# SAUDAMINI GHATGE

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## EDUCATION

**Carnegie Mellon University, School of Computer Science**, Pittsburgh, PA — May 2025

Master of Science in Robotic Systems Development | **CQPA – 3.92/4.0**

**Courses:** Planning & Decision-making, Optimal Control, Manipulation, Robot Learning, Computer Vision, Embodied AI Safety, Multi robot planning and control, Planning Techniques for Robotics (**TA**)

**D. J. Sanghvi College of Engineering,** Mumbai, India — Sep 2020

Bachelor of Engineering in Electronics Engineering | **CGPA – 8.13/10.0**

**Courses:** Robotics, Control Systems, Applied Mathematics

## EXPERIENCE

**Graduate Research Assistant** | *Search Based Planning Lab, Robotics Institute (RI), CMU* June 2024 – Present

Advisor: Dr. Maxim Likhachev

- Developing a **Multi-Agent Path Finding** (MAPF) algorithm capable of achieving constant-time path generation for all robots operating within the same environment, with a guarantee of complete solutions.
- Implemented a multi-query motion planner using pre-computed data structures, finding paths 50% faster.
- Conducting simulation experiments with the **Kinova** multi-arm setup to optimize assembly tasks in industry.
- Contributing to the development of **Search Library**, which incorporates multiple best-first search and multi-agent planning algorithms using **C++** for n-dimensional robots.

**Robotics Engineer** (website) | *TIH Foundation for IoT & IoE, IIT Bombay, Mumbai* July 2022 – June 2023

- Led the development of an autonomous differential drive robot for applications related to crop monitoring.
- Developed a **visual-servoing** algorithm for navigating crop rows, achieving a lateral error of 2 cm max.
- Implemented **Kalman Filter** to fuse wheel odometry and IMU data, reducing positional error by 2 cm.
- Established two-way communication between Nvidia Jetson Nano and Rpi Pico-w using **multi-threading**.

## PROJECTS

**Multi Quadruped Planning** (website) | *SBPL, RI, CMU* Aug 2024 – Present

- Training a locomotion policy for two quadrupeds to cross a narrow passageway using PPO in **Isaac Lab**.
- Created a Reinforcement Learning environment in Isaac Lab to train multiple quadrupeds for various tasks.

**Autonomous Nitrate Monitoring Robot** (website) (paper) | *MRSD Capstone, RI, CMU* Sep 2023 – Dec 2024

- Developed an autonomous **mobile manipulator** for monitoring nitrate concentration in cornstalks.
- Implemented a **MPC** controller for trajectory tracking, achieving less than 5% error in side drift.
- Designed a **Finite State Machine** to handle autonomous operations incorporating a safety trigger system.

**Autonomous Visual Target Tracking** (website) | *RI, CMU* Apr 2024 – May 2024

- Built a system capable of tracking and engaging with randomly moving objects using a 7 DOF robotic arm.
- Developed a vision controller to align the end-effector with moving objects, achieving an accuracy of 1 cm.

**Optimal Control for Robotics Projects** (website) | *RI, CMU* Jan 2024 – May 2024

- Implemented **iLQR** for quadrotors to generate collision-free trajectories in less than 160 iterations.
- Compared performance of a single control policy and MPC for a vehicle lane change and merge problem.

## SKILLS

**Programming Skills** C++, Python, C, MATLAB, Julia, Bash
**Robotic Frameworks** Isaac Sim, Isaac Lab, ROS, MoveIt, MuJoCo, Gazebo, PyTorch, OpenCV, Simulink
**Hardware Platforms** Kinova, xArm, Nvidia Jetson & Orin Nano, LiDAR, D435i, ESP32, Arduino

## PUBLICATIONS

**Design of Battery Management System** | *R. Ravikumar,* ***S. Ghatge,*** *R. Soni, J. Nadar* IEEE PuneCon, 2020