

# Jiyang Lee

212-302, Gangsong-ro 158, Ilsandong-gu, Goyang-si, Gyeonggi-do, South Korea 10416  
+82-10-9158-0911 | [jiyang.lee91@gmail.com](mailto:jiyang.lee91@gmail.com) | <https://jiyang91.github.io>

## RESEARH INTEREST

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Mechatronics, Robotics, Task/Motion Planning, Computer Vision, Anomaly detection, Image classification

## EDUCATION

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### Sogang University

Seoul, Korea

*Master of Science in Mechanical Engineering* (GPA: 4.07/4.30)

Mar. 2015 – Feb. 2017

- Master's Thesis: "Development of Path Planning using Marker for SCARA Robot PET Dispensing System"
- Advisor: Prof. Cheol-soo Lee
- GRA/TA: Full-tuition Scholarship for two years (2015, 2016).

*Bachelor of Science in Mechanical Engineering*

Mar. 2011 – Feb. 2015

- Merit-based Scholarships: Full-tuition award for 2011 and 2014, Half-tuition award for 2012
- Admitted with the highest distinction on College Entrance Exam with a scholarship.

## PROFESSIONAL EXPERIENCE

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### LG Display Co., Ltd.

Paju, Korea

*Research Engineer, Vision Algorithm Team*

Dec. 2020 – Present

- Develop a Multi-anomaly Detection GUI Tool.
  - Main Issues: Users' difficulty in training and testing anomaly models.
  - Design a GUI interface to support individual SOTA anomaly detection methods to train and test different models.
  - Deploy a different anomaly detection strategy to one interface and optimize each method.
- Established an Anomaly Detection System to detect stains on display panels.
  - Main Issues: Undifferentiable stain defects on display panel; non-automated alarming system for the manufacturing line.
  - Built an automatic anomaly detection system and localization the system for stain defect.
  - Devised a real-time auto-mailing system to send detection results and alarms to the production line.
- Developed a Few-Shot Image Classification Model for defect image in Fine Metal Mask (FMM).
  - Main Issues: Tiny defect detection problem, small dataset training, and data imbalance.
  - Improved the current detection rate by 16% and optimized data augmentation for the classification system.
- Accelerated the legacy system with a CUDA-based algorithm.
  - Upgraded major algorithms used in a smart factory and increased the speed by seven times.

### Korea Institute of Science and Technology (KIST)

Seoul, Korea

*Robotics Researcher, Robot and Media Institute*

Oct. 2018 – Feb. 2020

- Designed and assembled a quadruped robot with smart motors; programmed position control program with inverse dynamics.
- Developed a remote 360-degree panoramic view system for the command centers of Firefighting Armored Robots.
  - Upgraded the wired system to a WI-FI 6 wireless panoramic view system to support firefighters in disaster rescue vehicles.
  - Demonstrated multi-robots (armored robots, drones, and snake robots) with a firefighter team in disaster simulations.
- Estimated positions for a robot swarm with various type of sensors in an indoor environment.
  - Conducted experiments for robust position estimation algorithm with Ultra-wideband (UWB) sensor and TurtleBots.
  - Published one conference paper (3).

### CSCAM Co., Ltd.

Gwangju, Korea

*Assistant Research Engineer, CNC Department*

Jan. 2017 – Sep. 2018

- Devised a smartphone aluminum frame vision (optic/mechanical) inspection machine in two stages to identify surface defects.
  - Programmed the software and implemented a rule-based algorithm with OpenCV to create an optimal inspection setting.
- (Client: Samsung Electro-Mechanics) Designed a high precision XRF inspection machine.
  - Outlined the mechanism and parts using Autodesk Inventor; Created and managed the BOM list.
- (Client: Samsung Display) Constructed a loading machine and buffer machine in the T-bending manufacturing line for OLED.
  - Modified parts and drawings using SolidWorks; Created and managed the BOM list.

