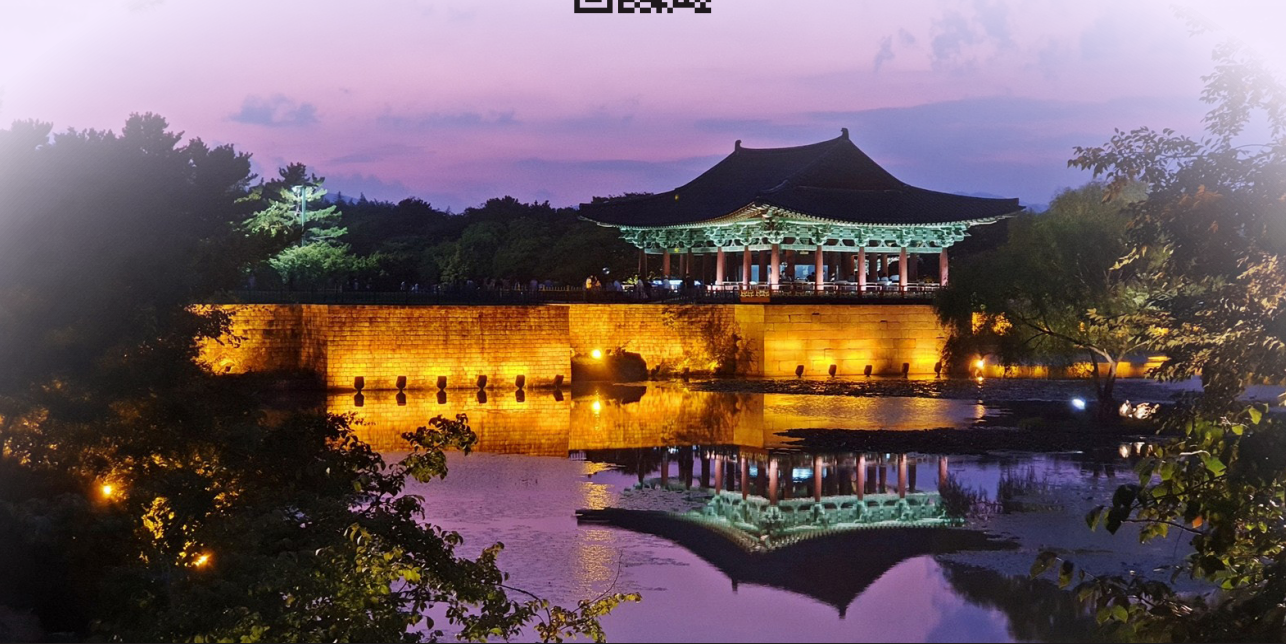# 12th International Conference on
Robot Intelligence Technology and Applications

RiTA 2024

UNIST, Ulsan, Korea | December 4 - 7, 2024

Program Booklet

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Program at a Glance

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16:40-17:40	<WP1> Poster Session I	<TP1> Poster Session II		
18:00-20:00	Welcome Reception @ UNIST	Conference Banquet @ Silla Stay Hotel	Ulsan Moonlight Tour	
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Organizations and Sponsors

Organized by
- Ulsan National Institute of Science and Technology (UNIST)
- Center for Autonomous Unmanned Monitoring Systems (CAMS)
- Korea Advanced Institute of Science and Technology (KAIST)

Supported by
- J.MARPLE
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- Pablor Air
- Human-Robot Convergence Research Center
- Eco-friendly Smart Ship Parts Technology Innovation Center (RLRC)
- Center for Development of Innovative Human Resources for Unmanned Land, Sea and Air Vehicles (Chungnam National University)
- Ulsan Culture & Tourism Foundation

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       Hae-In Lee, Cranfield University, UK

Industry Inclusion Chair

       Seunghan Lim, Pablo Air, Korea

General Information

Conference Venue

The conference will take place in the Auditorium Hall on the 2nd floor of the Main Administration Building (#201) at the UNIST campus in Ulsan. Refer to the campus map for directions and parking locations.

Registration Information

Registration will take place in the lobby of the Auditorium Hall (2nd floor) during the following times:

- Wednesday, December 4: 12:20 PM to 6:00 PM
- Thursday, December 5: 8:30 AM to 6:00 PM
- Friday, December 6: 8:30 AM to 12:00 PM

Conference Proceedings

Only papers selected for publication will be included in the Lecture Notes in Networks and Systems (LNNS) series by Springer, as conference proceedings. These will be published after the conference. All registered final manuscripts will be made available on a designated website during the conference.

Wifi Service

Conference attendees can access a dedicated Wi-Fi service using the following credentials:

- ID: RITA2024
- Password: Rita1234

Shuttle Bus Service

Shuttle buses will be available for transportation between Shilla Stay Ulsan and designated locations. Please note that while Shilla Stay Ulsan is the official hotel for conference delegates, attendees staying at any other hotel are also welcome to use the shuttle bus service.

Time Table of Shuttle Bus

Route	D1, Wed 4 Dec	D2, Thu 5 Dec	Fri 6 Dec	Sat 7 Dec
Shilla Stay Ulsan --> UNIST	12 PM - 12:30 PM	8 AM - 8:30 AM	8 AM - 8:30 AM	
UNIST --> Shilla Stay Ulsan	8 PM - 8:30 PM	6 PM - 6:30 PM		
UNIST --> Hyundai Motor			1:30 PM - 2 PM	
Hyundai Motor --> Shilla Stay Ulsan			4 PM - 4:30 PM	
Hyundai Motor --> UNIST			4 PM - 4:40 PM	
Shilla Stay Ulsan <--> Ulsan Moonlight Tour			6 PM - 10 PM	
Shilla Stay Ulsan <--> Gyeongju				9 AM - 5 PM

Social Events

Welcome Reception
Wednesday, December 4, 6:00 PM – 8:00 PM
  @ Gyeongdong Hall (4th Floor) in the Main Administration Building (#201)
We warmly welcome all conference registrants to the reception, where you can exchange greetings and enjoy an ice-breaking atmosphere with new acquaintances. Buffet-style food and refreshments will be provided.

