SHOUNAK NAIK

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EDUCATION

Worcester Polytechnic Institute *August 2022 - May 2024*
Masters in Science, Robotics; GPA: 4.0/4.0

Birla Institute of Technology and Science, Pilani *August 2017 - May 2022*
B.E. Computer Science, MSc. Biological Sciences; CGPA: 8.28/10

EXPERIENCE

Aireal Inc *Generative ML Engineer* *June 2024 - Ongoing*

- Improved PSNR by 20% by alternating between Bundle Adjustment and Triangulation while refining camera poses.

Cognex Corporation *Computer Vision Intern, Boston* *September 2023 - December 2023*

- Studied the effect of adding relative pose constraints to the **Perspective-n-Point** step for a multicamera system.
- Prototyped a **Epipolar Geometry** based extrinsic calibration and the motion model error detection system of a tunnel.

Carnegie Robotics *Computer Vision Intern, Pittsburgh* *May 2023 - August 2023*

- Implemented, **Quantized** and deployed **SSD300** (object detection) on a FPGA using Xilinx Vitis AI acheiving **24 FPS**.
- Designed a ROS based error flagging system for length measuring product that uses Stereo matching and MaskRCNN.

Bloomreach, Inc *Machine Learning Engineer, Bangalore* *July 2021 - June 2022*

- Designed, trained and analyzed multi-modal **RankNets** (images+text) to build a Neural Recommendation Engine.
- Trained networks (multiple GPUs) according to the **BYOL** self-supervised technique with **ResNet** being the base encoder.
- Improved network performance (upto 10% on certain classes) by evaluating attention maps generated by **GradCAM**.

Perception and Autonomous Robotics Lab, WPI *Graduate Research Assistant* *Jan 2023 - May 2023*

- Generated Synthetic Optical Flow, Depth and Surface Normals datasets using Blender Python API.
- Designed a Aleoteric Uncertainty based perception stack that on a Tello Drone could **dodge static obstacles** in the scene.

Vision, Intelligence, and System Laboratory *Graduate Research Assistant* *Jan 2024 - May 2024*

- Using COLMAP Point Clouds to signal geometric information to novel view synthesis transformer networks (NeRFs)

TECHNICAL SKILLS

Languages: Python, C, C#, C++, Java, Javascript, LaTeX, SQL
Tools and Libraries: PyTorch, TensorFlow, ONNX, OpenCV, ROS2, NumPy, Pandas, GIT, Docker, Cuda

FEATURED PROJECTS/PUBLICATIONS

Structure from Motion *Github*

- **Calibrated camera** using Zhang's method which optimizes non-linear geometric projection after finding homographies.
- Implemented **Non-Linear Triangulation**, **PnP** and **Bundle Adjustment** to reconstruct the 3D structure of a building.

Depth By Stereo Matching *Github*

- Estimated a dense depth map by estimating camera poses, rectifying planes and a sliding window block matching approach.

Lidar Semantic Segmentation *Github*

- Built LiDAR point cloud map using Point to Point ICP, transferred semantic labels obtained from DeepLab onto the map.

Zero Shot Semantic Style Transfer *Github*

- Implemented an AdaAttn based semantic neural style transfer pipeline. Reduced 13% FLOPS by performing ablations

Panorama Stitching *Github*

- Stitched spatially varied photos into a panorama by using Harris corner detection, feature mapping, ANMS and RANSAC.

Embedded Deep Learning Projects

- **Pruning, Quantization** for optimizing the VGG-16 network for CIFAR-10 classification. *Github*
- **Neural Architecture Search** for microcontroller deployment from MCUNet super-network by evolutionary search. *Github*