



# ABHISHEK SINGH KUDAVALE *AI/ML Engineer*

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🌐 LinkedIn 🐙 GitHub 🔗 portfolio

## PROFILE

Results-driven machine learning engineer with a passion for computer vision and deep learning seeking a full-time role in data science, ML engineering, or software development. Strong foundation in algorithm design and model deployment, with practical experience in cloud environments and scalable architectures. Committed to transforming research into reliable, production-ready systems.

**Technical Skills:** Python, C++, Pytorch, OpenCV, NumPy, Pandas, Scikit-learn, LangChain, AWS, Git, Docker

## PROFESSIONAL EXPERIENCE

### AI Research Intern & Master's Thesis

05/2025 – Present | Gifhorn, Germany

IAV GmbH

- Engineered an AI framework integrating computer vision with vision language models for automated scenario generation, delivering a comprehensive solution for off-highway setup in IAV Mela project.
- Implemented and optimized benchmarked CV models on real-world off-road data, achieving significant improvements in object detection and localization accuracy.
- Developed integrated reasoning systems combining VLM capabilities with CV outputs through prompt optimization and temporal context to enhance semantic scene understanding.
- Collaborated with cross-functional teams to deploy a low-latency AWS microservice connected to CARLA and dSPACE simulators for automated scenario extraction and generation.

### AI/ML Research Assistant

10/2023 – 11/2024 | Siegen, Germany

Universität Siegen

- Enhanced 6D pose estimation by integrating deep learning models with dynamically tuned Kalman filters, achieving 22.88% performance improvement over baseline for the TRUST-E automotive project.
- Optimized parameters and algorithm configurations to maximize tracking accuracy on real-world IMU data.
- Implemented robust preprocessing techniques for IMU signals that significantly reduced drift in challenging conditions.
- Designed comprehensive evaluation workflows with reproducible benchmarks to quantify improvements from noise tuning and preprocessing.

### Graduate Engineering Trainee

10/2020 – 11/2021 | Hyderabad, India

Technique Design Group

- Designed 3D models and assemblies in CATIA V5, ensuring manufacturability and performance optimization.
- Developed and deployed ML models (XGBoost, SVMs) on edge devices such as Raspberry Pi for real-time predictive analysis integrated with custom 3D CAD systems.
- Managed fabrication workflows and quality control for three client projects from concept to delivery.
- Collaborated with a 5-member cross-functional team to deliver projects on time and within scope.

## EDUCATION

### Masters of Science – Mechatronics

10/2022 – Expected 2026 | Siegen, Germany

Universität Siegen; CGPA: 1.9 (Best: 1.0)

- Focus: ADAS, Object-oriented Programming (C++ and Python), Machine Learning, Deep Learning, Embedded Systems, Computer Vision, Control Theory, Sensorics, Electric Machine, Project Management

### Bachelor of Engineering – Mechanical Engineering

08/2016 – 05/2020 | Hyderabad, India

Vasavi College of Engineering; CGPA: 8.69 (Best: 10.0)

- Focus: Programming Languages (C and C++), Database Management, Fluid Mechanics, Machine Design, Thermodynamics, FEM Simulation, CAD/CAM, Automobile Engineering, Physics, Mathematics

## PROJECTS

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### Advance RAG for Research Paper Question Answering

10/2025 – Present

Proficiencies: RAG Pipeline, LangChain, Huggingface, Prompt Optimization, BERT, Transformers

- Architected an advanced RAG pipeline incorporating reranking, memory integration, and DSPy-based prompt optimization for research paper queries.
- Developed custom question-answer datasets and implemented context relevance and answer correctness evaluation metrics achieving 62% precision using the Gemini-2.5 flash model.

### Fine-Tuning Large Language Model for spam classification

02/2025 – 04/2025

Proficiencies: LLM Pipeline, Token Embedding, Attention Mechanism, Transformer Architecture, GPT2

- Implemented transformer based architecture with 12 attention heads for efficient context vector generation. Optimized token embedding and attention mechanisms for classification performance.
- Fine-tuned pretrained GPT2 model on 10,000+ spam classification examples, achieving 97.21% training accuracy and 95.67% test accuracy.

### Robustness and Fairness in Deep Learning

05/2024 – 07/2024

Proficiencies: CNN, Python, Adversarial Training, Computer Vision, Transfer Learning, Classification

- Performed PGD training with 3 distinct robust loss rules, achieving 84% and 76% accuracy against targeted and untargeted attacks, enhancing security for vision-based systems.
- Developed batch sampling techniques ensuring equal class representation, improving model fairness and reducing vulnerability to adversarial attacks in production AI systems.

### Image Classification Challenge on Custom Dataset

11/2023 – 01/2024

Proficiencies: Deep Learning, Python, Pytorch, NumPy, Pandas, Data Pipeline, Data Augmentation

- Trained EfficientNet-b4 on custom 8-class dataset, achieving 96.20% test accuracy through hyperparameter optimization, outperforming all comparison models.
- Implemented advanced regularization strategies and scheduling techniques applicable to production image recognition systems with limited training data.

## SKILLS

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**AI and Machine Learning:** Artificial intelligence, Machine learning, LLMs, AI agents, LangChain, LangGraph, Data science, Applied mathematics, Statistical analysis, Data visualization, Computer vision, Image processing

**Software Engineering:** Software development, Git, Docker, AWS, Linux

**Programming & Simulation Skills:** C++, Python, Matlab, Simulink

**ML and Data Libraries:** PyTorch, Tensorflow, Keras, NumPy, Pandas, Matplotlib, OpenCV, Scikit-learn

**Tools and Environments:** Visual Studio Code, Jupyter Notebook, PyCharm, Linux

## ACHIEVEMENTS

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- Ranked 1st in 2nd Year of Mechanical Engineering
- Academic scholarship in Master's program.

## LANGUAGES

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**English:** C1, **German:** A2

## ADDITIONAL INTERESTS

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Travelling, Hiking, Badminton, Formula-1 enthusiast



**Abhishek Singh Kudavale**