Lunches
• **Thursday, December 5, 12:20 PM – 1:20 PM**
• **Friday, December 6, 12:20 PM– 1:20 PM**
  @ Gyeongdong Hall (4th Floor) in the Main Administration Building (#201)
Lunch boxes will be provided for all attendees, offering more opportunities to build professional networks. Also, refreshments and cookies will be served in the lobby of the Auditorium Hall during each break to33 allow you to relax and socialize.

Conference Banquet
Thursday, December 5, 6:30 PM – 9:00 PM
  @ Modern & Delightful, 2nd Floor, Shilla Stay Ulsan
The banquet is a highlight of the conference's social events. Buffet-style food and draft beer will be served. All registrants are invited to attend. Best papers will be announced during the awards ceremony, followed by the next RiTA announcement and a performance by a Korean traditional fusion music band. The shuttle bus will depart from the campus at 6 PM.

Technical and Optional Tours

UNIST Lab Tour
Thursday, December 5, 1:20 PM – 2:20 PM
Join us for a visit to two labs at the Artificial Intelligence Research Center and the Robotics Center. The number of visitors allowed to enter the labs is limited, and participation will be on a first-come, first-served basis.

Technical Tour - Hyundai Motor Company
Friday, December 6, 1:30 PM – 5:00 PM
All conference attendees are invited to join a technical tour of the Ulsan Hyundai Motor Plant. The tour includes a one-hour guided inspection of the production process, with both English and Korean guide services available. The charter buses will depart from the campus at 1:30 PM.
• *Note: Visitors working in the automotive industry will NOT be permitted to participate in this tour.*

Ulsan Moonlight Tour
Friday, December 6, 6:00 PM – 10:00 PM
You will be excited to enjoy a scenic evening exploring Ulsan's picturesque landscapes, including the Jangsaengpo Cultural Warehouse, Ulsandaegyo Bridge Observatory, and Simni Bamboo Grove Galaxy Road. This optional tour is available for US$10 and includes transportation, an English-speaking guide, admission fees, and dinner. The tour bus will depart from Shilla Stay Ulsan at 6 PM.

Gyeongju Cultural Tour
Saturday, December 7, 9:00 AM – 5:00 PM
Discover the rich heritage of Korea in Gyeongju, a must-visit destination filled with historical treasures such as Seokguram Grotto, Bulguksa Temple, Cheomseongdae Observatory, and Woljeonggyo Bridge. This optional tour is available for US$50 and includes transportation, an English-speaking guide, admission fees, and lunch. The minibus will depart from Shilla Stay Ulsan at 9 AM.

Plenary Session

Plenary Talk 1
Wednesday, December 4, 1:20 PM - 2:20 PM @ Auditorium (2F)

Chair: Inmo Jang, Korea Aerospace University, Korea

From Drones to Autonomous Cars to Generalist Approaches

Prof. Hyunchul Shim
KAIST, Korea

Abstract: Over the last three decades, there have been dramatic advances in mobile robotics, particularly in perception, localization, and path planning for various platforms such as aerial vehicles (drones) and self-driving cars. Thanks to innovations in sensors and computing systems, what once required large airplanes and minivan-sized robots has now been miniaturized into palm-sized drones and F1tenth cars. With the latest SLAM (Simultaneous Localization and Mapping) algorithms, these systems can now navigate and operate indoors without the aid of GPS.
Robotics is experiencing yet another quantum leap, this time driven by the integration of cutting-edge machine learning technologies. Notably, large language and visual models are enabling robots to perceive their environments and make intelligent decisions. Moreover, these breakthroughs are paving the way for a new approach where humanoid robots can take control of any vehicle as needed. In this talk, the speaker will introduce the latest advancements in autonomous drones and self-driving cars, including the Indy Autonomous Race cars. Additionally, the speaker will discuss recent progress in humanoid robots that can control various vehicles simply by "reading" their manuals, without the need for manual coding, suggesting a promising direction for future robotics research.

Biography: Dr. David Hyunchul Shim received the B.S. and M.S. degrees in mechanical design and production engineering from Seoul National University, Seoul, Korea, in 1991 and 1993, respectively, and the Ph.D. degree in mechanical engineering from the University of California Berkeley, Berkeley, USA in 2000. From 1993 to 1994, he was with Hyundai Motor Company, Korea. From 2001 to 2005, he was with Maxtor Corporation, Milpitas, CA, USA as Staff Engineer. From 2005 to 2007, he was with the University of California Berkeley as Principal Engineer, in charge of Berkeley Aerobot Team. In 2007, he joined KAIST, Daejeon, Korea, as an Assistant Professor and is now Professor in School of Electrical Engineering. He has received a number of major awards from Korean government and global events including 1st prizes in AI Grand Challenges in 2019 and 2020, and from AlphaPilot 2019. He has served as Director of KI Robotics Center at KAIST from '19 to '22 and Director of Korean RPAS Research Center from '16 to '21. He is now leading Future Challenge Research Program developing intelligent robots using foundation models, supported by Korean Government.

Plenary Talk 2
Thursday, December 5, 9:40 AM - 10:40 AM @ Auditorium (2F)

Chair: Hae-Won Park, KAIST, Korea

Why Humanoids Now?

