Sushmitha Govindaraj

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Summary

Robotics engineer with expertise in AI-driven autonomous systems, data science, and industrial automation. Focus on Deep Learning, Reinforcement Learning, SLAM, big data analytics, and robotic manipulation. Experience in developing intelligent systems and data-driven solutions to improve autonomy, adaptability, and efficiency through advanced AI and data science technologies.

Technical Skills

AI & Machine Learning: Deep Learning, Reinforcement Learning, Computer Vision, PyTorch, TensorFlow, LSTM
Data Science & Big Data: Databricks, PySpark, Data Analytics, Data Pipelines
Robotics & Autonomous Systems: ROS1/ROS2, SLAM, Sensor Fusion, Navigation, Gazebo, MoveIt
Programming: Python, C++, MATLAB, SQL
Automation & Control: PLC Programming, SCADA, Robot Integration, OpenCV, Control Engineering
Cloud & Platforms: AWS, Databricks Platform, Data Pipeline Optimization
Embedded Systems: SI/PI Design, SPICE Simulation, Microstrip Design
Languages: English (C2), German (B2 - Learning), Tamil (Native)

Education

Master of Science | ***Automation & Robotics*** — Oct. 2022 – Present
TU Dortmund — Dortmund, Germany

Bachelor of Engineering | ***Robotics & Automation*** — 2018 – 2022
PSG College of Technology — Coimbatore, India

Work Experience

Werkstudentin - Data Science & Control Engineering — Dec. 2025 – Present
Wilo Group — Dortmund, Germany

- Development of data analytics solutions using Databricks platform for water management technology
- Implementation of big data processing workflows with PySpark for large-scale data analysis and optimization
- Design and optimization of data pipelines for control engineering solutions in industrial water systems
- Collaboration with cross-functional teams to enhance data-driven decision making processes

Master Thesis Student — Nov. 2024 – June 2025
TU Dortmund — Dortmund, Germany

- Research on sonar-based SLAM for GNSS-free localization of autonomous ships in underwater environments
- Development of localization system with IMU, DVL, and sonar sensors in ROS2 framework
- Design of LSTM neural network model to improve underwater odometry accuracy
- Implementation of Extended Kalman Filter algorithms for real-time positioning in autonomous navigation

Research Assistant — June 2024 – May 2025
TU Dortmund - Information Processing Laboratory — Dortmund, Germany

- Optimization of signal processing in embedded systems through AI-driven modeling techniques
- Application of machine learning techniques to improve circuit performance and signal integrity analysis
- Development of Python tools for model training, data preprocessing, and automated evaluation frameworks

Project Intern — Dec. 2021 – May 2022
AAtek Robo Private Limited — Coimbatore, India

- Development of robotic automation system for RTPCR sample collection and processing
- Implementation of computer vision algorithms with Python and ROS framework for precise robot control
- Improvement of laboratory automation through intelligent control systems and adaptive mechanisms

Projects and Research

Advanced Lane Detection System | ***Python, OpenCV, Computer Vision*** Dec 2025 – Jan 2026
Personal Project

- Real-time CV system for lane detection and steering angle estimation achieving 20-30 FPS on CPU hardware
- Classical CV implementation using Canny edge detection and Hough Transform for autonomous vehicles
- Rich visualization and debugging capabilities with configurable ROI masking and temporal smoothing
- HSV color filtering integration for enhanced accuracy in various lighting conditions

Industrial RAG Assistant | ***Python, Anthropic Claude, FAISS, Streamlit*** Nov 2025 – Dec 2025
Personal Project

- Production-ready RAG system using Anthropic Claude Sonnet 4 for technical documentation queries
- Cost-effective TF-IDF embeddings with FAISS vector store achieving sub-100ms retrieval performance
- Responsive Streamlit web interface with source citations and multi-document processing capabilities
- Query cost optimization achieving $0.004 per query with enterprise-grade scalability

AI-based SI/PI Compliant PCB Design | ***Python, SPICE, Zuken eCADSTAR*** Oct. 2023 – June 2024
TU Dortmund

- Development of AI-based models for optimizing high-speed PCB designs for signal integrity
- Creation of comprehensive training datasets with SPICE simulations and Zuken eCADSTAR
- Integration of AI-driven recommendations to improve PCB design reliability and performance

Publications

Development of Robotic Arm on an Omnidirectional Base 2021
Natural Volatiles & Essential Oils, Vol. 8(5): 2601-2612 — View Publication

- Presented novel integration of Mecanum wheel technology with precise robotic manipulation systems
- Demonstrated high-accuracy pick-and-place operations in dynamic industrial environments

RFID Based Human Following Load Carrier 2021
Natural Volatiles & Essential Oils, Vol. 8(5): 3522-3530 — View Publication

- Introduced innovative sensor fusion approach combining ultrasonic, infrared, and RFID technologies
- Achieved reliable human-following behavior with obstacle avoidance in real-world industrial settings

Certifications

- Fundamentals of Agents (Hugging Face, Oct. 2025)
- Building a Generative AI-Ready Organization (AWS, Oct. 2025)
- Introduction to Generative AI - Art of the Possible (AWS, Oct. 2025)
- No-code Machine Learning and Generative AI on AWS (Oct. 2025)
- Generative AI Learning Plan for Decision Makers (AWS, Oct. 2025)
- Create Your First Chatbot with Rasa and Python (Coursera, July 2020)
- AI For Everyone (Coursera, June 2020)
- Machine Learning for All (Coursera, June 2020)
- Aerial Surveying and Mapping using Drone Technology (Aviocian Technologies, June 2020)
- Techno Workshop Series on Machine Learning (IIT Madras, Feb. 2019)

Hobbies and Interests

Robotics & Technology: Open-source projects, ROS community, 3D printing, prototyping
Continuing Education: AI conferences, webinars on autonomous systems, technical literature
Creative & Active: Photography, traveling, cultural exchange