# Min-Sung Yoon

# Ph.D. CANDIDATE · SCHOOL OF COMPUTING (SoC), KAIST

Bldg E3-1, 291 Daehak-ro, Yuseong-gu, Daejeon 34141, South Korea

"Passionate about bridging AI and robotics to enhance quality of life."

Research Keywords: motion & path planning, deep reinforcement learning,
navigation under uncertainty, energy-efficient multi-modal locomotion, and safe remote manipulation

# Education \_

#### **KAIST (Korea Advanced Institute of Science and Technology)**

Daejeon, South Korea

Ph.D. IN COMPUTER SCIENCE

• Advisor: Prof. Sung-Eui Yoon

Mar. 2022 - Present

Total GPA: 4.1 / 4.3

#### **KAIST (Korea Advanced Institute of Science and Technology)**

Daejeon, South Korea Mar. 2020 - Feb. 2022

M.S. IN COMPUTER SCIENCE

· Advisor: Prof. Sung-Eui Yoon

Total GPA: 4.0 / 4.3Inha University

Incheon, South Korea

B.S. IN INFORMATION AND COMMUNICATION ENGINEERING (ICE)

Mar. 2015 - Feb. 2019

Major GPA: 4.48 / 4.5, Total GPA: 4.34 / 4.5

# **Honors & Awards**

2023	Outstanding Planning Paper Award, IEEE International Conference on Robotics and Automation (ICRA)  Title: "Learning-based Initialization of Trajectory Optimization for Path-following Problems of Redundant Manipulators"	UK
2022	<b>Outstanding Navigation Paper Finalist Award,</b> IEEE International Conference on Robotics and Automation (ICRA)  Title: "Confidence-Based Robot Navigation Under Sensor Occlusion with Deep Reinforcement Learning"	USA
2018	Best Comprehensive Design Award (1st Place, Graduation Project), Inha University, ICE Title: "Platooning with Autonomous Driving"	S.Korea
2017	National Science & Technology Scholarship, Ministry of Science and ICT Full funding support for 5th–8th semesters	S.Korea
2016	<b>Dean's List,</b> Inha University, College of IT Engineering (Fall Semester)	S.Korea
2016	Dean's List, Inha University, College of IT Engineering (Spring Semester)	S.Korea
2016	Academic Excellence Scholarship, Inha University, ICE Full funding support for 3rd-4th semesters	S.Korea
2015	Academic Excellence Scholarship, Inha University, ICE Two-thirds funding support for 2nd semester	S.Korea

# **Publications**

#### **International Papers**

# [1] Enhancing Navigation Efficiency of Quadruped Robots via Leveraging Personal Transportation Platforms

MINSUNG YOON AND SUNG-EUI YOON

IEEE International Conference on Robotics and Automation (ICRA), 2025

#### [2] Learning-based Adaptive Control of Quadruped Robots for Active Stabilization on Moving Platforms

**MINSUNG YOON**, HEECHAN SHIN, JEIL JEONG, AND SUNG-EUI YOON IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2024 Agile Robotics Workshop @ ICRA, 2024

# [3] Navigation Among Movable Obstacles with Mobile Manipulator using Learned Robot-Obstacle Interaction Model

TAEGEUN YANG, MINSUNG YOON, JEIL JEONG, AND SUNG-EUI YOON

Mobile Manipulation and Embodied Intelligence (MOMA.v2) Workshop @ ICRA, 2024

#### [4] Analysis of Terrain-Aware Optimal Path Planning Methods for Stable Off-Road Navigation

**MINSUNG YOON**, TAEGEUN YANG, CHANMI LEE, HYUNSIK SON, AND SUNG-EUI YOON Off-Road Autonomy Workshop @ IEEE Intelligent Vehicles Symposium (IV), 2024

# [5] Learning-based Initialization of Trajectory Optimization for Path-following Problems of Redundant Manipulators

MINSUNG YOON, MINCHEUL KANG, DAEHYUNG PARK, AND SUNG-EUI YOON

IEEE International Conference on Robotics and Automation (ICRA), 2023 – Outstanding Planning Paper Award, Top 1.1% (15 of 1,345 papers)

#### [6] Towards Safe Remote Manipulation: User Command Adjustment based on Risk Prediction for Dynamic Obstacles

MINCHEUL KANG, MINSUNG YOON, AND SUNG-EUI YOON

IEEE International Conference on Robotics and Automation (ICRA), 2023

#### [7] Confidence-Based Robot Navigation Under Sensor Occlusion with Deep Reinforcement Learning

Hyeongyeol Ryu, Minsung Yoon, Daehyung Park, and Sung-Eui Yoon

IEEE International Conference on Robotics and Automation (ICRA), 2022 – Outstanding Navigation Paper Finalist Award, Top 2.7% (39 of 1,428) Selected as one of the KAIST 2023 Research Highlights

