Thiyanayugi Mariraj

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Summary

Graduate Engineer in Automation and Robotics specializing in AI-driven systems, generative AI, and autonomous robotics. Expertise in developing intelligent solutions using LLM fine-tuning, RAG architectures, knowledge graphs, and multi-agent systems. Strong foundation in sensor fusion, computer vision, and ROS-based development with proven ability to deploy scalable ML solutions on cloud platforms for industrial applications.

Skills

- **Programming:** Python, C++, C, MATLAB, SQL, Bash
- **Robotics Platforms:** ROS, ROS2, Gazebo, SLAM, Path Planning
- **AI & Machine Learning:** Deep Learning, Computer Vision, NLP, Reinforcement Learning
- **Gen AI:** LLM Fine-tuning, Prompt Engineering, RAG
- **AI Frameworks:** PyTorch, TensorFlow, LangChain, Hugging Face Transformers
- **Cloud & ML Ops:** AWS SageMaker, Model Deployment, MLOps, Edge AI
- **Knowledge Systems:** Knowledge Graphs, Vector Databases, Semantic Search
- **Sensor Technologies:** LiDAR, IMU, Camera Systems, mmWave Radar
- **Industrial Systems:** Automation, Fleet Management, Quality Control
- **Development Tools:** Git, Linux, Docker, Kubernetes
- **Languages:** English (C2), German (B2 in Progress)

Education

Technical University Dortmund — **October 2022 – July 2026**
Master of Science in Automation and Robotics — *Dortmund, Germany*

PSG College of Technology — **July 2018 – May 2022**
Bachelor of Engineering in Robotics and Automation — *Coimbatore, India*

Experience

Information Processing Laboratory, TU Dortmund — **June 2024 – May 2025**
Research Assistant – Faculty of Electrical Engineering and Information Technology — *Dortmund, Germany*

- Designed deep learning models for intelligent signal interpretation in complex electromagnetic systems.
- Applied reinforcement learning for adaptive optimization and real-time parameter tuning in dynamic environments.
- Improved signal processing precision in high-frequency industrial applications via supervised ML techniques.

Chair of Material Handling and Warehousing, TU Dortmund — **January 2025 – July 2025**
Master's Thesis – Collaborative Robotic Perception — *Dortmund, Germany*

- Developed 6G-enabled collaborative perception framework for multi-robot systems using mmWave radar technology.
- Implemented Graph Neural Network architectures for real-time occupancy prediction in warehouse environments.
- Conducted comprehensive validation using dual robotic platforms with motion capture ground truth systems.

Pricol Limited — **November 2021 – June 2022**
Robotics Engineering Intern – Autonomous Systems — *Coimbatore, India*

- Designed and deployed Autonomous Mobile Robot for industrial logistics and inspection automation applications.
- Integrated LiDAR, IMU, and camera systems for robust SLAM-based navigation in dynamic industrial environments.
- Developed real-time path planning and obstacle avoidance algorithms using ROS framework.

Certifications

- **AWS Training:** Amazon SageMaker JumpStart Foundations, Building Language Models on AWS, Customizing and Evaluating LLMs Using Amazon SageMaker JumpStart, No-code Machine Learning and Generative AI on AWS
- **DeepLearning.AI:** ChatGPT Prompt Engineering for Developers
- **Hugging Face:** Fundamentals of AI Agents
- **LinkedIn Learning:** What Is Generative AI?, Generative AI: The Evolution of Thoughtful Online Search

Projects

RoboVision-3D: Computer Vision for Indoor Robotics **November 2025**

- Developed multi-sensor fusion system integrating RGB-D cameras and LiDAR for 3D environment mapping.
- Implemented YOLOv8-based object detection with PCA-driven 3D bounding box localization.
- Built point cloud colorization pipeline with camera-LiDAR calibration and voxel downsampling.

AI Teaching Platform with Intelligent Chatbot **December 2025**

- Built production web platform with bilingual support and Claude API-powered intelligent assistant.
- Engineered AI-driven personalized email generation system with context-aware recommendations.
- Deployed containerized application on Google Cloud Run with automated CI/CD pipeline.

Edge Detection ROS Challenge: 3D Vision System **September 2025 – October 2025**

- Developed modular edge detection system with ROS service architecture for real-time image processing.
- Implemented 3D coordinate conversion pipeline using camera intrinsics and synchronized depth data.
- Built RViz visualization with robot URDF integration and ArUco marker-based ROI detection.

AI Agent Framework for Robotic Automation **October 2025 – November 2025**

- Architected multi-agent system integrating CLIP vision, GPT-3.5 NLP, and ChromaDB RAG.
- Implemented LangChain orchestration for task planning with knowledge retrieval and semantic search.
- Deploying production-quality framework with comprehensive testing and documentation for robotics.

AI-Powered Industrial Signal Processing System **October 2023 – June 2024**

- Engineered neural network models (ANN, CNN) for real-time signal integrity classification in industrial applications.
- Implemented edge-AI monitoring systems for predictive maintenance and anomaly detection in manufacturing.

Integrated Robotic Automation Platform **June 2021 – October 2021**

- Built and controlled multi-DOF robotic arm with omnidirectional base for factory automation.
- Developed adaptive motion planning and precision manipulation algorithms using ROS framework.