YASH MEWADA

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EDUCATION

Northeastern University, Boston, MA — Dec 2024
Master of Science in Robotics (Concentration: Electrical and Computer Engineering) — GPA: 3.8

Vishwakarma Government Engineering College, Ahmedabad, IN — June 2022
Bachelor of Technology in Instrumentation and Control Engineering — GPA: 3.9

SKILLS

Programming Languages: C, C++, Python, MATLAB
Software and Frameworks: ROS, ROS2, AirSim, Nvidia Isaac Sim, Gazebo, Rviz, CUDA, TensorFlow, Fusion 360, Ardupilot
Libraries and Tools: OpenCV, Sklearn, Pandas, NumPy, PyTorch, Eigen, Point Cloud Library (*PCL*), CMake, Git, Docker, YOLO

RESEARCH EXPERIENCE

Autonomy & Intelligence Laboratory, Northeastern University**,** Boston, MA — Dec 2022 - Present
Research Assistant (Algorithms/Technologies – *OctoMap, Semantic Segmentation, MPPI Planner, RGBD Fusion)*

- Constructed a 3D semantic mapping for robot exploration by fusing Lidar data with Vision Transformer-based segmented images to create an integrated map to enhance robot exploration capabilities by 15% compared to frontier-based exploration.
- Implemented a Risk-aware Model Predictive Control to improve pace by 25% for faster and safer navigation on uneven terrain utilizing simulation environments (Microsoft AirSim, Nvidia Isaac Sim) for testing and performed Lidar-Camera extrinsic Calibration

ACADEMIC PROJECTS

Autonomous Navigation and SLAM — Course: *Mobile Robotics*
Algorithms/Technologies – *PRM, RRT[1], A*, Particle Filters, Visual odometry.* — Mar 2023 - Apr 2023

- Collaborated on developing an autonomous robot for reconnaissance in simulated disaster zones using Cartographer-based SLAM and implemented frontier exploration[1], achieved accurate victim detection (13 out of 15) through extrinsic camera calibration.

Structure from Motion (SFM) — Course: *Computer Vision*
Algorithms/Technologies – *Lucas-Kanade feature tracker, Optical Flow, Factorization, GTSAM* — Mar 2023 - Apr 2023

- Implemented a 3D reconstruction technique for 100+ images using Cholesky decomposition and performed Bundle Adjustment.

Navigation and Guidance stack using IMU and GPS — Course: *Robotics Sensing and Navigation*
Algorithms/Technologies – *Complimentary Filter (CF), Sensor Fusion* — Feb 2023 - Mar 2023

- Formulated a ROS driver using IMU and GPS for localization and navigation, employed Allan variance analysis to assess IMU stability, and integrated Complimentary Filter and Dead reckoning algorithms to accurately estimate the vehicle's true position.

Image Mosaicing and Stereo Vision — Course: *Robotics Sensing and Navigation*
Algorithms/Technologies – *Feature detection, RANSAC, Homography, Epipolar Geometry, GTSAM* — Jan 2023 - Feb 2023

- Devised an algorithm for panorama generation by detecting and aligning features in 25+ images, improved Homography estimation using Pose graph optimization, and determined the disparity between stereo images for multi-view stereo depth estimation.

Motion detection using simple Image Filtering — Course: *Computer Vision*
Algorithms/Technologies – *Convolution, Noise estimation, Spatial Filters.* — Jan 2023 - Feb 2023

- Created a motion detection algorithm using temporal evolution and a derivative of Gaussian Filter over 20+ images, developed a noise estimation algorithm with a 98% accuracy rate.

WORK EXPERIENCE

Studio Carbon — Gandhinagar, IN
Robotics Software Intern — Mar 2022 - Sept 2022

- Designed and executed a control strategy of feed-forward and PID control system, achieving a 5° motor positioning error from 20°.
- Led the team of 5+ embedded engineers to program a firmware for a smart stepper motor and BLE stack for a fitness device, programmed a closed-loop control for a 2D Lidar to accurately count the number of foot taps for endurance sports.

WeHear Hearing Solutions — Ahmedabad, IN
Embedded Engineer Intern — Jan 2019 - July 2019

- Programmed firmware for a BLE-based hearing aid device that used a bandpass filter on MEMS I2S microphone data.
- Utilized RTOS to optimize data communication and filtering, which reduced latency from 400ms to 90ms and enhanced audio quality, also created multi-layer industry standards PCBs which increased battery runtime from 2.5 to 5.5 hours.

ACTIVITIES

Gujarat Technological University Robotics Club — Ahmedabad, IN
Management and Technical Core Team Member (Mech. And ECE) — Aug 2019 - Sept 2022

- Mentored and trained a team of 40+ members in the intricacies of robotics, for the ABU Robocon competition from 2020 to 2022.
- Guided the software team to integrate PID control and Kalman filtering on IMU and wheel odometry to transition the robot's navigation tasks from manual control to semi-autonomous and fully autonomous modes and set up a CI/CD pipeline.
- Utilized Free-RTOS for improved management of robot components, enhancing efficiency in task scheduling and execution.