Minsung Kim

Princeton, NJ, USA

https://www.cs.princeton.edu/~minsungk

minsungk@cs.princeton.edu

RESEARCH INTERESTS

Wireless Systems and Networks
Quantum and Emerging Computing Systems
High Performance/Parallel Computing
Distributed Systems and Applied Machine Learning

EDUCATION

Princeton University, NJ Sep. 2017 – (Expected) May. 2023
Ph.D. Student in the Department of Computer Science
Advisor: Prof. Kyle Jamieson (kylej@cs.princeton.edu)

Dissertation: Quantum and Quantum-Inspired Computation for Wireless Networks
FPO Committee: Prof. Kyle Jamieson, Prof. Jennifer Rexford, Prof. Yasaman Ghasempour
Prof. Ravi Netravali, Prof. Lin Zhong (Yale), Dr. Davide Venturelli (NASA/USRA RIACS)

Korea University, Seoul August. 2016
B.E. in Electrical Engineering *with Great Honor & Presidential Best Research Award*
Advisor: Prof. Sangheon Pack (shpack@korea.ac.kr)

Stanford University, CA Summer. 2016
Visiting Student, Electrical Engineering

PROFESSIONAL EXPERIENCE (summer: approx. 3-4 months)

Meta, Ph.D. Software Engineer Intern – Systems and Infrastructure, Menlo Park, CA Summer. 2022

InterDigital Communication, Ph.D. Research Intern – R&I Department, Conshohocken, PA Summer. 2021

National Aeronautics and Space Administration (NASA) – Ames Research Center in Silicon Valley, CA
- Affiliated Researcher, *Quantum Artificial Intelligence Laboratory (QuAIL)* Apr. 2018 – Feb. 2021
- Ph.D. Research Intern, *Quantum Artificial Intelligence Laboratory (QuAIL)* Summer. 2020
- Ph.D. Research Intern, *Quantum Artificial Intelligence Laboratory (QuAIL)* Summer. 2019
- Visiting Scholar, *Universities Space Research Association (USRA)* Summer. 2018

PUBLICATIONS (+: co-first author)

M. Kim, D. Venturelli, J. Kaewell, and K. Jamieson, "Warm-Started Quantum Sphere Decoding via Reverse Annealing for Massive IoT Connectivity," In ACM **MobiCom 2022**, acceptance rate: 17.8% (56/314).

M. Kim+, S. Kasi+, A. Lott, D. Venturelli, J. Kaewell, and K. Jamieson, "Heuristic Quantum Optimization for 6G Wireless Communications," In IEEE **Network** July/August 2021, IF:10.693 (1 of 3 **Invited Papers** in 2021).

M. Kim, S. Mandra, D. Venturelli, and K. Jamieson, "Physics-Inspired Heuristics for Soft MIMO Detection in 5G New Radio and Beyond," In ACM **MobiCom 2021**, acceptance rate: 16.8% (19/113, summer round).

M. Kim, D. Venturelli, and K. Jamieson, "Towards Hybrid Classical-Quantum Computation Structures in Wirelessly-Networked Systems," In ACM **SIGCOMM HotNets 2020**, acceptance rate: 24.8% (30/121).

M. Kim, D. Venturelli, and K. Jamieson, "Leveraging Quantum Annealing for Large MIMO Processing in Centralized Radio Access Networks," In ACM **SIGCOMM 2019**, acceptance rate:14.5% (32/221)

(In progress):

M. Kim, and K. Jamieson, “Finer-Grained Decomposition for Parallel Quantum MIMO Processing," **Invited Paper** (under review)

M. Kim, John Kaewell, and K. Jamieson, “Physics Meets Physical Layer: What’s Next? – Challenges and Opportunities," (under review)

M. Kim, A. Singh, D. Venturelli, J. Kaewell, K. Jamieson, “X-ResQ: Cross Reverse Annealing for Flexibly Parallel Quantum MIMO Processing," (in preparation)

