

ADITHYA KAMESWARA RAO

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Education

Carnegie Mellon University

May 2025

Master of Science, Research: Machine Learning

Pittsburgh, PA

Relevant Coursework: Machine Learning, Deep Learning, Advanced Computer Vision, ML in Production

CGPA - 4/4

Research Experience

Tekkotsu Lab, Carnegie Mellon University

Oct 2023 – Present

Graduate Research Assistant

Pittsburgh, PA

- Engineered interactive visualizations for Stable Diffusion internals, running entirely on browser leveraging **WebGPU**.
- Accelerated Stable Diffusion model by $\sim 70\%$ through multi-node latent consistency training on **32 V100 GPUs**.
- Creating a web-based tool for LLM finetuning, to be adopted in the AI curriculum for US high schools under AI4GA.
- Streamlining finetuning by eliminating complex installations, enabling one-click experience with minimal dependencies.

Professional Experience

Apple

May 2024 – Aug 2024

Machine Learning Intern

Cupertino, CA

- Optimized end-to-end MacBook defect detection by improving synthetic data, enhancing unsupervised and supervised ML models. Hosted refined pipeline on internal platform, enabling over $\sim 1000s$ employees explore model selection.
- Boosted synthetic data quality by $\sim 25\%$ utilizing Apple's MM1 and fostering cross-functional team collaboration.
- Doubled** anomaly detection recall score via a combined student-teacher and autoencoder-based architecture.
- Achieved $\sim 7.5\%$ **IoU** score improvement with SegFormer (Transformer-based), outperforming Upernet (CNN-based).
- Improved object detection **mAP@IoU=0.5** by $\sim 6\%$ using YOLOv8x vs. YOLOv5s, with multi-node distb. training.

Hexo

Feb 2023 – May 2023

Machine Learning Intern

Bangalore, India

- Finetuned a stable diffusion model on several custom product datasets using dreambooth on AWS EC2.
- Built robust pipelines for inpainting and outpainting, efficiently generating product backgrounds without distortions.
- Improved inference generation through extensive hyperparameter experimentations, ControlNet, and mask modulations.
- Devised custom model performance evaluation procedures through **FID** (~ 7.5), **UIDS**, and **PIDS** metric calculations.

Orangewood Labs

May 2022 – Dec 2022

Robotics Engineer

Delhi, India

- Built AR tracking for custom objects using BRIEF feature matching, RANSAC homography, and content warping.
- Utilized topological optimization tools to achieve a **40 percent reduction** in weight of robotic links.
- Manufactured a heat chamber at **1/10th cost** of off-the-shelf products for thermal performance testing of robot.

Projects

Tracking and 3D Reconstruction

Aug 2023 – Dec 2023

- Executed Lucas Kanade tracker with template correction and inverse compositional algorithm, optimizing runtime.
- Reconstructed 3D point clouds via F matrix computation, stereo triangulation, and bundle adjustment optimization.

Classification and Segmentation of Skin Lesions

Jun 2022 – Nov 2022

- Evaluated a classification model of ResNet18 architecture with Levit, Swin, Convnext, and EfficientNetV2 families.
- Attained accuracy of 0.98 and **F1 score of 0.85** through construction of an ensemble of multiple architectures.
- Performed semantic segmentation using transfer learning with pre-trained ImageNet weights for improved performance.
- Achieved an Intersection over Union (**IoU**) of **0.95** using the U-Net framework and ResNet34 architecture.

Skills

Languages : Python, C++, JavaScript Frameworks : PyTorch, TensorFlow.js, sklearn, OpenCV, React, Git

Awards

- Working Internships in Science and Engineering (WISE), Deutscher Akademischer Austauschdienst Scholarship:** Received for pursuing research internship at Karlsruhe Institute of Technology, one of ~ 100 recipients.
- Indian Academy of Sciences Summer Research Fellowship:** Awarded to top $\sim 10\%$ of **30000+** applicants.

Publications

[Best Paper] Adithya Et al. "An Abstract Model for Onshore Wind turbine Blade Maintenance" (ICRoM 22)