JUNSEOK LEE

AI Researcher & Robot Vision Engineer

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https://scholar.google.com/citations?user=0D3_0cAAAAAJ&hl=ko

1. SUMMARY

As an AI researcher, I have developed novel maritime situation awareness frameworks focusing on the improvement of performance and efficiency by leveraging maritime object detection without human intervention. Successfully applied these advances to real-world applications: robot perception, autonomous navigation, and recognition systems for self-checkout.

2. SKILLS

Languages: Korean (Native) & English

Programming: Deep Learning (Python - Pytorch)

3. EDUCATION

9/2019 - Present **Gwang ju Institute of Science and Technology (GIST)** **Advisor: Prof. Kyoobin Lee**
M.S&Ph.D. Courses in School of Integrated Technology (Robotics Program)

3/2016 - 8/2019 **Gyeongsang National University (GNU)** ***Summa Cum Laude***
B.S. in Aerospace&Software engineering

4. RESEARCH INTERESTS

Computer Vision : Object Detection & Segmentation, Medical Image Processing, Face Recognition

Knowledge Distillation : Cross-Domain Knowledge Distillation for Robust Object Detection

Real-World Application : Applying Deep Learning Model to Unmanned Surface Vehicle, Robots, and Autonomous Ship

5. PROJECTS

Project Leader **Development of a Swarm Autonomous Navigation Algorithm** **Agency for Defense Development (S.Korea)**
(*Apr. 2020 - Nov. 2024*)
TL;DR : Development of Technologies for Enhancing Swarm Situation Awareness, Intent Inference, and Maritime Target Detection Performance
[Video1: Project News]
- Construction of a Comprehensive Maritime Target Dataset for Object Detection
- Development of an Algorithm for Detecting and Tracking Multiple Maritime Objects
- Incremental Learning Algorithms for Learning Novel Objects
- Development of an Algorithm for Intent Inference and Trajectory Prediction of Maritime Objects for Battlefield Situational Awareness

Project Leader **Development of a Situational Awareness System for Preventing Collisions and Accidents of Autonomous Ship** **Ministry of Trade, Industry and Energy (S. Korea)**
(*Apr. 2023 - Dec. 2024*)
TL;DR : Development of a Camera-Based Maritime Object Detection Algorithm for Maritime Situation Awareness
[Video1: Project News]
- Development of an Algorithm for Maritime Object Detection and Tracking from Multiple Camera Views
- Construction of a Training Dataset for Deep Learning Models for Maritime Object Detection and Tracking
- Integration into Real Systems through Application of the Algorithm to Maritime Autonomous Ship

Project Leader **Development of reconnaissance robots having amphibious mobility** **Ministry of Trade, Industry and Energy (S. Korea)**
(*Oct. 2022 - Set. 2027*)
TL;DR : Development of a Surveillance Target Detection Algorithm for Monitoring and Reconnaissance of Amphibious Robots
- Construction of a Maritime Target Dataset
- Development of an Algorithm for Maritime Target Detection and Tracking

Project Leader **Development of Artificial Intelligence Implant Guide Simulation Software and Surgical Guide System** **Ministry of SMEs and Startups (S. Korea)**
(*Jun. 2020 - May. 2022*)
TL;DR : Development of an Artificial Intelligence-Based Algorithm for Implant Surgery Planning to Support Implant Guide Simulation Software and Surgical Guide System Development
- Construction of a Large-Scale Implant Database for Deep Learning Training
- Development of a Deep Learning-Based Algorithm for Implant Surgery Planning

Project Member **Robotic IKEA Furniture Assembly from Assembly Manuals** **Ministry of Science and ICT (S.Korea)**
(*Apr. 2019 - May. 2020*)
TL;DR : A Competition of AI-robot Systems for Assembly of IKEA Furniture from Assembly Manuals
[Video1: Assembly Manual Understanding] / [Video2: Robot Assembly Contest]
- Sim2Real Dataset: Rendering IKEA CAD Parts into Manual-like Images using Blender
- Parsing Assembly Manual using OCR and Document Segmentation
- 2D Manual Image to 3D CAD Part Retrieval for Part Recognition
- 6D Pose Estimation of Parts using Differentiable Renderer and Assembly Sequence Generation

