JIAMING ZHANG

Baltimore, Maryland, USA
jzhan282@jhu.edu Jiaming Zhang

RESEARCH INTEREST

I'm highly interested in studying robotics-oriented solutions to real-world challenges. My specific interests include ROS development, visual-based control, motion planning, augmented reality and reinforcement learning.

EDUCATION

Johns Hopkins University Baltimore, MD
M.S.E. in Mechanical Engineering, GPA 3.72/4.00 Sept. 2021 - Present
Core Courses: *Algorithms for Sensor-Based Robotics*, *Robot System Programming*, *Computer Integrated Surgery*, *Applied Optimal Control*, *Robot Motion Planning*, *Robot Dynamics Kinematics and Control*, *Statistical Learning*

Huazhong University of Science and Technology Wuhan, China
B.E. in Mechanical Engineering , GPA: 3.59/4.00 Sept. 2016 - Jun. 2020
Thesis: "Dynamics Simulation of Knee-Joint for Human Gait"

RESEARCH EXPERIENCE

VOR LAB and **BIGSS LAB**
The Laboratory for Computational Sensing and Robotics (LCSR), Johns Hopkins University Baltimore, MD
Research Assistant Nov. 2021 - Present
Advisor: Professor Amir Kheradmand and Professor Mehran Armand
Project: the Impedance Control on KUKA for Transcranial Magnetic Stimulation

- Optimizing data acquisition process for NDI-Polaris optical tracker
- Estimated the COM of deformable load in real-time and implemented the algorithm on ROS using C++
- Constructed the deformable object with PyBullet
- Simulated KUKA in GAZEBO to verify the estimation
- Develop a motion planning package for KUKA to move in a collision-free area (In progress)

PUBLICATIONS

1. **Zhang, J**. An Automatic Arranging Device for PTC Ceramic Heating Chips, *The National Practical Patent, No.CN201920955308.X, June 2019*
2. **Zhang, J**. 2D SLAM with Visual Servoing Target Tracking System for Nonholonomic Mobile Robot, *Under Review, Submitted in Sept., 2022*

SKILLS

Programming Skills:

- **Proficient at:** C++ (especially ROS related) , MATLAB
- **Good at:** Python (especially in Machine Learning and Deep Learning), Mathematica, Bash
- **Familiar with:** C#

Other Skills:

- **Proficient at:** Solidworks, Opensim, Operating ABB, KUKA and UR-5 manipulators

PROJECTS

The Asia-Pacific Robot Contest (Robocon) Oct. 2018 - Jun. 2019
Goal: Build a robot that can transport daily items.

- Designed a special gripper for holding specific objects.
- Applied basic **PID control** to the robotic gripper via **MATLAB**

MCM: The Mathematical Contest in Modeling Jan. 2019 - Feb. 2019

Goal: Design a mathematical model for evacuation system of Louvre Museum

- Modelling the situation by Directed Graph
- Utilized the **A-star algorithm** to compute the optimal evacuating path for every tourist
- Implemented a **C++** program to demonstrate and solve our mathematical model

Optimal Control of the Quad-copter Obstacle-Avoiding Task Nov. 2021 - Dec. 2021

Goal: Generate a optimal trajectory by controlling the motors of the quad-copter

- Simplified the dynamics model of the quad-copter and linearized it
- Represented the 3D obstacles as ellipsoids
- Implemented a **MATLAB** code to solve the collision-free and optimal trajectory based on **Discrete Dynamic Programming** method

Robotic Motion Planning Algorithm Packages Apr. 2022 - May. 2022

Goal: Develop a series of packages for Surgical Robotic Motion Planning problems

- Implemented a path planning program of an **4-link manipulator** using **PRM** and **RTT*** algorithm
- Implemented a path planning program of a **holonomic rigid robot** using **APF** algorithm
- Implemented a path planning program of a **flexible needle**, where the asymmetric needle tip is modeled as a nonholonomic mobile robot, using **RRT** algorithm
- Developed a Point Cloud to Point Cloud Registration and a Pivot Calibration package using **Python**
- Developed a program for inverse-pendulum based on reinforcement learning using **Python**

LiDAR-based SLAM Project Feb. 2022 - Sep. 2022

Goal: Implement **ROS packages** enabling the robot to track an object in an unknown area

Outcome: Ended up with a manuscript that was under review.

- Applied the **Gmapping** and **Cartographer** to construct a grid map for an unknown test field
- Developed ROS packages for locating and tracking objects in the grid map using 2D images generated by a pinhole camera
- Collaborated with other team members to test and analyze the performance of the robotic software.

WORKING EXPERIENCE

Narwal Robotics & HUST-Wuxi Research Institute Jiangsu, China

Intern Robotics Engineer Oct. 2020 - May. 2021

Mentor: Dr. Gang Zhang

- Participated in LiDAR-based SLAM development for Robot Vacuum Product
- Responsible for solving the problem of hand-eye calibration during robot assembly
- Cooperated with the hardware team to test and analyze the prototype

TEACHING EXPERIENCE

Whiting School of Engineering, Johns Hopkins University Baltimore, MD

Teaching Assistant for Statistical Learning For Engineers (EN.530.641) Fall 2022

- Answer homework-related questions, grade programming assignments and hold office hours.

SCHOLARSHIPS AND AWARDS

2019 **The Scholarship for Scientific Research Innovation of HUST** Wuhan, China

2020 **Graduate with Honors in HUST** Wuhan, China