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**. In *IEEE Computer Architecture Letters*, 7(1): 17–20, 2008 CAL'08

## Patents

- Bryan S. Kim and Sang Lyul Min. **Control Device for Dynamically Allocating Storage Space and Data Storage Device Including the Control Device**. Korea Patent Application 10-2018-0116646: filed Sep. 2018; U.S. Patent 10,929,028: filed Feb. 2019 and issued Feb. 2021 Korea: filed  
U.S.: granted
- 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; U.S. Patent 10,635,351: filed Mar. 2018 and issued Apr. 2020; China Patent Application 2018-1-0298334.X: filed Apr. 2018 Korea: filed  
U.S.: granted  
China: filed
- Bryan S. Kim and Eyee Hyun Nam. **Memory Apparatus and Control Method Thereof**. Korea Patent 10-1564574: filed Nov. 2013 and issued Oct. 2015 Korea: granted
- Hongseok Kim, Bryan S. Kim, and Eyee Hyun Nam. **Memory Apparatus and Control Method Thereof**. Korea Patent 10-1531965: filed Nov. 2013 and issued June 2015 Korea: granted
- 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; U.S. Patent 8,493,782: filed Oct. 2009 and issued July 2013; China Patent 101727983: filed Oct. 2009 and issued June 2016 U.S.: granted  
Korea: granted  
China: granted

## Teaching

- **CIS341: Computer Organization & Programming Systems**

Spring 2021

- *I'd really like to take this opportunity to thank you again for all your support during this semester. Your lectures are very interesting and OHs are super helpful. You really make me feel your care and support and I can't express how grateful I am for these.*
- *Thank you for teaching me this semester and always taking the time to meet with me. As I've told you, the complexity of this class challenged me to work my hardest but it was the most rewarding class in my time here in Syracuse. I appreciate all you've done for me so much, and I look forward to being in touch in the future for research and other endeavors!*
- *Thank you so much for all the wonderful lectures and all the help during OHs.*
- *You've been an incredible teacher. Thank you for all the emails you sent me to answer my many questions! Your powerpoint diagrams in class were especially helpful.*
- *I applaud him for the serious effort and thought he takes into his lectures despite students still lost in the dark (again, more of a material thing than it is an instruction thing).*
- *You seem very knowledgeable and like a wealth of information. You are good at teaching, and will slow down if someone vocalizes difficulty understanding the material.*
- *Professor Kim clearly knows a lot about the subject and is very welcoming to students. He allows/promotes students asking questions and can easily give the correct answer. He tries to explain things in multiple different ways to help students understand and cares about the students well being. Overall I appreciate Professor Kim's effort and feel like I have learned a lot from this class.*
- *Overall very interesting class and I am very happy to now know much more about how computers work at the lowest level.*
- *I enjoyed the class and found it very difficult and interesting. There was a lot of difficult concepts and I would have loved if there was a part 2 in this class.*

- **CIS700/CSE791: Storage Systems for Big Data**

Fall 2020

- **CIS341: Computer Organization & Programming Systems**

Spring 2020

- *I wanted to thank you for the semester as this time through the course I'm walking away feeling like I actually learned useful information from the course.*
- *You have been a very helpful and informative professor and out of all the professors I had this year, you were the one who still tried their hardest even after we all had to leave. I hope maybe I will have you again as a professor for one of my classes next year because having one like you is a blessing.*
- *It is something that most people do not think about which I find pretty cool. Although it was a challenge, this was by far my favorite class this semester and one of my favorites I have ever taken. Before taking this class, all I understood about computers were how to put parts together and build them. Learning the major concepts on how components work such as the CPU and cache has changed the way that I understand programming and showed me how complex computers really are. I do see the knowledge of this course being handy in the route I am gravitating towards in the future. Thank you for the great semester.*
- *Your class was a good challenge for me personally and I found the course content and your teaching style incredibly engaging. You are a great professor and I hope you continue to teach at Syracuse.*
- *Bryan Kim is probably one of the nicest, most genuine professors I have ever had here at SU.*
- *I thought the quality of the teaching here was excellent. Though the class seemed challenging for other I found the difficulty to be just right for a sort of bridge course to upper division courses.*

