

# Jiasen Zheng

linkedin.com/in/jiasen-zheng | jiasenzheng.github.io | jiasenzheng2020@u.northwestern.edu | 773-977-9323

## EDUCATION

### Northwestern University

*Master of Science in Robotics (3.95/4.00)*

Evanston, IL

Sep. 2021 – Dec. 2022

### Union College

*Bachelor of Science in Mechanical Engineering (Departmental Honorary)*

Schenectady, NY

Sep. 2015 – June 2019

## RELATED EXPERIENCE

### Software Engineer Intern | Mach9 Robotics | Pittsburgh, PA

June 2022 – Sep. 2022

*Automated a targetless (RGB and Thermal) camera-lidar calibration pipeline*

- Streamlined processes, including image/ point clouds selection, data processing, parameter tuning, and result writing to reduce user intervention, which saved 90% of operational time
- Created an interactive parameter tuning tool using ROS dynamic reconfiguration for edge extractions (both image and point clouds) and initial extrinsic, resulting in faster converging and more accurate results in the calibration
- Integrated the calibration package to adopt thermal camera-lidar calibrations

*Built the company's mapping accuracy evaluation stack from the ground up*

- Brought up a Parker Lord GPS module with dual antennas and multi-sensor fusion capabilities, connected to a private RTK station
- Aligned GPS trajectories collected from different devices and computed their absolute/ relative pose errors for GPS accuracy evaluation
- For SLAM evaluation, developed an efficient landmark detector for manholes in point cloud space using PCL region growing segmentation and RANSAC, which has a detection accuracy higher than 85%
- Made a user-friendly interface for picking features in the point cloud space for a more general landmark accuracy comparison

*Developed background subtraction for lidar point cloud, removing ego-vehicle points and reflections*

- Removed the stationary part from ego-view and most of the reflections to improve SLAM map quality

*Supported the company's image annotation framework by enabling pre-labeling, which increased the labeling efficiency*

- Selected images that would most benefit the CNN model base on the results from model inference automatically using heuristic approaches
- Created an inference server using REST API and hosted it on AWS Sagemaker

## PROJECTS

### Point Cloud Object Detection and Pose Estimation | C++, ROS, Pytorch (ongoing)

Spring/Fall 2022

- Build a multiple lidar camera perception platform with pixel-level accurate calibrations between lidars and cameras and hardware time synchronizations
- Merge point clouds from multiple lidars and project RGB pixels to generate a photo-realistic 3D colored model
- Design and Develop an image annotation framework using CVAT with fully-automated model inference to improve labeling efficiency
- Create a data preparation pipeline to automatically collect images and remove background pixels and trained an instance segmentation CNN model using Detectron2 (Pytorch)
- Project the image labels to point cloud space and estimate the object pose using point cloud registration

### Extended Kalman Filter SLAM on Turtlebot3 | C++, Docker, ROS

Winter 2021

- Developed a feature-based EKF SLAM package from scratch using C++ and Robot Operating System (ROS) in both simulation and real robot
- Wrote a control library for differential drive robot and Implemented a landmark detection algorithm using supervised learning with data association

### Stereo Visual Odometry on KITTI Dataset | Python, OpenCV

Fall 2021

- Created visual odometry with a stereo camera setup on the KITTI dataset using Python
- Calculated disparity maps and performed feature extractions using SIFT in OpenCV
- Applied RANSAC solver to determine 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)

## TECHNICAL SKILLS

**Languages:** C++, Python, C, Bash, Matlab **CAD:** SolidWorks, AutoCAD

**Developer Tools:** Git, Docker, AWS, ROS/ROS2, Pytorch (Detectron2), Tensorflow (Keras), OpenCV, PCL

**Sensors:** Lidar, RGB/Thermal Camera, IMU, GPS (RTK) **Calibrations:** Lidar-Lidar, Lidar-Camera