**Binwei Liu**

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# Working Experiences

**Embedded Software Engineer, Shanghai Fourier Intelligence Co. Ltd**

*Developed a medical-purpose skeleton robot which aims to help patients do* Mar.2017 – Dec.2017 *rehabilitation training*

* Designed CAD for mechanical components based on project requirements
* Programmed for microcontroller to send and receive CAN, I2C, and SPI message
* Developed state equations for accelerometer and design Kalman filter to obtain reliable sensor readings
* Implemented STMWIN and Qt on microcontroller to build a graphical user interface (GUI)
* Performed safety analysis and existing issues report for the embedded system and solve customer’s issues regarding to the embedded system

**Research Assistant in USC Center of Advance Manufacturing** May 15, 2018 - Now

*Developed Motion Planning & Point Cloud software for 7 degree of freedom Kuka robot arm to accomplish surface polishing task*

* Developed an A\* algorithm to search for a collision free path in 3D space and used Jacobian Inverse to do the inverse kinematics for a 7 DOF robot arm
* Benchmarked the performance of the motion planning and the inverse kinematics algorithms, and recording the test results to SQL database
* Built software to get the interactive point cloud around the robot arm from Kinect depth camera, then integrated the point cloud with motion planning node in ROS, and visualized the whole surface polishing process in Rviz

# Professional & Research Experiences

**Road Obstruction Recognition** Jan.06 2019 – Now

*Developed machine learning software which could recognize road obstructions represented by 3D point cloud*

* Implemented Tensorflow and Keras python library to build a convolution neural network, which is able to recognize 3D point cloud.
* Trained the CNN model with dataset and tune its parameters based on the performance of the model’s performance
* Built a simulation scene in ROS Rviz, which includes the point cloud coming from depth camera and the labels created by the CNN model telling the location and name of the recognized obstructions

**Unmanned Vehicle Simulation** Jan.06 2019 – Now

*Developed 6 degree of freedom vehicle dynamics model and complete a path following task*

* In Simulink, built a Center Control model for a 1/10 scaled RC car with steering and throttle control, aiming to follow a pre-computed path which consisting a series of waypoints.
* Implemented Magic Formula to compute the longitudinal and latitudinal tire force and used standard mass and damper system to represent suspension system, and adjusted the spring and damper constants
* Developed lane detection software with OpenCV library which could simultaneously compute the radius of curvature and offset from center of the lanes
* Compared the performance difference between PID and Model Predictive Control (MPC) algorithm, and implemented the MPC algorithm onto the car
* Created a Pure Pursuit Controller to control the steering angle for the vehicle with adjustable look ahead distance according to the velocity and curvature to eliminate the understeer and oversteer effects

**Skills**

* Professional Skills: C/C++, Python, SQL, ROS, QT, Matlab Simulink, Solidworks, Arduino IDE, MPC, LQR, PID

# Education

**University of California Irvine (UCI)**

* Major: Mechanical Engineering GPA:3.7
* Degree: Bachelor of Science (Deans Honor List in 2015 Fall)

**University of Southern California (USC)**

* Major: Mechanical Engineering (Dynamics and Control) GPA:3.8
* Degree: Master of Science