

Sangyoon Han

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EDUCATION

University of California, Berkeley Aug 2010 - May 2016

- M.S./Ph.D. in Electrical Engineering and Computer Sciences
- Advisor: Professor Ming C. Wu

Seoul National University Mar 2006 - Aug 2010

- B.S. in Electrical Engineering, Summa cum laude
- GPA: 4.19/4.30 (major), 4.08/4.30 (overall)

ACADEMIC APPOINTMENTS

Daegu Gyeongbuk Institute of Science and Technology (DGIST) Feb 2020 - Current

- Assistant Professor
- Department of Robotics Engineering

Korea Advanced Institute of Science and Technology (KAIST) July 2016 – Feb 2020

- Military research personnel & Postdoc in Physics Department (병역: 전문연구요원/포닥)
- As a mandatory military service required for all Korean male

Berkeley Sensor & Actuator Center (BSAC) Jan 2011 – May 2016

- Graduate student researcher

Center for Energy Efficient Electronics Science (E3S) Jan 2015 – May 2015

- Graduate student researcher

University of California, Berkeley Aug 2011 – May 2016

- Graduate student researcher in Electrical Engineering and Computer Sciences department

University of California, Berkeley Jun 2014 – Dec 2014

- Graduate Student instructor for EE 40 in Electrical Engineering and Computer Sciences department

HONORS & AWARDS

Top Scored Paper at Optical Fiber Communication Conference and Exposition (OFC), 2021

- paper F4A.3, as a corresponding author

Collegiate Inventors Competition, 2015

- Held at United States Patent and Trademark Office (USPTO) (미국 특허청)
- Graduate bronze medal
- Prize: USD 10,000

Corning Outstanding Student Paper Competition, 2014

- Held at Optical Fiber Communication Conference (OFC)
- Finalist (top 6 papers out of 341 papers)

Korea Foundation for Advanced Studies Scholarship (한국고등교육재단 해외유학 장학생), 2010 - 2015

- Full tuition and stipend for five years for graduate study

Top Scored Paper at Optical Fiber Communication Conference and Exposition (OFC), 2015

- paper M2B.4, as a co-author, paper is highlighted in OFC press release

Top Scored Paper, Optical Fiber Communication Conference and Exposition (OFC), 2014

- paper M2K.2, as a first author

Global Leader Scholarship, 2008

- By College of Engineering in Seoul National University
- Financial support for student exchange program at Tsinghua University (China)

University Students Contest of Engineering Mathematics, 2007

- By Korean Mathematical Society
- Excellence award

Early Career Development Scholarship, 2006

- Selected as one of top 16 (GPA rank based) among the entire freshmen students of College of Engineering in Seoul National University

RESEARCH GRANTS

1. Samsung Science & Technology Foundation (삼성미래기술육성사업), Dec 2020 – Dec 2024

- Principal investigator
- 1.4B KRW (~1.4M USD) for 4 years
- Title: On-chip photonic Ising machine for combinatorial optimization problems

2. Future Defense Innovation Technology (미래국방혁신기술개발사업), Aug 2020 – Dec 2021

- Co-principal investigator
- Title: Development of 3D video sensor based on silicon phased array

3. Open research program, KIST Center for Quantum Information, Jan 2021 – Dec 2021

- Principal investigator
- 50M KRW (~50k USD) for 1 years
- Title: Multi-function quantum photonic circuits based on silicon photonics

4. Gibon Research Program, National Research Foundation of Korea, Jun 2017 - May 2020

- Principal investigator
- 50M KRW /year (~50k USD/year) for 3 years
- Title: Brillouin Laser with KiloHertz Linewidth Integrated on Silicon Photonics Platform for Optical Communication Bands

MEDIA APPREARANCES

1. [SPIE New, Apr 13th 2021, "Photonic MEMS switches going commercial"](#)
2. [메디컬투데이, Dec 23rd 2020, "KAIST, 초소형·저전력·저잡음 브릴루앙 레이저 구현"](#)
3. [서울신문, Oct 12th 2020, "DGIST 2020년도 하반기 '삼성미래기술육성사업' 2개 과제 선정"](#)
4. [The Daily Californian, Nov 19th, 2015, "UC Berkeley team wins \\$10,000 for cloud-storage innovation."](#)
5. [Huffington Post, Oct 29th, 2015, "2015 Collegiate Inventors Competition to be Held November 16."](#)

6. [Technically Media](#), Nov 18th, 2015, "Meet the winners of the 2015 Collegiate Inventors Competition."

