

# 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

## SELECTED COURSE PROJECTS

**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

**Advanced Process Control** Spring 2019

- Implemented a Linear Quadratic Optimal Controller (**LQOC**) and a Model Predictive Controller (**MPC**) on a simulated model of a continuous stirred-tank reactor (CSTR) using MATLAB

## 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