Yichu Yang

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Education

Northeastern University — Boston, MA
Candidate for Master of Science in Mechanical Engineering — *Sep. 2018 – May 2021*
Concentrated in Robotics; GPA 4.0

Shanghai Jiaotong University — Shanghai, China
Bachelor of Science in Mechanical Engineering — *Sep. 2014 – May 2018*
Concentrated in New Energy Science and Engineering; GPA 3.4

Experience

Mechantronics Engineer — May 2019 – Dec. 2019
Qlibrium Inc.(Previously named Cammed Inc.) — *Lowell, MA*

- Developed a firmware to accurately control dosing amount for a micro pump system based electrolysis: Accurate timing and trigger system using external timer, alarm and interruption in C ;Bluetooth application development using Nordic nRF52840
- Helped with circuit layout design, debugged and improved the circuit design based on test result on the pilot batch
- Designed and prototyped a micro active valve to prevent unexpected dosing caused by ambient pressure or temperature change during flight or bathing
- Helped with product iteration: Pump parts and membrane molds design in SolidWorks; CNC toolpath design in Fusion 360; Pump shell, electrolysis chamber and membrane manufacturing using thermal-forming and injection moulding; Pump dosing test and hydrogen leaking test under different conditions measured in LabView
- Tested batteries of multiple types and brands using an electro-chemical workstation to find energy density and battery life under specified discharging condition

Mechanical Engineer — Jun. 2017 – Aug. 2017
Shanghai Boyang New Energy Technology Co.,Ltd. — *Shanghai, China*

- Designed, built and tested an experimental PVT solar heat pump system
- Programmed in Python to simulate behavior of the system under different weather conditions
- Designed and modeled peripheral brackets using SolidWorks
- Collected and analyzed data from GSHP (Ground Source Heat Pump) to evaluate system efficiency and to launch a soil temperature distribution simulation

Projects

Quadruped Robot Simulation in Simulink — Dec 2019 – Present
MATLAB, SolidWorks, C — *Course Project*

- Developed a simulink simscape environment for quadruped simulation, based on URDF file grnerated from CAD model and the ground contact force library
- Derived forward and inverse kinematics of the robot and the Forward/Inverse dynamic equations
- Implemented lower-level position and torque controller on
- Implemented virtual model control based on
- Developed a optimization-free control method using external reference governor
- Implemented Reinforcement learning on the robot
- Data Visualization using MATLAB app designer and python
- Data transimission
- Experimented on real robot using MATLAB external system realtime

Control of Robot Arm in Multiple Tasks with Reinforcenment Learning — Dec 2019 – Present
Python, Pytorch, Linux, DDPG(-HER), TD3(-HER) — *Course Project*

- Implemented DDPG and TD3 from scratch and trained them in OpenAI Robotic Gym environment
- Compared DDPG performance in dense-reward and sparse reward environment
- Compared DDPG and TD3 with or without the help of HER(Hind-sight Replay)
- Successfully trained the robot arm to perform reach, fetch reach and push actions

Lidar Mapping and Localization Feb 2020 – Apr 2020

MATLAB, C++, ICP, Sensor fusing, Signal filtering *Course Project*

- Implemented ICP registration on a provided dataset in MATLAB
- Sensor data fusing (GPS, IMU and Lidar) based on complementary filter
- Extracted ground, buildings and vehicles using Euclidean clustering to build a cleaner dense map
- Implemented edge and corner detection to downsample the point cloud(based on ideas from LOAM) to accelerate the progress in C++ using PCL library

Playing Game Binding of Isaac with Reinforcement Learning Dec 2019 – Present

Python, Pytorch, WindowsAPI, DQN, DQRN, RL *Individual Project*

- Created an training environment in Python with windowsAPI to optain image and send control commands to an inactive window in background
- Implemented DQN and DQRN and trained them in the customized environment at a 20x speed hack
- Successfully trained the agent to beat boss 'Pin' in 1.5M steps

Biomechanical simulation guided soft exoskeleton design Nov 2017 – Jun 2018

OpenSim, SolidWorks, C, C# *Graduate Project*

- Edited a musculoskeletal model in OpenSim and performed simulation to calculate metabolic cost during human walking with or without exoskeletons
- Generated optimum control signal of the actuators according to CMC results
- Completed mechanical design of the exoskeleton parts in SolidWorks
- Developed a gait detection system using IMUs and plantar pressure sensors
- Completed the electronic design of sensor and control system in Altium Designer
- Visualized sensor data in real time in Unity
- Programmed basic control algorithm using FreeRTOS in Keil

Semantic Segmentation in Game RainbowSix Siege Sept 2016 – Mar 2017

Python, Pytorch *Individual Project*

- Implemented semantic segmentation to detect road in RainbowSix Siege, based on the ICNet paper

Design and engineering of a book sorting robot Sept 2016 – Mar 2017

OpenSim, SolidWorks, C, C# *Course Project*

- Completed modeling and motion simulation in SolidWorks
- Designed hardware and control algorithm of the manipulator
- Developed a binocular visual book detection algorithm using OpenCV and Keras

Development of a file management system Sept 2016 – Mar 2017

Python *Individual Project*

- Design and completed website structure using Flask python
- Website UI design using flask-wtforms and html
- Implemented website user manage system using Google firebase and google authentication

Technical Skills

Languages: Python, MATLAB, C/C++, R, Html/CSS, Latex, JQuery
Developer Tools & Platform: ROS, Arduino, STM32, Git, Keras, Linux
Commercial Software: SolidWorks, Fusion 360, AutoCAD, Catia, ANSYS Workbench, ANSYS Fluent, OpenSim, Altium Designer, LabVIEW, Unity3D, 3ds MAX
Libraries: pandas, PCL, NumPy, Matplotlib, Flask, OpenCV, Pytorch