

ARYAMAN SHARDUL

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Education

Veermata Jijabai Technological Institute

B.Tech in Computer Engineering

CGPA : 8.52/10

2020 – 2024

Mumbai, India

Prakash Junior College of Commerce And Science

HSC : 91.54%

2018 – 2020

Mumbai, India

Experience

Research Intern at Multi-Robot Autonomy Lab

IISER Bhopal

Dr. P. B. Sujit

Dec 2022 - Present

- The changing **wind patterns** around obstacles can increase the **turning radius** for **Unmanned Aerial Vehicles(UAVs)**.
- Working on using a **machine learning model** to predict these wind patterns around obstacles.
- Studied about **Model Predictive Control(MPC)**.
- Designing a **Model Predictive Controller** which takes these predicted wind patterns as input and generates an **optimized path** which takes turns around obstacles efficiently.

Research Intern at Multi-Robot Autonomy Lab

IISER Bhopal

Dr. P. B. Sujit

Oct 2022 - Present

- Working on developing an **Autonomous Underwater Vehicle(AUV) Simulator** based on an existing simulator and expanding it to include **swarm capabilities**.
- Tested existing controllers on different AUV models.
- Currently developing a **custom controller** to move **multiple AUVs simultaneously** from one point to another.

Summer Research Intern 📄

E-Yantra, IIT Bombay

Dr. Kavi Arya

June 2022 - July 2022

- Worked on "**Prota: The ROS Bot**", a project whose main goal was to create an **efficient and modular** design of an Unmanned Autonomous Ground Vehicle from scratch, assemble it in hardware and implement **SLAM** using it.
- Calibrated and tested different sensors like **RPLidar**, **MPU9250**, **Time of Flight sensors(VL53L0X)**, **Intel Realsense D435i depth camera** etc and contributed in assembling the bot in hardware.
- Implemented **SLAM algorithms** on the Prota Bot in **simulation** as well as **hardware**.
- Developed the **navigation stack** for the bot using **ROS Noetic**.

Projects

Dairy Bike 📄 | *Coppeliassim, Octave, Lua, Solidworks, Fusion 360*

Oct 2021 - April 2022

- Designed a Dairy Bike comprising a Two Wheeled **Self Balancing Robot**. The robot loads and unloads dairy products from a dairy farm to designated delivery points.
- Used concepts like **Euler-Lagrange mechanics** and **State-Space modelling** to create a mathematical model of our bike.
- Used **Linear Quadratic Regulator(LQR)** control strategy for balancing the robot equipped with a **flywheel mechanism**.
- Designed a **4 Degree of Freedom custom arm** and used **Inverse Kinematics** and wrote some **optimization algorithms** for the efficient picking and placing of the dairy products.
- After building the bot, we navigated it in an arena to complete a set of tasks.

Wall-e-Simulation-ros2 📄 | *ROS2, Gazebo, Rviz, SolidWorks, C++, Python*

Sept 2021 - Oct 2021

- The project's aim was to design a two-wheeled **self-balancing** and **line-following bot**.
- **SolidWorks** was used to design the robot.
- Used **ROS 2** framework and **Gazebo** Simulator to implement the algorithms on the bot.
- Implemented self-balancing and line-following algorithms using **Proportional Integral Derivative(PID)**.

Street Racer 📄 | *HTML, CSS, Phaser.js, Python, OpenCV, Mediapipe*

Nov 2021 - Jan 2022

- Made a **Gesture-controlled** 2D Car Racing game using **phaser.js**.
- Implemented steering control using hand gestures with help of **OpenCv** library of Python.

Obstacle-Avoidance 📄 | *ROS, Gazebo, Python*

July 2021

- Implemented **obstacle-avoidance** algorithm on a **differential drive robot**.
- Used **ROS** and **Gazebo Simulator** to simulate the robot and implement the algorithm on it.

Technical Skills

Languages	: C, C++, Python, Octave, Lua
Web Developer Tools	: HTML, CSS, JavaScript
Technologies/Frameworks	: Linux, GitHub, ROS, ROS 2, Gazebo, Coppeliasim, Rviz, SolidWorks, MATLAB, Arduino IDE, TensorFlow
Domains explored	: Robotics, Control Systems, Simulation, Computer Vision, SLAM

Achievements

E-Yantra Robotics Competition by IIT Bombay

3rd Place

- Winner of the **3rd Position** in E-Yantra Robotics Competition (**Theme: Dairy Bike**), an **international level** competition held by **IIT Bombay**.

SRA Autosim Challenge

3rd Place

- Winner of the **3rd Position** in the **SRA Autosim Challenge** organized by the Society of Robotics and Automation, VJTI.

MHT-CET Examination

100 percentile, State rank 11

- Secured **100 percentile, State rank 11** in the **MHT-CET** examination, a state entrance examination for engineering majors in PCM.

Committees/Extracurricular

Society of Robotics and Automation, VJTI

Dr. A. S. Rao

Software Head

June 2022 - Nov 2022

- Made **improvements** and did **research** in the domain of **programming and allied fields**.
- Fine-tuned the **programming content** for workshops.
- Maintained the committee's **GitHub repositories**.
- **Automated** tasks such as **registration** for workshops and seminars.

Active member and Lecturer

Aug 2021 - Nov 2022

- Taught concepts like **line-following, self balancing, PID Tuning** of a two wheeled bot in **Coppeliasim** to **150+** first year students in the **Walle** workshop.
- Introduced first year students to **Morphology** in Image Processing and a few basic **Morphological Operations** in the **Pixels** workshop.
- Taught about **ROS file systems** and some basic **ROS commands** to first year students in the **MARIO workshop**.
- Mentored a team of second-year students on a project called **SLAM-CV-Navigation**, which aims to implement **SLAM** on a differential drive bot in gazebo. Using a convolutional neural network called **YOLO**, the bot detects and follows humans in an indoor environment.