Sai Venkatesh Balaji

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Available May - December 2024

Education

Northeastern University **Boston, MA**
Master of Science in Robotics | GPA: 4.0/4.0 *Expected May 2025*
Coursework: Mobile Robotics, Robot Sensing and Navigation, Computer Vision

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

Technical Skills

Programming Languages: Python, C/C++, MATLAB
Frameworks & Tools: PyTorch, OpenCV, Scikit-Learn, NumPy, Pandas, TensorFlow, Linux, Git
Designing and Simulation: Robot Operating System (ROS), Gazebo, MATLAB/Simulink, SolidWorks

Experience

Technological Innovation Hub, 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
- Simulated the navigation of the robot using Robot Operating System (ROS) and Gazebo

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

Localization of Multiple Mobile Robots using Aruco Markers | *Python, OpenCV, ROS*

- Collaborated as part of a team to construct a fleet of ground robots, each equipped with an ArUco marker mounted on top of the robot
- Performed Aruco marker detection utilizing a ceiling-mounted camera, enabling precise localization of the robots using OpenCV and Python
- Implemented multi-object tracking based on the initially detected ArUco markers

Visual SLAM and Dead Reckoning | *ROS, Python, MATLAB*

- Captured real-time odometry and camera data from Northeastern University's autonomous car (NUANCE)
- Implemented Visual SLAM using ORBSLAM3 on the collected rosbag
- Performed Sensor Fusion to accurately estimate the yaw and velocity using the IMU and GPS data

Vehicle and Pedestrian Detection | *PyTorch, OpenCV*

- Implemented Vehicle and Pedestrian Detection leveraging YOLOv5's real-time object detection capabilities
- Achieved accurate localization and identification of vehicles and pedestrians in diverse scenarios

Publication

Inturi, V., **Balaji, S. V.**, Gyanam, P., Pragada, B. P. V., Sabareesh, G. R., & Pakrashi, V. (2022). An integrated condition monitoring scheme for health state identification of a multi-stage gearbox through Hurst exponent estimates. Structural Health Monitoring-an International Journal, 22(1), 730–745. https://doi.org/10.1177/14759217221092828.