ACADEMIC HONORS AND AWARDS

School of Engineering and Applied Science Award for Excellence, Princeton University Sep. 2022
Annual Award given to Advanced Princeton SEAS Students at Highest Level as Scholars and Researchers [link]

Student Travel Grants: ACM SIGMOBILE Award, Princeton Dean’s Funding Award, Princeton SEAS Award

Qualcomm Innovation Fellowship (North America), Qualcomm, CA Jun. 2021
Winner of QIF 2021 (1 of 16 in North America) for Innovative Research, $100,000 Award [link]

Alumni Scholarship Prize, Korea University Alumni Association (NY) Mar. 2021
Scholarship for Outstanding KU-Alumni Graduate Students in New York Metropolitan Area

Princeton Honorific Fellow Nominee (2021 & 2022), Princeton University 2 Times
Annually Selected Ph.D. Student (1 of 4 in CS Dept.) with Outstanding Performance and Professional Promise

NASA Student Spotlight, NASA Ames Research Center Aug. 2020
Outstanding Research Intern introduced in summer Newsletter from NASA Ames Research Center

Graduate School Fellowship, Princeton University 2017-18 Academic year
Full Fellowship awarded to Incoming Doctoral Students

Great Honor, Korea University Aug. 2016
Graduation with Great Honor Award, GPA: 3.97 / 4.0 (Original Scale 4.34 / 4.5 and 98.2 / 100)

Presidential Best Research Award, Korea University Mar. 2016
Presidential Award for Best Research at Creative Challenger Program (President. Jaeho Yeom)

Semester High Honors, Korea University 8 Times
Exceptional Grades during All Semesters

Qualcomm IT Tour supported by Qualcomm, CA Jul. 2015
Selected Student in S. Korea and Invited Small Conference with Executive Chairman (Dr. Paul Jacobs) [link]

Korea Telecom (KT) Excellence Award Feb. 2016
Best Project & Outstanding Intern at KT

Creative Challenger Scholarships, Korea University Jun. 2015 - Mar. 2016
Research Funding for Creative Independent Research & Scholarships for Best Research (Team TAS Leader)

National Science and Engineering Scholarship, Korea Student Aid Foundation 5 Times
Full Scholarships for Academic Honors

Best Honors Scholarship, LOTTE Foundation 2 Times
Full Scholarships for Academic Honors

Family Scholarships, Korea University 1 Time
KU Admission Scholarship

PATENTS

Provisional US Patent Application 62/845,642 filed May 9, 2019. PCT application PCT/US2020/032398. Leveraging Quantum Annealing for Large MIMO Processing in Cloud-Based Radio Access Networks. **M. Kim**, D. Venturelli, K. Jamieson. Assignee: Princeton University.

OTHER RESEARCH OUTPUTS

M. Kim, K. Jamieson, “Transforming MIMO BPSK Maximum Likelihood Detection into QUBO Form," Department of Computer Science Technical Report TR-010-17, Princeton University 2017.

M. Kim, J. Y. Lee, and H. Kim, “Warning and Detection System for Epidemic Disease," In International Conference on ICT Convergence, ICTC 2016, (undergraduate publication and talk).

GRANTS AND FUNDING

Qualcomm Innovation Fellowship 2021 Award ($100,000)
Award for innovative research “Quantum Computation for Wireless Networks” w/ Srikar Kasi, 2021−2022.
Fellowship mentor: Dr. Naga Bhushan, Vice President of Technology, Qualcomm

National Science Foundation (NSF) Award #1824357 ($372,667) and Award #1824470 ($277,206)
“SpecEES: Collaborative Research: Advancing the Wireless Spectral Frontier with Quantum-Enabled Computational Techniques (QENeTs)”, Oct. 2018−Jul. 2022.
- Conducted experiments and prepared the proposal with (PIs) Prof. Kyle Jamieson and Dr. Davide Ventruelli.

Princeton University SEAS Project X Innovation Fund ($150,000), Feb. 2018−Jan. 2020.
- Conducted experiments and prepared the proposal with (PI) Prof. Kyle Jamieson.

