Nagaraj Bhat

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LinkedIn Profile — GitHub Profile

Professional Summary

Automation and Robotics Engineering student specializing in autonomous systems, UAV navigation, and model-based design using MATLAB and Simulink. Experienced in developing GPS-denied navigation systems using Visual-Inertial Odometry (OpenVINS) integrated with ROS2 and PX4. Strong in system-level engineering, combining control systems, embedded computing, and simulation-driven validation to build real-world robotic platforms. Proven track record with All India Rank 1 (SAEINDIA Aerothon 2025) and AIR 2 (SAEISS ADDC), demonstrating excellence in UAV design, payload engineering, and integrated system development.

Technical Skills

Programming: Python, C, C++, MATLAB, Bash
MATLAB & Modeling: Simulink, ROS Toolbox, Control System Toolbox, Simscape, Model-Based Design
Robotics & Autonomy: ROS2, PX4 Autopilot, MAVLink, OpenVINS (VIO), Gazebo, AirSim
Embedded Systems: STM32, Raspberry Pi 5, Jetson Nano/AGX Orin, Pixhawk
Simulation & Tools: MATLAB Simulation,ROS2,Gazebo,Airsim,NVIDIA ISAC SIM, RobotStudio, Git/GitHub, Docker
Hardware & Design: SolidWorks, PCB Design, Basic FEA (ANSYS)
Operating Systems: Linux (Ubuntu, Arch/Garuda, Jetson Linux), Shell Scripting, System Configuration,RTOS
Concepts: Control Systems, Sensor Fusion, Visual-Inertial Odometry, UAV Dynamics, Computer Vision

Experience

aeroKLE, Hubballi Dec 2024 – Present
Automation and Robotics Engineer

- Contributed to securing **All India Rank 1 in SAEINDIA Aerothon 2025** by designing and integrating a fully autonomous UAV system with robust avionics and real-time processing.
- Achieved **All India Rank 2 in SAEISS ADDC competition** by designing a **servo-driven 3-finger payload mechanism** for precise egg grasping and dropping, ensuring stable and damage-free delivery.
- Led **end-to-end system integration**, including flight controller, companion computer, sensors, and power systems, ensuring reliable communication and synchronization across subsystems.
- Integrated mechanical payload systems with real-time control logic, aligning actuation with mission execution and flight dynamics.
- Developed efficient perception-to-control pipelines, improving responsiveness and stability of autonomous operations.

Projects

GPS-Denied Autonomous UAV Navigation System 2025 – Ongoing
MATLAB, Simulink, ROS2, PX4, OpenVINS, Raspberry Pi 5

- Developed a **GPS-denied navigation system** using **OpenVINS** for real-time visual-inertial state estimation.
- Implemented a **model-based design approach** using **MATLAB and Simulink**, leveraging ROS Toolbox for system modeling, validation, and data flow simulation.
- Integrated OpenVINS with **PX4 via ROS2 and MAVLink**, enabling stable flight using VIO-based pose estimation in place of GNSS.
- Designed and tested **sensor fusion pipelines** combining IMU and vision data, improving robustness under real-world conditions.
- Deployed the system on **Raspberry Pi 5**, optimizing for real-time performance under embedded constraints.

- Currently performing **real-world flight testing and validation** to ensure reliability and accuracy of the navigation stack.

UAV–UGV Cooperative Autonomous System 2025
ROS2, MATLAB, Multi-Robot Systems

- Designed a **cooperative UAV–UGV system** for coordinated autonomous operations and task sharing.
- Modeled system behavior and communication pipelines using **MATLAB and ROS Toolbox**.
- Implemented ROS2-based communication for real-time data exchange, enabling coordination between aerial and ground platforms.
- Integrated ROS2 simulation using gazebo and Airsim with the uav ugv integration with px4 controlling multivehicle and liadr simulation point cloud mapping thermal camera integration for the search and rescue operation with UAV-UGV
- Developed scalable architecture for multi-agent systems, focusing on autonomy, coordination, and system robustness.

ML-Driven Industrial Robot Optimization 2025
Python, RobotStudio, MATLAB

- Developed a machine learning-based optimization pipeline to reduce cycle time in industrial robotic operations.
- Built a RAPID code parser to extract motion trajectories and generate optimized paths.
- Integrated optimization results with RobotStudio via RWS API, reducing manual tuning efforts.

FOC-Based BLDC Motor Torque Optimization 2025
MATLAB Simulink, STM32

- Implemented Field-Oriented Control (FOC) using **Simulink** for efficient and stable motor control.
- Applied Clarke and Park transformations along with SVPWM for torque ripple minimization.
- Designed embedded implementation strategy using STM32 for real-time execution.

Education

KLE Technological University, Hubballi
B.E. in Automation and Robotics Engineering — Expected Aug 2027
CGPA: 8.5

Government PU College, Honavar
Pre-University (Science) — May 2023
Score: 92%

Certifications

- MATLAB Onramp
- Simulink Onramp
- Control System Toolbox
- Simscape Onramp