SHANGZHOU YE

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Portfolio - shangzhouye.tech
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WORK EXPERIENCE

Robotics Software Intern
June 2020 – Sep. 2020

Vecna Robotics Inc. Waltham, MA

⇒ Developed 3D object detection and pose estimation system for warehouse environments using camera-3D-LiDAR fusion based approach
- Designed and implemented multithreaded pose estimation pipeline, Camera-LiDAR calibration, and point cloud registration in ROS & C++
- Capability developed was used as demo for company's customers

⇒ Created GroundTruth motion capture system to provide robot pose for validation of localization algorithms in ROS & Python
- Decreased position error by 82% and achieved 25Hz frame rate

Robotics Research Engineer
Nov. 2018 – Feb. 2019

RoMI Lab, Monash University Melbourne, Australia

⇒ Developed novel foot interface that controls 4-DoF robotic assistive arm
- Completed 3D CAD modeling, prototyping, assembly, sensor/encoder selection, and programming in C

⇒ Designed assessment protocol and led two-stage comparative study involving 18 participants
- Wrote first-authored publication for IEEE BioRob 2020

ROBOTICS PROJECTS

Autonomous Disinfection Robot | 2020 **[Website]**
- Developed full-stack disinfection robot with perception, SLAM and navigation capability in ROS based on Jackal mobile robot platform
- Created image-LiDAR fusion based 3D object detection system in C++ that can classify & localize tables/chairs, as well as detect & track people
- Set up local network between multiple Linux machines and deployed Mask R-CNN inference "in the cloud"

Stereo Visual SLAM with Bundle Adjustment | 2020 **[Website]**
- Developed stereo visual localization and mapping system with ORB feature-based frontend and keyframe-based backend from scratch
- Implemented motion estimation, map management, and nonlinear optimization following OOP principles in C++ using OpenCV and g2o
- Achieved 4.17% translational error on KITTI dataset

EKF SLAM from Scratch on Turtlebot3 | 2020 **[Website]**
- Developed wheeled robot SLAM stack in ROS using 2D-LiDAR
- Implemented extended-Kalman-filter SLAM and landmark detection
- Developed 2D Lie Group library in C++ for differential drive robot

2D Object Detection with CenterNet | 2020 **[Website]**
- Implemented CenterNet using PyTorch and trained on Nvidia GPU
- Tested on KITTI dataset and achieved 86.72% average precision (AP)

Sawyer Robot Playing Mini-Golf | 2019 **[Website]**
- Implemented obstacle avoidance motion planning in Python using MoveIt
- Adopted Git/Github for version control and collaborated in team of four

See shangzhouye.tech for further projects in portfolio

EDUCATION

Northwestern University

Master of Science in Robotics

Dec. 2020 Evanston, IL
- GPA: 3.9/4.0
- **Coursework Focus:** Computer Vision, Perception, Deep Learning, State Estimation, Mapping, Navigation

Monash University

Bachelor of Engineering (Honors) in Mechanical Engineering

Dec. 2018 Melbourne, Australia
- GPA: 3.8/4.0
- P. Dransfield Prize in Systems and Control Engineering
- Award for Excellence in Robotics

Central South University

Bachelor of Engineering in Traffic Equipment and Control Engineering

July 2019 Changsha, China
- GPA: 3.58/4.0
- Tutor for the freshman class

SKILLS

- **Robotics:** Robot Operating System (ROS), Rviz, Gazebo, MoveIt
- **Languages:** C++, Python, C, MATLAB
- **Linux:** Command Line, SSH
- **Libraries:** OpenCV, PCL, g2o (graph optimization), Eigen, Sophus
- **Machine Learning:** PyTorch, Detectron2, CUDA, NumPy, Pandas
- **Tools:** Git (Version Control), CMake
- **Mechanical:** SolidWorks, ANSYS, 3D Printing, Finite Element Analysis

PUBLICATION

S.-Z. Ye, P. Jain, A. Walley, Y.-J. Yang, and E. Abdi, "A Novel Four-Degree-of-Freedom versus a Conventional Foot Interface for Controlling a Robotic Assistive Arm in Surgery," presented at the 8th IEEE RAS/EMBS International Conference on Biomedical Robotics & Biomechatronics, New York, NY, USA, 2020.