Prof. Joohyung Kim
University of Illinois Urbana-Champaign, USA

Abstract: As automation becomes increasingly prevalent in manufacturing and logistics, there is a growing demand for robots that can work closely with humans and perform tasks requiring interaction and cooperation. Companies like Boston Dynamics, Tesla, and Figure have intensified their efforts in humanoid robot development, drawing significant attention to this field. This talk explores the reasons behind the recent surge of interest in humanoid robots by examining their historical development, advancements in AI technologies, and practical application areas. Insights will be shared on designing user-friendly robots, with an emphasis on motion control and human-robot interaction to create robots that integrate seamlessly and safely into human environments. Enhancing the usefulness of robots in daily life requires a deeper understanding of human tasks and improved methods for task execution. Ultimately, this presentation aims to highlight the importance of humanoid robots and their potential impact across various industries and everyday life, illustrating why now is the time to focus on the development and deployment.

Biography: Joohyung Kim is an Associate Professor of ECE (Electrical and Computer Engineering) and MechSE (Mechanical Science & Engineering), and the director of KIMLAB (Kinetic Intelligent Machine LAB) at University of Illinois, Urbana-Champaign. His research focuses on design and control for humanoid robots, system for motion learning in robot hardware, and safe human-robot interaction. He received BSE and Ph.D. degrees in Electrical Engineering and Computer Science (EECS) from Seoul National University, Korea, in 2001 and 2012. He was with Disney Research as a Research Scientist from 2013 to 2019. Prior to joining Disney, he was a postdoctoral fellow in the Robotics Institute at Carnegie Mellon University for DARPA Robotics Challenge in 2013. From 2009 to 2012, he was a Research Staff Member in Samsung Advanced Institute of Technology and Samsung Electronics, Korea, developing biped walking controllers for humanoid robots.

Plenary Session

Plenary Talk 3
Friday, December 6, 9:00 AM - 10:00 AM @ Auditorium (2F)

Chair: Hyo-Sang Shin, KAIST, Korea / Cranfield University, UK

Sustainability Robotics: from Nature to Robotics and Back

Prof. Mirko Kovac
Ecole Polytechnique Federal de Lausanne (EPFL), Swiss Federal Laboratories for Material Science and Technology (Empa) Switzerland/ Imperial College London, UK

Abstract: Environmental sciences rely heavily on accurate, timely and complete data sets which are often collected manually at significant risks and costs. Robotics and mobile sensor networks can collect data more effectively and with higher spatial-temporal resolution compared to manual methods while benefiting from expanded operational envelopes and added data collection capabilities. In future, robotics and AI will be an indispensable tool for data collection in complex environments, enabling the digitalisation of forests, lakes, off-shore energy systems, cities and the polar environment. However, such future robot solutions will need to operate more flexibly, robustly and efficiently than they do today.
This talk will present how animal-inspired robot design methods can integrate adaptive morphologies, functional materials and energy-efficient locomotion principles to enable this new class of environmental robotics. The talk will also include application examples, such as flying robots that can place sensors in forests, aerial-aquatic drones for autonomous water sampling, drones for aerial construction and repair, and impact-resilient drones for safe operations in underground and tunnel systems.

Biography: Prof. Mirko Kovac is director of the Aerial Robotics Laboratory and full professor at Imperial College London. He is also heading the Laboratory of Sustainability Robotics at the Swiss Federal Laboratories for Materials Science and Technology (Empa) in Zürich and the École polytechnique Fédérale de Lausanne (EPFL). His research group focusses on the development of novel mobile robots for distributed sensing and autonomous manufacturing in complex natural environments. Prof. Kovac's particular specialisation is in robot design, hardware development and multi-modal sensor mobility. Before his appointment in London, he was post-doctoral researcher at Harvard University and he obtained his PhD at the Swiss Federal Institute of Technology in Lausanne (EPFL). He received his undergraduate degree in Mechanical Engineering from the Swiss Federal Institute of Technology in Zurich (ETHZ) in 2005. Since 2006, he has presented his work in more than 100 peer reviewed publications in leading conferences and journals, has won several best paper awards and has delivered over 100 keynote and invited lectures. He also regularly acts as advisor to government, investment funds and industry on robotics opportunities.

Invited Talk Session

Invited Talk 1
Wednesday, December 4, 4:10 PM - 4:40 PM, *Virtual Talk*

Chair: Hae-In Lee, Cranfield University, United Kingdom

Learning Enabled Marine Autonomy in Uncertain Marine Environments

Associate Prof. Yuanchang Liu
University College London, UK

Abstract: Autonomous marine robots have made rapid advancements in recent years, driven by exciting progress in artificial intelligence (AI), advanced sensory technologies, and robust decision-making systems. These robots are now being deployed in high-impact applications such as offshore wind farm inspections, search and rescue operations, and seabed mapping, among others. The key to achieving high-level autonomy in marine robots lies in the autonomous navigation system, which encompasses sensing/perception, planning/decision-making, and automatic control. This talk will focus on recent developments in advanced autonomy technologies for marine robots at UCL. Key topics include: 1) reliable semantic segmentation of the water surface, 2) efficient multi-constraint planning for surface vessels, 3) reinforcement learning-powered multi-task allocation, and 4) adversarial networks for enhanced maritime systems.

Biography: Dr. Yuanchang Liu is an Associate Professor and Chair of Marine Research in the Department of Mechanical Engineering at University College London. Dr Liu is also the Programme Director of MSc Power Systems Engineering. Prior to joining the department, he served as a Research Fellow in Robotic Vision and Autonomous Vehicles at the Surrey Space Centre, University of Surrey. Dr. Yuanchang Liu earned his MSc degree in Power Systems Engineering and a PhD degree in Marine Control Engineering, both from University College London in 2011 and 2016, respectively. Dr. Liu's research primarily focuses on automation and autonomy, with a special emphasis on exploring technologies related to sensing, perception, and the guidance and control of intelligent and autonomous vehicles. In recognition of his contributions, Dr. Liu was featured among the World's Top 2% Scientists by Stanford University in both 2022 and 2023. Additionally, he received the Denny Medal, awarded by the Institute of Marine Engineering, Science, and Technology (IMarEST).