USRA Cycle 3 and Cycle 4 Awards
Research time on a D-Wave Quantum Computer in the USRA-NASA-Google Quantum Artificial Intelligence Laboratory at NASA Ames Research Center, Feb. 2018 (Cycle 3) & Nov. 2020 (Cycle 4).
- Conducted experiments and prepared the proposal with (PI) Prof. Kyle Jamieson.

TALKS

Conference Talks

- ACM MobiCom 22, Sydney, Australia — Oct. 2022
“Warm-Started Quantum Sphere Decoding via Reverse Annealing for Massive IoT Connectivity”

- ACM MobiCom 21, New Orleans, LA — Mar. 2022
“Physics-Inspired Heuristics for Soft MIMO Detection in 5G New Radio and Beyond”

- ACM SIGCOMM HotNets 20, Chicago, IL (virtual due to COVID-19) — Nov. 2020
“Towards Hybrid Classical-Quantum Computation Structures in Wirelessly-Networked Systems”

- NASA Symposium 20, NASA Ames Research Center, CA (virtual due to COVID-19) — Aug. 2020
“Quantum-Inspired Heuristics for Wireless Networks”

- ACM SIGCOMM 19, Beijing, China — Aug. 2019
“Leveraging Quantum Annealing for Large MIMO Processing in Centralized Radio Access Networks”

- ICTC 16, Jeju, Korea — Oct. 2016
“Warning and Detection System for Epidemic Disease”

Invited Talks

- International Network on Quantum Annealing (INQA) at UCL, UK (virtual, scheduled) — Jan. 2023
“Warm-Started Quantum Sphere Decoding via Reverse Annealing for Massive IoT Connectivity”, host: Prof. Paul Warburton

- KAIST, Daejeon, Korea — Oct. 2022
“Quantum and Quantum-Inspired Computation for Wireless Networks”, host: Prof. Sung-Ju Lee

- Qualcomm, CA — May. 2021
“QIF Summit: Quantum Computation for Wireless Networks”, host: Qualcomm

- Princeton University, NJ — Nov. 2020
“Quantum Annealing for MIMO Processing”, host: Princeton Quantum Science and Engineering Group

- Pusan National University, Pusan, Korea — May. 2019
“Wireless Systems and Quantum Computing”, host: Prof. Wonjae Shin

- Korea University, Seoul, Korea Feb. 2016
"CCP Winner: Smart Public Transportation", host: Korea University Center for Teaching and Learning

Special Lectures

- Ajou University, Suwon, Korea May. 2021
"Wireless Communications and MIMO Techniques", Mobile Communications (ECE 432)

TEACHING EXPERIENCE

Teaching Assistant, Department of Computer Science, Princeton University
- Wireless Networks (COS 463) – Precept/Lab Instructor Spring. 2019
- Mobile Computing Design for Assistive Technology (COS IW 07) Fall. 2018
- Network Measurement, Sensing, and Visualization Across the Princeton Campus (COS IW 08) Fall. 2018

KUCTL Voluntary Peer Tutor - Linear Algebra (IMEN15102)**,** Korea University Spring. 2016

SERVICE

Technical Program Committee
- ACM SenSys 2022 (Shadow)
- ACM S^3 Workshop at ACM MobiCom 2022

Reviewer
- IEEE/ACM Transactions on Networking
- IEEE ICASSP
- Springer Quantum Machine Intelligence
- IEEE Internet of Things Magazine
- IEEE Network Magazine
- IEEE Transactions on Communications
- Elsevier ICT Express

OTHER EXPERIENCE

Undergraduate Internship, Department of Wireless Engineering, Korea Telecom Dec. 2015 - Feb. 2016

Intelligence Agent & Translator (Eng), Foreign Affairs Division, National Police Jun. 2012 - Mar. 2014
- Mandatory military service in South Korea (Sergeant at R.O.K Army)

End of CV ***(latest update: 01/2023)***