Thomas Detlefsen

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Education, Coursework, & Skills

Carnegie Mellon University *M.S. in Robotic Systems Development*   Pittsburgh, PA
QPA: 4.08/4.30   *April 2025*

University of Pittsburgh *B.S. in Electrical Engineering*   Pittsburgh, PA
GPA: 3.7/4.0   *April 2022*

Relevant Graduate Coursework

Visual Learning & Recognition	Optimal Control	Manipulation, Estimation & Control	Systems Engineering

Programming Languages (in descending proficiency)

Python	MATLAB	C++

Technologies and Frameworks

PyTorch	ROS/ROS 2	OpenCV	Git	Linux	MoveIt 1

Experience

Carnegie Mellon University   Pittsburgh, PA
MRSD Capstone – Project Manager, Perception, Manipulation   *September 2023 – December 2024*
Autonomous insertion of a needle-like sensor into cornstalks to monitor nutrients and conserve resources
- **Increased sensor insertion success by 17%** through robust perception and manipulation systems
- Developed a ROS package to detect cornstalks and determine sensor insertion angles using Mask R-CNN
- Created trajectories that avoid obstacles for an xArm6 using the MoveIt motion planning framework
- Managed project development using a mix of Agile methodologies and the V-Model

Biorobotics Lab – Research Associate   *August 2021 – May 2023*
- **Improved e-waste classification by 5%** using a supervised contrastive learning model built in PyTorch
- Explored synthetic data generation and domain randomization using Blender to train classification models
- Applied the Concorde algorithm to solve the traveling salesman problem of removing screws from e-waste
- Deployed a user interface using PyQt5 and ROS to track and classify material in a recycling facility
- Managed a team of graduate and undergraduate students to meet goals set by project sponsors

Leaficient   Pittsburgh, PA
Software Engineering Intern   *May 2024 – August 2024*
- Developed a method to help farmers predict their harvest throughout the plants' growth period
- Devised and executed experiments to track the growth of lettuce plants
- Conducted analyses to determine the performance of systems in comparison to customer expectations

University of Pittsburgh
Indy Autonomous Challenge – Perception Lead   *August 2020 – October 2021*
A high-speed head-to-head race on the Indianapolis Motor Speedway using a full-scale Dallara Indy-Lights vehicle
- Tested KM3D, a monocular camera object detection method to detect opponent vehicles in ROS
- Drove the technical direction and managed the work distribution for a sub-team of 7 people
- Assisted with fundraising $200k from corporate sponsors for team budget and operations

Pitt Robotics & Automation Society – President, Director of Operations   *August 2020 - April 2022*
- Collaborated with students to develop three new projects (F1Tenth, RAS Aerial, Independent Projects)
- Created learning materials to introduce students to robotics concepts (ROS, Sensors, Deep Learning)
- Led a team of club executives to achieve club goals such as fundraising, events, and projects

Publications

J. Lee, **T. Detlefsen**, S. Lawande, S. Ghatge, S. Ramesh Shanthi, S. Mukkamala, G. Kantor, and O. Kroemer "Autonomous Sensor Exchange and Calibration for Cornstalk Nitrate Monitoring Robot," 2024, Accepted to International Conference on Robotics and Automation 2025, https://arxiv.org/abs/2411.10585.