

Aswinkumar Varathakumaran

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Profile

Undergraduate researcher enthusiastic about computer vision, generative modeling, and multimodal AI, with research experience in real-time perception systems, foundation model adaptation, and applied deep learning for high-impact real world tasks.

Education

Vellore Institute of Technology <i>B.Tech in Computer Science with AI/ML Specialization — CGPA: 8.96</i>	2022 – Present Chennai, India
Delhi Public School <i>CBSE XII — 94.4%</i>	2021 – 2022 Bangalore, India

Experience

Deffo Tech AI AIML Intern	Sep 2025 – Current
<ul style="list-style-type: none">Working on India's first fully indigenous Large Language Model developed under the TamilAI project.	
AIML Program Representative VIT Chennai	Aug 2024 – Current
<ul style="list-style-type: none">Facilitated communication between HoD and student of the AIML branch, helped with the organization of college level events.	
Undergraduate Machine Learning Teaching Assistant 📄 PI: Dr. Sajidha S A — VIT Chennai	July 2024 – Dec 2024
<ul style="list-style-type: none">Assisted final year ML students with machine learning assignments, tutorials, and guided project workflows for hands-on learning.	
Undergraduate Research Assistant PI: Dr. Nirmala P — VIT Chennai	Sep 2024 – Jan 2025
<ul style="list-style-type: none">Built depth-aware pothole detection system using custom DPT architecture fusing DepthPro and SegFormer for real-time monocular depth estimation and segmentation in ADAS applications.	

Publications

- Varathakumaran, A., & Paramanandham, N.** *ProRain: Rain-Adaptive Denoising and Vehicle Detection via MobileNet-UNet and Faster R-CNN.* **ICCID 2025.** (Presented & In Press) 📄 Code 📄 Paper
- Varathakumaran, A., Jawahara, A., Mynampati, S.A., Sajidha, & Thaseen, S.** *PROXI-NAV: Proximity-Aware Navigation with Audio-Visual Sensing Intelligence.* **CCNCPS 2026.** (Accepted) 📄 Code 📄 Paper
- Varathakumaran, A., & Paramanandham, N.** *Depth-Aware Instance Segmentation for Accurate Pothole Depth Estimation Using Monocular Depth Maps for Advanced Driver Assistance.* **International Journal of Pavement Engineering (IJPE).** (Under Review) 📄 Code 📄 Paper
- Varathakumaran, A., Jawahar, A., & Pandiyaraju, V.** *CLAIMS: Clinical Labeling and Abnormality Inference from Multilead ECG using LLMs with Evidence Citation.* **ICACRS 2025.** (Presented & In Press) 📄 Code 📄 Paper

Projects

Intent-Aware Clinical Product Recommendation System (ClinicalBERT, Sentence Transformers, FAISS, NoSQL, PubChem API, RxNorm API)	Jan 2026
<ul style="list-style-type: none">Built an NLP-driven clinical product recommendation system at the Apollo THIT Solvathon 2026 by extracting therapeutic intent and contraindications from doctor patient conversations into structured JSON.Implemented semantic retrieval over the Apollo Catalog using Sentence Transformers and FAISS with NoSQL-based filtering to exclude contraindicated ingredients and recommend exact and class-equivalent drug alternatives.Normalized all drug and ingredient entities using PubChem and RxNorm APIs for standardized clinical reasoning.	
Space Agriculture Data Portal 📄	Feb 2025
(NASA OSDR API, LangChain, Ollama, FAISS, NoSQL, FastAPI, Streamlit)	
<ul style="list-style-type: none">Built a data exploration portal for NASA OSDR, automating dataset ingestion, metadata parsing, and time-series analysis of microgravity plant-growth experiments.Implemented semantic retrieval and question-answering using LangChain, Ollama, and FAISS over experiment metadata and mission logs.Developed a Streamlit dashboard backed by FastAPI for interactive visualization of growth curves, environmental parameters, and genotype comparisons.	

IMU-Guided Obstacle Prediction for Robust ADAS

Jan 2026

(Sensor Fusion, ADAS, IMU Sensors)

- Designed a camera-IMU fusion framework to predict obstacle locations during vision degradation caused by high-dynamic vehicle motion.
- Used IMU-based ego-motion estimation to propagate obstacle states from the last reliable camera frame and reproject predictions into image space with uncertainty modeling.
- Validated on autonomous driving datasets under simulated camera degradation, demonstrating improved obstacle retention compared to vision-only baselines.

Basketball Player Tracking with Court Projection 🏀

May 2025

(YOLO, Streamlit, Docker, FastAPI)

- Developed a complete sports analytics pipeline using YOLOv11 trained on custom DeepSportRadar court and player annotations, enabling robust multi-player tracking under dynamic lighting and motion.
- Computed homography transformations to map broadcast-view detections onto a top-down court representation, enabling zone-based heatmaps, possession analytics, and trajectory inference.
- Built a Dockerized Streamlit-FastAPI deployment supporting live video ingestion, asynchronous inference, and real-time overlay rendering with sub-80ms latency per frame.

Achievements

- Top 5 Finalist at *THIT Apollo Solvathon 2026* a 36-hour hackathon with **140+** participants nationally.
- Top 10 Finalist at *Hack The Horizon 2.0* — VIT Chennai AI Club's flagship 24-hour hackathon with **200+** participants from South India.
- Top 5 Finalist in *Cosmonova*, a space-based research hackathon hosted by **SEDS Antariksh**.

Extracurriculars

- **Treasurer & Marketing Lead, Socrates Club - VIT** Aug 2023 – Present
Managed club finances, sponsorship acquisition, budgeting for events, directed promotional strategies, designed materials, and enhanced campus visibility.
- **Sophrosyne VIT, Toastmasters International** July 2024
Was part of the newsletter editorial team and organized public speaking workshops for 80+ participants.
- **Internshala Student Program (ISP) 2025** Mar 2025
Represented Internshala, promoting internships, trainings, and student engagement.
- **Marina Beach Cleanup** May 2024
Co-led 3 km cleanup with 15+ volunteers.
- **American Football Team — VIT Chennai** June 2023 – April 2024
Vice Captain, led a 15-member team to semi finals in a state level tournament.

Certifications

- Advanced Computer Vision with Tensorflow — **Coursera, DeepLearning.AI** Sep 2025
- Oracle Cloud Infrastructure 2025 Generative AI Professional — **Oracle University** June 2025
- Neural Networks and Deep Learning — **Coursera, DeepLearning.AI** Aug 2024
- Forge Industry Certification – Accenture Nordics — **Forge** May 2024

Technical Skills

- **Languages:** Python, C/C++, Java, SQL, HTML/CSS, JavaScript
- **Frameworks:** PyTorch, TensorFlow, Streamlit, React, Next.js
- **Developer Tools:** Git, VSCode, CVAT, Roboflow, Docker
- **Libraries:** OpenCV, MediaPipe, HF Transformers, LangChain, pandas, NumPy
- **Vision Models:** YOLO, Detectron2, SAM, HRNet, MiDaS, ZoeDepth
- **Core:** Keypoints, Segmentation, Homography, Depth Estimation, Video Inference
- **NLP:** NER, Sentiment Analysis, Speech-to-Text, Text Generation
- **APIs & Data:** HF API, NASA OSDR API, REST APIs, SQLite3, MySQL