

# JIASEN ZHENG

ROBOTICS, PERCEPTION, SLAM, PLANNING AND MORE

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## EDUCATION

### NORTHWESTERN UNIVERSITY

MS in ROBOTICS GPA: 3.93/4.00

Sep 2021 - Dec 2022

### UNION COLLEGE (NY)

BS in MECHANICAL ENGINEERING

(Departmental Honorary)

Sep 2016 - Jun 2019

## SKILLS

### PROGRAMMING

- **Proficient:** Python, Matlab, Git/Github
- **Comfortable:** C, C++

### MECHANICAL

- **CAD:** SolidWorks, AutoCAD
- **Simulation (FEA):** Stress-Strain, Heat transfer, Topology Optimization (SolidWorks); Electromagnetic (Ansys); Fluid Dynamics (STAR-CCM+); Simulink (Matlab)
- **Prototype:** 3D printing, Laser cut, Mill, Lathe, Drill press

### ELECTRICAL

- **Embedded:** PIC32, Arduino
- Soldering, Wiring

### ROBOTICS

- **ROS:** Moveit, Gazebo, Rviz
- Implement **Forward/Inverse Kinematics/Dynamics** and simulate in **CoppiaSim**
- Model, fine-tuning, and simulate **PID Control** systems
- Model 2D multi-body physics system from scratch using **Lagrangian Dynamics**
- **Computer Vision:** OpenCV, SIFT, RANSAC, ORB, Canny, Hough, Target Tracking
- **Planning:** A\*, RRT, Frontier Exploration
- **SLAM:** Stereo Visual Odometry, RTAB Map, Slam Toolbox

## EXPERIENCE

### First Robotics Team 7522| Mechanical Mentor| Shanghai, CN

Jun 2020 - Jun 2021

- Developed and built a ball-shooting mechanism for the robot, which participated in a domestic FRC game in Guangzhou and won the first place
- Led to design and create a swerve drivetrain using SolidWorks, which significantly improved the agility and traction of the robot

### ZF Automotive| Manufacturing Engineer Intern| Suzhou, CN

Feb 2020 - May 2021

- Analyzed data from the automated assembly line of Electric Parking Brake (EPB) to identify potential errors and assisted in improving them, which shortened the cycle time by 5%
- Developed an approach to assemble the cylinder seals of the brake, which enhanced the success rate by 3%

### Runshan Precision Machinery| Mechanical Engineer| Suzhou, CN

July 2019 - Jan 2020

- Collaborated with a senior engineer in the product design of new model knitting machines using SolidWorks and applied FEA for design validation
- Performed topology optimization for the designed parts to save material costs
- Participated in three mechanical designs of components in circular knitting machines and filed for domestic patents

## PROJECTS

[jasonzheng.github.io](https://github.com/jasonzheng)

### 3D SLAM And Point Cloud Colorization

Jan 2022- Present

- Performed 3D SLAM on Jackal UGV using Velodyne Lidar and RTAB Map package
- Designed a perception algorithm to align RGB/thermal data to the point cloud

### Stereo Visual Odometry Using KITTI Dataset

- Created a visual odometry stereo camera setup using the KITTI dataset
- Calculated disparity maps and performed feature extractions using SIFT
- Applied RANSAC to solve for the 3D rigid body transform between each frame
- Estimated the position and orientation of the vehicle within a reasonable drift (lower than 50m at loop closure)

### Marker Assembling Robot (Group Project)

- Controlled a Franka arm to assemble markers and caps through a sequence of pick, place, press, and sort operations using ROS, and Moveit
- Developed a perception algorithm using OpenCV to detect a wide range of colors and their positions
- The detection algorithm is robust in that no error is caused by the vision part in 50 rounds of tests

### 2D Physics Engine From Scratch

- Simulated a planer multi-body dynamics of a jack in a box with external forces and impacts by applying lagrangian dynamics
- Animated the simulation with collision detections and user-specified external forces