

Hyomuk Kim

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INTERESTS

Robot Perception (Visual SLAM), Motion Planning & Trajectory Optimization, Embodied AI, Robot Learning (RL, Generative Models), and Safe Real-Time Systems.

EDUCATION

University of California, San Diego

Master of Science in Electrical and Computer Engineering

La Jolla, CA

Sep 2025 – Expected Jun 2027

- Track: Intelligent Systems, Robotics, and Control (EC80)
- Advisor: Prof. Nikolay Atanasov (Existential Robotics Laboratory)
- Relevant Coursework: Sensing & Estimation in Robotics, Planning & Learning in Robotics, Statistical Learning, Random Processes, Mechanics of Robotics, Deep Generative Models, Machine Learning, Linear Systems Theory

Chung-Ang University

Bachelor of Science in Electrical and Electronics Engineering

Seoul, Republic of Korea

Mar 2007 – Feb 2011

- Cadet in the Army ROTC 49th program

RESEARCH EXPERIENCES

Robot Intelligence Team, Robot Center, Samsung Research

Staff Software Engineer

Seoul, Republic of Korea

Apr 2021 – Present

Project: **Autonomous Mobile Robot Navigation** (Advisor: [Dr. Junghyun Kwon](#))

- Led the architecture and C++ implementation of a visual SLAM system, incorporating feature extraction, descriptor matching, and pose estimation using Ceres, Eigen, OpenCV, and ROS2.
- Validated the visual SLAM module on mobile robots in diverse indoor environments, addressing critical matching and tracking issues while benchmarking performance against state-of-the-art algorithms.
- Optimized the core navigation stack by redesigning the Dynamic Window Approach (DWA) motion planner's cost function and refactoring the LiDAR-based Monte-Carlo Localization (MCL) module to ensure robust performance.
- Enhanced overall navigation efficiency by developing a recovery planner to handle edge-case failures and tuning system parameters for complex configurations.

Global AI Center, Samsung Research

Software Engineer

Seoul, Republic of Korea

Jan 2020 – Apr 2021

Project: **Brain-Machine Interface** (Advisor: [Dr. Daniel D. Lee](#))

- Built and evaluated brain-machine interface prototypes for speech imagery (EEG) and hand gesture recognition (EMG) using hardware from *OpenBCI* and *BITalino*.
- Established data collection paradigms and trained convolutional neural networks (CNNs) to extract features, successfully demonstrating system feasibility through user testing.

Project: **Voice Command Recommendation for AI Assistant Users** (Advisor: [Dr. Inchul Hwang](#))

- Engineered a novel voice command recommendation system for the *Bixby* AI assistant by analyzing large-scale pretrained interactions and real-time logs.
- Leveraged auto-encoders to extract latent vectors and established a dictionary using TF-IDF scores to identify specific user patterns, deploying a prototype Android application in Java.

Language & Voice Team, Global AI Center, Samsung Research

Software Engineer

Seoul, Republic of Korea

Apr 2018 – Jan 2020

Project: **Neural Speech Synthesis** (Advisor: [Dr. Chanwoo Kim](#))

- Developed and commercialized an edge-optimized neural TTS engine deployed on millions of Samsung mobile devices, building on deep generative models such as *WaveNet* and *LPCNet*.
- Handled the full pipeline for AI voice services, from data collection and DNN model training (Python/TensorFlow) to optimizing C++ deployment using intrinsic functions.
- Evaluated synthesized voice quality through rigorous hyperparameter tuning and Mean Opinion Score (MOS) testing.

PROFESSIONAL EXPERIENCES

TV R&D Lab., Visual Display Div., Samsung Electronics
Hardware Engineer

Suwon, Republic of Korea
Apr 2013 – Apr 2018

- Drove system validation for 5 consecutive flagship TV launches, ensuring robust global mass production.
- Resolved critical hardware issues by measuring and analyzing picture/sound quality, electromagnetic interference (EMI), wireless connectivity, DC power sequences, and overall device compatibility.
- Managed the full PCB lifecycle, including schematic review, layout modification, and system bring-up, applying design changes via CAD to guarantee optimal performance for complex TV systems.

C-Lab., Visual Display Div., Samsung Electronics
Project Leader

Suwon, Republic of Korea
Jun 2014 – Jun 2015

Project: **User Contents Archive Platform on TV System** (Advisor: [Dr. Kwan Min Lee](#))

- Led project in developing concept and prototype with team of 2 planners and 3 developers.
- Refined service concept, designed information architecture and user interface, and implemented seamless multi-device connection and broadcasting between users via channel for archiving and sharing user content.

