

SAI VENKATESH BALAJI

Boston, MA

+1 857-230-5896 | balaji.saiv@northeastern.edu | <https://linkedin.com/in/saiv20> | <https://saiv20.github.io/>

Education

Northeastern University

Boston, MA

Master of Science in Robotics | GPA: 3.93/4.00

Expected May 2025

Coursework: Mobile Robotics, Robotics Sensing and Navigation, Computer Vision, Machine Learning and Pattern Recognition

Birla Institute of Technology and Science, Pilani

Hyderabad, India

BE Mechanical Engineering, Minor in Robotics and Automation | CGPA: 8.51/10

May 2022

Coursework: Robotics, Artificial Intelligence for Robotics, Modern Control Systems, Neural Networks and Fuzzy Logic

Technical Skills

Programming Languages: Python, C/C++, MATLAB

Frameworks & Tools: PyTorch, Tensorflow, OpenCV, Scikit-Learn, NumPy, Pandas, Linux, Git

Designing and Simulation: Robot Operating System (ROS), Gazebo, MATLAB/Simulink, SolidWorks, PX4

Experience

TIH Foundation for IoT & IoE, IIT Bombay

Nov. 2022 – May 2023

Project Research Assistant

Mumbai, India

- Developed ground robots for precise navigation in agricultural fields in collaboration with a team of six, optimizing field coverage and operational efficiency
- Implemented path planning on an Unmanned Aerial Vehicle (UAV) across an agricultural field using Probabilistic Road Map (PRM) and A* algorithm and simulated the navigation of the robot using ROS, PX4 Autopilot and Gazebo
- Designed a multi-robot navigation system in ROS and a robust vision pipeline for real-time pose estimation and tracking, resulting in a 10% improvement in tracking accuracy.

Centre for Artificial Intelligence and Robotics (CAIR-DRDO)

July 2021 – Dec. 2021

Project Trainee

Bangalore, India

- Modeled the dynamics of an Autonomous Ground Vehicle whose steering wheel was actuated by a DC Motor
- Conducted a literature review of path tracking control schemes and path planning algorithms
- Built a control strategy based on Model Predictive Control (MPC) for path tracking in MATLAB/Simulink
- Assessed the effectiveness and performance of the control scheme through simulation using CarSim, ensuring precise path tracking capabilities

Projects

Vehicle and Pedestrian Detection | Python, PyTorch

- Implemented Segformers with Efficient Self-Attention, Mix-FFN, Overlap Patch Embedding, and Dice Loss integration.
- Achieved a Mean Intersection over Union (IoU) score of 77.07% on the BDD 100K dataset.

Visual SLAM and Dead Reckoning | ROS, Python, MATLAB

- Captured real-time odometry and camera data from Northeastern University's autonomous car (NUANCE) using ROS
- Executed Visual SLAM with ORBSLAM3 on the collected rosbag, conducting performance comparison with and without the integration of odometry data
- Performed Sensor Fusion using Extended Kalman Filter (EKF) and Complementary Filter to accurately estimate the yaw and velocity using the IMU and GPS data

Condition monitoring of a multi-stage gearbox using Hurst Exponent Estimates | MATLAB, Python, TensorFlow

- Collected Vibration and Acoustic Signals from a multi-stage gearbox operating under fluctuating speeds
- Estimated the Hurst exponent of the raw vibration and acoustic signals as a health indicator
- Applied Support Vector Machine(SVM) and Deep Learning based classifiers to effectively classify the thirteen health states of the gearbox, achieving a classification accuracy of 96.4%
- Published the findings in Structural Health Monitoring