Invited Talk 2
Thursday, December 5, 9:00 AM - 9:30 AM, *Virtual Talk*

Chair: Joao S. Sequeira, Instituto Superior Técnico - Institute for Systems and Robotics, Portugal

Neural Certificates and Certificate-carrying RL in Large-Scale Autonomy Design

Associate Prof. Chuchu Fan
MIT, USA

Abstract: Learning-enabled control systems have demonstrated impressive empirical performance on challenging control problems in robotics. However, this performance often arrives with the trade-off of diminished transparency and the absence of guarantees regarding the safety and stability of the learned controllers. In recent years, new techniques have emerged to provide these guarantees by learning certificates alongside control policies — these certificates provide concise, data-driven proofs that guarantee the safety and stability of the learned control system. These methods not only allow the user to verify the safety of a learned controller but also provide supervision during training, allowing safety and stability requirements to influence the training process itself. In this talk, we present two exciting updates on neural certificates. In the first work, we explore the use of graph neural networks to learn collision-avoidance certificates that can generalize to unseen and very crowded environments. The second work presents a novel reinforcement learning approach that can produce certificate functions with the policies while addressing the instability issues in the optimization process.

Biography: Dr. Chuchu Fan is an Associate Professor in AeroAstro and LIDS at MIT. Before that, she was a postdoc researcher at Caltech and got her Ph.D. from ECE at the University of Illinois at Urbana-Champaign. Her research group, Realm at MIT, works on using rigorous mathematics, including formal methods, machine learning, and control theory, for the design, analysis, and verification of safe autonomous systems. Chuchu is the recipient of the 2020 ACM Doctoral Dissertation Award, an NSF CAREER Award, and an AFOSR Young Investigator Program (YIP) Award.

Invited Talk Session

Invited Talk 3
Thursday, December 5, 4:10 PM - 4:40 PM @ Auditorium (2F)

Chair: Runqi Chi, Beijing Institute of Technology, China

Agrimor: Precision Agriculture Solution Using UAV

Dr. Tiagrajah V. Janahiraman
Aerodyne Group, Malaysia

Abstract: Data analytics using Unmanned Aerial Vehicle (UAV) can provide farmers with valuable insights into crop health, nutrient levels, irrigation management, pest infestations, and more. This information can help farmers optimize the use of fertilizers, pesticides, and water, leading to increased crop yields and reduced costs. Agrimor is a digital precision agriculture platform that provides valuable insights from RGB and Multispectral (MS) data capture using drones. Upon reconstruction of RGB Orthoimages and MS bands, mathematical formulation for vegetation indices will be used for deriving indices map. Vegetation indices (VI) are combinations of surface reflectance of 2 or more wavelengths designed to highlight a particular properties of vegetation. They are derived using the reflectance properties of vegetation. Each of the VIs is designed to accentuate a particular vegetation property. Potential diseases infection and pest infestation is highlighted by vigor analysis. Ability to absorb water and nutrients from ground and state of underground root of crop is described by water uptake analysis. Chlorophyll analysis interprets the presence of green pigmentation on leaves which is essential for photosynthesis process. Other yield limiting factors that may affect the growth of plant is reported in stress analysis. From our past experience, a durian farm was able to increase the yield up to 30% after executing the preventive measures based on our crop insights.

Biography: Ir Dr Tiagrajah is the Chief Technology Officer of Aerodyne Group, which specializes in drone technology, data platform and digital transformation. Aerodyne Group is ranked as number one in Global Drone Service Provider Ranking by Drone Industry Insights, Germany, for three consecutive years: 2023, 2022 and 2021. He is actively involved in agriculture drone design, assembling and drone module development. He leads the R&D activity for plant health evaluation and soil movement estimation using multispectral sensors attached as a payload to the Unmanned Aerial Vehicle (UAV). He architected a web based geographic information system (GIS) platform hosted on cloud to visual and analyse the UAV captured data. The GIS web platform illustrate new perspectives, data-driven mapping styles and intuitive analysis tools to gain location intelligence. His previous roles include Head of Automation and AI and Head of Analytics and Business Insights in an IT shared service company. His responsibility was to provide Analytic and AI solutions to several business groups under the flagship of RGE Group, Singapore, in the field of fibre and palm oil plantation, manufacturing and business processes. Prior to industrial experience, he was a Senior Lecturer in Universiti Tenaga Nasional (UNITEN). He carried out research and consultancy projects in the field of pattern recognition, image processing and manufacturing process modelling & optimization. He accomplished 3 technical consultation projects with TNB Research Sdn Bhd and TNB IT Sdn Bhd. He has graduated 4 postgraduate students and 67 undergraduate students.

[WO1] Special Session and AI

Wednesday, December 4, 14:30-16:00 @ Auditorium (2F)

