Akshaj Raut

Boston, MA | raut.aks@northeastern.edu | +1 (617) 331-6848 | LinkedIn |Github

EDUCATION

Northeastern University, Boston, MA — May 2026
Master of Science in Robotics, Concentration: Electrical and Computer Engineering — GPA: 3.7/4
Coursework: Mobile Robotics, Computer Vision, Robot Sensing and Navigation, Mechanics and Control

University of Mumbai, Mumbai, India — May 2023
Bachelor of Engineering in Electronics and Telecommunication — GPA: 8.8/10
Coursework: Autonomous Vehicles, IOT and Industry 4.0, Wireless Networks

TECHNICAL SKILLS

- **Languages and Frameworks:** Python, PyTorch, ROS2, Embedded C, C++, Dart, Java
- **Softwares:** SolidWorks, KiCad, EAGLE, MATLAB, LabVIEW, Git, GitHub, GitLab
- **Development Boards and Sensors:** Raspberry Pi, Arduino, ESP8266, ESP32, IMU, GPS, LiDAR

ACADEMIC PROJECTS

Autonomous AI Drone — May 2025 - Present
- Constructed a UAV using Pixhawk PX4 flight controller paired with Raspberry Pi 4 running Ubuntu and 915 MHz telemetry, tuned own Extended Kalman filter for sensor fusion. Autonomous p2p navigation through GPS coordinates via GPS API.
- Integrated TF-Luna TOF LiDAR and RGB camera for object detection and obstacle avoidance; currently developing person-following and object lock-scan functionality to capture multi-angle images for 3D reconstruction and anomaly detection. Future work includes migrating to Jetson for onboard compute and upgrading to a 360° LiDAR for SLAM and mapping.

Omnidirectional Dense SLAM with 360° Video — March - April 2025
- Developed a monocular SLAM (Simultaneous Localization and Mapping) pipeline using video captured with an Insta360 ONE X2 camera to address the challenges of omnidirectional perception
- Implemented the system in Python, leveraging OpenCV to process the 360° video and perform sparse visual odometry
- Estimated camera trajectory and reconstructed a sparse 3D map, demonstrating proficiency in computer vision and robotics

Live Firearm Detection and Alerting System using YOLOv8 — March - April 2025
- Developed a full-stack, real-time surveillance system to detect firearms in live video feeds, integrating a computer vision model with an automated alerting system
- Fine-tuned a YOLOv8 object detection model on a custom dataset of firearm images, achieving a robust mean Average Precision (mAP) of 0.87
- Integrated the system with the Twilio API to trigger automated SMS and call alerts on detection

ORB-SLAM3 on Autonomous Car — November - December 2024
- Engineered and implemented an ORB-SLAM3 pipeline to enable robust, real-time SLAM for autonomous vehicles
- Collected real-world data from Northeastern University's NUance autonomous car, which is equipped with multiple cameras and sensors, to create a realistic testing environment
- Utilized both stereo and stereo-inertial data to create detailed and accurate 3D maps of the surrounding environment

Low-Cost LIDAR Sensor for 2D Mapping — August - April 2023
- Designed and implemented a low-cost LIDAR sensor system to create an affordable solution for 2D mapping and object detection
- Engineered a custom hardware solution by designing and 3D printing a sensor housing and integrating a time-of-flight sensor
- Mounted the system on a vehicle to create a rough map of its surroundings, demonstrating hands-on experience in hardware development and integration

WORK EXPERIENCE

PicoStone Technologies, Mumbai, India — September - December 2022
Hardware Development Intern
- Developed firmware for smart home lights using ESP-IDF to control lights from a smartphone
- Designed PCB for a Wi-Fi-based LED light controller using KiCad to optimize the layout for low-cost production
- Collaborated with the hardware team of 4 members to conduct testing and integrate smart lighting solutions to enhance product reliability

PUBLICATION

- N. Tandan et al., "Design and Implementation of IoT Based Local Weather Station - An Experimental Setup," 2022 IEEE Bombay Section Signature Conference (IBSSC), Mumbai, India, 2022, pp. 1-6, doi: 10.1109/IBSSC56953.2022.10037309.