Vishnu Vardhan Badam

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EDUCATION

Carnegie Mellon University Pittsburgh, PA

Master of Science in Engineering-Research (Machine Learning) | **GPA : 4.0/4.0** May 2025

- Teaching Assistant: ML/AI for engineers,CV for Engineers, Manufacturing Futures
- Relevant Coursework: Deep Learning, Advanced NLP, ML/AI for engineers, Visual learning, Computer Vision

EXPERIENCE

Biorobotics Lab, Carnegie Mellon Pittsburgh, PA

Graduate Researcher September 2024 – Present

- Deployed production-grade computer vision algorithms for efficiency tracking in a Material Recovery Facility (MRF) plant, achieving 0.9 AUC detection accuracy and optimizing sorting performance
- Pioneered research into a self-supervised learning pipeline for automated labeling, eliminating 98% of manual annotation time and accelerating model iteration cycles
- Led a team of 7 in integrating computer vision models for real-time object tracking and classification, enhancing material sorting precision and increasing plant throughput

Apple x Biorobotics Lab, Carnegie Mellon Pittsburgh, PA

Graduate Researcher August 2023 – September 2024

- Collaborated on design and development of an AI-driven end-of-life recycling robot, integrating a novel whip-like linkage for efficient battery removal in a 12-month (Apple-funded CMU project)
- Spearheaded design of a real-time perception and control pipeline integrating CV for component detection, precise positioning, and adaptive algorithms for force-feedback control, achieving a 95% success rate in under 2 seconds
- Architected a supervised learning pipeline with Area-Based Contrastive Learning (0.92 F1 score) by building a Blender-based synthetic data pipeline to accelerate defect detection

Warar Energy Vellore, India

Founding Engineer- Data Science February 2022 – July 2022

- Led development of ML models to optimize delivery routes and battery usage for last-mile EVs, leveraging predictive analytics to improve efficiency by 20% and reduce operational costs

PROJECTS

2D to 3D Scene Reconstruction November 2024 – Present

- Engineered a custom generative AI pipeline for 2D scene reconstruction using segmentation and 3D generation
- Streamlined scene reconstruction with custom preprocessing and fine-tuning, boosting accuracy by 40%

RAG for Music Generation August 2024 – November 2024

- Enhanced Meta's MusicGen(3.3B) model by fine-tuning LLaMA with NLP techniques for improved output quality
- Integrated a RAG system with CLAP embeddings, boosting accuracy by 10% and enhancing musical coherence

Vision-based CubeSat navigation August 2024 – November 2024

- Collaborated on a vision-based navigation system for a CubeSat launching in August 2025
- Researched and developed a 2-stage image-to-coordinate pipeline to extract positional data based on imagery

QR Code Generation via Diffusion Models January 2024 – April 2024

- Devised a 2-stage QR code generation pipeline with a custom diffusion model and fine-tuned LLM
- Improved QR code scannability by 35% over ControlNet, enhancing both visual design and functional reliability

AI-Assistant for 3D Printing August 2023 – December 2023

- Engineered a Python-based vision system with OpenCV and SciPy to improve 3D print accuracy
- Designed a 3-stage process for feature analysis, overhang detection, and STL conversion

SKILLS

Languages & Databases: Python, C++, SQL, JavaScript (Basic)
Tools & Technologies: PyTorch, TensorFlow, Scikit-learn, Matplotlib, OpenCV, Kubernetes, Docker, Git, AWS, GCP