Chair: Juyoun Park, Korea Institute of Science and Technology, Korea, South

WO1.1	14:30- 14:40	**Personality Trait Prediction Using Text Data from Social Media** *Sousa, Luis; Sequeira, Joao* *Instituto Superior Técnico - Institute for Systems and Robotics, Portugal*
WO1.2	14:40- 14:50	**Learning-Based Lower-Limb Joint Kinematics Estimation Using Open-Source IMU Data** *Hur, Benjamin; Baek, Sunin; Kang, Inseung; Kim, Daekyum* *Korea University, Korea, South*
WO1.3	14:50- 15:00	**Vertiport Marking Detector for an Instrument Landing System** *Heo, Hyeonjeong; Lee, Kyuman* *Kyungpook National University, Korea, South*
WO1.4	15:00- 15:10	**FedPGD: Federated Learning with Projected Gradient Descent for Catheter and Guidewire Segmentation** *Kongtongvattana, Chayun; Huang, Baoru; Nguyen, Hoan; Olajide, Olufemi; Nguyen, Anh* *University of Liverpool, United Kingdom*
WO1.5 *virtual*	15:10- 15:20	**AI-Assisted Natural Programming of Assistive Robots Using Verbal Commanding with Assistive Robots for the Elderly – an Explorative Study Using IsaacSim and ChatGPT** *Park, Nathan; Yu, Beomyeol* *McLean High School, United States of America*
WO1.6	15:20- 15:30	**Reactive Constraint Relaxation for Urban Environment Navigation** *Kim, Jinwoo; Koh, Keonyoung; Lee, Samuel Seungsup; Park, Yohan; Park, Daehyung* *Korea Advanced Institute of Science and Technology, KAIST, Korea, South*
WO1.7	15:30- 15:40	**VC-2AG: Verb-Conditional 2D Affordance Generation for Robotic Manipulation** *Kim, Geonkuk; Choi, Tae-Min; Park, Juyoun* *Korea Institute of Science and Technology, Korea, South*
WO1.8	15:40- 15:50	**Real-Time Multi-Object Tracking and Identification Using Sparse Point-Cloud Data from Low-Cost mmWave Radar** *Pico Rosas, Nabih Andres; Vanegas Silva, Maykoll Steven; Auh, Eugene; Jung, Hong-ryul; Coutinho, Altair; Montero Cadena, Elvia Estrella; Moon, Hyungpil* *Sungkyunkwan University, Korea, South*
WO1.9	15:50- 16:00	**Robot Task Planning on Tabletop Environment Based on Small Language Models** *Choi, Gawon; Ahn, Hyemin* *Ulsan National Institute of Science and Technology, Korea, South*

[WP1] Poster I

Wednesday, December 4, 16:40-17:40 @ Lobby (2F)

WP1.1   **Overcoming Bias towards Base Sessions in Few-Shot Class-Incremental Learning (FSCIL)**
Lee, Myeongjin; Yoon, Jiae; Kim, Ue-Hwan
Gwangju Institute of Science and Technology (GIST), Korea, South

WP1.2
virtual   **Virtual Camera Viewpoint Control for Omnidirectional Video-Shooting System**
Dong, Hongyu; Hu, Shaopeng; Wang, Feiyue; Shimasaki, Kohei; Ishii, Idaku
Hiroshima University, Japan

WP1.3   **Swarm Control of Mobile Robots Using an Alternating Signal-Based Activation Algorithm**
Nguyen, Minh Trieu; Trinh, Duc Cuong; Nguyen Truong, Thinh
University of Economics Ho Chi Minh City ⬚UEH, Vietnam

WP1.4   **Enhancing Exploration Efficiency Using Uncertainty-Aware Information Prediction**
Kim, Seunghwan; Shin, Heejung; Yim, Gaeun; Oh, Hyondong,
UNIST, Korea, South

WP1.5   **Sparsity in Social Robotics Experiments: An Abstract View**
Sequeira, Joao
Instituto Superior Técnico - Institute for Systems and Robotics, Portugal

WP1.6   **Contact-Implicit Trajectory Optimization for Quadruped Maneuvers on Non-Flat Terrain**
Oh, Seungbin; Kim, Gijeong; Park, Hae-Won
Korea Advanced Institute of Science and Technology, Korea, South

WP1.7   **A Training Method with 3D Feature Space Visualization for Pattern Recognition Controlled Myoelectric Prosthetic Hands**
Tsujimoto, Tatsuki; Yamanoi, Yusuke; Jiang, Hai; Yabuki, Yoshiko; Jiang, Yinlai; Yokoi, Hiroshi
The University of Electro-Communications, Japan

WP1.8   **Development of a Compact, Self-Deployable Bio-Inspired Robot for Planetay Exploration**
Lee, Seongjun; Lee, Dae-Young
KAIST, Korea, South

WP1.9   **Hierarchical Control of Legged Robots Using Diffusion Models and Reinforcement Learning for Real-Time Motion Tracking**
Lee, Sowoo; Kang, Dongyun; Park, Hae-Won
Korea Advanced Institute of Science and Technology, Korea, South

WP1.10   **High Efficient Magnetic Sensor-Based Drone Charging Station: Robust to Landing Position and Orientation Errors**
Son, Jeongwoo; Kim, Chansu; Kang, Sang Hoon
Ulsan National Institute of Science and Technology (UNIST) / U. of Maryland, Korea, South

WP1.11   **Effect of Shoulder Girdle Movement on Upper Limb Dummy**
Kim, Minjae; Kang, Sang Hoon
Ulsan National Institute of Science and Technology (UNIST) / U. of Maryland, Korea, South

[WP1] Poster I

WP1.12   **Distributed Estimation-Based Formation Control with Orientation Alignment**
Lee, Chanyong; Lee, Hojin; LEE, JUSANG; Kwon, Cheolhyeon
Ulsan National Institute of Science and Technology, Korea, South

WP1.13   **Chest X-Ray Image Analysis for Lung Disease Detection Using Deep Learning Techniques**
Nguyen T., Bao; Nguyen Truong, Thinh
University of Economics Ho Chi Minh City, Vietnam

WP1.14   **B-MCTS for Information-Theoretic Source Search in Urban Environments**
Hyoungho, Park; Jang, Hongro; Seo, Jaemin; Oh, Hyondong
UNIST, Korea, South

WP1.15   **Attitude Control of eVTOL UAV Using Incremental Sliding Mode Control Driven by Super-Twisting Disturbance Observer**
Shin, Dongjoon; Park, Heetae; JEONG, HOIJO; Suk, Jinyoung; Kim, Seungkeun
Chungnam National University, Korea, South

WP1.16   **Image SR Based Real-Time UAV Detection and Classification**
Singh, Siddharth; Shin, Hyo-Sang; Tsourdos, Antonios; Felicetti, Leonard
Cranfield University, United Kingdom

