

EDUCATION

- Indian Institute of Technology Madras** Chennai, India
 • *Master of Technology - Robotics, Bachelor of Technology - Mechanical Engineering; GPA: 8.67* 2018 - 2023
*Minors in **Computing and Artificial Intelligence and Machine Learning***
Relevant Coursework: Pattern Recognition and Machine Learning, Deep Learning, Reinforcement Learning, Smart Sensing for IOT, Computational Photography, AI in Manufacturing, Data Structures, Probability, Linear Algebra.

PUBLICATIONS

- U2NeRF: Unifying Unsupervised Underwater Image Restoration and Neural Radiance Fields**
 • *Manoj S[†], Mukund Varma T[†], Vinayak Gupta[†], Kaushik Mitra*
 Under Review at CVPR 2023, [PDF](#)

EXPERIENCE

- 3D Reconstruction and Restoration of Underwater Images** Computational Imaging Lab, IITM
 • *Masters' Thesis, Guide: Dr.Kaushik Mitra* August 2022 - Present
 - Developed method for simultaneous novel view synthesis and color restoration in underwater scenes by learning a radiance field constrained by multi-view geometry.
 - Successfully built Underwater View Synthesis (UVS) benchmark dataset consisting of 12 underwater scenes, containing both synthetically-generated and real world data of varying difficulty.
 - Setting up structured light imaging methods to obtain depth cues for guiding novel view rendering even in the presence of very few views.
- Volume Rendering from Multi-View Stereo Images** Remote
 • *Deep Learning Intern at Preimage* Sept 2022 - Present
 - Enhancing the performance of dense 3D geometry reconstruction on multi view aerial images by autotuning the hyperparameters based on the scene bounds.
 - Exploring approaches on using transformers and monocular depth-guided finetuning, aimed at reducing computational costs without compromising on performance.
- Abnormal Activity Detection for Security Monitoring** Remote
 • *Machine Learning Intern at Asilla Japan* May 2022 - July 2022
 - Improved the existing pipeline for abnormal activity detection in surveillance systems by fine-tuning the quantization mechanism used to learn “normal action” dictionary and identify abnormal samples.
 - Increased runtime speeds aided in the deployment of the system on CCTV feeds at Hankyu Nishinomiya Gardens Mall, Japan.
- Super-Resolution of Satellite SAR Images** IITM Research Park, Chennai, India
 • *Image Processing Intern at GalaxEye Space* Dec 2021 - Jan 2022
 - Built a network to upsample low-resolution remote-sensing data in the form of Synthetic Aperture Radar (SAR) images, along with a generative model to predict RGB images from the super-resolved SAR output.
 - Experiment results on ISRO's data indicate improved super-resolution quality even at higher scales like 16x.
- 3D Object Detection using Monocular Images** Remote
 • *Vision Intern at Birupakshya Mahapatra* Feb 2021 - May 2021
 - Developed 3D object detection module that uses monocular (single-view) images/videos captured from autonomous vehicles; aimed at bringing out performance without using LIDAR data.

[†] denotes equal contribution

- The model achieved competitive performance (20.00 MAP) against several baselines in benchmark datasets with improved computational efficiency (20 FPS).
- Constructed dataset of Indian driving scenarios and extensively evaluated the method's generalization performance.

PROJECTS

- **Counterfactual Image Generation Using Text Guidance** [Report](#)
Guide: Dr.Sutanu Chakraborti *Oct 2022 - Present*
 - Generate counterfactuals conditioned on an initial image, and a text prompt to control its several attributes while minimally altering the actual image.
 - Propose to perform image inpainting on regions corresponding to high confidence towards the target class using Stable Diffusion and CLIP models.
- **PHASE: 3D Surface Mesh Reconstruction** [Report](#)
Guide: Mr.Siddarth Jha *April 2022 - May 2022*

Implemented an implicit 3D reconstruction neural network that constructs a surface mesh using its point cloud data. The network is trained to find the occupancy metric of different point coordinates in the point cloud, in turn finding the points present on the surface during inference.
- **Few-Shot Image Synthesis using Generative Networks** [Report](#)
Guide: Dr.Anurag Mittal *Sept 2020 - Nov 2020*

Simplified SOTA generative networks namely StyleGanv1,2 to lower network capacity and introduced dense connections between multiple resolutions. Improved perceptual image quality scores by 10% even with as little as 100-1000 training images.
- **Steel Surface Defect Detection and Classification** [Report](#)
Guide: Dr.Somashekar *Sept 2020 - Nov 2020*

Involves performing semantic segmentation on pictures of steel surfaces to classify and localize the surface defects using the UNET architecture. Got an average of 95 - 97% IOU score.

MISCELLANEOUS EXPERIENCE

- **Teaching Assistant** IIT Madras, Chennai
Deep Learning for Imaging (EE5179) - Dr.Kaushik Mitra *June 2022 - Present*

Assisted in the preparation and grading of assignments, as well as the delivery of in-class tutorial sessions on course modules such as MLPs, CNNs, RNNs, Autoencoders, and GANs.
- **Project Member** IIT Madras, Chennai
Team Envisage, Center for Innovation *June 2019 - Jan 2020*

Worked in a team of 4 and designed an automatic painting bot that paints on a big screen by shooting paintballs. The project was later showcased in a techno-entertainment show.
- **Conducted Webinar:** On Introduction to AI, ML and Deep Learning ([link](#)), where about 40-50 attended when it was live. Explained the basics of ML and demonstrated image classification module using pytorch.

SCHOLASTIC ACHIEVEMENTS

- Awarded the National Talent Search Examination (**NTSE**) scholarship in 2017, one of the top 0.1% percent in the country.
- Secured All India Rank of 1467 in JEE Advanced and 3160 in JEE Mains.
- Scored centum in Grade 12 Mathematics board exam.

EXTRACURRICULAR ACTIVITIES

- Participated in district level and inter-club Under-15 doubles badminton tournaments previously, played upto semi-finals.
- Was part of the National Cadet Corps (NCC) in IIT Madras (2018-2019).