Tejas Rao M

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EDUCATION

Program	Institution	%/CGPA	Year of Completion
BTech in Mechanical Engineering	Indian Institute of Technology, Madras	8.74	2023
Class XII (CBSE)	RCIS [1], Kalyan Nagar, Bangalore	93.4%	2019

RELEVANT COURSES

- Probability & Statistics
- Deep Learning**
- Machine Learning***
- Introduction to Scientific Computing
- Inverse Methods in Heat Transfer
- Advanced Topics in **Signal Processing**
- Modern **Control Theory**
- **Deep Learning** for **Computer Vision****
- Introduction to **Motion Planning**

SKILLS

Languages: Python, MATLAB	Tools: ROS, Coppeliasim, Gazebo, PyTorch	Prototyping: Fusion 360, AutoCad, EAGLE

PROFESSIONAL EXPERIENCE

Project Assistant, Stochlab IISc (June '23 -*)	• Project on safe control for mobile robots taken under guidance of Prof. Shishir Kolathaya. • Developed a **perception stack** for obstacle pose and velocity estimation using depth cameras. • Implemented a **Collision-Cone Control Barrier** (C3BF) function controller for obstacle avoidance. • Integrated the perception stack with the C3BF controller and deployed on Turtlebots.
	• Performed **hardware testing** of the C3BF controller using motion capture frameworks and ROS for unicycle and bicycle model robots. Submitted results to the Transactions on Automatic Control (TAC).
	• Implemented an orientation aware model predictive controller **(OA-MPC)** for a bipedal robot. • Currently testing the controller on a humanoid robot using Mujoco and python.
Mechatronics Intern, Jaguar Land Rover (May '22 - Jul '22)	• Performed **Automotive Benchmarking** on Panoramic Roof Structure (SUVs) using A2MAC1 software. • Analyzed frontal crash kinematics of competitor vehicles with A2MAC1 and representational diagrams • **Placed 1st in the JLR Hackathon** – Proposed a method for the Conditioning Monitoring of sensors.
Eigen Dynamix (July '21 - Aug '21)	• Worked on remote transmission of sensor data using **MQTT Bridges** and **Websockets**. • Remotely operated and transmitted sensor data from a catvehicle model across different networks.

PROJECT WORK

Localization for Mobile Robots (Jan'23 – May'23)	• Bachelor's Project under the guidance of Prof. Bijo Sebastian, Dept of Engineering Design, IITM. • Implemented an EKF-Localization Algorithm for a Pioneer P3-AT robot in indoor environments. • Used a **Seeded Region Algorithm** for extraction and detection of lines from 2D LiDAR data. • Estimated robot pose fusing Odometry and LiDAR data utilizing lines as features (**EKF – Localization**) • Tested and deployed the code on a **Pioneer P3-AT** using **Raspberry Pi** while interfacing with ROS.
Motion Planning for Surgical Robot (Sept'23 – Nov'23)	• Developed a Planning and Control Software for a Surgical Robot with a Remote Centre of Motion. • Implemented variations of the **RRT algorithm** for high dimensional C-Spaces for the **Kuka IIWA7**. • Simulated algorithm performance on the manipulator in **Gazebo** with custom kinematics scripts.
Design of Rover Chassis (April'23 – March'21)	• Simulated and a designed a **CRAB mechanism** for the traversal system of a **Mars Rover**. • Performed **optimization** of design parameters based on kinematic constraints to minimize vibration. • Prototyped and performed **stress analysis** simulation on Fusion 360 to validate the design.
Heads Up Display (April'20 – March'21)	• Designed the **optical system** for a helmet mounted Heads-Up Display system using Optic Studio. • Designed the outer casing to hold the electronics and optics modules on Fusion 360.

POSITIONS OF RESPONSIBILITY

Head of Traversal (April '21 – May'22)	• Head of the traversal module comprising 5 members of **Team Anveshak-CFI**. Responsible for ensuring the rover met the performance requirements while traversing over Martian Terrain. • Lead the module in implementing an upgraded **rocker-bogie design** for the ARC[4] Competition.

OTHER ACTIVITIES

Extra-curricular	• Active member of the Dynamics Leaders Toastmasters Club, having completed level 1.

*: Ongoing, **: NPTEL Course, ***: Coursera, [1]: Royale Concorde International School, [2] Mars Rover Team of IIT Madras, [3]: Center For Innovation, IIT Madras [4]: Anatolian Rover Challenge, [5]: National Sports Organization, India