

# Minsung Kim

Princeton, NJ, USA

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## RESEARCH INTERESTS

Wireless Systems and Networks  
Quantum Computing (Quantum Annealing/Gate Model)  
High Performance/Parallel Computing  
Distributed Systems and Artificial Intelligence

## EDUCATION

### Princeton University, NJ

Sep. 2017 - Present

Ph.D. Student in the Department of Computer Science

Advisor: Prof. Kyle Jamieson ([kylej@cs.princeton.edu](mailto:kylej@cs.princeton.edu))

### 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](mailto:shpack@korea.ac.kr))

### Stanford University, CA

Summer. 2016

Visiting Student, Electrical Engineering

## PROFESSIONAL EXPERIENCE

### Research Intern, InterDigital Communications, Inc., PA

Summer. 2021

Advisor: John Kaewell, Senior Principal - Advisor to CTO ([John.Kaewell@InterDigital.com](mailto:John.Kaewell@InterDigital.com))

### The National Aeronautics and Space Administration (NASA) – Ames Research Center in Silicon Valley, CA

Advisor: Dr. Davide Venturelli, Research Scientist ([davide.venturelli@nasa.gov](mailto:davide.venturelli@nasa.gov))

- Affiliated Researcher, *Quantum Artificial Intelligence Laboratory (QuAIL)* Apr. 2018 – Feb. 2021
- Research Intern, *Quantum Artificial Intelligence Laboratory (QuAIL)* Summer. 2020
- Research Intern, *Quantum Artificial Intelligence Laboratory (QuAIL)* Summer. 2019
- Visiting Scholar, *Universities Space Research Association (USRA)* Summer. 2018

## PUBLICATIONS

(<sup>+</sup>: co-first author)

**M. Kim**, D. Venturelli, J. Kaewell, and K. Jamieson, "Warm-Started Quantum Sphere Decoding via Reverse Annealing for Massive IoT Connectivity," under Review.

**M. Kim**<sup>+</sup>, S. Kasi<sup>+</sup>, A. Lott, D. Venturelli, J. Kaewell, and K. Jamieson, "Heuristic Quantum Optimization for 6G Wireless Communications," In **IEEE Network Magazine**, July/August 2021, IF:10.693 (**Invited Paper**).

**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 deadline).

**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).

## ACADEMIC HONORS AND AWARDS

<b>Qualcomm Innovation Fellowship, Qualcomm, CA</b> Winner of QIF (North America) 2021 for Innovative Research	June. 2021
<b>Alumni Scholarship, Korea University Alumni Association (NY)</b> Scholarship for Exceptional KU Alumni in New York Metropolitan Area	March. 2021
<b>Princeton Honorific Fellow Nominee, Princeton University</b> Selected Doctoral Student (4 in CS Dept.) with the Outstanding Performance and Professional Promise	February. 2021
<b>Student Spotlight, NASA Ames Research Center</b> Outstanding 2020 Research Intern introduced in summer Newsletter from NASA Ames Research Center	August. 2020
<b>Graduate School Fellowship, Princeton University</b> Full Fellowship awarded to Princeton Doctoral Students	2017-2018 Academic year
<b>Great Honor, Korea University</b> Graduation with Great Honor, GPA: 3.97 / 4.0 (Original Scale 4.34 / 4.5 and 98.2 / 100)	August. 2016
<b>Korea University Presidential Best Research Award</b> Best Undergraduate Research at Creative Challenger Program	March. 2016
<b>Semester High Honors, Korea University</b> Exceptional Grades during All Semesters	8 Times
<b>Qualcomm IT Tour supported by Qualcomm, CA</b> Selected Excellent EE/CS Student and Invited Small Conference with Executive Chairman (Dr. Paul Jacobs)	July. 2015
<b>Korea Telecom (KT) Excellence Award</b> Best Project & Outstanding Intern at KT	February. 2016
<b>Creative Challenger Scholarships, Korea University</b> Research Funding for Creative Independent Research & Scholarships for Best Research	Jun. 2015 - Mar. 2016
<b>National Science and Engineering Scholarship, Korea Student Aid Foundation</b> Full Scholarships for Academic Honors – Fall'10, Spring'14, Fall'14, Fall'15, Spring'16	5 Times
<b>Best Honors Scholarship, LOTTE Foundation</b> Full Scholarships for Academic Honors – Spring'11, Fall'11	2 Times
<b>Family Scholarships, Korea University</b> Korea University Entrance Scholarship – Spring'10	1 Time

## 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, IEEE 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", 2021–2022.  
Fellowship mentor: 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**

Proposal selected for 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 21, New Orleans, LA (planned) Jan. 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"
- IEEE ICTC 16, Jeju, Korea Oct. 2016  
"Warning and Detection System for Epidemic Disease"

### **Invited Talks**

- Qualcomm, CA May. 2020  
"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) 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

## **SERVICE**

### **Reviewer**

- IEEE Network Magazine
- IEEE Transactions on Communications

## **OTHER EXPERIENCES**

**Undergraduate Internship**, Department of Wireless Engineering, Korea Telecom Dec. 2015 - Feb. 2016  
Optimized KT's communication systems using wireless network guard system (WING) & antenna tilting.

**Intelligence Agent & Translator (Eng)**, Foreign Affairs Division, National Police Jun. 2012 - Mar. 2014  
Covered special requirement intelligence (SRI) and foreign affairs in Korea. (Military Service in Korea)

*End of CV*

*(latest update: 10/2021)*

**References:**

*Prof. Kyle Jamieson, Professor, Computer Science Dept, Princeton University (kylej@cs.princeton.edu)*

*Dr. Davide Venturelli, Research Scientist, NASA ARC & USRA RLACS (DVenturelli@usra.edu)*

*John Kaewell, Senior Principal-Advisor to CTO, InterDigital (John.Kaewell@InterDigital.com)*

*Prof. Sangheon Pack, Professor, Electrical Engineering Dept, Korea University (shpack@korea.ac.kr)*

## **Links**

**Personal Website**: <https://cs.princeton.edu/~minsungk>

**PAWS Research Group**: <https://paws.cs.princeton.edu/>

**QENeTs Project**: <https://qenets.cs.princeton.edu/index.html>

**LinkedIn**: [linkedin.com/in/minsung-kim-093407132](https://www.linkedin.com/in/minsung-kim-093407132)