WP1.17   **Enhancing Human-Robot Collaboration through Deep Learning Based Pose Estimation Using a Single Camera**
Dinh, Binh Khanh; Nguyen Truong, Thinh
University of Economics Ho Chi Minh City, Vietnam

WP1.18   **Sparse Identification of Nonlinear Dynamics-based Model Predictive Control for Multirotor Collision Avoidance**
Lee, Jayden Dongwoo; Kim, Youngjae; Kim, Yoonseong; LEE, Seungho; Park, Sanghyeok; kim, Seongmin; SHIN, Yuseop; Bang, Hyochoong
KAIST, Korea, South

WP1.19   **Explainable AI Analysis of Autoencoder Reconstruction Error for Hexacopter Motor Failure**
LEE, SEUNG SHIN; kim, taegyun; Kim, Yeji; Kim, Seungkeun
Chungnam National University, Korea, South

WP1.20   **Safe Robot Teleoperation with Constrained Nonlinear Disturbance Observer**
Kim, Taehyun; Han, Ji Wan; Kim, Min Jun
KAIST, Korea, South

WP1.21   **Explainable Deep Reinforcement Learning for Patrol Speed Control of Rail-Guided Robot System**
Lee, Hosun; Kwon, Jaesung; Chong, Nak Young; Yang, Woosung
JAIST, Japan

WP1.22   **A Study on Mid-Air Collision Avoidance of Lift-Cruise eVTOL UAM Aircraft Using SVO**
Oh, Sungtak; Shin, Jeonghun; Lee, Dongjin; Lawson, Nicholas; Wang, Zihao; Wong, KC
Hanseo University, Korea, South

[TO1] Control and Planning

Thursday, December 5, 10:50-12:20 @ Auditorium (2F)

Chair: Hae-In Lee, Cranfield University, United Kingdom

TO1.1	10:50-11:00	**Traversability-aware Consistent Situational Graphs for Indoor Localization and Mapping** *Kim, Jeewon; Oh, Minho; Myung, Hyun* *KAIST (Korea Advanced Institute of Science and Technology), Korea, South*
TO1.2	11:00-11:10	**SPACE: A Simulator for Swarm Planning and Control Evaluation** *Jang, Inmo* *Korea Aerospace University, Korea, South*
TO1.3	11:10-11:20	**Multimodal Transformer Models for Human Action Classification** *Varga, Zoltán; Valls Mascaro, Esteve; Sliwowski, Daniel; Lee, DongheuiTechnische Universität Wien, Austria*
TO1.4	11:20-11:30	**Path Planning and Foothold Adaptation for Quadrupedal Locomotion on Challenging Terrain** *LEE, YONGHOON; Kim, Gijeong; Song, Tae-Gyu; Park, Hae-Won* *Korea Advanced Institute of Science and Technology, Korea, South*
TO1.5	11:30-11:40	**Hedonic Game for Task Allocation in Heterogeneous Multi-Robot Systems** *Kim, Hyeongseop; Jang, Inmo; Oh, Hyondong* *UNIST, Korea, South*
TO1.6	11:40-11:50	**NM-LIO: Multiple LiDAR-Inertial Odometry Addressing LiDAR Measurement Noise Discrepancy** *Shin, Gunhee; Lee, Seungjae; Oh, Minho; Lee, Dongkyu; Lee, Jaeyoung; Seo, Young-Woo; Myung, Hyun* *KAIST (Korea Advanced Institute of Science and Technology), Korea, South*
TO1.7	11:50-12:00	**Adaptive LQR for Spacecraft Rendezvous and Docking Using Deep Reinforcement Learning** *Han, Dong-Woo; Kim, Minchae; Kim, Sung Jun; Choi, Han-Lim* *KAIST, Korea, South*
TO1.8	12:00-12:10	**An Advanced Air Suspension Control System Utilizing Intelligent Algorithms and Real-Time Terrain Detection** *Saeed, Omer; Kafash hoshiar, Ali; Woods, John* *University of Essex, United Kingdom*
TO1.9	12:10-12:20	**ESO for UAV Attitude Dynamics Under Offset Weight, via Modification of PX4 Framework** *Marshall, Benjamin; Knowles, James; Liu, Cunjia* *Loughborough University, United Kingdom*

[TO2] Design, Sensing, and Optimization

Thursday, December 5, 14:30-16:00 @ Auditorium (2F)

Chair: Runqi Chai, Beijing Institute of Technology, China

TO2.1	14:30- 14:40	**Multiple Shooting Parameterized Differential Dynamic Programming for Waypoint-Trajectory Optimization** *Xia, Feiran; Chai, Runqi; Chaoyong, Li; He, Shaoming* *Beijing Institute of Technology, China*
TO2.2	14:40- 14:50	**Targetless Extrinsic Calibration Via Penetrating Lines for RGB-D Cameras with Limited Co-Visibility** *Shin, Jaeho; Yun, Seungsang; Kim, Ayoung* *Seoul National University, Korea, South*
TO2.3	14:50- 15:00	**Development, Evaluation, and Design Implications of Manipulation Robot Teaching Pendants Based on UI Design Principles** *Ruozhang, Qian; You, Yue; Ha, Sehoon; Kang, Dongyeop; DONG, JEYOUN; Kim, Jennifer* *Georgia Institute of Technology, United States of America*
TO2.4	15:00- 15:10	**Development of Remote Piping Inspection System with Dual-Mode Locomotion Quadruped Robot** *Kim, Hyun-Bin; Kim, Chanseok; Ham, Byeong-Il; Kang, Jeonguk; Choi, Minseong; Choi, Keun Ha; Kim, Kyung-Soo* *KAIST, Korea, South*
TO2.5	15:10- 15:20	**Architecture Design and Configuration of Lower-Cost Flying Ad-Hoc Network Based P2P Connection for UAV Swarm Deployment** *Wilfried Yves Hamilton, Adoni; Fareedh-Shaik, Junaidh; Singh, Aastha; Richard, Gloaguen; Lorenz, Sandra; Thomas D., Kühne* *Helmholtz-Zentrum Dresden-Rossendorf - (HZDR), Germany*
TO2.6	15:20- 15:30	**Drone-Based Remote Sensing for Yield Estimation of Xisha Watermelon Using Global Scanning** *Zhang, Xiaofei; zheng, yuqin; xun, yi; Yang, Qinghua; Wang, Zhiheng* *Zhejiang University of Technology, China*
TO2.7	15:30- 15:40	**Flat-Foldable Wheel for Small Exploration Robot Swarm** *Kim, Junseo; Lee, Sung-Jin; Lee, Dae-Young* *Korea Advanced Institute of Science and Technology, Korea, South*
TO2.8	15:40- 15:50	**Recognition and Image Segmentation of Broccoli Head in Fields under Different Lighting Conditions** *Wang, Zhiheng; Xu, Jixing; Zhang, Xiaofei; SHEN, Ao; Yang, Qinghua* *Zhejiang University of Technology, China*
TO2.9	15:50- 16:00	**Soft Gripper Equipped with a Variable Loop Actuator** *CHOE, JUNPIL; Kang, Gyeongji; Song, Kahye* *Korea Institute of Science and Technology, Korea, South*

