Hyeongheon Cha

Ph.D. student

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RESEARCH INTEREST SUMMARY

Passionate about developing **On-device AI Solution**, aiming to create **cutting-edge, adaptable, and efficient software for real-world environments.**

EDUCATION

03/2022 – present **Korea Advanced Institute of Science and Technology (KAIST)** Daejeon, Republic of Korea
M.S. and Ph.D. in School of Electrical Engineering
Advisor: Sung-Ju Lee

03/2017 – 02/2022 **Korea Advanced Institute of Science and Technology (KAIST)** Daejeon, Republic of Korea
B.S. in School of Electrical Engineering
GPA: 3.85/4.3

PROJECTS

07/2025 – Present **Seamless Healthcare: Wearable Sensing and AI for Everyday Wellness**
Research intern at Microsoft Research Asia, Wireless Communication and Sensing Group (Advisor: prof. Lili Qiu)
- Exploring earphone-based end-to-end bio-sensing AI systems for applications such as auditory hallucination detection, silent speech decoding, and emotion recognition.
- Developing robust foundation models for physiological ExG signals, including EEG, EOG, and EMG.

01/2024 – 07/2025 **Efficient Domain Adaptation Framework for Real-Time Applications**
Project leader in KAIST Network and Mobile System Lab
- Aim to develop a novel efficient on-device domain adaptation (test-time adaptation) strategy for real-time mobile applications, balancing model accuracy and inference speed.
- Exploring model adaptation algorithms that enable low-latency inference on resource-constrained devices.

05/2022 – 03/2024 **Translating Knowledge from Large-Scale Images to IMU Sensing Applications**
Project member in KAIST Network and Mobile System Lab
- Developed a specialized semi-supervised algorithm for IMU-based tasks.
- Implemented state-of-the-art Contrastive Learning algorithms and conduct evaluations.
- Developed an inference application for demo and on-device benchmarking on smartphones.

09/2023 – present **UWB-Based Personal Mobility Warning System for Pedestrians**
Project member in KAIST Network and Mobile System Lab
- Utilizing UWB-based sensing technology to detect approaching personal mobility devices and proactively alert pedestrians, thereby preventing potential collisions and enhancing urban safety.

02/2021 – 09/2023 **Development of Drone/Smartphone based Hidden Camera Detection System**
Project member in KAIST Network and Mobile System Lab
- Built & trained several lightweight AI models to distinguish camera lenses from ordinary reflective objects.
- Developed an application for real-time inference on Android smartphone/drone platforms using that model.

02/2020 – 12/2020 **Development of Automatic Stethoscope Blood Pressure Measuring System**
Leader of Inbody Co., Future Innovation Team Interns
- Crafted fully operational prototype chair with the tablet application.
- Implemented software functions included estimating heart height using the front camera (AI based facial tracking), controlling a laser and motor module using BLE communication, and managing measurement results with the cloud server.

09/2023 – 11/2023 **Domain-aware Contrastive Federated Learning with Major Domain Group Selection Approach in Extreme Non-iid Conditions**
Final project of Advanced Big data – AI Integration class
- Developed a novel model contrastive federated learning approach considering domain-wise non-iidness, and suggested Major Domain Group-based client selection method, which appropriately selects half of the clients from the major.

02/2023 – 12/2024 **Development of Networking Technology for Micro-Scale Cluster Robots**
Project leader in KAIST Network and Mobile System Lab
- Developed distributed resource allocation algorithms, routing protocols, and routing metrics suitable for cluster robot operation.
- Performed network analysis using the NS3 simulator.

PUBLICATIONS

SNAP: Low-Latency Test-Time Adaptation with Sparse Updates
Hyeongheon Cha, Dong Min Kim, Hye Won Chung, Taesik Gong, and Sung-Ju Lee
The Thirty-Ninth Annual Conference on Neural Information Processing Systems (NeurIPS '25)

From Vision to Motion: Translating Large-Scale Knowledge for Data-Scarce IMU Applications
Hyungjun Yoon, Hyeongheon Cha, Canh Hoang Nguyen, Taesik Gong, and Sung-Ju Lee
IEEE Transactions on Mobile Computing

Poster: Time-Efficient Sparse and Lightweight Adaptation for Real-Time Mobile Applications
Hyeongheon Cha, Taesik Gong, and Sung-Ju Lee
International Conference on Mobile Systems, Applications, and Services (MobiSys'24) Posters

Sherlock: Automated Hidden Camera Detection with Shutter Speed Adaptation
Sooyoung Park, Hyeongheon Cha, Sriram Sami, Jun Han and Sung-Ju Lee
Preprint

PROFESSIONAL EXPERIENCE

07/2025 – Present **Microsoft Research Asia, Wireless Communication and Sensing Group** — Shanghai, China
Research Intern

02/2021 – 02/2022 **KAIST, Network and Mobile System Lab** — Daejeon, Republic of Korea
Undergraduate Research Intern

02/2020 – 08/2020 **InBody Co., Future Innovation Team** — Seoul, Republic of Korea
Research Intern

08/2019 – 09/2019 **KAIST, Smart and Mobile System Lab** — Daejeon, Republic of Korea
Individual Research Intern

AWARDS & HONORS

2024 **Inseong Scholarship**
Korea Advanced Institute of Science and Technology
Top 20 (0.2%) out of 8000+ graduate students in KAIST

2022 **Magna Cum Laude**
Korea Advanced Institute of Science and Technology

2019 **Noyeop Cultural Foundation Scholarship**
Noyeop Cultural Foundation
Top 25 undergraduate students in the Republic of Korea, provided until graduation

2017 **Dean's list**
Korea Advanced Institute of Science and Technology
Top 2% outstanding students among KAIST students admitted in 2017

TEACHING EXPERIENCES

2022 **Mobile Computing, Sensing, Learning, and Interactions (EE595)**
Teaching Assistant at KAIST (Instructor: Prof. Sung-Ju Lee)

2022 **Computer Networks (EE323)**
Teaching Assistant at KAIST (Instructor: Prof. Sung-Ju Lee)

2023 **Programming Structures for Electrical Engineering (EE209)**
Teaching Assistant at KAIST (Instructor: Prof. Sung-Ju Lee)

LEADERSHIP EXPERIENCE

2025 – 2025 **Graduate Student Council Member**
KAIST School of Electrical Engineering

2024 – 2024 **Graduate Student Council President**
KAIST School of Electrical Engineering

2020 – 2020 **Team Leader**
InBody Co., Future Innovation Team

2018 – 2019 **Undergraduate Student Council President**
KAIST School of Electrical Engineering

2018 – 2019 **Freshman Program Designer**
Korea Institute of Science and Technology
Design and operate special classes and programs for KAIST freshmen

SKILLS

Programming — Python, C, C++, Java | **Machine Learning** — Pytorch, Tensorflow (Lite), NCNN |
Hardware Prototyping — Arduino, RaspberryPi, Zetson, Qorvo | **Network Simulation** — NS3 simulator