Jihai Zhao

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EDUCATION

Northwestern University, GPA 3.85/4.0 **Sep. 2023 – Dec. 2024**
Master of Science in Robotics, College of Engineering *Evanston, IL*
Coursework: *Robot Manipulation, Lagrangian Dynamics, Embedded Systems in Robotics*

The Ohio State University, GPA 3.73/4.0 **Sep. 2019 – Jun. 2023**
Bachelor of Science in Mechanical Engineering, College of Engineering *Columbus, OH*
Minor in Computer and Information Science, College of Engineering
Coursework: *Applied ML, Calculus, Dynamics, Num Methods, Linear Algebra & Differential Equation, Programming C++, Data Structure of C++*

RESEARCH EXPERIENCE

Model Predictive Control for Stable Robotic Autonomy **Jan. 2022 – Dec. 2022**
Undergrad Research Assistant, CyberRobotics Lab, Mentored by Prof. Hereid *Columbus, OH*

- Implemented and applied Model Predictive Control (MPC) algorithms, with an ideal linear model, nonlinear model, and digital models, to achieve stable control of the bipedal robot.

SELECTED PROJECTS

PORTFOLIO: HTTPS://JIHAIZHAO.GITHUB.IO/

Coffee Maker **Sep. - Dec. 2023**

- Work in a group of five to develop a collection of ROS2 packages to drive the Franka robot arm to brew a cup of pour-over coffee.
- Computer vision and AprilTags were used to find the location of each object and a custom wrapper package for MoveIt was written in Python to control the robot.

KUKA YouBot Manipulation **Sep. - Dec. 2023**

- Plans a trajectory for the end-effector of a mobile base with four mecanum wheels and a 5R robot arm by using feed-forward control and a PI controller.
- Performs feedback control to drive the youBot to pick up a block at a specified location, carry it to a desired location, and put it down. Simulated in CoppeliaSim.

Jack in The Box **Sep. - Dec. 2023**

- Used Lagrangian Dynamics and defined 16 constrain of the system. Then apply the impact update law to get symbolic solutions and define a function for the impact update in the simulation loop to get numerical values.
- Successfully develop the dynamic simulation of a jack inside a box.

Pen Stealer **Sep. 2023**

- Use the RealSense to measure the 3D location of a purple pen. Align the Depth map to the RGB image and use the pen location as a mask to get the 3D information. Finally, find the centroid of the pen.
- Used the interbotix_xs_toolbox to control the robot to move to the centroid of the pen.
- Successfully localize the pen by using a camera and capture the pen.

RRT Algorithm **Sep. 2023**

- Implement Rapidly-Exploring Random Tree to create a collision-free path in an arbitrary object

Robot Arm and Gripper Design Project **Jan. - May 2022**

- Lead a group of six to design a 4-DoF robot arm with a 1-DoF gripper. Implemented the prototype and initial motion simulation with SolidWorks. Designed the gripper equipped with both open/close control modes and programmed the inverse kinematics controller with Arduino.
- Successfully allowed the robot to pick and place cuboids, cylinders, and triangular prisms in various locations.

SKILLS

Programming: Python, C++, R, Arduino, MATLAB, Linux, Git
Robotics: ROS2/ROS, TensorFlow, OpenCV, MoveIt, Rviz, Gazebo, SLAM, Computer Vision
Language: Chinese (Native), English (Full Professional Proficiency)