# 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) | Royale Concorde Int'l School, Bangalore | 93.4% | 2019 |

## ACHIEVEMENTS

- Secured a rank of 1633 out of 38705 candidates in the Jee (Advanced) Examination, 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, C++, MATLAB, SQL. **Frameworks**: ROS, Pytorch, Git, Docker. **Libraries**: OpenCV, Numpy, Pandas, Scikit-learn

## PROFESSIONAL EXPERIENCE

**Project Assistant, Stochlab IISc**
(June '23 - Present)

- 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 (TAGIL).
- Developed a **perception stack** for estimating obstacle pose and velocity 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 Unicycle and Bicycle robots.
- Programmed a MPC based controller facilitating locomotion of a bipedal robot on custom terrains.
- Used HDL Slam to convert 3D Lidar Recordings into point clouds to generate custom height maps.

**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 kinematic diagrams.
- **Placed 1st in the JLR Hackathon** – Proposed a method for the Conditioning Monitoring of sensors.

**Eigen Dynamix**
(July '21 - Aug '21)

- Devised a method enabling remote transmission of sensor data using **MQTT Bridges.**
- Remotely operated and transmitted sensor data from a catvehicle model across different networks.

## PROJECT WORK

**Localization for Mobile Robots**
***(B.Tech Project)***
(Jan'23 – May'23)

- Developed and tested an EKF-Localization Algorithm for a mobile robot with **cm level accuracy**.
- 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**)
- Deployed and validated the method on a Pioneer-P3AT robot in an indoor environment.

**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.

**Face Recognition**

- Trained a Convolutional Neural Network to rate faces with an **Mean Absolute Error of 0.208.**
- Preprocessed the SCUT-fbp5500 dataset using **face-net** to extract faces and resized using Open-CV.

**Design of Rover Chassis**
(April'23 – March'21)

- Simulated and a designed a **CRAB mechanism** for the traversal system of a **Mars Rover** using **MATLAB**.
- 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**
***(Team Anveshak)***
(April '21 – May'22)

- Lead the traversal module, comprising of 6 members in implementing an upgraded rocker-bogie design.
- Helped the team in placing **5th** out of 40+ international teams at the Anatolian Rover Challenge, 2022.

## OTHER ACTIVITIES

**Extra-curricular**

- Achieved level 1 at Dynamic Leaders Forum Toastmasters Club. Avid golfer and Tennis Player.