Johnathon Li

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Education

University of California, Berkeley *August 2019-May 2021*

Master of Science in Mechanical Engineering | Hybrid Robotics Laboratory | GPA: 3.9/4.0

- **Relevant Coursework:** Linear Systems Theory, State Estimation, Nonlinear Control, Legged Robotics, Probabilistic Robotics, Deep Reinforcement Learning, Model Predictive Control

Massachusetts Institute of Technology (MIT) *August 2015-May 2019*

Bachelor of Science in Mechanical Engineering | Major GPA: 4.9/5.0

- **Relevant Coursework:** Robotic Science and Systems, Analysis and Design of Feedback Control Systems, Dynamics and Controls I/II, Intro to Artificial Intelligence, Intro to Machine Learning, Measurement & Instrumentation, Design & Manufacturing I/II, Mechatronics, Numerical Computation, Fundamentals of Computer Science

Work Experience

Software Engineering Intern - Autonomous Vehicle Perception *June – August 2019*
Aptiv - Active Safety & User Experience *Los Angeles, California*

- Developed first proof of concept for SW development environment in ROS C++ by programming software wrapper for controls algorithm (Automatic Emergency Braking) in ROS and linking necessary source code libraries
- Ensured consistency of transition to ROS by writing RViz visualization tools and Python test scripts
- Communicated and effectively worked with cross-continental controls and perception teams in Los Angeles (USA), Gothenburg (SE), and Wuppertal (DE)

Controls Engineering Intern - Vehicle Dynamics *June - August 2018*
General Motors – Global Propulsion Systems *Milford, Michigan*

- Enhanced performance of Chevy Bolt One-Pedal Driving on graded roads by improving existing software control architectures and implementing new control algorithms in Simulink
- Enabled usage of old IMU software on Chevy Bolt by debugging and parsing old IMU software and re-calibrated gains to match new vehicle dynamics of Chevy Bolt

Robotics Research Assistant - Computer Vision *May – September 2016*
MIT Computer Science and Artificial Intelligence Robotics Laboratory *Cambridge, Massachusetts*

- Implemented a computer vision location tracking feedback system for a small, foldable copper robot by writing machine vision code in MATLAB that interfaced over serial data with an Arduino connected to SyRen Motor Drivers
- Successfully showed that robot could move freely on surgical operating surface with significantly less interruption from nonlinearities of magnetic coil drivers

Relevant Projects

MS Capstone Project: Quadrupedal Robot Control via Deep Reinforcement Learning *August 2020 – May 2021*
Berkeley Hybrid Robotics Laboratory *Berkeley, California*

- Developed novel reinforcement learning method utilizing periodic reward composition functions to train quadrupedal robot how to walk with various stable gaits
- Created high-fidelity quadruped simulator in PyBullet to facilitate the PPO training process
- Showed successfully that reward composition method is a new all-in-one training method to enable one policy to learn different walking gaits without changing network architecture and hyperparameters

Project: Autonomous Racing via Model Predictive Control *June 2020 – August 2020*
Berkeley Hybrid Robotics Laboratory *Berkeley, California*

- Developed an autonomous racing simulator for motion planning and control via Model Predictive Control (MPC)
- Designed constrained optimization with vehicle curvilinear dynamics and safety constraints
- Successfully demonstrated autonomous racing with MPC via trajectory optimization and optimal input tracking

Autonomous Racecar (1:10 Scale) Controls Team Lead *February – May 2019*
MIT 6.141: Robotic Science and Systems *Cambridge, Massachusetts*

- Obtained path tracking with less than 0.3 meters of error by programming adaptive pure pursuit controller in ROS
- Localized our autonomous racecar to within 0.5 meters of error by developing motion model (with calibrated noise in speed, position and yaw) for Monte-Carlo particle filter
- Achieved robust traffic cone and lane following by implementing PID controller for distance and angle inputs along with color segmentation for cone identification and homography for cone distance estimation from robot in OpenCV

Robotics Competition Quarter Finalist - 6th out of 180 Students *February - May 2017*
MIT 2.007: Design and Manufacturing I *Cambridge, Massachusetts*

- Manufactured a top performing telescoping winch robot that spanned two engines on a Star Wars X-Wing game board by creating SolidWorks CADs, water-jetting & band-sawing aluminum, calculating force & torque requirements, and writing control code in Arduino
- Assisted peers by guiding them in machining process and taught them how to code Arduino control programs

Skills

- **Software:** Python & C++ (*ROS, OpenCV, PyTorch*); MATLAB & Simulink; LabView; Arduino; Linux Software Development
- **Mechanical:** SolidWorks; Fusion 360; MasterCam; Rapid Prototyping (*3D Printing, Machining, CNC Mill and Lathe*)