Anirudh Addagada

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Portfolio

EXPERIENCE

NYU Mechatronics, Controls, and Robotics Lab   New York, USA
Research Assistant   *Sept 2022 to Current*

- Developed indoor SLAM system using WiFi RTT ranging to map WiFi devices in 3D space with errors under 1m.
- Performed sensor fusion for indoor localization using Python, C++, ESP32S2, and BNO055 IMU to achieve accuracy of $\pm$60cm, using Extended Kalman Filtering to improve the accuracy of the IMU and WiFi ranging systems.

NYU Tandon School of Engineering   New York, USA
Course Instructor   *Sept 2022 to May 2023*

- Instructed students in Automatic Controls and Measurement Systems on topics such as filters, PID/LQR controllers.
- Conducted hands-on experiments using oscilloscopes and opamps, and building controllers with HIL systems interfaced with MATLAB, using DACB, from sensor calibration to fully operational controllers.

Team Haya Racing   Bangalore, India
Vehicle Dynamics, Brake system and wheel assembly engineer   *Sept 2018 to May 2021*

- Managed project to develop compact brake system using novel pedal box design resulted in 15% shorter bulkhead.
- Designed the braking system resulting in a 78% reduction of weight and shortened chassis overhang.
- Collaborated with vehicle dynamics and chassis team to iteratively optimize wheel assembly reducing overall weight by 48% improving vehicle maneuverability.

EDUCATION

New York University   New York, USA
Master of Science in Mechatronics and Robotics|Specialization in Mobile Robotics   *Sept 2021 to May 2023*
Courses: *Robot Localization and Navigation, Robot Perception, Reinforcement Learning and Optimal Control, Advanced Mechatronics*

PES University   Bangalore, India
Bachelor of Technology in Mechanical Engineering|Specialization in Automotive Engineering   *Aug 2017 to May 2021*
Courses: *Vehicle Dynamics, Mechanical Vibrations, Automotive Systems, Control Engineering*

PROJECTS

Control of Cross-Spherical gear   *Teensy4.0, Motors, closed-loop control, PCB*
Prototyped 360-degree gear and developed hardware controller to drive actuators and perform inverse kinematics.

- Implementation does not require offline computation and runs on a single microcontroller running at 1GHz.

Iterative LQR on quadrotor for trajectory tracking and aerobatic movements   *Optimal Control*
Implemented Iterative Linear Quadratic Regulator (LQR) with finite and infinite horizons for trajectory planning of aerobatic movements on a simulated 2D quadrotor.

- Created and applied quadratic cost function to reduce state space errors and improve controller efficiency.

Recursive state estimation of a Quadrotor using Kalman Filter   *Robot localization*
Implemented EKF and UKF using IMU and camera data from a quadrotor to estimate its pose and velocity.

- Used optical flow on camera data to estimate linear and angular velocity using RANSAC algorithm for a quadrotor's 3D pose estimation.

Q-Learning on motor actuated inverted pendulum   *Reinforcement Learning*
Implemented Q-learning algorithm using Python to learn an optimal control policy.

- Incorporated a value function to guide the Q-learning algorithm toward finding a policy that optimizes the tradeoff between stability and energy consumption, used epsilon-greedy policy to efficiently explore the state-action space.

SKILLS SUMMARY

- **Languages**: Python, C++, C, MATLAB, Bash
- **Frameworks**: Scikit, TensorFlow, Keras, ESPIDF
- **Tools**:   SolidWorks,GIT, Eagle CAD, Fusion 360, Network protocols
- **Platforms**:   Linux, Windows, Arduino, Single Board Computers, ROS/2
- **Other**:   3D Printing, Rapid Prototyping, Simulation, Digital control systems