Project Member **Development of Cloud Robot Intelligence Sharing Framework to Enhance the Intellgience of Multiple Robots** **Ministry of Science and ICT (S.Korea)**
(*Apr. 2020 - Dec. 2023*)
TL;DR : Enhancing Robot Perception via Cloud-based Knowledge Sharing for Novel Object Discovery and Incremental Learning
[Video1: Robot Serving Demo] / [Video2: Smart Restaurant PoC]
- Development of Out-of-Distribution Detection Algorithms for Novel Object Detection
- CLIP based Multi-Modal Data (Text + Image) Retrieval from Cloud Database
- Incremental Learning Algorithms for Learning Novel Objects
- PoC: Smart Robot Restaurant with Incremental Learning for New Menu Recognition

6. PUBLICATIONS

Google Scholar: *https://scholar.google.com/citations?user=0D3_0cAAAAAJ&hl=ko* * indicates the equal contribution

Robust Maritime Object Detection under Adverse Conditions via Joint Semantic Learning without Extra Computational Overhead

Under review in IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2025)

Junseok Lee, Seongju Lee, Jongwon Kim, Jumi Park, Kyoobin Lee

CD-FKD: Cross-Domain Feature Knowledge Distillation for Robust Single-Domain Generalization in Object Detection

Under review in International Conference on Computer Vision (ICCV 2025)

Junseok Lee, Sungho Shin, Seongju Lee, Kyoobin Lee

Cross-Resolution Token Knowledge Distillation for Detection Transformers

In preparation for the IEEE Transactions on Multimedia

Sungho Shin*, **Junseok Lee***, Yeonguk Yu, Kyoobin Lee

MV2: A Large-Scale 360-degree Multi-View Maritime Vision Dataset for Object Detection and Segmentation

Under review in IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2025)

Junseok Lee*, Jongwon Kim*, Seongju Lee*, Taeri Kim, Kyoobin Lee

Automated Diagnosis for Extraction Difficulty of Maxillary and Mandibular Third Molars and Post-Extraction Complications using Deep Learning

Scientific Reports

Junseok Lee, Jumi Park, Seongju Lee, Seong-Yoon Moon, Kyoobin Lee

3rd Workshop on Maritime Computer Vision (MaCVi) 2025: Challenge Results

Winter Conference on Applications of Computer Vision (WACV 2025)

Seongju Lee, **Junseok Lee**, Kyoobin Lee
[Paper] 1st in Semantic Segmentation track
2nd in Panoptic Segmentation track

MART: MultiscAle Relational Transformer Networks for Multi-agent Trajectory Prediction

European Conference on Computer Vision (ECCV 2024)

Seongju Lee, **Junseok Lee**, Yeonguk Yu, Taeri Kim, Kyoobin Lee

- 27.9% Acceptance Rate
[Paper] [Code]

Enhancing Multi-Resolution Face Recognition via Cross-Resolution Feature Similarity Knowledge Distillation

Submitted to IEEE Transactions on Circuits and Systems for Video Technology

Sungho Shin, Yeonguk Yu, Sangjun Noh, **Junseok Lee**, Kyoobin Lee

Teaching Where to Look: Attention Similarity Knowledge Distillation for Low Resolution Face Recognition

European Conference on Computer Vision (ECCV 2022)

Sungho Shin, Joosoon Lee, **Junseok Lee**, Yeonguk Yu, Kyoobin Lee

- Best Paper Award, 2019, Korea Computer Congress
- 28.0% Acceptance Rate
[Paper] [Code] [Presentation] [News: YTN Sciences]

