Sagar Chotalia

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Education

RWTH Aachen University 2024 - Present
M.Sc. Robotic Systems Engineering *Aachen, Germany*
- Key Courses: Machine Learning, Linear Control Systems, Advanced Robotic Kinematics and Dynamics

Veermata Jijabai Technological Institute(VJTI) 2021 - 2024
Bachelor of Technology in Electronics and Telecommunications Engineering *Mumbai, India*
- Cumulative GPA: 8.81/10

Arya Gurukul International Junior College 2019 - 2020
Maharashtra State Board *Navi Mumbai, India*
- HSC (Grade 12): 83.84%

Research Experience

Research Intern | *Flight Mechanics and Control Division, CSIR-NAL* | *Dr.Omkar Halbe* June 2023 – July 2023
- Developed flight control logic based on the extensive ArduPilot code base in **Simulink**.
- Created a custom controller for a **high-altitude glider**, complete with **FBWA** and **Manual modes**. Implemented a **Robust PID controller** for stabilization of roll, pitch and yaw.

Research Intern | *IISER Bhopal* | *Dr. P.B. Sujit* Oct 2022 – Nov 2022
- Studied **Model Predictive Control** and **programmed an MPC-based controller** for a mobile robot in MATLAB.
- Explored latest developments in Computer Vision such as **NeRFs**, studied **incremental Signed Distance Fields(iSDFs)**, and **Potential Fields** approach to Obstacle Avoidance.

Experience

Co-Founder, AmbitDesign Jan 2024 – Present
- Started a fully bootstrapped company focusing on demonstrating **company missions** and driving growth through unique, next-generation web applications.
- Securing clients like Pear.AI, attending networking events and ideating new ways the company can grow.

Google Summer of Code | *OpenAstronomy* | *Mentor: Erwan Pannier* May 2022 – Sept 2022
- **Improved the memory performance** of the RADIS codebase(Now in NumFOCUS).
- Worked on the existing memory bottlenecks and reduced calculation times by **caching various parameters to improve performance**. Set up memory-performance benchmarks for debugging and maintenance.
- Implemented **processing by chunks feature in the code**, allowing upto **75% reduction in RAM usage during large computations.**

Summer Intern, e-Yantra Labs | *IIT Bombay* | *Dr. Kavi Arya* June 2022 – July 2022
- Built an **open-source, off-the-shelf** Autonomous Nano Drone from scratch, and designed a custom autonomous control system using PID with an **on-board flight computer** (Raspberry Pi 0).
- Localised the drone in an indoor environment using **WhyCon software**. Our work was crucial for conducting the **eYRC competition for 1000+ students in 2022.**

Projects

External Joystick for Robot Kyle | *Unity, ESP8266* Dec 2024 – Jan 2025

- Wrote scripts to interface sensors like IMU(after applying Kalman Filters to reduce noise), rotary encoder, and IR sensors with ESP8266, broadcasting them as messages over WiFi through WebSockets.
- Developed scripts on the Unity backend to receive the broadcasted data and display it.
- Developed logic to couple the robot position and camera angles using IMU and coded scripts to display temperature on the walls, jump using the IR sensor, and open doors using the rotary encoder.

DroneSense | *ROS, RViz* Dec 2023 – Jun 2024

- Developed and tested software for a drone platform as a part of my Bachelor's Thesis.
- Explored and applied Visual-Inertial Odometry to drones in simulation.

Synchropter UAV Designing | *ROS, Gazebo, Redhawk Linux* Feb 2023 – Apr 2023

- Researched and developed a **Terrain Collision Avoidance System(TCAS)**.
- Used NASA's SRTM mission data to feed terrain height to the autopilot.
- Explored a robust TCAS 5-step approach, involving Position Prediction, Search Volume, Runway Search and Alert Generation.

SLAM(Simultaneous Localisation and Mapping) | *ROS Gazebo, Turtlebot3* Apr 2022 – Oct 2022

- Studied various SLAM concepts and techniques, including Occupancy Grid Maps, Locomotion and Navigation.
- Implemented the **Kalman Filter** and **EKF-SLAM** on Turtlebot3.

e-Yantra Robotics Competition | *IIT-Bombay* Oct 2021 – Mar 2022

- Won the **4th Prize** in our Theme, "Functional Weeder", out of **250+ teams globally.**
- Designed and constructed a **robotic 3-DOF manipulator arm**, picking and placing plant stalks.
- Ideated and implemented a **novel mechanism** to drop "seeds" accurately from scratch, worked with **Raspberry Pi 3** and programmed line-following using PID.

Pick and Place Bot using Bin Packing | *CoppeliaSim* Sept 2021 – Oct 2021

- Simulated a gantry system that would detect boxes placed on a conveyor, pick and place them in a container of known dimensions according to a 3D Bin Packing algorithm using Python API in CoppeliaSim.
- Used **Inverse Kinematics and OpenCV** to detect the object size.

Technical Skills

Languages: C++, C, Python
Developer Tools: Linux, Git, Bash
Libraries: OpenCV, NumPy, MatPlotLib, Pandas, Vaex
Simulators: CoppeliaSim, Gazebo, RViz, MATLAB, Simulink

Positions of Responsibility

Society of Robotics and Automation | *Core Member and Lecturer* Sept 2021 – Jun 2024

- Mentored students on projects in Control Systems and SLAM as a part of **Eklavya**, SRA's mentorship program.
- Actively mentoring the current core team of SRA in robotics-based projects and competitions.
- Key contributor in the organization and overseeing of various flagship events. Attended various workshops as a freshman in domains including **Computer Vision, Robotics and Embedded Systems.**
- Delivered lectures in Python and SLAM to 150+ attendees of SRA's workshops.
- Designed and conducted assembly of a robotic manipulator arm in SRA's flagship **MARIO** workshop.

Community

Project Mumbai | *Volunteer* Aug 2023 – Present

- Volunteering at Jallosh, a monthly beach-cleaning initiative organized in many parts of Mumbai.