

Heasung Kim

📁 <https://github.com/Heasung-Kim> ✉ heasung.kim@utexas.edu

SUMMARY

- Expertise in **federated learning**, **deep learning-based compression**, **reinforcement learning**, and applications to **wireless networks** (e.g., wireless channel compression/resource management).
- Ph.D. student at The University of Texas at Austin possessing a deep understanding of **optimization** and **probability** (4.0/4.0 GPA).
- Extensive hands-on experience in industry such as **InterDigital** and **Samsung**.
- The first author of the top-tier conferences/journals in the fields of machine learning (e.g., **ICML**), Information Theory (e.g., **ISIT**), and wireless communications (e.g., **JSAC**, **Globecom**).
- Highly skilled in programming languages/frameworks (Python, C, PyTorch, TensorFlow, etc.)

EDUCATION

Ph.D. Student, Electrical and Computer Engineering Fall 2021-Present
The University of Texas at Austin, TX, USA
— Recipient of Fellowships/Awards including The UT-Austin Engineering Fellowship

M.S. in Electrical and Computer Engineering 2019
Seoul National University, South Korea
— Recipient of Distinguished M.S. Dissertation Award (The Best M.S. Dissertation Award)

B.S. in Computer and Communication Engineering 2017
Korea University, South Korea

WORK & RESEARCH EXPERIENCE

Intern | InterDigital, NY, USA May 2024-Aug 2024
— Developed advanced conditional diffusion models for lossy compression problems
— Designed and simulated ray tracing channel environments
— Contributed to patent disclosures, with developed models being submitted for patent protection

Graduate Research Assistant | UT Austin, TX, USA Aug 2021-Present
— Created an efficient gradient similarity-based client clustering algorithm to address data heterogeneity in federated learning, ensuring privacy-preserving solutions (published in ICML 2024)
— Developed algorithms for estimating rate-distortion tradeoffs and fixed-rate compression in lossy image compression with side information, with a particular focus on Channel State Information (CSI) compression, yielding substantial performance improvements (published in ISIT 2024 with a Spotlight Talk; extended work under review in IEEE JSAC)

Researcher | Ajou University, South Korea Jun 2021-Aug. 2021
— Applied reinforcement learning with shallow neural networks for wireless resource management, achieving a solution to the power allocation problem (published in the IEEE Journal of Selected Topics in Signal Processing)

Machine Learning Engineer | Network Analytics, Samsung, South Korea. Aug. 2019-Apr. 2021
— Developed reinforcement learning algorithms for resource management in self-organizing networks / designed key point indicator prediction models / Networks data analysis / database construction
— Received an *Excellent (Highest) Grade in 2020 Performance Appraisal*

SELECTED PUBLICATIONS

C8. **Heasung Kim**, Hyeji Kim, and Gustavo De Veciana. “Clustered Federated Learning via Gradient-based Partitioning.” *International Conference on Machine Learning (ICML)*, 2024.

C7. **Heasung Kim**, Hyeji Kim, and Gustavo De Veciana. “Estimation of Rate-Distortion Function for Computing with Decoder Side Information.” In *Proc. IEEE International Symposium on Information Theory (ISIT)*, 2024. (**Spotlight Paper** with a Talk in ISIT Learn to Compress Workshop)

J2. **Heasung Kim**, Taehyun Cho, Jungwoo Lee, Wonjae Shin, and H. Vincent Poor. “Optimized Shallow Neural Networks for Sum-Rate Maximization in Energy Harvesting Downlink Multiuser NOMA Systems.” *IEEE Journal on Selected Areas in Communications (JSAC)*, 2021.

C6. **Heasung Kim**, Hyeji Kim, and Gustavo De Veciana. “Learning Variable-Rate Code for CSI Feedback.” In *Proc. IEEE Global Communications Conference (GLOBECOM)*, pp. 1-6. IEEE, 2022.

SELECTED AWARDS AND HONORS

Grand Prize (First Place), **Smart Museum Implementation** Aug. 2019
National Research Foundation of Korea and The Independence Hall of Korea
— Developed & Designed AI-based image colorization systems for restoring old portraits

Excellence Award (First Place), **Artificial Intelligence Capstone Project** Dec. 2018
SK Telecom Co. Ltd. and Seoul National University (Graduate Course, Topics in Computer and VLSI)
— Developed *on-device* object detection models for smartphones
— Designed interactive user interface using Android Studio (Java) and developed prototypes, including implementation of voice recognition, for a smart speaker-based diet service

Professional Development Award (2024), Friends of Alec Graduate Student Fellowship (2024), Student Travel Grant Award for ISIT (2024), Grad Site Travel Award (2021), The University of Texas at Austin Engineering Fellowship (2021), Samsung Super Rookie Project Second Place Award (2020), Distinguished M.S. Dissertation Award (The Best M.S. Dissertation Award) (2019), Brain Korea 21 Plus Research Scholarship (Fall 2017-Fall 2018), Jin-Air Tuition Fee Scholarship (Fall 2011—Fall 2013, Spring 2016—Spring 2017), Korea University Semester High Honors & Semester Honors (Fall 2016, Spring 2017 & Fall 2012, Fall 2013)

ADDITIONAL PROJECTS

Deep and Reinforcement Learning Techniques for Smart IoT Networks
Funded by the Korean Ministry of Science Mar. 2018—Jul. 2019
— Researched and developed lightweight and shape-constrained artificial neural networks for energy-efficient communications
— Researched power allocation policies based on deep learning for advanced IoT Networks

Development of Artificial Intelligence for Automatic Train Operation
Funded by the Korea Railroad Research Institute Apr. 2018—Dec. 2018
— Developed reinforcement learning algorithms for speed scheduling of railway vehicles
— Implemented real-time packet communications between reinforcement learning agents and a virtual railway simulator that reflects the Korean railway systems

Low-Powered Jamming in Cyber and Electronic Warfare
Funded by the Korean Agency for Defense Development Jan. 2018—Dec. 2018
— Designed algorithms for low-powered jamming using generative adversarial neural networks, which generate fake signals that mimic enemy signals
— Implemented jamming scenarios on GNU Radio simulator with C/C++

TEACHING EXPERIENCE

Teaching Assistant, **Introduction to Reinforcement Learning** (430.758) Spring 2019
Graduate Course, Seoul National University
— Ran Teaching Assistant session for over 70 students, answered questions in person and online, graded assignments and projects, and proctored exams

Teaching Assistant, **Introduction to Communications** (420.317.002) Fall 2017
Undergraduate Course, Seoul National University
— Answered questions in person and online, graded assignments, and proctored exams

SKILLS

Programming languages, machine learning frameworks
— Python, C/C++, Java, Matlab, TensorFlow, PyTorch, scikit-learn, Sionna

Expertise Areas

— Federated Learning, lossy image compression, reinforcement learning, resource management (scheduling), time-sequence prediction, signal/image generation (generative models), object detection