[TP1] Poster II

Thursday, December 5, 16:40-17:40 @ Lobby (2F)

TP1.1   **Robust Pose Estimation for Large Displacement Trajectories through Dual-Task Learning**
Lee, Jeongwook; Jang, Suji; Kim, Ue-Hwan
Gwangju Institute of Science and Technology (GIST), Korea, South

TP1.2   **Blood Pressure Monitoring Difference of Gaussians and Deep Learning**
Kim, Sung Woo; Lee, Jae Young; Kim, Junmo
KAIST, Korea, South

TP1.3   **GMM Information Gain-Based Deep Reinforcement Learning for Source Term Estimation**
Lee, Junhee; Jang, Hongro; Park, Minkyu; Oh, Hyondong
UNIST, Korea, South

TP1.4   **Design and Simulation of an Emergency Navigation System for Indoor Swarm Drones**
Ahn, Seunggyu; Lee, Minkyu; Kim, YeonJung; YOU, DONG IL; Lim, Seunghan
PABLO AIR Co.,Ltd., Korea, South

TP1.5   **Learning-Based 3D Human Body Movement Estimation Using Body-Worn Inertial Sensors**
Lee, Suyeong; Sheem, Seokyong; Kim, Daekyum
Korea University, Korea, South

TP1.6   **Gimbal Camera-Based Flight Guidance for Striking Illegal Drones**
Lee, Hojun; Lee, Kyuman
Kyungpook National University, Korea, South

TP1.7   **Improving Optical Character Recognition On Partially Broken Khmer Characters In Printed Documents**
Hean, Menghang; Peou, Khem Raksa; Cadungog-Uy, Neil Ian; Va, Hongly; Math, Sa; Thap, Tharoeun
Ministry of Post and Telecommunications, Cambodia

TP1.8   **Design and Identification of Keypoint Patches in Unstructured Environments**
Park, Taewook; Kim, Seunghwan; Oh, Hyondong
UNIST, Korea, South

TP1.9   **An Efficient Image Filtering Algorithm for UAV-Based Photogrammetry Using ORB Feature Matching in Large-Scale Outdoor Environments**
Yim, Gaeun; Hyoungho, Park; Bae, Seonguk; Seo, Jaemin; Oh, Hyondong
UNIST, Korea, South

TP1.10   **Optimal Thrust Estimation Considering Actual Thrust Fitting of Quadrotors**
Kim, Joonhyun; Kim, Kyunam
Sungkyunkwan University, Korea, South

TP1.11   **Individualized Therapeutic Approaches for Children with ADHD in Virtual Reality (VR) Environments: Application and Evaluation of Game-Based Training to Facilitate Parallel Thinking**
Kim, Haeun; Kim, Taehong; Jeong, Jiwoo; Hwang, Jooyeong; Kim, Dongmyeong; Lee, WonHyong
Handong Global University, Korea, South

[TP1] Poster II

Thursday, December 5, 16:40-17:40 @ Lobby (2F)

TP1.12   **Predictive Localization Uncertainty-aware Planning for Safe Exploration**
Lee, Sanghun; Lee, Hojin; Yi, Seunghak; Kwon, Cheolhyeon
Ulsan National Institute of Science and Technology, Korea, South

TP1.13   **An Efficient Solution to the Multi-Depot Vehicle Routing Problem Using Reinforcement Learning**
Son, Hakmo; Do, Haggi; Kim, Jinwhan
KAIST, Korea, South

TP1.14   **Real-Time Estimation and Search of Hazardous Emission Source with Multiple Mobile Robots**
Park, Minkyu
Changwon National University, Korea, South

TP1.15   **Wheel Speed Estimation for Ground Vehicles Based on ABS Sensors Using Adaptive Moving Average Filter**
Lim, Myunghwan; Son, Hungsun
Ulsan National Institute of Science and Technology, Korea, South

TP1.16   **ReDepth: Rectified Activations for Robust Depth Estimation**
Kim, Jiwoo; Shin, Woojae; Shin, Heejung; Kim, Minwoo; Lee, Jinwoo; Oh, Hyondong
UNIST, Korea, South

TP1.17   **Cooperative Mission Planning for Heterogeneous Robots with Energy Constraints**
Duong, Thi Thuy Ngan; Lee, Jungeun; Jeon, Jeong hwan
Ulsan National Institute of Science and Technology, Korea, South

TP1.18   **Real-time Monitoring of Point Cloud Registration in Mixed Reality**
Chang, Hanbeom; Lim, Hansol; Choi, Jongseong
State University of New York, Stony Brook, United States of America