#### [8] Fast and Robust Trajectory Generation for Cartesian Path-following Problems of Redundant Manipulators

MINSUNG YOON, MINCHEUL KANG, DAEHYUNG PARK, AND SUNG-EUI YOON

Machine Learning for Human-Robot Interaction (HRI) Workshop @ IEEE RO-MAN, 2022

# [9] Deep Neural Network-based Fast Motion Planning Framework for Quadrupedal Robot

JINHYEOK JANG, HEECHAN SHIN, **MINSUNG YOON**, SEUNGWOO HONG, HAE-WON PARK, AND SUNG-EUI YOON Machine Learning for Motion Planning (MLMP) Workshop @ ICRA, 2021

#### Domestic (Korean) Papers

#### [10] Adversarial Attack on Visuomotor Policy

CHANMI LEE, **MINSUNG YOON**, AND SUNG-EUI YOON Korea Computer Congress (KCC), 2024

#### [11] Manipulator-Assisted Navigation Among Movable Obstacles using Learned Robot-Obstacle Kinodynamics Model

TAEGEUN YANG, **MINSUNG YOON**, AND SUNG-EUI YOON Korea Robotics Society Annual Conference (KRoC), 2024

#### [12] Robust Robot Navigation against External Disturbance using Deep Reinforcement Learning

HYEONGYEOL RYU, **MINSUNG YOON**, DAEHYUNG PARK, AND SUNG-EUI YOON *Korea Robotics Society Annual Conference (KRoC)*, 2021

#### [13] Bias Tree Expansion using Reinforcement Learning for Efficient Motion Planning

MINSUNG YOON, DAEHYUNG PARK, AND SUNG-EUI YOON Korea Robotics Society Annual Conference (KRoC), 2021

### **Patents**

#### [1] Learning-based Adaptive Control of Quadruped Robots for Active Stabilization on Moving Platforms

(APPLICATION IN PROGRESS)

