

# SCOTT (SEONGWON) LEE

205 N. Goodwin Ave., Champaign, IL 61820, USA

◇ +1 217-377-9970 ◇ sl148@illinois.edu

◇ [LinkedIn](#) ◇ [Google Scholar](#) ◇ [Personal Webpage](#)

## SUMMARY STATEMENT

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- Robotics researcher specializing in **multi-robot algorithms** to solve real-world challenges in warehouse and factory automation.
- Focused on improving algorithmic efficiency through hierarchical structure and effective information/constraint management.
- Strong experience in integrating hardware and software for practical, impactful multi-robot system deployments.

## EDUCATION

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### University of Illinois at Urbana-Champaign

Aug. 2021 - Dec. 2026 (*Expected*)

*Ph.D. Candidate in Department of Mechanical Science and Engineering*

**Advisor:** Prof. Nancy M. Amato

- Current GPA: 3.8/4.0

### Yonsei University, Seoul, South Korea

Mar. 2016 - Feb. 2021

*B.S. in Department of Mechanical Engineering*

**Advisor:** Prof. Jongeun Choi

- Granted National Science and Technology Scholarship (Full tuition)
- Overall GPA: 3.92/4.0 (Graduated with Cum Laude)

### University of California, Berkeley

Jan. 2020 - May. 2020

*Exchange Student Program*

- Overall GPA: 4.0/4.0

## RESEARCH EXPERIENCE

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### Parasol Lab ([Lab Webpage](#))

*Ph.D. Candidate (Prof. Nancy M. Amato)*

Aug. 2021 - present

#### • Multi-robot Task and Motion Planning (MR-TAMP) Algorithm

June. 2022 - present

- Designed MR-TMP algorithm using hypergraph-based representation and query methods.
- Developed a hierarchical feedback mechanism for fast and efficient constraint management.
- Integrated on warehouse-like biology lab automation system, funded by National Science Foundation (**MiV Project**).

#### • Parasol Planning Library (PPL)

June. 2022 - present

- Contributed to open-source C++ task and motion planning library PPL.

### Machine Learning and Control System Lab ([Lab Webpage](#))

*Undergraduate Internship (Advisor: Prof. Jongeun Choi)*

Aug. 2017 - Feb. 2021

#### • Deep reinforcement learning-based controller design for ground vehicles

May. 2018 - Dec. 2018

- Studied a multi-task autonomous driving algorithm that minimizes driver's injuries in unexpected collisions.
- Integrated Deep Deterministic Policy Gradient algorithm with Convolutional Neural Network to efficiently analyze spatio-temporal information.

#### • Controller design for Unmanned Aerial Vehicles (UAVs)

Jan. 2019 - May. 2020

- Developed a robust controller for UAVs under external and internal uncertainties using Dynamic Inversion combined with Recursive Least Square.
- Designed an Extended High-Gain Observer for state and uncertainty estimator.
- Integrated the controller into a quadrotor and a small-scale helicopter.

### Deep Machine Lab (Startup) ([Webpage](#))

Feb. 2021 - Jun. 2021

*Machine Learning Researcher (Supervisor: Prof. Hanseok Ko)*

#### • Multimodal Human-interactive Avatar

- Developed a virtual avatar that interacts with humans by utilizing multimodal gesture generation networks.
- Constructed a real-time data storing infrastructure using Google Cloud Platform with pixel streaming techniques.

## PUBLICATIONS

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*Ordered in chronological order*

+ Non-peer-reviewed • peer-reviewed

- **Seongwon Lee**, James Motes, Isaac Ngui, Marco Morales, Nancy M. Amato, "Lazy DaSH: Lazy Approach for Hypergraph based Multi-robot Task and Motion Planning" *Preparing for Submission*
- + **Seongwon Lee**, James Motes, Isaac Ngui, Marco Morales, Nancy M. Amato, "Lazy DaSH: Lazy Approach for Hypergraph based Multi-robot Task and Motion Planning" *ICRA@40 Extended Abstract*
- + Isaac Ngui, **Seongwon Lee**, James Motes, Marco Morales, Nancy M. Amato, "A hierarchical Approach to Workstation-based Task Allocation and Motion Planning" *IROS 2023 Workshop Paper*

- **Seongwon Lee**, JooHwan Seo, Connor J. Boss, Joonho Lee, Jongeun Choi, “Output Feedback Control Design for Quadrotors Using Recursive Least Square Dynamic Inversion” *Elsevier Mechatronics*
- Myunhoe Kim, **Seongwon Lee**, Jaehyun Lim, Jongeun Choi, Seong Gu Kang, “Unexpected Collision Avoidance Driving Strategy Using Deep Reinforcement Learning” *IEEE Access*
- JooHwan Seo, **Seongwon Lee**, Joonho Lee, and Jongeun Choi, “Nonaffine helicopter control design and implementation based on a robust explicit nonlinear model predictive control” *IEEE Transactions on Control System Technology*

## PROJECT EXPERIENCE

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- **Mind in Vitro (MiV) Project (Project Description)** *Jan. 2023 - present*  
- Developing MR-TMP algorithm for automating warehouse-like biology lab operations.
  - **ICRA2019, DJI Robomaster AI Challenge (Project Description)** *Feb. 2021 - Jun. 2021*  
- Achieved 3<sup>rd</sup> place among 32 selected teams worldwide.  
- Implemented a Multi-Agent DDPG (MADDPG) algorithm for collaborative maneuver.

## AWARDS AND SCHOLARSHIPS

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- **National Science and Technology Scholarship**, Korea Student Aid Foundation *2016-2020*
  - **Highest Honor**, Yonsei University *Fall 2016*
  - **High Honor**, Yonsei University *Spring 2016, Spring 2017*

## TEACHING & MENTORING EXPERIENCES

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- **Research Program Mentor** Computer Science at UIUC *Fall 2023, Summer 2024, Spring 2024*
  - **ME 310** Fluid Mechanics *Fall 2022, Spring 2024, Fall 2024*
  - **TAM 541** Mathematical Methods *Fall 2023*

## TECHNICAL SKILLS

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- **Programming Tools** C++, C, Python, Javascript, Docker
  - **Robotics Tools** Robot Operating System (ROS), Gazebo, Mujoco, Unreal Engine, Simulink
  - **Hardware** Universal Robot Manipulators, Intel Realsense, Nvidia Jetson, Raspberry Pi, Arduino
  - **Modeling** Autodesk 360, Creo

## LEADERSHIP EXPERIENCE

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- **Military Service for Republic of Korea** *Mar. 2014 - Dec. 2015*
  - **Student Organizational Roles**
    - Student president of School of Mechanical Engineering at Yonsei University *Mar. 2016 - Dec. 2016*
    - Graduate student president of Korean Society Association at UIUC *Aug. 2023 - July. 2024*
  - **Soccer Clubs**
    - Captain in the Korean soccer club at UIUC *May. 2024 - present*
    - Captain in School of Mechanical Engineering at Yonsei University *Dec. 2017 - May. 2018*