TP1.19   **Decentralized Formation of UAVs with UWB-Based Bias Correction**
Kim, Myunggun; Kim, wansoo; Son, Hungsun
Ulsan National Institute of Science and Technology, Korea, South

TP1.20   **UAV Localization Using CNN-Based Ground Landmark Detection under GNSS-Denied Situation**
Seo, Young; RA, CHUNGGIL; Kim, Yeji; kim, taegyun; Kim, Seungkeun; Suk, Jinyoung
Chungnam National University, Korea, South

TP1.21   **Task Scheduling for UAV: A Finite State Machine Based Clustering Algorithm**
Yoon, Jakyung; LEE, JUSANG; Kwon, Cheolhyeon
Ulsan National Institute of Science and Technology, Korea, South

TP1.22   **Hierarchical-Federated-Learning-based Predictive Maintenance in Industrial Edge Systems**
Tech, Berinike; Shcherbyna, Volodymyr; Kästner, Linh; Bhuiyan, Teham; Lambrecht, Jens
Technical University Berlin, Germany

[FO1] Robotics Applications in Diverse Tasks I

Friday, December 6, 10:10-11:10 @ Auditorium (2F)

Chair: Joao Sequeira, Instituto Superior Técnico – Institute for Systems and Robotics, Portugal

FO1.1 *virtual*	**10:10-** **10:20**	**Innovative Sensing and Data Processing for Deformation and Texture Classification in Robot-Assisted Minimally Invasive Surgery** *Govalla, Dema Nua; Rozenblit, Jerzy W* *University of Nevada, Las Vegas, United States of America*
FO1.2 *virtual*	**10:20-** **10:30**	**Information-Efficient Vicsek Flocking Using Deep Reinforcement Learning** *Kim, Jongyun; Lee, Hae-In; Shin, Hyo-Sang; Tsourdos, Antonios* *Cranfield University, United Kingdom*
FO1.3 *virtual*	**10:30-** **10:40**	**Wind Field Estimation from UAV Data Using Machine Learning** *Dwivedi, Vijay Shankar; Shin, Hyo-Sang; Tsourdos, Antonios* *Cranfield University, United Kingdom*
FO1.4 *virtual*	**10:40-** **10:50**	**Drone Image Processing for Efficient Obstacle Avoidance in Transmission Line Inspections** *Nazaruddin, Yul Yunazwin; Rahardian, A.S. Reinard; Bandong, steven; Romdlony, Muhammad Zakiyullah; Tamba, Tua* *Institut Teknologi Bandung, Indonesia*
FO1.5 *virtual*	**10:50-** **11:00**	**Clustered Temporal Path Planning (CTPP) for Drone Swarms in Real-Time Updated Digital Twins** *Cetinsaya, Berk; Gallagher, Reese; Neumann, Carsten; Reiners, Dirk; Cruz-Neira, Carolina* *University of Central Florida, United States of America*
FO1.6 *virtual*	**11:00-** **11:10**	**Clustering Clients by Port in Large-Scale AutoStore Using Genetic Algorithms** *Ha, Won Yong* *New York University, United States of America*

[FO2] Robotics Applications in Diverse Tasks II

Friday, December 6, 11:20-12:20 @ Auditorium (2F)

Chair: Jeong hwan Jeon, Ulsan National Institute of Science and Technology, Korea, South

FO2.1 *virtual*	**11:20-** **11:30**	**A Pressure-Sensitive Bending Waveguide Sensor for Proprioception in a Soft Cylindrical Actuator** *ALJaber, Faisal; Hassan, Ahmed; Ataka, Ahmad; Vitanov, Ivan; Almeadadi, Noora; ALHAJRI, HIND; AlEnazi, Sara; Al-Marri, Rashid; Choe, Pilsung* *Qatar University, Qatar*
FO2.2 *virtual*	**11:30-** **11:40**	**Prescribed Vibration Control for Long Slender Remote Systems in Nuclear Decommissioning** *Wang, Xinming; Yan, Yunda; Zhang, Kaiqiang; Liu, Cunjia* *University College London, United Kingdom*
FO2.3 *virtual*	**11:40-** **11:50**	**Modeling Weakly-Instrumented Excavator Arm Dynamics with Stacked-Input LSTM** *Hoffmann, Nicolas; Cohen, Max; Preda, Marius; ZAHARIA, Titus* *Télécom Sudparis, France*
FO2.4	**11:50-** **12:00**	**A Composite Neuronal Model as Miniaturized Visual Modality for Collision Perception** *Wang, mengying; Huang, Jiajun; Sun, Xuelong; Hu, Cheng; Peng, Jigen; Fu, Qinbing* *Guangzhou University, China*
FO2.5	**12:00-** **12:10**	**Synthetic Data Augmentation for Robotic Mobility Aids to Support Blind and Low Vision People** *Hwang, Hochul; Adhikari, Krisha; Rekha Prabhanjan, Satya Shodhaka; Kim, Donghyun* *University of Massachusetts Amherst, United States of America*
FO2.6	**12:10-** **12:20**	**Transforming SLAM Data into 3D Gaussian Splatting Models** *Lim, Hansol; Chang, Hanbeom; Choi, Jongseong* *State University of New York, Stony Brook, United States of America*

Campus Map & Parking Areas

Conference Venue
Auditorium Hall (2F.), Main Administration Building (#201)
Ulsan National Institute of Science & Technology
50, UNIST-gil, Ulsan 44919, Republic of Korea

Directions to Parking Areas
There are two parking lots near the Gymnasium (#205) and the University-Industry Cooperation Building (#251). Free parking passes will be available at the registration desk.

- P1: Located to your right, past the Main Administration Building (#201).
- P2: Behind the University-Industry Cooperation Building (#251).

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