#### [2] Learning-based Initialization of Trajectory Optimization for Redundant Manipulators' Path-Following Problem

KR 10-2023-0192803, PATENT APPLICATION FILED ON DEC. 27, 2023

#### [3] User Command Adjustment Based on Risk Prediction of Dynamic Obstacles for Safe Remote Manipulation

KR 10-2023-0169134, PATENT APPLICATION FILED ON NOV. 29, 2023

# Talks & Presentations \_\_\_\_

# Presented tutorial talks at Korea Robotics Society Annual Conference (KRoC)

Feb 2025

- TITLE: REINFORCEMENT LEARNING TECHNIQUES AND APPLICATIONS FROM ROBOTIC ARMS TO QUADRUPED ROBOTS

# Presented tutorial talks at Korea Computer Congress (KCC)

Jun. 2024

– TITLE: INTRODUCTION TO REINFORCEMENT LEARNING AND ITS APPLICATIONS IN ROBOTIC MANIPULATION

# Presented an invited talk at the Flagship Conference / Journal Session of KRoC 2023

Feb. 2023

- TITLE: CONFIDENCE-BASED ROBOT NAVIGATION UNDER SENSOR OCCLUSION WITH DEEP REINFORCEMENT LEARNING

# Teaching Experience \_\_\_\_\_

Robet Motion Planning and Applications (CSS86), KAIST School of Computing LECTURER: PROS. SURGE BUYONE Robet Motion Planning and Applications (CS686), KAIST School of Computing LECTURER: PROS. SURGE BUYONE Introduction to Artificial Intelligence (CS470), KAIST School of Computing LECTURER: PROS. Daswrunce Pane Introduction to Artificial Intelligence (CS470), KAIST School of Computing LECTURER: PROS. Daswrunce Pane Introduction to Artificial Intelligence (CS470), KAIST School of Computing LECTURER: PROS. Daswrunce Pane Introduction to Artificial Intelligence (CS470), KAIST School of Computing LECTURER: PROS. Daswrunce Pane  Research Projects  EchoHound: Sonar-based Autonomous Navigation Mor 2023 - Present Supporte by Sonar-based Autonomous Navigation Mor 2023 - Present Supporte by Sonar-based Autonomous Navigation Mor 2023 - Present Supporte by Sonar-based Autonomous Navigation Mor 2023 - Present Supporte by Sonar-based Autonomous Navigation Mor 2023 - Present Supporte by Sonar-based Autonomous Navigation Mor 2023 - Present Supporte by Sonar-based Autonomous Navigation Mor 2023 - Present Supporte by Sonar-based Autonomous Navigation Supporte by Sonar-based Navigation Supporte by Sonar-based Sonar-based Sonar-based Navigation Supporte by Sonar-based Sonar-based Navigation Supporte by Sonar-based Sonar-based Navigation Supporte by Sonar-based Sonar-based Sonar-based Navigation Supporte by Sonar-based Sonar-based Sonar-based Navigation Supporte by Sonar-based Sonar-based Navigation Supporte by Sonar-based Sonar-based Navigation Supporte by Sonar-based Sonar-based Sonar-based Navigation Supporte by Sonar-based Sonar-based Navigation Supporte by Sonar-based Sonar-based Navigation Supporte by Sonar-based Navigation Supporte by Sonar-based Sonar-based Navigation Supporte by Sona						
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Introduction to Artificial Intelligence (CS470), KAIST School of Computing   Soring 2023		Fall 2023				
LECTURER: PROF. DAENYUNG PARK Introduction to Artificial Intelligence (C\$470), KAIST School of Computing  F08 7022 - LECTURER: PROF. DAENYUNG PARK  Research Projects  EchoHound: Sonar-based Autonomous Navigation  SUPPORTED BY DSO NATIONAL LABORATORIES, SINGAPORE  Autonomous Off-Road Navigation  SUPPORTED BY HANNIMA AEROSPACE  SUPPORTED BY HANNIMA AEROSPACE  Prosent Supported by HANNIMA AEROSPACE  Bevelopment of Quadruped Robot System Technology  Oct. 2019 - Sep. 2024  Supported by HANNIMA AEROSPACE  Provention, Action and Interaction Algorithms for Open-world Robot Service  Supported by STRALAB UNDER BY MINISTRY OF SCIENCE AND ICT (MSIT) VIA INTORNATION & COMMUNICATIONS  TECHNOLOGY PLANNING & EVALUATION (IITP)  Visual-Acoustic Understanding and Planning Based on Realistic Modeling  Supported by KINTONAL RESEARCH FOUNDATION OF KOREA (NRF) FUNDED by MSIT  AIA (AI in Action): Autonomous Action Planning AI Lab  Supported by MSIC RESEARCH LABORATORY (RRI) FUNDED by MSIT VAN NRF  Understanding, Localization, and Planning Based on Modeling and Rendering  Supported by MSIT FUNDED by MSIT VIA IITP  Media Coverage  Featured in KAIST Alumni News  RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2023, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD  Featured in KAIST Alumni News  RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2022, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD  Featured in KAIST Supported by MSIT VIA IITP  Media Coverage  Featured in KAIST CS Department News  RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2023, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD  Featured in KAIST CS Department News  RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2023, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD  Featured in KAIST CS Department News  RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2023, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD  Featured in KAIST CS Department News  RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2023, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD  Featured in KAIST CS Department News  RECOGNIZED FOR		7 411 2020				
