MANOJ KUMAR EEDHARA

Portfolio: https://manojkumareedhara.netlify.app/
Github: github.com/manojkumareedhara

Email: manojkumareedhara3@gmail.com
Mobile: +44 7830344552
LinkedIn: linkedin.com/in/manojeedhara

Summary

Robotics Engineer specialising in autonomous systems development for UAVs and ground robots. Proficient in developing perception systems (SLAM, computer vision), navigation algorithms, and flight controller firmware using ROS2 and PX4. Experienced in sensor fusion, embedded programming, and optimising algorithms for edge deployment. Motivated to apply expertise in autonomous navigation and multi-sensor fusion to develop impactful robotics solutions that contribute to sustainable ecosystems and a better future.

Technical Skills

- **Robotics Frameworks**: ROS/ROS2, Nav2, MicroROS, Zenoh, PX4, MAVLink, ModalAI, OMPL, PCL, SLAM Toolbox
- **Perception & Navigation**: SLAM (Visual, Lidar), Sensor Fusion, Path Planning, Obstacle Avoidance
- **Computer Vision**: Opencv, Point Cloud Processing, Object Detection/Tracking, Feature Extraction, Pose Estimation
- **AI/ML**: TensorFlow, PyTorch, Deep RL (PPO, A3C, DQN), Meta-Learning, LLM Fine-tuning, Computer Vision Models
- **Embedded Systems**: PX4 Firmware, Flight Controller Programming, Sensor Integration, Arduino, Raspberry Pi
- **Programming & Tools**: C++, Python, Embedded C, ROS, Git, Docker, CI/CD, Linux, AWS, Edge Computing (Jetson, QRB5), Gazebo, IssacSim, UnReal Engine, Foxglove Studio, Rviz2.

Experience

- **Robotics Engineer** — London, United Kingdom
  Autonome Labs PVT LTD — *Sep 2024 – Present*
  - **Autonomous UAV Software Architecture**: Led the design, developmental deployment of advanced autonomous navigation systems using ROS2 and PX4, incorporating Visual SLAM, multi-sensor fusion, and dynamic obstacle avoidance for robust performance in GPS-denied environments.
  - **Embedded Systems & Firmware Development**: Developed and optimised low-level PX4 firmware modules and sensor drivers across diverse UAV platforms, enhancing flight control stability, state estimation accuracy, and real-time responsiveness.
  - **Perception & Vision-Based Navigation**: Built end-to-end computer vision pipelines for object detection, feature tracking, and 3D mapping, enabling high-reliability navigation and situational awareness in complex, cluttered environments.
  - **Autonomous Mission Planning**: Designed modular behaviour trees and hierarchical state machines for autonomous task execution, supporting payload delivery, infrastructure inspection, and adaptive path planning under dynamic constraints.
  - **Edge Deployment & Performance Tuning**: Optimised SLAM and perception algorithms for real-time execution on edge devices (Jetson, QRB5, VOXL), reducing compute load while maintaining mission-critical reliability.

- **Computer Vision Engineer** — London, United Kingdom
  Hitcoach — *Mar 2024 - Jan 2025*
  - **Fighter Detection System**: Trained and deployed high-performance computer vision models for MMA fighter detection, achieving 96% accuracy in real-time environments. Implemented models like kalman filter, DeepSort & SAM trackers to enhance detection consistency and reduce false positives, and deployed in the app HITAI
  - **Pose Estimation for Combat Sports**: Developed specialised pose estimation models for complex MMA fighting positions, enabling accurate punch, kick, grappling and technique detection in challenging scenarios with occlusion and rapid movement.
  - **Sports Analytics Platform**: Designed and implemented AI-powered analytics systems for Disney Hotstar Pro Kabaddi League, providing real-time player tracking, performance metrics, and predictive game analysis.
  - **Model Optimization**: Optimized deep learning models for deployment on mobile and cloud platforms, achieving a 40% reduction in inference time while maintaining detection accuracy for live sports broadcasting applications.

- **AI/ML Developer** — Sunbury-On-Thames, United Kingdom
  MAASR LTD — *Jun 2023 - Feb 2024*
  - **LLM Training & Fine-tuning**: Led the training and fine-tuning of large language models for domain-specific applications, implementing custom datasets and optimization techniques that improved model performance by 35% for financial data processing.
  - **Cognitive Computing Integration**: Engineered production-ready LLM-based solutions for intelligent task automation and sentiment analysis, integrating advanced prompt engineering methods that improved operational efficiency by 25%.
  - **Cloud Infrastructure**: Designed and implemented scalable cloud architecture using AWS services and Docker, creating robust and cost-efficient infrastructure for training and serving AI models in production.

