

# Rakesh Chowdary Machineni

 [Rakesh Chowdary Machineni](#) |  [MRakeshC@umich.edu](mailto:MRakeshC@umich.edu) |  +1 734.968.9425 |  [Personal Web](#)

## SUMMARY

AI Researcher and Full-Stack Developer with 4+ years of experience specializing in computer vision and multimodal AI solutions. Proven track record publishing in top-tier venues (CVPR, CVIU) and developing/deploying impactful 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 focused on developing novel learned-based 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

## PUBLICATIONS & PATENTS

- Bijan Sayyarodsari, **Rakesh Chowdary Machineni**, Shashank Gupta, Kadir Liano “Systems and Methods for Identifying and Controlling Operational Targets”, 2024 (Patent Filed).
- **Rakesh Chowdary Machineni**, Bijan Sayyarodsari, Kadir Liano “Managing Noise in labels for Machine Vision at low computational cost”, 2024 (Patent Filed).
- 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).

## PROFESSIONAL SERVICE

- **Reviewer Experience:** Information Fusion Journal 2025; Journal of Optics 2025; ICML 2025 Workshops (PUT, LXAI, FMSD); CVPR 2025 Workshop (DemoDiv); BMVC 2025; ICCV 2025 Workshop (MIRA).

## EXPERIENCE

• **Research Scientist – Computer Vision | Rockwell Automation | Austin, TX** July 2021 – Present

- Designed **LenzAI**, a closed-loop machine vision AI software enabling seamless industrial operator use for data labeling, model training, performance monitoring, and analytics (including time-series visualization).
- Advanced AI-driven data labeling platform combining Vision Language Model (Molmo) with SAM (point prompts) for Instance Segmentation, reducing per-image annotation time by **10X**.
- Developed a Model-Health (MH) monitoring system that detected data distribution shifts to trigger an Active Learning strategy, reducing training data needs by **~30%** while maintaining model performance, and alerting industry operators of potentially unreliable inferences (false positives).
- Developed a novel unsupervised depth-based wrinkle detection system for automotive seat inspection resulting in **83%** precision and **97%** recall (publication underway).
- Generated heatmaps using depth analysis to visualize wrinkle severity and guide operator during labeling process of seats-wrinkles (patent filed).
- Created a Zone Transformation technique that dynamically adapts analysis (wrinkly) regions to overcome geometric seat misalignments, eliminating manual ironing-bot recalibration.

- Engineered a real-time, video-based AI (CPU/GPU optimized) to perform dynamic state classification (e.g., different fan speeds) and drive automated closed-loop system actuation (patent filed).
  - Developed a multimodal approach applying Normalizing Flows (unsupervised) on the joint distribution of raw infrared (IR) data fused with DINO features from RGB images for robust defect detection.
  - Generated synthetic defects on tire images using an AdaBLDM-based diffusion model for data augmentation.
  - Implementing a Vision Language Model (Molmo type) for automated image quality assessment, providing operators with natural language explanations of image issues.
  - Deployed the scalable LenzAI vision system (Docker/Portainer) across **3+** paying customers, processing over 100,000 images monthly with **99.00%** uptime.
  - Engineering 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, Redis, OpenCV, PyTorch, Spark, MLLib, ONNX, PostgreSQL
- **Graduate Research Assistant | University of Michigan | Ann Arbor, MI** Jan 2022 – April 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** July 2019 – July 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** Aug 2018 – June 2019
- A novel end-to-end deep learning model to profile the **3D** shape of objects from deformed fringe patterns, [CVIU 2020](#).
  - Reconstructed shaped at **-5dB** SNR with a **0.005** RMSE surpassing traditional approaches by **10** folds.
  - **Tools:** PyTorch, 3D Vision, Optical Metrology, Fringe Projection Profilometry, Cuda

## OTHER PROJECTS

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- **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 a 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.