Nikhileswara Rao Sulake

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Education

Rajiv Gandhi University of Knowledge and Technologies,Nuzvid IIIT **Nuzvid,Eluru**
*Pre University Course,**CGPA-9.88*** *December 2021 - August 2023*

Rajiv Gandhi University of Knowledge and Technologies,Nuzvid IIIT **Nuzvid,Eluru**
*Bachelor of Technology in Computer Science,**CGPA-8.84*** *August 2023 - May 2027*

Course Work

DRDO and DIAT, Pune - AI/ML Professional Certification Course **Online**
Course Guide: Dr. Upasana Singh, ***Grade-9.2*** *June 2023 - November 2023*

Experience

Stanford Medicine Department of Radiology **Remote (June 2025 - August 2025)**
Fellowship in Molecular Biology *California, USA*

- An intensive summer program covering molecular imaging technologies, imaging agents, preclinical and clinical applications, and AI-based image analysis.
- Engaged in weekly seminars led by Stanford faculty, including hands-on exposure to luminescent imaging, cellular imaging, and radiotracer development.

School of Medical Science and Technology (SMST) at IIT Kharagpur **Hybrid (May 2025 - July 2025)**
Summer Research Intern *Kolkata, India*

- Working on Medical Imaging and focusing on CT Physics on the Lung and developing a multi-disease segmentation model.
- Developing a technique for better interpretation of the disease in 3D Lung CT scans using RBF algorithm.

Core AI **Remote (January 2025 - March 2025)**
AI Researcher *Vijayawada, India*

- Developed new model configurations on **Joint Autoregressive and Hierarchical Priors** for Learned **Image Compression** for image compression to work on **OCT** grayscale images.
- Developed a new methodology for efficient classification of **Alzheimer disease** on **3D Brain MRI** with visualizing the gradients using **Guided Smooth GradCam ++**.

Parabola9 **Onsite (December 2024 - February 2025)**
AI/ML Developer *Vijayawada, India*

- Developed and optimized advanced **machine learning models** to solve complex problems, creating impactful AI solutions, including for generative AI applications.And worked on **LLMs**.
- Deployed **AI models** in production, ensuring scalability, efficient integrations and streamlined operational workflows.

Projects

CardioLens - Automated Segmentation of Left Ventricle and Ejection Fraction Calculation

- Developed an AI-powered echocardiogram analysis system using the Stanford's **EchoNet Dynamic** dataset to automate left ventricle segmentation and ejection fraction calculation and give out detailed health report for patients.
- Worked on Intel DPT Large and ResNet-101 models for segmentation, achieving Dice coefficients of 0.78 and 0.90, respectively and R2plus1D Model for Ejection Fraction calculation.
- Developed an algorithm to generate electrocardiogram (ECG) waveforms by analyzing heart contractions and expansions using systole and diastole boundaries.

Multi Modal Chest X-Ray Classification

- Tackled a multimodal classification challenge in **MAIC** by extracting embeddings from images (Chest X-rays) and text using the **OpenAI's CLIP model**.
- Designed a cross-attention fusion mechanism and a custom neural network, achieving a **macro-averaged F1 score of 0.35**, showcasing expertise in multimodal deep learning

Eye OCT Disease Classification and Analysis over CNN and MLP Models

- Evaluated the effectiveness of deep learning models on OCT data, achieving over 99% classification accuracy with the MLP-Mixer model.
- Leveraged techniques like confidence-uncertainty quantification to compare CNN-based models with MLP-based models for enhanced performance.

Multi backbone Integration for YOLOv8

- Developed a modular framework to integrate multiple backbones into the YOLOv8 model, replacing the **vanilla Dark-FPN** with **convolutional**, **Vision Mamba**, **transformer-based**, and **ViT**-based architectures.
- Implemented and analyzed these variations from scratch, leveraging model-building expertise to enhance detection performance on the Mini-COCO dataset.

Enhanced DG-YOLO: Domain-Generalized Object Detection Model

- Designed **DG-YOLO**, an enhanced **YOLO model** that performs both **object detection** and **domain classification**, incorporating advanced loss functions like **IRM Loss** and **Domain Classifier Loss** for improved reliability on **marine datasets**.
- Reworked the **YOLOv3-based architecture** to support adaptability across **YOLOv5, v8, v9, and v11**, making it more flexible for various detection tasks.

Thyroid Nodule Segmentation

- Conducted extensive research on state-of-the-art models for thyroid nodule segmentation, including **UNet, UNet++, Attention UNet, Residual UNet, UNeXt, TransUNet, U²-Net, and DuckNet**.
- Evaluated and optimized segmentation models to improve dice coefficient in Thyroid Nodule Detection.

ZOYA - The AI powered Humanoid Robot

- **Project Zoya**, presented at **Teckzite 2k24**, is a **humanoid robot** capable of **voice-to-voice communication** using **GenAI**, allowing it to answer user queries with **voice-based responses**.
- Integrated the AI system with **IoT (Raspberry Pi)**, making Zoya a **self-contained, fully functional humanoid robot**, designed for interactive sessions at student events like **inaugurations and campus presentations**.

Technical Skills

- Programming Languages: Python, C, Java
- Technologies: Medical Image Analysis, Computer Vision, Deep Learning, Machine Learning, Generative AI, LLMs, VLMs
- Frameworks: PyTorch, Tensorflow, CUDA, OpenCV, Langchain, Hugging Face
- Tools: VS Code, Git, TensorBoard, Wandb, Kaggle, Draw.io
- Environments: Anaconda, NVIDIA Jetson Nano, NVIDIA AI Workbench, Raspberry PI
- Soft Skills: Communication skills, Time management,leadership

Achievements

- **SNU Multi-Modal AI 4 TB Top 22** – Led sole Indian team in chest X-ray + text analysis at Seoul National University competition *2024*
- **Intel AI 2024 Hackathon – 2nd Runner-Up** – Developed AI-driven echocardiography analysis tools presented at IIT Kharagpur in IEEE Indicon 2024 *2024*
- **AI 4 Andhra Police Hackathon Winners** – Build a product for digitising the handwritten multi-lingual document with a user-admin website for interactions. *2025*
- **NCC Innovation Challenge Finalist** – Presented women's safety project *Swetcha* to NCC leadership at Republic Day Camp, Delhi *2025*
- **Parabola9 Hackathon Winner** – Built traffic analysis video captioning system with chatbot-integrated data storage *2024*
- **Teckzite Expo – 2nd Place** – Engineered Gen-AI-powered interactive humanoid robot for student assistance *2024*
- **Intel/Awiros CV Appathon Semi-Finalist** – Created hand-sign detection system for accessibility communication *2023*
- **GDSC AI/ML Lead** – Directed educational sessions introducing AI concepts to 100+ students *2023–2024*
- **YOLOv11 Architecture Researcher** – Published article on YOLOv11 architecture with novel diagram contribution at Analytics Vidhya Blogathon 49 (Winner) *2024*