JOURNAL PUBLICATIONS

1. **S. Han***, J. Beguelin*, L. Ochikubo, J. Jacobs, T. J. Seok, K. Yu, N. Quack, C.-K. Kim, R. S. Muller, and M. C. Wu, "[32 x 32 silicon photonic MEMS switch with gap-adjustable directional couplers fabricated in commercial CMOS foundry](#)," *SPIE J. Opt. Microsyst.*, **2021**, 1(02). *equal contribution, **selected as a front cover**
2. D.G. Kim*, **S. Han***, J. Hwang, I.H. Do, D. Jeong, J.H. Lim, Y.H. Lee, M. Choi, Y.H. Lee, D.Y. Choi, H. Lee, "[Universal light-guiding geometry for on-chip resonators having extremely high Q-factor](#)", *Nat. Commun.*, **2020**, 11, 5933. *equal contribution
3. H. Sattari, T. Graziosi, M. Kiss, T. J. Seok, **S. Han**, M. C. Wu, N. Quack, "[Silicon photonic MEMS phase-shifter](#)," *Optics Express*, **2019**, 27 (13), 18959-18969.
4. **S. Han**, T. J. Seok, C. -K. Kim, R. S. Muller, and M. C. Wu, "[Multicast silicon photonic MEMS switches with gap-adjustable directional couplers](#)," *Optics Express*, **2019**, 27 (13), 17561-17570.
5. S. J. Yoon, J. Lee, **S. Han**, C. K. Kim, C. W. Ahn, M. K. Kim, and Y. H. Lee, "[Non-fluorescent nanoscopic monitoring of a single trapped nanoparticle via nonlinear point sources](#)," *Nature Communications*, **2018**, 9 (1), 2218.
6. **S Han**, T. J. Seok, K. Yu, N. Quack, R. S. Muller, and M. C. Wu, "[Large-scale polarization-insensitive silicon photonic MEMS switches](#)," *Journal of Lightwave Technology*, **2018**, 36 (10), 1824-1830.
7. H. Y. Hwang, J. S. Lee, T. J. Seok, A. Forencich, H. R. Grant, D. Knutson, N. Quack, **S. Han**, R. S. Muller, G. C. Papen, M. C. Wu, and P. O'. Brien, "[Flip chip packaging of digital silicon photonics MEMS switch for cloud computing and data centre](#)," *IEEE Photonics Journal*, **2017**, 9 (3), 1-10.
8. N. Quack, T. J. Seok, **S. Han**, R. S. Muller, and M. C. Wu, "[Scalable row/column addressing of silicon photonic MEMS switches](#)," *IEEE Photonics Technology Letters*, **2016**, 28 (5), 561-564.
9. T. J. Seok, N. Quack, **S. Han**, R. S. Muller, and M. C. Wu, "[Large-scale broadband digital silicon photonic switches with vertical adiabatic couplers](#)," *Optica*, **2016**, 3 (1), 64-70.
10. T. J. Seok, N. Quack, **S. Han**, R. S. Muller, and M. C. Wu, "[Highly scalable digital silicon photonic MEMS switches](#)," *Journal of Lightwave Technology*, **2015**, 34 (2), 365-371.
11. **S. Han**, T. J. Seok, N. Quack, B. W. Yoo, and M. C. Wu, "[Large-scale silicon photonic switches with movable directional couplers](#)," *Optica*, **2015**, 2 (4), 370-375.

CONFERENCE PUBLICATIONS

1. D. U. Kim, M.S. Hong, D. Y. Kim, Y. Park, A. Y. Takabayashi, Y. J. Jeong, J. W. Park, S. J. Han, N. Quack, K. S. Yu and **S. Han**, "8x8 Programmable Multi-Beam Pattern Projection Based on Multicast Silicon Photonic MEMS Switches", *Optical Fiber Communication Conference and Exposition (OFC)*, **2021**, IEEE.
2. D. Y. Kim, Y. Park, D. U. Kim, M.S. Hong, A. Y. Takabayashi, Y. J. Jeong, J. W. Park, S. J. Han, N. Quack, K. S. Yu and **S. Han**, "16-Core Recirculating Programmable Si Photonic MEMS", *Conference on Lasers and Electro-Optics (CLEO)*, **2021**, OSA.
3. Y. Park, D. U. Kim, D. Y. Kim, M.S. Hong, A. Y. Takabayashi, Y. J. Jeong, J. W. Park, S. J. Han, N. Quack, K. S. Yu and **S. Han**, "Fully Reconfigurable Coupled-Resonator Optical Waveguides (CROWs) with 10nW Static Power MEMS", *Conference on Lasers and Electro-Optics (CLEO)*, **2021**, OSA.

