Liam Merz Hoffmeister

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Research Interests

- Task and motion planning for tool use.
- Online task and motion planning and plan adaptation under uncertainty.
- Planning in high-stakes/ emergency situations.

Education

Yale University
Aug 2023 - May 2029
PhD Computer Science Robotics Focus

University of Colorado Boulder
Aug 2015 - May 2020
Bachelors - Computer Science, Physics, and Mathematics

Research Experience

Yale University, Department of Computer Science
Aug 2023-Present
Realtime Robotics Task Execution Framework - Advisors: Prof. Daniel Rakita, Prof. Brian Scassellati

- Conducting research to develop a real-time, adaptable robotics framework for healthcare facilities, addressing computational challenges, and leveraging Large Language Models (LLMs) for optimized action selection.

The University of Colorado Boulder, Department of Computer Science
2019-2020, May 2022-Sept 2023
Robotic Learning Via Verbal User Feedback Project: - Advisor: Prof. Bradley Hayes

- Worked with three graduate students.
- Developed an approach to robotic skill learning and correction via user feedback.
- Implemented an algorithm for assessing whether user input is negative or positive feedback and the probability of association with each primitive skill. This work was used in a paper published in IROS 2021.
- Incorporated robotic skill learning and correction system with a concept-constrained learning from demonstration algorithm to further evaluate the algorithm's viability.

Torque-Aware Trajectory Planning Project - Advisor: Prof. Alessandro Roncone

- Worked with three graduate students.
- Developed a manipulation trajectory planner optimized based on the torque limits of a robot performing a manipulation task. The planner used RRT*, min jerk trajectory optimization, and applied torque constraints based on the task's necessary torques evaluated via Recursive Newton-Euler.

Robotic Tray Handling Project - Advisor: Prof. Alessandro Roncone

- Worked with three graduate students.
- Expanded on the tool use problem to include tools such as trays and bins to increase the carrying capacity of robot arms by extending an existing planner by incorporating a torque limit constraint, a center of mass balancing object placement constraint, and an arm reconfiguration controller.

Work Experience

Soft Robotics Inc.
Robotics Software Engineer | Aug 2021 - Present

- Designed and Integrated the following with a robotic pick and place system.
  - A vision-based occlusion detection for detected objects and other computer vision features.
  - An Ethernet/IP system interface for a robotic pick and place system.
  - The control interface for two models of robotic arms.
  - A system diagnostic subsystem for assessing the ready/fault state of the system.
- Integrated object class and orientation detection ML model with robotic control software to compute the absolute orientation of detected objects and inform 6 degree of freedom pick location.
- Utilized C++, Python, OpenCV, Socket Messaging, Ethernet/IP, and Robot interface APIs.

Cassi Robotics
Robotics Consultant | Jan 2021 - Mar, 2021

- Designed a teleoperated differential drive robot, control software for a differential drive robot, and a web-based control interface for a differential drive robot.
- Utilized C++, Python, ROS, and a Raspberry Pi.

Raytheon
Software Engineer | Oct 2020 - Aug, 2021

- Designed and implemented classified task scheduling and command creation features for several radar systems.
- Analyzed data from simulations to find and fix bugs in several radar systems.
- Utilized C++ and MATLAB.

Plus One Robotics
Robotics Software Intern | May 2020 - Oct 2020

- Implemented a test fixture for analyzing image and depth data from a robotic pick and place system and a Dynamic model loading system for an ML server.
- Created an organizational system for automated ML model download and upload.
- Utilized C++, Python, ROS, OpenCV, and PCL.

Technical Universal Group LLC.
Co-Founder, Software Engineer | Jul 2018 - Mar, 2019

- Co-Led software development for a programable glove controller for use in various applications.
- Carried out project management duties, such as organizing meetings and assisting in setting and assessing deadlines.
- Integrated Scrum/Agile tools and methodologies into an early-stage start-up.
- Utilized C and Python.

Freelance Tutoring
Computer science Tutor

- Tutored five students in introduction to computer science topics.
- Tutored three students/peers in introduction to algorithms topics.
- Tutored five students/peers in introduction to robotics topics.

Awards

- Deans List (Spring 2020, Fall 2019, Spring 2019, Fall 2018, Fall 2017, Spring 2017)

Technical Skills

- Programming Languages: C++, Python, Matlab, LabView, JavaScript
- Packages: OpenCV (C++, Python), ROS, NLTK, PyBullet
- Other: Ubuntu, Windows