PATENTS

- [1] **Hyomuk Kim**, Aron Baik.
Robot, Robot System And Controlling Method Thereof. 🌐 [US20240148213A1](#), *May 2024.*
 - Robot System as a Mothership and Controller of Microbots.
- [2] **Hyomuk Kim**, Woojeong Kim, Jewoong Ryu, Mideum Choi, Aron Baik.
Robot Device Operating In Mode Corresponding To Position Of Robot Device And Control Method Thereof. 🌐 [US20240036585A1](#), *Feb 2024.*
- [3] Eunsol Chang, Youngil Koh, **Hyomuk Kim**, Mideum Choi.
Movable Robot And Controlling Method Thereof. 🌐 [US20230356391A1](#), *Nov 2023.*
 - Method for Reducing Redundant Directional Decisions to Enhance Obstacle Avoidance in Mobile Robots.
- [4] Mideum Choi, **Hyomuk Kim**, Jewoong Ryu, Aron Baik.
Electronic Device And Control Method Therefor. 🌐 [US20230333567A1](#), *Oct 2023.*
 - Method of Yield Planning for Mobile Robots.
- [5] Boseong Jeon, **Hyomuk Kim**.
Motion Generation Method for Active Screen Extension by Multiple Movable Projectors. *Application In Process, Oct 2023.*
- [6] Woojeong Kim, Haeyeon Gim, **Hyomuk Kim**, Keunchan Oh.
Robot Cleaner and Cleaning Method Thereof. *KR10-2023-0106202, Aug 2023.*
 - Method for Improving Coverage Rate of Cleaning Robots by Their Moving Things on the Floor.
- [7] Soonbeom Kwon, Aron Baik, Dohoon Kim, **Hyomuk Kim**, Hyunki Hong.
Robot And Control Method Thereof. 🌐 [WO2023003158A1](#), *Jan 2023.*
 - Real-Time Minimum-Time Path Planning with Obstacle Information Incorporation.
- [8] Keunseok Cho, Dongseop Lee, **Hyomuk Kim**, Yusun Son, Dojun Yang, Ziwon Hyung.
Electronic Device And Control Method Therefor. 🌐 [WO2022186580A1](#), *Sep 2022.*
 - Method and Apparatus for Optimizing Environment and Content Based Brainwave Signal Recognition.
- [9] Dongseop Lee, Ziwon Hyung, **Hyomuk Kim**, Dojun Yang, Keunseok Cho.
Electronic Device And Control Method Therefor. 🌐 [WO2022080659A1](#), *Apr 2022.*
 - Method for Auto-Verification of AI Assistant's Capability.
- [10] Dongseop Lee, **Hyomuk Kim**.
Electronic Device And Control Method Therefor. 🌐 [WO2022050644A1](#), *Mar 2022.*
 - Method for Anthropometry-Based Personalized Posture Correction.
- [11] **Hyomuk Kim**, Seongjin Park, Soyoon Eo, Seungyeon Jeong, Yeonseok Choi, Taehun Kang, Hyejeong Lee, Kwanmin Lee.
Display Apparatus And Control Method Thereof. 🌐 [US20170026528A1](#), *Jan 2017.*
 - Method and Apparatus of Forming Digital Albums Based on Display Unit.

CERTIFICATES

- Nanodegree in Robotics Software Engineer**, Udacity *Online*
• Learned localization, mapping, planning with C++, ROS, and Gazebo. 🎓 [Certificate](#) *Sep 2021 – Dec 2021*
- The Complete Self-Driving Car Course - Applied Deep Learning**, Udemy *Online*
• Learned to use DL, CV and ML techniques with Python 🎓 [Certificate](#) *Jan 2022 – Mar 2022*
- Beginning C++ Programming - From Beginner to Beyond**, Udemy *Online*
• Learned modern C++ OOP and STL skills. 🎓 [Certificate](#) *Apr 2022 – Jun 2022*

SKILLS

Languages: C/C++, Python, MATLAB, Java, LaTeX

Robotics: Visual SLAM (OpenCV, Ceres, Eigen), Motion Planning, Navigation Stack, ROS/ROS2, Gazebo

AI & ML: PyTorch, TensorFlow, Keras, Deep Generative Models, Computer Vision, NLP

Systems: System Bring-up & Validation, Sensor Integration (Camera, LiDAR, IMU), Circuit Design, CAD

Tools & Practices: Linux, Docker, Git, CMake, GDB, AWS MTurk, Android Studio

MILITARY SERVICE

- Reconnaissance Battalion**, 60th Div., Republic of Korea Army Goyang, Republic of Korea
First Lieutenant, Communication Platoon Leader *Mar 2011 – Jun 2013*
• Managed communication systems and trained military personnel.

AWARDS & HONORS

- Super Rookie Project Award**, Samsung Electronics (2nd Prize) *Apr 2014*
• For presenting an outstanding TV service concept of user contents archive platform with flexible interfaces.
• With this prize, my team got a chance to work on the project in C-Lab. (great honor for rookies!)