4. D. -Y. Choi, **S. Han**, J. Hwang, Y. -H. Lee, D. -G. Kim, I. H. Do, D. Jeong, H. Lee, "[Chalcogenide-silica hybrid planar platform for high performance nonlinear optic devices](#)," *OSA Laser Congress, 2019*, OSA.
5. **S. Han**, D. -G. Kim, J. Hwang, I. H. Do, D. Jeong, Y. -H. Lee, D. -Y. Choi, and H. Lee, "Brillouin lasers based on 11 million-Q on-chip chalcogenide resonators without direct etch process," *International Conference on Optical MEMS and Nanophotonics (OMN), 2019*, IEEE.
6. **S. Han**, D. -G. Kim, J. Hwang, I. H. Do, D. Jeong, Y. -H. Lee, D. -Y. Choi, and H. Lee, "[On-chip stimulated Brillouin lasers based on chalcogenide glass resonators with 10 million Q-factor](#)," *Conference on Lasers and Electro-Optics (CLEO), 2019*, OSA, paper SM4O.2.
7. N. Quack, T. J. Seok, **S. Han**, H. Sattari, T. Graziosi, M. Kiss, R. S. Muller, and M. C. Wu, "[Surface micromachined silicon photonic MEMS: a scalable technology platform for photonic network components](#)," *Photonic Networks and Devices, 2018*, OSA, NeM4F.1.
8. T. Graziosi, H. Sattari, T. J. Seok, **S. Han**, M. C. Wu, and N. Quack, "[Silicon photonic MEMS variable optical attenuator](#)," *Proceedings of SPIE: MOEMS and Miniaturized Systems XVII, 2018*, SPIE, 105450H.
9. H. Sattari, T. Graziosi, M. Kiss, T. J. Seok, **S. Han**, M. C. Wu, and N. Quack, "[Analog silicon photonic MEMS phase-shifter with double-step electrostatic actuation](#)," *International Conference on Optical MEMS and Nanophotonics (OMN), 2017*, IEEE.
10. T. J. Seok, **S. Han**, and M. C. Wu, "[Large-scale silicon photonic switches with MEMS](#)," *IEEE Photonics Society Summer Topical Meeting Series (SUM), 2017*, IEEE.
11. M. C. Wu, T. J. Seok, and **S. Han**, "[Silicon photonic switches for datacenters](#)," *Frontiers in Optics, 2016*, OSA, FTu1D.6.
12. T. J. Seok, H. Y. Hwang, J. S. Lee, A. Forencich, H. R. Grant, D. Knutson, N. Quack, **S. Han**, R. S. Muller, L. Carroll, G. C. Papen, P. O'Brien, and M. C. Wu, "[12x 12 packaged digital silicon photonic MEMS switches](#)," *IEEE Photonics Conference (IPC), 2016*, IEEE.
13. **S. Han**, T. J. Seok, K. Yu, N. Quack, R. S. Muller, and M. C. Wu, "[50x50 polarization-insensitive silicon photonic MEMS switches: design and experiment](#)," *European Conference on Optical Communication (ECOC), 2016*, VDE, Post Deadline paper.
14. J. Jacobs, T. Graziosi, M. Kiss, **S. Han**, T. J. Seok, M. C. Wu, and N. Quack, "Die level release of silicon photonic MEMS," *International Conference on Optical MEMS and Nanophotonics (OMN), 2016*, IEEE.
15. M. C. Wu, T. J. Seok, **S. Han**, and N. Quack, "[MEMS-enabled scalable silicon photonic switches](#)," *Frontiers in Optics, 2015*, OSA, FW3B.2.
16. T. J. Seok, N. Quack, **S. Han**, W. Zhang, R. S. Muller, and M. C. Wu, "[64x 64 low-loss and broadband digital silicon photonic MEMS switches](#)," *European Conference on Optical Communication (ECOC), 2015*, IEEE.
17. M. C. Wu, T. J. Seok, **S. Han**, N. Quack, "[Large-scale, MEMS-actuated silicon photonic switches](#)," *International Conference on Photonics in Switching (PS), 2015*, IEEE.
18. T. J. Seok, N. Quack, S. Han, W. Zhang, R. S. Muller, and M. C. Wu, "[Reliability study of digital silicon photonic MEMS switches](#)," *International Conference on Group IV Photonics (GFP), 2015*, IEEE.
19. N. Quack, T. J. Seok, **S. Han**, W. Zhang, R. S. Muller, and M. C. Wu, "[Row/column addressing of scalable silicon photonic MEMS switches](#)," *International Conference on Optical MEMS and Nanophotonics (OMN), 2015*, IEEE.
20. **S. Han**, T. J. Seok, C. K. Kim, R. S. Muller, and M. C. Wu, "[Multicast 4x 20 silicon photonic MEMS switches](#)," *Conference on Lasers and Electro-Optics (CLEO), 2015*, OSA, Stu1F.1.
21. M. C. Wu, **S. Han**, T. J. Seok, and N. Quack, "[Large-port-count MEMS silicon photonics switches](#)," *Optical Fiber*

Communications Conference and Exhibition (OFC), 2015, IEEE, M2B.3.

