Laukik Mujumdar

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EDUCATION

Master of Science, Robotics and Autonomous Systems (Artificial Intelligence)   08/2019-05/2021
Arizona State University, Tempe, Arizona   **GPA:4.00/4**
- Courses: Advanced Control Theory, Artificial Intelligence, Deep Learning, Perception

Bachelor of Technology, Aerospace Engineering   07/2015-05/2019
Indian Institute of Technology, Bombay, India   **GPA:7.42/10**
- Courses: Nonlinear Control, State Estimation, Optimal Control, Machine Learning

PROJECTS

Lane Detection by an Autonomous Vehicle   Summer 2020
- Used Gradient and Color Thresholding to filter input image streams and obtain binary images using OpenCV
- Detected lanes on the road using a sliding window approach and polynomial fitting

Self Driving Car Motion Planning   Summer 2020
- Implemented a Finite State Machine (FSM) based behavior planner on Udacity's Self Driving Car platform in C++
- Implemented a trajectory planner to drive the car around a loop on a multi-lane highway

Autonomous Vehicle Sensor Fusion   Summer 2020
- Implemented an Extended Kalman Filter on Udacity's self driving car platform in **C++**. The filter suffered from outliers
- Solved this problem by implementing **adaptive innovation thresholding**.

Pacman Motion Planning   Spring 2020
- Implemented DFS, BFS, UCS, and A* planning algorithms on the UC Berkeley Pacman Projects platform using **Python**
- Designed a heuristic for A* resulting in <3500 graph nodes expanded, well below the full credit cutoff (9000)
- Implemented D* Lite in a locally observable environment to expand 20% of the number expanded by A*

Controlling A Self Driving Car   Fall 2019
- Implemented Full State Feedback **(FSF)**, Linear Quadratic Regulator (**LQR)** controllers for the trajectory control of a car
- Successfully extended FSF & LQR controllers to track arbitrary trajectories in 2D space using body frame error modeling

RESEARCH AND TECHNICAL PROJECTS

Multi-Robot Graph Exploration   Spring 2018
Prof. Arpita Sinha, IIT Bombay
- Simulated a **multi-robot system** exploring an environment modeled as a graph. Robots dropped information at all nodes
- Used a **Modified Graph Incidence Matrix** data structure so that robots could collaborate in a decentralized fashion

LiDAR based Environment Mapping System   Fall 2017
Prof. Hemendra Arya, IIT Bombay
- Mounted a **LiDAR range sensor** atop a **servo motor** and created a wireless connection using **Zigbee modules**
- Utilized 'hector_slam' and **ROS**, to convert polar readings in the sensor frame to global cartesian coordinates using **C++**
- Used the sensor to map a corner of a room

WORK EXPERIENCE

Teaching Aide, Arizona State University, Tempe, Arizona   Spring 2020
- Conducted weekly tutorial sessions for MAE 318 (Control Theory) for a class of 90 undergraduate students

Undergraduate Research Intern, Zhejiang University, China   Summer 2018
- Fabricated a linear actuator (like an artificial muscle) under a non-uniform magnetic field, using a Polyacrylamide gel with embedded magnetic nanoparticles to lift **upto 50 grams of weight**

TECHNICAL SKILLS

- **Programming**: C/C++, Python, MATLAB/Simulink, OpenCV
- **Other**: Gazebo, Arduino, Robotics, Dynamics and Control Theory, AI, Deep Learning, Computer Vision

EXTRA-CURRICULARS

- Awarded a Sho Dan Black Belt in the art of Goju Ryu Karate Do
- Cleared 2 stages of Hindustani Classical Vocals, certified by Gandharva Mahavidyalaya