Introduction to Artificial Intelligence (CS470), KAIST School of Computing - LECTURRER PROF. DAEHYUNG PARK  Research Projects  EchoHound: Sonar-based Autonomous Navigation SUPPORTED BY DSON National Lakoratomics, Sincapore  Autonomous Off-Road Navigation SUPPORTED BY HANNIMA AEROSPACE  Task-Optimal Motion Planning for Robots SUPPORTED BY HANNIMA AEROSPACE  Task-Optimal Motion Planning for Robots SUPPORTED BY HANNIMA AEROSPACE  Development of Quadruped Robot System Technology Oct. 2018 - Sep. 2014 SUPPORTED BY HANNIMA AEROSPACE  Development of Quadruped Robot System Technology Oct. 2018 - Sep. 2014 SUPPORTED BY HANNIMA AEROSPACE  Development of Quadruped Robot System Technology Oct. 2018 - Sep. 2014 SUPPORTED BY HANNIMA AEROSPACE  Development of Quadruped Robot System Technology Oct. 2018 - Sep. 2014 SUPPORTED BY HANNIMA AEROSPACE  Development of Quadruped Robot System Technology Oct. 2018 - Sep. 2014 SUPPORTED BY HANNIMA AEROSPACE  Development of Quadruped Robot System Technology Oct. 2018 - Sep. 2014 SUPPORTED BY HANNIMA AEROSPACE  Development of Quadruped Robot System Technology Oct. 2018 - Sep. 2014 SUPPORTED BY STARLAS FUNDED BY MINISTRY OF SCIENCE AND KT (MST) via Information & Communications TECHNOLOGY PLANNING & ENALUATION (ITTP)  SUPPORTED BY STARLAS FUNDED BY MINISTRY OF SCIENCE AND KT (MST) TUAN INFORMATION & COMMUNICATIONS SUPPORTED BY NATIONAL RESEARCH FOUNDATION OF KOREA (NRF) FUNDED BY MIST VIA NRF  Understanding, Localization, and Planning Based on Realistic Modeling SUPPORTED BY NRF FUNDED BY MIST VIA IITTP  Media Coverage  Featured in KAIST Alumni News RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2022, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD Featured in KAIST 2023 RESEARCH PRESENTED AT ICRA 2022, FINALIST FOR THE OUTSTANDING PLANNING PAPER AWARD Featured in KAIST CS Department News RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2022, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD Featured in KAIST CS Department News RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2022, RECIPIENT OF THE OUTSTANDI	Introduction to Artificial Intell	ligence (CS470), KAIST School of Computing	Spring 2023			
Research Projects  EchoHound: Sonar-based Autonomous Navigation  Supported by DSO National Laborationess, Singapore  Autonomous Off-Road Navigation  Jun. 2003 - Present  Supported by DSO National Laborationess, Singapore  Autonomous Off-Road Navigation  Jun. 2003 - Present  Supported by Hanning for Robots  Supported by Hanning for Robots System Technology  Supported by Hanning for Robots System Technology  Supported by Hanning for Robots System Technology  Supported by Agency for Beterns Devictoment (ADD)  Recognition, Action and Interaction Algorithms for Open-world Robot Service  Apr. 2003 - Present  Supported by Starlar Funded by Ministry or Science and Ict (MSTI) via Information & Communications  Technology Planning & Present  Supported by Starlar Funded by Ministry or Science and Ict (MSTI) via Information & Communications  Technology Planning & Moz. 2023 - Present  Supported by Hanning & Present Supported by Maria						
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Etch Hound: Sonar-based Autonomous Navigation  SupPointED BY DSO NATIONAL LABORATORIES, SINGAPORE  Autonomous Off. Road Navigation  Jun. 2023 - Present  SupPointED BY HAWMHA AEROSPACE  Task-Optimal Motion Planning for Robots  Mor. 2010 - Feb. 2011  SupPointED BY HAWMHA AEROSPACE  Task-Optimal Motion Planning for Robots  SupPointED BY HAWMHA AEROSPACE  Development of Quadruped Robot System Technology  SupPointED BY AGENCY FOR DEFENSE DEVELOPMENT (ADD)  Recognition, Action and Interaction Algorithms for Open-world Robot Service  SupPointED BY STARLAB FUNDED BY MINISTRY or Science And ICT (MSIT) VIA INFORMATION & COMMUNICATIONS  TECHNOLOGY PLANNING & EVALUATION (ITTP)  Visual-Acoustic Understanding and Planning Based on Realistic Modeling  Not. 2023 - Present  SupPointED BY AGENCY RESEARCH FOUNDATION of KOREA (INFE) FUNDED BY MSIT  AIA (All in Action): Autonomous Action Planning All Lab  SupPointED BY AGENC RESEARCH FOUNDATION of KOREA (INFE) FUNDED BY MSIT VIA INFF  Understanding, Localization, and Planning Based on Modeling and Rendering  SupPointED BY MSIC RESEARCH ABRORATORY (BRL) FUNDED BY MSIT VIA INFF  Understanding, Localization, and Planning Based on Modeling and Rendering  SupPointED BY STARLAB FUNDED BY MSIT  Mor. 2019 - Feb. 2023  Printing  SupPointED BY STARLAB FUNDED BY MSIT VIA IITP  Media Coverage  Featured in KAIST Alumni News  RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2023, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD  Featured in KAIST Research Mighlights  RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2023, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD  Featured in KAIST CS Department News  RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2023, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD  Featured in KAIST CS Department Research Highlights  RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2023, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD  Featured in KAIST CS Department Research Highlights  RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2023, RECIPIENT OF THE OUTSTANDING PAPER AWARD  Featured in K	- LECTURER: PROF. DAEHYUNG PARK					