22. T. J. Seok, N. Quack, **S. Han**, and M. C. Wu, "[50x 50 digital silicon photonic switches with MEMS-actuated adiabatic couplers](#)," *Optical Fiber Communications Conference (OFC), 2015*, IEEE, M2B4.
23. M. C. Wu, **S. Han**, T. J. Seok, and N. Quack, "[Monolithic large-scale optical switches using silicon photonic MEMS](#)," *OptoElectronics and Communication Conference (OECC), 2014*, IEEE.
24. N. Quack, J. Ferrara, S. Gambini, **S. Han**, C. Keraly, P. Qiao, Y. Rao, P. Sandborn, L. Zhu, S. -L. Chuang, E. Yablonovitch, B. Boser, C. Chang-Hasnain, and M. C. Wu, "[Development of an FMCW LADAR source chip using MEMS-electronic-photonic heterogeneous integration](#)," *GOMACTech Conference, 2014*.
25. **S. Han**, T. J. Seok, N. Quack, B. -W. Yoo, and M. C. Wu, "[Monolithic 50x 50 MEMS silicon photonic switches with microsecond response time](#)," *Optical Fiber Communications Conference (OFC), 2014*, M2K.2.

INVITED TALKS

1. **Gwangju Institute of Science and Technology (GIST) Colloquium**, Gwangju, Korea, "Photonics for Intelligence", April **2021**
2. **Center for Quantum Information at Korea Institute of Science and Technology (KIST)**, Gyeonggi-do, Korea, "Large-Scale Programmable Photonics with Mechano-Optics," Feb **2021**
3. **Agency for Defense Development (ADD) of Korea**, Daejeon, "Mechano-optic devices for large-scale photonic integration", Jan **2021**
4. **Photonics Conference (PC) of Optical Society of Korea (OSK)**, Online, "Ising Machine on Silicon Photonics", Nov **2021**
5. **Center for Quantum Information at Korea Institute of Science and Technology (KIST)**, Gyeonggi-do, Korea, "Large-scale silicon photonic switches for next-generation data centers," Nov **2019**
6. **Seoul National University (SNU)**, Seoul, Korea, "High-Radix Silicon Photonic Switches for Next-Generation Data Centers", Oct **2019**
7. **Optics and Photonics Congress of Optical Society of Korea (OSK)**, Busan, Korea, "On-chip Brillouin Lasers Based on High-Q Chalcogenide Devices", Jul **2019**
8. **Daegu Gyeongbuk Institute of Science and Technology (DGIST)**, Daegu, Korea, "Easing datacenters with large-scale silicon photonic MEMS switches," Jul **2019**
9. **University of California, Berkeley**, California, USA, "High-Q chalcogenide device platform without direct etching process for non-linear and mid-IR applications," for Solid State Technology and Devices Seminar, May **2019**
10. **Korea Advanced Institute of Science and Technology (KAIST)**, Daejeon, Korea, "Large-scale Silicon Photonic MEMS Switches," Sep **2016**
11. **Korea Institute of Science and Technology (KIST)**, Seoul, Korea, "High performance optical devices on silicon photonics platform," Jan **2015**
12. **Electronics and Telecommunications Research Institute (ETRI)**, Daejeon, Korea, "High performance optical devices on silicon photonics platform," Jan **2015**

INTERNATIONAL PATENTS

1. M. C. Wu, **S. Han**, T. J. Seok, N. Quack, B. -W. Yoo, "Silicon-photonics-based optical switch," US patent, **2018**, US10061085B2.

2. T. J. Seok, **S. Han**, M. C. Wu, “Silicon-photonics-based optical switch with low polarization sensitivity”, US patent, **2019**, US20190253775A1.

INDUSTRIAL COLLABORATORS

1. **Opticis Co., LTD.**, Seongnam-Si, Gyeonggi-do, Rep. of Korea.

- Co-developing solid-state high-coherence Brillouin laser on chip
- Roll: Design, fabrication, and measurement of silicon based Brillouin laser
- Supported by fund from Ministry of Science and ICT (과학기술정통부) of Korea

LANGUAGE SKILLS

Chinese (Mandarin): fluent in speaking, reading, and writing

- Three years in overseas Chinese elementary school at Jeonju, Korea.
- One year in elementary school at Harbin, China.
- Half year in Tsinghua University at Beijing, China.

English: fluent in speaking, reading, and writing

Korean: native language