- **CSE791: Storage for Big Data & Cloud Computing**

Fall 2019

- **035.001: Introduction to Computer Science**

Spring 2019

- **035.001: Introduction to Computer Science**

Spring 2018

## Talks

- **CPR for SSDs**  
*ACM Workshop on Hot Topics in Operating Systems* May 2019
- **Towards Performant and Reliable Flash-Based Storages**  
*Technische Universität Dresden* May 2019
- **Taming Performance Variability in SSDs**  
*Soongsil University* Apr. 2019
- **Design Tradeoffs for SSD Reliability**  
*USENIX Conference on File and Storage Technologies* Feb. 2019
- **SSD Reliability Management for Unreliable Flash Memory**  
*Korean Conference on Semiconductors* Feb. 2019
- **Performance Predictability for Flash-Based Storages**  
*University of Wisconsin–Madison* Feb. 2019
- **Performance Predictability for Flash-Based Storages**  
*Syracuse University* Feb. 2019
- **Performance Implications for Flash Memory Error Handling**  
*SK Hynix* Dec. 2018
- **AutoSSD: an Autonomic SSD Architecture**  
*USENIX Annual Technical Conference* July 2018
- **Utilitarian Performance Isolation in Shared SSDs**  
*USENIX HotStorage* July 2018
- **The Balancing Act in SSDs**  
*DGIST* June 2018
- **Evaluating the Performance and Reliability of Flash Storages**  
*SK Hynix* June 2018
- **An Autonomic SSD**  
*KIISE SIG on File and Storage Technology* May 2018
- **NVM-based Storage Systems for HPC I/O Nodes**  
*KIISE SIG on Heterogenous Computing and Storage* Jan. 2018
- **DRAM-less Flash Memory Storage Device**  
*SK Hynix* Nov. 2017
- **Efficient and Flexible Flash Memory Operation Scheduling**  
*IEEE Non-Volatile Memory Systems and Applications* Aug. 2017
- **QoS-aware Flash Memory Controller**  
*IEEE Real-Time and Embedded Technology and Applications Symposium* Apr. 2017

## Institutional Services

- Ph.D. thesis committee
  - Amar Shrestha. *Inference and Learning in Spiking Neural Networks for Neuromorphic Systems.* Fall 2020
  - Amit Ahlawat. *Securing User Interaction Channels on Mobile Platform Using ARM TrustZone.* Fall 2020
- EECS search committee 2020–2021
- Faculty reviewer for SOURCE (undergrad research proposal) 2019–2020

## Academic Services

- Program committee, *IEEE Non-Volatile Memory Systems and Applications Symposium (NVMSA)* 2021
- Editorial Board, *Journal of Systems Research (JSys)* 2021
- Reviewer, *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)* 2019–2020
- Program committee, *Design Automation Conference (DAC)* 2019–2021

## Student Mentoring

- Shao-Peng Yang (*Ph.D., Syracuse University*) Aug. 2021 – present
- Xiangqun Zhang (*Ph.D., Syracuse University*) Aug. 2020 – present
- Omkar Desai (*Ph.D., Syracuse University*) Aug. 2020 – present
- Ziyang Jiao (*Ph.D., Syracuse University*) Aug. 2020 – present
- Minwook Kim (*Ph.D., Seoul National University*) June 2018 – Mar. 2020
- Hyeongyu Lee (*Ph.D., Seoul National University*) Jan. 2018 – Mar. 2020
- Juwon Lee (*M.S., Seoul National University*) Jan. 2018 – Mar. 2020
- Seunggeun Chi (*B.S., Seoul National University*) Jan. 2018 – Dec. 2018
- Geonhee Lee (*M.S., Seoul National University*) Jan. 2018 – July 2018
- Yonggun Lee (*M.S., Seoul National University*) Jan. 2017 – Aug. 2017