Janmesh Patel

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PROFESSIONAL SUMMARY

Robotics & Embedded Systems Engineer with **3+ years** of experience in **soft-realtime systems**, **ROS2 middleware**, and **autonomous navigation**. Proven track record in deploying multi-sensor fusion (LiDAR/Stereo) and optimizing firmware-hardware integration for industrial-grade autonomous platforms.

TECHNICAL SKILLS

Robotics and Autonomy: *ROS2, Nav2, SLAM, A*, Sensor Fusion, Perception Systems.*
Embedded Systems: *STM32 Microcontrollers, FreeRTOS, Embedded Linux, Real-time Systems, Memory-Mapped IO.*
Communication Protocols: *SPI, I2C, UART, CAN, Serial Communication.*
Robotics Simulation and ML/AI: *Gazebo, Linux, Git, NVIDIA Issac Sim [Planned], TensorFlow, PyTorch.*

EXPERIENCE

Clearpath Robotics by Rockwell Automation | *Robot Builder* *Jan 2024-May 2025*

- **Validated and deployed** ROS2-based autonomy stacks on Husky A300 platforms, ensuring seamless integration of firmware and high-level navigation modules.
- Performed precise **Lidar calibration** (roll, pitch, yaw) and multi-sensor alignment for 3D SLAM, improving spatial awareness in autonomous systems.
- Optimized electro-mechanical assembly processes, achieving a **50% increase in production efficiency** through tooling and firmware adjustments.
- Troubleshot complex **mixed hardware-software systems** using logic analyzers and oscilloscopes to resolve timing issues in communication protocols.

PROJECTS

Autonomous Hazard Mapping Rover (AHMR) *Jan 2026-Present*

- Developing a **multi-agent swarm** system featuring a DJI UAV for "God's-eye" pathfinding and a ROS2-based 4WD ground rover.
- Planning to implement **Nav2 (Smac Planner)** with custom costmap plugins for dynamic obstacle avoidance in debris-heavy disaster zones.
- Engineering a high-resiliency **Mesh Network (MANET)** using UDP/TCP to enable reliable drone-to-rover C2 (Command & Control) in GPS-denied areas.
- Formulating an action plan for path-planning logic against extreme terrain physics using **NVIDIA Isaac Sim** digital twin environments.

Real-Time Multi-Sensor Data System *Oct 2025 – Nov 2025*

- Architected a multitasking environment using **FreeRTOS** on STM32 to manage concurrent data streams with deterministic timing.
- Leveraged **DMA** and circular buffers for high-efficiency SPI logging, reducing CPU overhead by offloading I/O tasks.
- Developed high-efficiency data handling systems using **SPI + DMA** and circular buffers on STM32 to minimize CPU overhead during high-frequency sensor acquisition.

EDUCATION

Master of Engineering (MEng), Systems and Computing | *University of Guelph*
Bachelor of Engineering (BE), Mechatronics & Robotics | *GH Patel College of Engineering*

CERTIFICATIONS

- Mastering RTOS: Hands-on FreeRTOS and STM32Fx.
- Master C and Embedded C.