

ABHISHEK SINGH KUDAVALE

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EDUCATION

Masters of Science – Mechatronics

Universität Siegen

10/2022 – present | Siegen, Germany

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

Vasavi College of Engineering

08/2016 – 05/2020 | Hyderabad, India

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

PROFESSIONAL EXPERIENCE

Master Thesis Student

IAV GmbH

08/2025 – Present | Gifhorn, Germany

- Develop and deploy a multimodal AI framework that merges CV and VLM outputs into the pipeline for scenario generation from off-highway/Agricultural raw video dataset while maintaining low latency.
- Performing prompt engineering to improve VLM outputs and integrated temporal information across video frames to increase parameter extraction and scene understanding.

Workstudent

IAV GmbH

05/2025 – 07/2025 | Berlin, Germany

- Researching potential cybersecurity attack scenarios on vehicles and developing experimental plans for implementing a Design of Experiments (DoE) AI agent to enhance system resilience.
- Conducting experiments on test vehicles and contributing to initiatives aimed at strengthening the automotive sector's digital presence and improving customer engagement.

Student Research Assistant

Universität Siegen

10/2023 – 11/2024 | Siegen, Germany

- Integrated deep learning-based 6D pose estimation with the Kalman filter and adjusted noise parameters dynamically during network optimization and evaluation.
- Optimize model performance by 22.88% compared to the original study through algorithm fine-tuning and applying data processing to real-world 6D IMU data.

Graduate Engineering Trainee

Technique Design Group

10/2020 – 11/2021 | Hyderabad, India

- Designed and built 3D models using CATIA V5 CAD tool and developed prototypes. Researched, Optimized and managed fabrication and real-world testing for three projects.
- Collaborated with a 5-member cross-functional team and coordinated with three clients to contribute to the successful completion of cutting-edge design projects.

PROJECTS

Advance RAG for Research Paper Question Answering

10/2025 – Present

Proficiencies: RAG Pipeline, Reranking, Memory Integration, Prompt Optimization, BERT Score

- Built an advanced RAG pipeline that uses reranking, memory, DSPy based prompt optimization, and structured reasoning to deliver accurate retrieval for research paper queries.
- Created a custom question and answer dataset and evaluated the system with context relevance and answer correctness metrics, currently achieved 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	
<ul style="list-style-type: none"> Understanding the stages of building a Large Language Model involves efficient conversion of words into context vectors using 12 attention heads. Fine-tuning a pretrained transformer-based LLM with 10,000+ spam classification examples and accomplished 97.21% and 95.67% accuracy on Train and Test dataset, respectively. 	

Robustness and Fairness in Deep Learning	05/2024 – 07/2024
Proficiencies: CNN, Python, Adversarial Training, Computer Vision, Transfer Learning, Classification	
<ul style="list-style-type: none"> Performed PGD training on the CIFAR-10 dataset and studied the class distribution of misclassification and introduced batch sampling to ensure an equal number of classes in a batch. Implemented PGD training while considering 3 distinct robust loss rules and achieved 84% and 76% accuracy on targeted and untargeted attacks, respectively. 	

Semantics Segmentation on Cityscape Dataset	02/2024 – 04/2024
Proficiencies: Deep Learning, Cluster Computing, Cityscapes , Data Visualizations, CUDA	
<ul style="list-style-type: none"> Enhanced model performance by 10% on pre-recorded CityScapes dataset, achieving an 87% IoU accuracy. Accomplished this through transfer learning and data augmentation techniques. Developed a training, testing, and validation pipeline that reduced training time by 15% by utilizing parallel processing with GPU and optimizing batch size and learning rate. 	

Pick and Place Manipulator LEGOEV3 Robot	12/2023 – 03/2024
Proficiencies: Matlab, Simulink, Robot Kinematics & Dynamics, PID Control, Motion Planning	
<ul style="list-style-type: none"> Programmed robot kinematics and dynamics using MATLAB for collision free trajectory, reducing processing time by 20%. Automated trajectory planning and control through Simulink. Designed and tuned PID feedback controller in MATLAB to optimize robot movement accuracy by 15%, increasing smooth and real-time control of robotic joints. 	

Image Classification Challenge on Custom Dataset	11/2023 – 01/2024
Proficiencies: Deep Learning, Python, Pytorch, NumPy, Pandas, Data Pipeline, Data Agumentation	
<ul style="list-style-type: none"> Trained a custom 8 Christmas classes image dataset on EfficientNet-b4, achieving 98% and 96.20% training and testing accuracy, respectively. Improved optimal performance by conducting fine hyperparameter tuning, scheduling, and regularization strategies. Obtained the highest test accuracy compared to all tested models. 	

SKILLS

Technical Skills: CAN Networks, Git, Artificial Intelligence (AI), Robotics, Sensor Data Fusion, Kalman Filter, Applied Mathematics, Statistical Analysis, Software Development, ROS2, Neural Networks, LiDAR & Radar, Image Processing, Signal Processing, LLMs, Data Visualization, Data Science, AI Agents, RAG Pipeline, Docker, AWS, Literature Research, Documentation, LaTeX, MS Office

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

Data Frameworks: PyTorch, Tensorflow, NumPy, Pandas, Matplotlib, OpenCV, Scikit-learn, SpaCy

Environments: Visual Studio Code, Jupyter Notebook, PyCharm, Linux

LANGUAGES

English: C1

German: A2

Telugu & Hindi: Native



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