## RESEARCH EXPERIENCE

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### Sogang University

Seoul, Korea

Graduate Research Assistant, CAD/CAM Lab

Mar. 2015 – Feb. 2017

- Reviewed the designs and applications of multi-axis manipulators, produced a SCARA (Selective Compliance Assembly Robot Arm) robot for industrial purpose, analyzed the PET dispensing process, and built a SCARA-based robotic dispensing system.
- Developed two computer vision applications: Marker pose extraction and Human-Robot interface with RGBD sensor.
- Published two journals (1, 2) and attended three conferences (4, 5, 6).

Undergraduate Research Assistant, CAD/CAM Lab

Dec. 2013 – Feb. 2015

- Examined the mechanisms of industrial Six-Axis Robot Manipulator; designed and produced a mock-up with 3D-printer.

## TEACHING EXPERIENCE

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### Sogang University

Seoul, Korea

Graduate Teaching Assistant, MEE6413: Intelligent Actuator

Aug. 2017 – Dec. 2017

- Delivered lectures on LabView and managed term projects controlling various motors with FPGA myRIO.

Graduate Teaching Assistant, MEE4004: 3D CAD & Practice

Mar. 2015 – Feb. 2017

- Delivered lectures on 3D CAD (Autodesk Inventor), created exam problem, and graded daily quizzes/tests.

Grader, MEE2026: 2D-CAD

Mar. 2015 – Feb. 2017

## PUBLICATIONS

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### Journals

1. **Lee, J.Y.** and Lee, C.S. (2018). "Path planning for SCARA robot based on marker detection using feature extraction and labelling." *International Journal of Computer Integrated Manufacturing*, 31(8), 769-776.
2. **Lee, J.Y.**, Lee, D.G., and Lee, C.S. (2017). "Development of Robotic Dispensing System for Radiopharmaceuticals using SCARA Robot." *Journal of the Korean Society of Manufacturing Technology Engineers*, 26(5), 441-449. **[Best Paper Award]**

### Conferences

3. Kim, M., **Lee, J.Y.**, Kim, J., Nigatu, H., and Kim, D. "A Robust Position Estimation Algorithm under Unusual Large Range Errors," 2019 28<sup>th</sup> IEEE International Conference on Robot and Human Interactive Communication (ROMAN), New Delhi, India, 2019, pp. 1-6 (Oral session).
4. **Lee, J.Y.** and Lee, C.S., "Path planning for SCARA robot based on marker detection using feature extraction, labeling, and inverse perspective transform." 26<sup>th</sup> International Conference on Flexible Automation and Intelligent Manufacturing, Seoul, Korea, Jun. 2016 (**Presenter**, Oral session).
5. Lee, C.S., **Lee, J.Y.**, Lee, D.G. and Kim, J.M. "Teleoperation of SCARA Robot for Radiopharmaceutical Product Dispensing." 2016 Fall Conference of The Korean Society of Manufacturing Technology Engineers, Jeju Island, Korea, Nov. 2016 (Oral session).
6. **Lee, J.Y.** and Lee, C.S. "SCARA Robot 2-Dimensional Path Planning by Using Markers." The 2016 Winter Conference of Society for Computational Design and Engineering, Gangwon Province, Korea, Jan. 2016 (**Presenter**, Oral session).

## AWARDS

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- *Best Paper Award*, The Korean Society of Manufacturing Technology Engineers, Oct. 2018.
- *Robot Membership Award*, Samsung Techwin, Mar. 2014.
- *Excellence Award*, Texas Instruments Innovation Challenge: Korean MCU Design Contest, Nov. 2013.

## TECHNICAL SKILLS

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- **Programming:** C++, Python, C#, OpenCV, PyTorch, and Cuda
- **Mechanical Design:** Autodesk AutoCAD, Inventor, and SolidWorks
- **Languages:** Korean (native fluency), English (full-professional proficiency)