Taejoo Kim

Ph.D. Student (M.S./Ph.D. Integrated Program) · SEJONG UNIVERSITY

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Education

Sejong University — *Seoul, South Korea*

Ph.D. Candidate (M.S./Ph.D. Integrated Program) in Intelligent Mechatronics Engineering — *Mar.2021 - Current*

- Overall GPA : 4.43/4.5
- Supervised by Prof. Yukyung Choi

Sejong University — *Seoul, South Korea*

B.S in Intelligence Mechatronics Engineering — *Mar.2019 - Feb.2021*

- Hornors: Magna cum laude (Overall GPA : 3.71/4.5)

Publications (Selected Papers)

[J1] INSANet: INtra-INter Spectral Attention Network for Effective Feature Fusion of Multispectral Pedestrian Detection — *Fep, 2024*

Sangin Lee*, **Taejoo Kim**, , Jeongmin Shin, Namil Kim and Yukyung Choi

- Sensors
- Q2 / IF 3.847

[J2] Multispectral Benchmark Dataset and Baseline for Forklift Collision Avoidance — *Sep, 2022*

Hyeongjun Kim*, **Taejoo Kim***, Won Jo, Jiwon Kim, Jungmin Shin, Daechan Han, Yujin Hwang and Yukyung Choi

- Sensors
- Q2 / IF 3.847

[J3] Crop Growth Monitoring System in Vertical Farms Based on Region-of-Interest Prediction — *July, 2022*

Yujin Hwang*, Seunghyeon Lee, **Taejoo Kim** , Kyeonghoon Baik and Yukyung Choi

- Agriculture
- Q1 78.33 / IF 3.408

[J4] Instance-Aware Plant Disease Detection by Utilizing Saliency Map and Self-Supervised Pre-Training — *July, 2022*

Taejoo Kim*, Hyeongjun Kim, Kyeonghoon Baik, Yukyung Choi

- Agriculture
- Q1 78.33 / IF 3.408

[J5] MLPD : Multi Label Pedestrian Detection in Multispectral Domain — *Oct, 2021*

Jiwon Kim*, Hyeongjun Kim*, **Taejoo Kim***, Namil Kim, Yukyung Choi.

- IEEE Robotics and Automation Letters (RA-L) with IROS, October 2021
- Q2 69.64 / IF 3.856

Research Experience

ONGOING PROJECTS

Development of robotic manipulation task learning based on Foundation model to understand and reason about task situations — *Sejong Univ*

Funded by the Technology Innovation Program under the Ministry of Trade, Industry & Energy (MOTIE) — *Sep. 2024 - Current*

- Developing a manipulator for interpreting ambiguous commands and executing autonomous actions.
- Research on a Language Model Program for understanding ambiguous commands and generating context-aware robotic tasks.
- Developing a 3D Language Field for embedding language-based task information directly into spatial representations.

Development of artificial intelligence software for unseen object manipulation that integrates prompt and situation-specific unseen object recognition and arbitrary gripper shape analysis through gripper self-observation — *Sejong Univ*

Funded by the Technology Innovation Program under the Ministry of Trade, Industry & Energy (MOTIE) — *Apr. 2024 - Current*

- Development of a segmentation model for unseen object manipulation.
- Developing robust open-world object segmentation through continuous learning for unseen objects.

Development of core technology for indoor unmanned platform and leakage blocking for accident response at operating nuclear power plants — *Sejong Univ*

Funded by the National Research Foundation of Korea (NRF) and the Unmanned Vehicle Advanced Research Center (UVARC) under the Ministry of Science and ICT — *Mar. 2023 - Current*

- Development of robust 3D object detection and 6D pose estimation for workspace recognition and panel operation in low-light and high-density aerosol environments during nuclear accidents.

COMPLETED PROJECTS

Development of AI-based HD map building and crop image analysis for smart farm agricultural automation robots — *Sejong Univ*

Funded by the Institute of Information & Communications Technology Planning & Evaluation (IITP) under the Ministry of Science and ICT — *Jun. 2023 - May. 2024*

- Development of 3D detection for crop recognition to automate harvesting in smart farm environments.
- Research on 3D detection techniques for estimating crop stem-axis heading considering harvesting methods. **[J3, J4]**

Development of a Precise Localization and Hazard Detection Algorithm for Electric Facility Monitoring Robots through Magnetic Map and Visual Information Fusion — *Sejong Univ*

Funded by Korea Electric Power Corporation (KEPCO) — *Jan. 2021 - Dec. 2023*

- Development of an anomaly detection model for unmanned robots to identify defects in electrical facilities.
- Research on LWIR-based fault detection for monitoring heat anomalies caused by aging and leakage in electrical facilities. **[J1]**

A Fault-tolerant Fusion Method for Robust Visual Localization — *Sejong Univ*

Funded by the National Research Foundation of Korea (NRF) under the Ministry of Science and ICT (MSIT) — *Apr. 2020 - Feb. 2023*

- Development of a fault-tolerant fusion method for precise visual-inertial odometry in disaster-stricken environments, ensuring robustness against low-light conditions, motion blur, and sensor failures.
- Research on RGB-IMU sensor fusion for resilient visual-inertial odometry, addressing sensor loss, synchronization slip, and adverse environmental factors affecting robotic navigation.

A Fault-tolerant Fusion Method for Robust Pedestrian Detection *Sejong Univ*

Funded by the National Research Foundation of Korea (NRF) under the Ministry of Science and ICT (MSIT) *Sep. 2018 - Aug. 2020*

- Development of an adaptive fusion method for pedestrian detection, ensuring robust performance under sensor failures and adverse environmental conditions using RGB-Thermal fusion.
- Research on multi-label pedestrian detection in the multispectral domain, leveraging deep learning-based RGB-Thermal fusion to improve recognition under sensor degradation, occlusions, and environmental noise. **[J5, J2]**

Patents

Object detection method and apparatus in multispectral domain using multi-label learning *Oct. 2023*

YuKyung Choi, **Taejoo Kim**, Jiwon Kim, Hyeongjun Kim, Namil Kim

- Korea patent (patent application) No.10-2590622

Method and apparatus for multispectral pedestrian detection based on attentional-based illumination environment *Aug. 2023*

YuKyung Choi, **Taejoo Kim**, Sangin Lee, Dogyeung Kim, Hyeongjun Kim

- Korea patent (applied) No.10-2023-0106387

Awards

2021 **Best Excellence Prize**, 13th IDIS-ETNEWS ICT Paper Contest, Republic of Korea

2020 **3rd Prize**, NAVER LABS MAPPING & LOCALIZATION CHALLENGE, Republic of Korea

Teaching Experience

Graduate Courses

Introduction to Deep Learning *Spring, 2024. Fall, 2023*

Instructor: Prof. Yukyung Choi

- Role: TA

Computer Vision *Fall, 2023*

Instructor: Prof. Yukyung Choi

- Role: TA

Undergraduate Courses

Deep Learning System *Spring, 2023. Fall, 2022*

Instructor: Prof. Yukyung Choi

- Role: TA, Head TA

Artificial Intelligence *Fall, 2021*

Instructor: Prof. Yukyung Choi

- Role: TA

Machine Learning *Spring, 2021. Fall, 2020*

Instructor: Prof. Yukyung Choi

- Role: Head TA, TA