



# SUSHMITHA GOVINDARAJ

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Portfolio: [sushmithagovindaraj.github.io](https://sushmithagovindaraj.github.io)

## 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

**& 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*

TU Dortmund

Oct. 2022 – Present

Dortmund, Germany

### Bachelor of Engineering | *Robotics & Automation*

PSG College of Technology

2018 – 2022

Coimbatore, India

## WORK EXPERIENCE

### Werkstudentin - Data Science & Control Engineering

Wilo Group

Dec. 2025 – Present

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

TU Dortmund

Nov. 2024 – June 2025

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

TU Dortmund - Information Processing Laboratory

June 2024 – May 2025

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

AAtek Robo Private Limited

Dec. 2021 – May 2022

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

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### 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, Zuchen 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 Zuchen eCADSTAR
- Integration of AI-driven recommendations to improve PCB design reliability and performance

## PUBLICATIONS

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### 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

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- 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 (Aviopian Technologies, June 2020)
- Techno Workshop Series on Machine Learning (IIT Madras, Feb. 2019)

## HOBBIES AND INTERESTS

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**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