Automated Prediction of Extraction Difficulty and Inferior Alveolar Nerve Injury for Mandibular Third Molar Using Deep Neural Network

APPLIED SCIENCES (Q1)

Junseok Lee, Jumi Park, Seong-Yoon Moon, Kyoobin Lee
[Paper]

Deep Learning based Missing Tooth Regions Detection for Dental Implant Planning in Panoramic Radiographic Images

APPLIED SCIENCES (Q1)

Jumi Park*, **Junseok Lee***, Seong-Yoon Moon, Kyoobin Lee
[Paper]

Buoy Light Detection and Pattern Classification for Unmanned Surface Vehicle Navigation

International Conference on Ubiquitous Robots (UR 2024)

Junseok Lee, Taeri Kim, Seongju Lee, Jumi Park, Kyoobin Lee
[Paper] - Best Paper Award Finalist, 2024, International Conference on Ubiquitous Robots (UR 2024)

Automatic detection of injection and press mold parts on 2d drawing using deep neural network

International Conference on Control, Automation and Systems (ICCAS 2021)

Junseok Lee, Jongwon Kim, Jumi Park, Seunghyeok Back, Seongho Bak, Kyoobin Lee
[Paper]

Deep learning based food instance segmentation using synthetic data

International Conference on Ubiquitous Robots (UR 2021)

Deokhwan Park, Joosoon Lee, **Junseok Lee**, Kyoobin Lee
[Paper]

Multiple classification with split learning

International Conference on Smart Media and Applications (SMA 2020)

Jongwon Kim, Sungho Shin, Yeonguk Yu, **Junseok Lee**, Kyoobin Lee
[Paper]

7. PATENTS

7-1. REGISTRATION

Device for Assisting Eating Posture No. 10-23732050000, KR, 2022
Junseok Lee, Joosoon Lee, Deckhwan Park, Junho Yoon, Kyoobin Lee

7-2. APPLICATION

Method and Device for Multi-agent Trajectory Prediction via Graph Transformer-based Multi-relation Analysis Network, and Apparatus Thereof KR 2024
Junseok Lee, Seongju Lee, Yeonguk Yu, Taeri Kim, Kyoobin Lee

Method and Device for Providing Feature Vector to Improve Face Recognition Performance of Low-quality Image KR/US 2023
Junseok Lee, Sungho Shin, Joosoon Lee, Kyoobin Lee

Method and Device for Providing Attention Map to Improve Face Recognition Performance of Low-Resolution Image KR/US 2022
Junseok Lee, Sungho Shin, Joosoon Lee, Changhyun Jun, Kyoobin Lee

Tooth Extraction Difficulty Diagnosis And Complications Prediction Device Aand Method KR/US 2022
Junseok Lee, Jumi Park, Kyoobin Lee

8. TEACHING EXPERIENCES

Teaching Assistant GIST
Deep Learning, RT5101-01 Mar.2024 - Jun.2024

Teaching Assistant GIST
Advanced Deep Learning, RT5102-01 Sep.2023 - Dec.2023

Teaching Assistant GIST
Advanced Deep Learning, RT5102-01 Sep.2022 - Dec.2022

Teaching Assistant GIST
Advanced Deep Learning, RT5102-01 Sep.2021 - Dec.2021

Teaching Assistant GIST
Deep Learning, RT5101-01 Mar.2021 - Jun.2021

Teaching Assistant GIST
Advanced Deep Learning, RT5102-01 Sep.2020 - Dec.2020

Teaching Assistant GIST
Creative Knowledge Creation, ME5135 Sep.2020 - Dec.2020

9. MENTORING

- Jumi Park (Current. Hanwha system) Jul.2020 - Feb.2023
- Taeri Kim (Current. GIST Ph.D.) Mar.2022 - Present
- Taeyul Kim (Current. GIST M.S) Sep.2023 - Present
- Jongwon Kim (Current. GIST Ph.D.) Mar.2023 - Present