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Autonomous Off-Road Navigation   Jun. 2023 - Present Suprorted by Hawkind AEROSPACE   Task-Optimal Motion Planning for Robots   Jun. 2023 - Present Suprorted by Hawkind AEROSPACE   Task-Optimal Motion Planning for Robots   Jun. 2023 - Present Suprorted by Hawkind AEROSPACE   Development of Quadruped Robot System Technology   Oct. 2019 - Sep. 2024   Suprorted by Agency rob Defense EverLopment (ADD)   Recognition, Action and Interaction Algorithms for Open-world Robot Service   Apr. 2023 - Present Suprorted by StartLab Funded by Ministry of Science And ICT (MSTT) via Information & communications   Technology Planning & Evaluation (IITP)   Visual-Acoustic Understanding and Planning Based on Realistic Modeling   Jun. 2021 - Feb. 2024   Suprorted by National Research Foundation or Korber (NRF) Funded by MSIT   AIA (All in Action): Autonomous Action Planning All Lab   Jun. 2021 - Feb. 2024   Suprorted by Basic Research Laboratory (BRL) Funded by MSIT via NRF   Understanding, Localization, and Planning Based on Modeling and Rendering   Mor. 2019 - Feb. 2023   Suprorted by StartLab Funded by MSIT via IITP    Media Coverage   Featured in KAIST Alumni News   May 2024   Recognized for Research PRESENTED AT ICRA 2023, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD   Featured in KAIST 2023 Research Highlights   Jun. 2023   Recognized for Research PRESENTED AT ICRA 2023, Recipient of the Outstanding Planning Paper Award   Featured in KAIST Research News   Jun. 2023   Recognized for Research PRESENTED AT ICRA 2023, Recipient of the Outstanding Planning Paper Award   Featured in KAIST CS Department Research Highlights   Jun. 2023   Recognized for Research PRESENTED AT ICRA 2023, Recipient of the Outstanding Planning Paper Award   Featured in KAIST CS Department Research Highlights   Jun. 2023   Recognized for Research PRESENTED AT ICRA 2023, Recipient of the Outstanding Planning Paper Award   Featured in KAIST CS Department Research Highlights   Jun. 2023   Recognized for Research PRESENTED AT ICRA 2023, Recipient of the Ou	EchoHound: Sonar-based Auto	onomous Navigation	Mar. 2025 - Present			
SupPortED BY HANNHA AEROSPACE  Task-Optimal Motion Planning for Robots  Development of Quadruped Robot System Technology  Oct. 2019 - Sep. 2024  SupPortED BY AGENCY FOR DEFENSE DEVELOPMENT (ADD)  Recognition, Action and Interaction Algorithms for Open-world Robot Service  Apr. 2023 - Present  SupPortED BY STARLAB FUNDED BY MINISTRY OF SCIENCE AND ICT (MSIT) VIA INFORMATION & COMMUNICATIONS  TECHNOLOGY PLANNING & EVALUATION (IITP)  Visual-Acoustic Understanding and Planning Based on Realistic Modeling  Moc. 2023 - Present  SupPortED BY NATIONAL RESEARCH FOUNDATION OF KOREA (NRF) FUNDED BY MSIT  AIA (AI in Action): Autonomous Action Planning AI Lab  SupPortED BY BASIC RESEARCH LABORATORY (BRL) FUNDED BY MSIT VIA NRF  Understanding, Localization, and Planning Based on Modeling and Rendering  Moc. 2019 - Feb. 2024  SupPortED BY NRF FUNDED BY MSIT TYLA IITP  Media Coverage  Featured in KAIST Alumni News  RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2023, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD  Featured in KAIST 2023 Research Highlights  RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2023, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD  Featured in KAIST Research News  RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2023, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD  Featured in KAIST RESEARCH PRESENTED AT ICRA 2023, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD  Featured in KAIST CS Department News  RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2023, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD  Featured in KAIST CS Department News  RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2023, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD  Featured in KAIST CS Department Research Highlights  JUN. 2023  RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2023, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD  Featured in KAIST CS Department Research Highlights  JUN. 2023  RECOGNIZED FOR RESEARCH PRESENTED AT ICRA 2023, RECIPIENT OF THE OUTSTANDING PLANNING PAPER AWARD  Featured in KAIST CS Department Research Highlights  FOR	SUPPORTED BY DSO NATIONAL LABOR	atories, Singapore				
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Libraries & Frameworks Simulation Platforms  Experienced Robot Platforms  PyTorch, TensorFlow, Keras, OMPL, Movelt  Gazebo, Mujoco, Raisim, DART, IsaacGym/Sim/Lab, Habitat  Fetch, Go1, Jackal, Bunker Pro	Skills					
Simulation Platforms Gazebo, Mujoco, Raisim, DART, IsaacGym/Sim/Lab, Habitat  Experienced Robot Platforms Fetch, Go1, Jackal, Bunker Pro	Programming	C, C++, Python, MATLAB				
<b>Experienced Robot Platforms</b> Fetch, Go1, Jackal, Bunker Pro						
Middleware POS 1 POS 2	_					
Middlewale Nos1, Nos2	Middleware	ROS 1, ROS 2				

**Languages** Korean (Native), English