ANVESH REDDY GUMMI

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EDUCATION

Carnegie Mellon University Pittsburgh, PA
Master of Science - Robotics Specialization (Computer Vision) *Dec 2023*

- Relevant Coursework: Computer Vision, Geometry Based Methods for Vision, Machine Learning/Artificial Intelligence, Visual Learning & Recognition, SLAM, Modern Control Theory, Advanced Control Systems.

WORK EXPERIENCE

ST Engineering, Aethon Pittsburgh, PA
Robotics Intern *June 2023 - Aug 2023*

- Led the design and development of a computer vision system mounted on walls for autonomous mobile robots. Responsibilities included **hardware selection** and software implementation of **object detection (background subtraction and YOLOv7)**, **object tracking**, **3D object localization**, and Automatic Number Plate Recognition (ANPR) for identifying license plates and characters.

Dassault Systemes Solutions Lab Bangalore, India
R&D Software Developer (C++) - Assembly Simulation Team (DELMIA) *July 2019 - July 2022*

- Developed + maintained Manufacturing Assembly Simulation software solutions - Product Life-cycle Management.
- Implemented software features end-to-end: Planning, Development, Testing, Documentation, and Maintenance.

RESEARCH EXPERIENCE

Biometrics Lab - CyLab, Carnegie Mellon University Pittsburgh, PA
Research Assistant - Advised by Prof. Marios Savvides *May 2023 - June 2023*

- Used TensorRT and C++ to benchmark RetinaFace, a face detection model, on the NVIDIA Xavier AGX board. Worked on optimizing the model to achieve ∼60Hz for real time inference of 640x480x3 images on edge.

Biorobotics Lab - Robotics Institute, Carnegie Mellon University Pittsburgh, PA
Researcher - Advised by Prof. Howie Choset *Sep 2022 - Dec 2022*

- Worked on transmitting at real-time Realsense - RGBD's, array of 8 Thermal cameras', and three RGB cameras' data between Pipe Inspection Robot and base separated by 60ft, for autonomous pipe repair.

PROJECTS

LEARNING BASED COMPUTER VISION

Fashion AI: Diffusion Model Designs on Human Models Mar. 2023 – May. 2023

- Generated high-res clothing designs on human models using a pipeline of **Segmentation**, image processing, stable-diffusion (**Latent space diffusion**) and person image synthesis. Controlled the generation with input human model, desired texture, text prompt, and poses. Project Link

Visual Learning and Recognition Jan. 2023 – May. 2023

- Implemented FCOS **Object Detection** (21.7% mAP on Pascal VOC); Trained GAN models on CUB2011 (FIDS: Vanilla GAN: 61.2, LSGAN: 65.5, W-GAN: 72.5); AE and VAE training on CIFAR10 (with β annealing); Inference on **Diffusion Models** (FIDs- DDPM: 31.8, DDIM: 34.9); **Transformers** trained to caption images on COCO captions dataset (training loss: 0.03); ViT on CIFAR10 (test acc: 68%, train acc: 100%, training loss: 0.25).

CLASSICAL COMPUTER VISION PROJECTS

Classical Methods Sept. 2022 – Dec. 2022

- Hough Transform for Edge Detection, Bag of Visual Words for Scene Classification(60% acc on SUN image Dataset compared to VGG16 97.5%), **Homography Estimation** (features: Harris corners, BRIEF descriptor) for Augmented Reality and Stitching Images, LK Image Alignment, and Tracking.

3D VISION AND RECONSTRUCTION

Learning based vs. Conventional Non-Rigid SFM based 3D Reconstruction Oct. 2023 – Nov.2023

- Comparing deep learning and classical methods for Non-Rigid Structure from Motion (NRSfM).

Super Visual-Lidar Odometry and Mapping Mar. 2023 – May. 2023

- For **visual odometry** in VLOAM, replaced classical methods with Superpoint and Superglue deep learning models for feature extraction/matching. Compared with ORB-SLAM2, VLOAM.

ADDITIONAL COURSEWORK

Certifications: Deep Learning Specialization (5 courses) - Deeplearning.ai, Coursera
Programming Languages: C++, Python, MATLAB, C, JavaScript, Bash scripting.
Application Software: ROS, ROS2, Gazebo, Solidworks, Ansys, 3DEXPERIENCE - CATIA, DELMIA
Tools/Libraries: PyTorch, TensorRT, Keras, OpenCV, SQL, MS Office, LaTeX, GitHub, HTML, CSS, Linux.