Abhimanyu Suthar

abhimanyu.suthar@nyu.edu linkedin.com/abhimanyu-suthar github.com/Abhimanyu-0

Education

New York University Expected May 2025
Master of Science in Robotics and Mechatronics *Brooklyn, New York*

- **Relevant Coursework:** Robot Localization and Navigation, Foundations of Robotics, Mathematics for Robotics, Deep Learning, Advanced Mechatronics

Technical Skills

Languages: C++, Python, MATLAB, ROS (Robot Operating System), CUDA
Technologies: OpenCV, PCL (Point Cloud Library), TensorFlow, PyTorch, RViz, Gazebo, Unity3D, Docker, Git, OpenGL
Concepts: Computer Vision, 3D Reconstruction, SLAM (Simultaneous Localization and Mapping), Motion Planning, Trajectory Optimization, Sensor Fusion, Deep Learning, Robot Kinematics Dynamics, State Estimation, Point Cloud Processing

Research Experience

Agile Robotics and Perception Laboratory, NYU Tandon School of Engineering June 2024 – Present
Graduate Research Assistant *Brooklyn, New York*

- Leveraged Mast3r-SFM across multi-modal datasets to extract robust image correspondences, optimizing 3D Gaussian primitives
- Performed large-scale empirical testing of 30+ diverse image sequences, characterizing failures and success conditions for 3D Gaussian splatting
- Developed and validated ground truth data for multi-robot systems, integrating aerial and ground robot pose estimation to enhance localization accuracy

Projects

Vision Based Pose Estimator for MAV

- Implemented vision-based pose estimation using April Tags and planar homography, achieving real-time position and orientation tracking for autonomous quadrotor navigation.
- Enhanced motion estimation by detecting image keypoints and applying RANSAC for robust velocity calculation, resulting in reliable state estimation despite visual noise.

State Estimation of a drone using UKF

- Implemented an IMU-driven model for the prediction stage of the filter, enabling accurate state estimation for autonomous drone navigation.
- Developed an UKF filter to fuse the IMU model with camera pose and velocity from optical flow, improving tracking accuracy.

Trajectory Optimization for Aerial Maneuvers | *Python, ROS, Optimization*

- Implemented Sequential Quadratic Programming (SQP) controller for quadrotor trajectory optimization, enabling complex aerial maneuvers like loops.
- Formulated the trajectory optimization problem considering drone dynamics, actuator constraints, and minimizing control effort while achieving desired loop maneuver.

Driver Drowsiness Detection System | *Python, OpenCV, Arduino, Raspberry Pi*

- Developed an embedded system integrating Arduino-based vitality sensors with Raspberry Pi via USART for real-time driver monitoring.
- Implemented facial landmark detection using dlib and RaspiCam v2 to assess driver alertness, enabling automated vehicle control based on drowsiness state.

Additional Experience

K-12 Center at NYU Tandon School of Engineering June 2024 – August 2024
STEM Educator *Brooklyn, New York*

- Developed and delivered a DTCC-sponsored 4-week curriculum on computer science, networking, and cybersecurity for high school students, integrating hands-on activities and real-world case studies.
- Created engaging lesson plans combining technical concepts with ethical and legal considerations in technology, achieving active participation from 20+ students over a 4-week summer program.