- **Robotics Engineer** India
  Dash Dot Robotics *Jun 2021 - Aug 2022*
  - **Robotics and Software Development**: Engineered real-time tracking and sensor-based autonomous functionality using C++ and ROS2. Developed advanced communication protocols leveraging star and mesh network configurations for optimized device connectivity.
  - **Cloud Integration and Networking**: Ensured seamless integration with AWS cloud services, enhancing real-time monitoring and management capabilities. Implemented efficient data transmission between Box-it devices and cloud infrastructure.
  - **UI and Machine Learning Integration**: Engineered a ML-powered UI for inventory analysis and optimization. Implemented real-time management features, significantly reducing operational discrepancies and enhancing system efficiency.

Education

- **University of Birmingham** Birmingham,UK
  MSc.Robotics; Merit *Sep 2022 - Dec 2023*

  Courses: *Intelligent Robotics, Advanced Robotics, Machine Learning, Evolutionary computation, Artificial Intelligence, Neural computation, Computer Vision*

  Dissertation: *Meta-Learning for Robotic Search Applications in Remote and Inaccessible Terrains*

Projects

- **Pegasus: Accessible Autonomous Drone Platform (PX4, Obstacle Avoidance)**: Designed and developed Pegasus, a complete autonomous drone system with advanced collision avoidance capabilities specifically engineered for operation by non-expert pilots. Implemented Vector Field Histogram algorithms and Kalman filters, and Basic PD, PID Controls integrated with PX4 flight controller for robust obstacle detection and avoidance in dynamic environments. Leveraged ROS2 and Nav2 packages to create an intuitive control interface that abstracts complex flight mechanics while ensuring safety through multi-layered redundant safety systems. **ROS2, PX4, C++, Nav2, Sensor Fusion, Flight Control Systems.**
- **Frontier Based Exploration using Meta-Learning (Deep RL, Meta-Learning, Robotics Simulation)**: Developed a meta-learning framework for SAR robot simulations using MAML, REPTILE, and Zero-shot Learning. Implemented Deep RL algorithms (PPO, A3C), achieving 40% increase in exploration capabilities and 30% improvement in decision-making accuracy. **C++, Python, PyTorch, OpenAI Gym, ROS2, Gazebo.**
- **Spot - Fire Defender Robot (Robotics, AI, Computer Vision)**: Engineered fire detection system for Boston Dynamics' Spot robot using Python API and ROS. Implemented reinforcement learning algorithms (DQN, PPO) for navigation and decision-making in hazardous environments. Integrated thermal imaging and LIDAR data processing for enhanced situational awareness. **C++, SLAM, OpenCV, Spot SDK, GCP.**
- **ACTO Advanced Self-Balancing Robot (Open-Source Robotics Platform)**: Engineered a comprehensive self-balancing robotics platform from scratch, implementing multi-modal perception systems (Visual-SLAM, QVIO, LiDAR) on Raspberry Pi hardware. Developed custom sensor fusion algorithms to integrate IMU and visual data for robust state estimation while maintaining balance through optimized PID control. Implemented complex autonomous behaviors including object following, obstacle avoidance, and dynamic path planning on an inherently unstable platform, overcoming unique challenges in control system design. **ROS2, Control Theory, Sensor Fusion, Embedded Systems.**
- **Deliveri-Bot: Autonomous Hotel Delivery Robot (Robotics, AI, Navigation)**: Developed an AI-powered robot for automating hotel room service deliveries, enhancing guest experience and operational efficiency. Implemented autonomous navigation in dynamic indoor environments, obstacle avoidance, and secure delivery protocols. **ROS, Python, PyTorch, OpenCV, Gazebo, SLAM algorithms, TensorFlow, Git.**
- **Hashtag Generator ST7 (NLP, Cloud Computing, DevOps)**: Developed a scalable hashtag generation system for social media content, leveraging NLP for sentiment analysis and entity recognition to enhance hashtag relevance. Implemented continuous model training and real-time monitoring for improved accuracy and user insights. **Python, BERT, XLNet, AWS, Azure, Docker, Kubernetes, REST APIs, TensorFlow, Git.**

Certifications

- **IBM Data Science**: Coursera - IBM Data Science Certification
- **Machine Learning Specialization**: Supervised Machine Learning: Regression and Classification
- **Deep Learning Specialization**: Coursera - Deep Learning by Andrew Ng
- **Data Processing in RPA**: Data Manipulation in RPA
- **RPA Basics and Introduction to UiPath**: Robotics Process Automation with UiPath