# Jaganathan Ramkumar

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## Summary

Applied AI specialist with experience building intelligent systems from structured and unstructured data, taking solutions from concept to deployment. Background spans software development, Machine Learning, computer vision, with a current focus on generative AI based solutions—delivering high-impact, compliant AI solutions.

## Education

**M. Tech in Data Science and Engineering** 2020 – 2022
*Birla Institute of Technology and Science* *Work Integrated Learning*

**B. Engg in Electronics and Communication Engineering** 2002 – 2006
*Coimbatore Institute of Technology* *Coimbatore, India*

## Experience

**Lead AI/ML Engineer** Jan. 2024 – Present
*Bosch Engineering GmbH* *Holzkirchen, Germany*

- Leading technical development of organizing engineering artefacts (hierarchical requirements, code, test artefacts) for generating general purpose vector embeddings for downstream applications
- Implemented a pdf importer application that extracts requirements text and attributes from requirement pdf files, shrinking 2 weeks of manual effort into few hours using Python, Segment Any Text, pdfminer, and LLM-based few-shot text classification
- Implemented a Requirements Similarity Assistant performing semantic comparisons of new and legacy requirements to identify similarity and changes using Python, PySpark, Langchain, Pydantic, LLM integration, RAG, and Databricks
- Contributed to automated pipeline to ingest requirements data from management tools into Databricks Lakehouse for analytics and AI processing
- Conceptualized treating connected engineering artefacts as a heterogeneous information network to utilize Graph ML techniques with self-supervised contrastive learning

**CV/ML Engineer** Feb. 2018 – Dec. 2023
*Bosch Engineering GmbH* *Holzkirchen, Germany*

- Conceptualized, designed, and implemented a probabilistic graphical model predicting evolving height map of dump trucks during excavator loading, resulting in 45% increase in average accuracy using Python, Matlab, and Bayesian methods
- Designed data acquisition strategy and pipeline to collect time-synchronized data from LiDAR and vehicle kinematic sensors for AI model training
- Engineered use case specific perception software algorithms with focus on accuracy and runtime performance using C++, Python, MATLAB, ROS, OpenCV, PCL, and Scikit-learn
- Authored multiple invention reports and patents in perception and automation for off-road vehicles

**Software Engineer** Jun. 2015 – Jan. 2018
*Bosch Engineering K.K* *Yokohama, Japan*

- Engineered software modules ensuring compliance with project requirements and quality guidelines using Matlab/Simulink, C, and C++
- Automated the process of defining AUTOSAR definitions from network definition files, reducing manual effort by 70% using Python
- Earned the Bosch Inventor Award for an invention report on identification of road conditions using in-vehicle sensor data
- Led review process to enhance team performance and software reliability while maintaining traceability across development artifacts

**Software Engineer** Aug. 2006 – Mar. 2015
*Robert Bosch Engineering and Business Solutions Ltd* *Bangalore, India*

- Engineered basis software modules for active safety systems adhering to quality guidelines and project standards using C and C++
- Maintained traceability between software development artifacts to optimize documentation and workflow
- Provided technical leadership during review process and facilitated cross-functional collaboration

## Projects

**BYOS - Build Your Own Survey** | *Python, OpenAI GPT-4, LlamaIndex, Docker*

- Developed an intelligent survey creation agent using OpenAI GPT-4 LLM and LlamaIndex that automatically generates contextual surveys based on user prompts and document attachments
- Implemented multi-agent orchestration system with vector embeddings for document retrieval, automated question generation, and web search integration for research-backed questions
- Containerized the application using Docker for seamless deployment, enabling dynamic survey creation through conversational AI interactions

**BYOC - Build Your Own Classifier** | *Python, OpenAI GPT-4, Few-Shot Learning*

- Developed an interactive few-shot learning system that iteratively refines text classifiers through human-in-the-loop learning
- System uses OpenAI GPT-4 LLM to generate targeted questions about unlabeled text, collects user feedback, and automatically updates class descriptions based on predictions vs. ground truth
- Implemented three-stage pipeline: question generation, interactive annotation, and class refinement, enabling adaptive classification without traditional model retraining

## Technical Skills

**Programming Languages**: Python, C, C++, SQL, MATLAB
**AI Libraries**: PyTorch, Scikit-learn, Langchain, OpenCV, PCL, LlamaIndex
**Platforms & Tools**: Databricks, PySpark, ROS, Git, Docker, VS Code
**AI Methodologies**: Machine Learning, Deep Learning, Probabilistic Graphical Models, Graph ML, Reinforcement Learning, RAG, Agentic AI

## Languages

**Tamil**: Native | **English**: C2 | **Japanese**: B2 | **German**: A2

## Patents

**3D Height Profile of Load on Loading Area** Filed Mar. 2024 — DE102024202648A1

- ML-based method to accurately measure how new load affects height of existing load on surface, crucial for stability and safety

**Process Control via Grab Bucket Excavator** Filed May 2020 — DE102020206371A1

- Method using advanced optical sensors to analyze shape and height of bulk material for precise control of excavator's bucket

**Driving-Obstacle Detecting Device** Filed Mar. 2018 — JP6866479B2

- Vehicle system to identify obstacles on road ahead, providing timely alerts about potential hazards

## Certifications

**Completed**: Reinforcement Learning, Improving Deep Neural Networks, Convolutional Neural Networks, Neural Networks and Deep Learning
**Ongoing**: AI Governance Professional