Rakesh Chowdary Machineni, M.S

Rakesh Chowdary Machineni | RakeshC.Machineni@gmail.com | +1 734.968.9425 | Austin, TX

SUMMARY

AI Researcher and Full-Stack Developer with 4+ years of experience in multimodal AI solutions, specializing in computer vision. Proven track record publications in top-tier conferences and deploying AI solutions across diverse industries, including automotive and retail.

EDUCATION

Masters in Electrical and Computer Engineering (Computer Vision Specialization) 2021 – 2023

University of Michigan **(GPA of 4.0/4.0)** Ann Arbor, Michigan

- Research primarily focused on developing novel Video, Point Cloud & Image Compression Models

Bachelor of Technology in Electrical Engineering 2015 – 2019

Indian Institute of Technology Tirupati **(CGPA of 8.90/10.0)** Tirupati, India

- Hands on experience with C/C++, Python, OpenCV, ROS Raspberry Pi, Arduino, Autonomous Bot Perception

EXPERIENCE

- **Research Scientist – Computer Vision | Rockwell Automation | Austin, TX** July 2023 - Present
  - Designed **LenzAI**, a Closed-Loop Machine Vision AI solution that accommodates Data Labeling, Model Training, Performance Monitoring, and Analytics (tables, graph visualization over time) for seamless integration by industrial operators
  - Advanced AI-driven data labeling platform utilizing Instance Segmentation and Monocular Depth Estimation, reducing per-image annotation time by **10X**; integrated Active Learning with Model-Health Monitoring to minimize redundant labeling, reducing total required training samples by **30%**
  - Developed a novel zone transformation and unsupervised depth-based wrinkle detection system for automotive seat inspection, former dynamically adapts to geometric displacements of seats eliminating manual recalibration of ironing bot, latter achieved an **83%** precision and **97%** recall value in wrinkle identification on BMW seats while providing heatmaps showcasing the wrinkle severity
  - Implemented video-processing **AI** for CPU/GPU to model periodic patterns, enabling real-time closed-loop control systems for dynamic state classification and actuation
  - Filed a **patent** on the video analytics technology and co-authored a **technical paper** with BMW, featuring the success of AI in seat quality control; a second joint patent is pending.
  - Architected scalable deployment using **Docker** and **Portainer**, achieving **99.99%** uptime while supporting **100+** concurrent inference requests; successfully implemented across **3+** paying customers, processing over **100,000** images monthly
  - Engineered seamless integration with **PLCs** (e.g., Rockwell, Siemens) and industrial **cameras** (e.g., Cognex, Keyence, GenICam), achieving sub-**50ms** latency in real-time applications
  - **Tools**: Django, React, RTKQuery, OpenCV, PyTorch, Spark MLLib, ONNX, PostgreSQL

- **Graduate Research Assistant | University of Michigan | Ann Arbor, MI** 2021 - 2023
  - Proposed Multi-Mode Video Compression **(MMVC)** framework with block-based prediction mode selection and adaptive entropy coding, **CVPR 2023**
  - Outperformed **SOTA** learning-based and conventional codecs on popular benchmark datasets in PSNR & MS-SSIM metrics, specifically a **1dB** PSNR and **0.02** MS-SSIM improvement at a very low, **0.1** bit-rate
  - **Tools:** Qualitative and Quantitative Studies, PyTorch, RAFT, Arithmetic Coding, Quantization, ConvLSTM

- **Computer Vision Engineer | Toshiba Software Pvt | Bangalore, India** 2019 - 2021
  - Designed an Item Recognition software for **No Touch Checkout**, enabling automated billing in grocery stores
  - Deployed solution achieved a **98%** classification accuracy in real-time speed
  - **Tools:** Keras, Tensorflow, fine-tuned CNN's, Jupyter, Classical Computer Vision methods, PyQt
- **Undergraduate Research Assistant | VISA Lab | Tirupati, India** 2018 - 2019
  - A novel end-to-end deep learning model to profile the **3D** shape of objects from deformed fringe patterns, **CVIU 2020**
  - Reconstructed shapes at **-5dB** SNR with a **0.005** RMSE surpassing traditional approaches by **10** folds

PUBLICATIONS

- Bowen Liu, **Rakesh Chowdary Machineni**, Yu Chen, Shiyu Liu, Hun Seok Kim "MMVC: Learned Multi-Mode Video Compression with Block-based Prediction Mode Selection and Density-Adaptive Entropy Coding." in The IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2023.
- **Rakesh Chowdary Machineni,** G. E. Spoorthi, Krishna Sumanth V, Subrahmanyam G, Rama Krishna S. S. G "End-to-end deep learning-based fringe projection framework for 3D profiling of objects." Comput. Vis. Image Underst. 199: 103023 (2020).

OTHER PROJECTS

- **Stock Predictor:** Built an IR system using query expansion and DistilBERT to predict relevance of text to stock price movements, achieving **0.8593** MSE. (**link**)
- **Vision Transformer & SiamRPN++:** Finetuned ViT for **99.5%** CIFAR-10 and **84.65%** Tiny ImageNet accuracy; implemented SiamRPN++ tracker with **51%** EAO. (**link**)
- **NLP Models:** Developed RNN, LSTM, and attention-based captioning models scoring up to **18.1** BLEU on COCO; built transformer for arithmetic operations. (**link**)
- **Image Generation & Style Transfer:** Implemented GAN variants to generate MNIST-like digits; performed artistic style transfer using content, style, and TV losses. (**link**)
- **Annotation Tool & Grad-CAM:** Designed polygon annotation tool; conducted Grad-CAM analysis on ImageNet-trained ResNet50. (**link**)
- **Object Detection:** Achieved **43.63%**, **35.28%**, **40.51%** mAP on VOC with FCOS, YOLO, and Faster R-CNN; built simple CLIP-like model for image-text retrieval and ImageNet classification. (**link**)
- **Depth, Panorama, Navigation:** Implemented stereo rectification, ORB/RANSAC panorama stitching, and depth estimation for autonomous systems.