Arihant Gaur

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Experience

Metacube Software Pvt. Ltd. October 2023 – March 2025
Contractor *Remote*

- Designed and implemented pipeline to parse movies using computer vision algorithms, whose semantics are used by LLMs for downstream tasks like scene description and retrieval
- Also involved in automating commentary and scorecard for cricket matches using 3D skeletal human pose estimation and action recognition
- Currently working on predicting playing team 11 from historical data using end-to-end neural network

Mitsubishi Electric Research Laboratories (MERL) August 2022 – March 2023
Research Intern *Cambridge, MA, United States*

- Collaborated on cutting edge 3D computer vision research under supervision of Prof. Pedro Miraldo [Link]
- Proposed novel geometric encoder for structured 3D implicit representations. Work was published at 3DV 2024 conference in Davos, Switzerland
- Also involved briefly in a client project for surveying 3D object detection and tracking methods

Instituto Superior Técnico May 2021 – May 2022
Research Intern *Lisbon, Portugal*

- Worked on research projects related to 3D pointcloud registration and segmentation using PointNet related architectures, under supervision of Prof. Pedro Miraldo [Link]

Education

Universität des Saarlandes 2024 – 2026
Masters of Science in Visual Computing (Grade: 1.1) *Saarbrücken, Germany*

Visvesvaraya National Institute of Technology 2018 – 2022
Bachelor of Technology in Electrical and Electronics Engineering (CGPA: 9.31/10, Rank: 2/138) *Nagpur, India*

Sheth N.K.T.T. College of Commerce and Science 2018
Science Stream (HSC, Percentage: 88.3%) *Thane, India*

Hiranandani Foundation School 2016
Science Stream (ICSE, Percentage: 96.5%) *Thane, India*

Publications

Arihant Gaur, G. Dias Pais, Pedro Miraldo, **"Oriented-grid Encoder for 3D Implicit Representations"** in *International Conference on 3D Vision (3DV 2024), Davos, Switzerland* [Paper][Code*][Website]

Rohit Lal, Arihant Gaur, Aadhithya Iyer, Muhammed Abdullah Shaikh, Ritik Agrawal and Shital Chiddarwar, **"Open-Set Multi-Source Multi-Target Domain Adaptation"** in *35th Pre-registration workshop (NeurIPS 2021), Remote.* [Paper][Code][Website]

Arihant Gaur, Akshata Kinage, Nilakshi Rekhawar, Shubhan Rukmangad, Rohit Lal and Shital Chiddarwar, **"Cursor Control Using Face Gestures"** in *11th International Conference on Soft Computing and Pattern Recognition (SoCPaR 2019), Hyderabad, India* [Paper][Code][Website]

Relevant Projects

Volumetric path tracer with MIS from scratch [Code][Website]
October 2024 – February 2025

- Built ray tracer from scratch as a part of Computer Graphics - I [Link] course offered at UdS
- Bagged third prize in the rendering competition hosted during the course

Cricket Playing 11 Selection using Neural Networks

July 2024 – March 2025

- Developed PoCs to predict cricket playing 11 using player historical data with a custom neural network architecture. Achieved 75% accuracy on the test dataset
- Performed several experiments on top of iTransformer [Paper] with several network modifications tailored to our problem

Action Recognition for Cricket Analysis

January 2024 – June 2024

- Implemented a two-step approach for 3D pose estimation of players in cricket matches using a fine-tuned MotionAGFormer [Paper]
- Designed a novel action recognition head, similar to MotionBERT [Paper], to predict batsman shot types based on skeletal poses
- Achieved an F1 score of 0.5. Conducted additional PoCs involving mesh-based action recognition and pose estimation using LART [Paper] and PHALP [Paper]

Actor Face Recognition for Parsing Movies

October 2023 – December 2023

- Fine-tuned models like SwinFace [Paper] and AdaFace [Paper] on faces of mainstream actors in movies
- Achieved 91% accuracy. The pipeline was integrated with LLMs for movie parsing

Open-Set Multi-Source Multi-Target Domain Adaptation [Paper][Video]

October 2021 – March 2022

- Designed a novel approach for domain adaptation of multiple target domains from source domains, without knowing exact label sets of the target
- Accepted at the pre - registration workshop, NeurIPS'21 [Link]

Visual Odometry

March 2020 – May 2020

- Designing a pipeline for estimating the current location of the vehicle using a monocular camera as the only sensor, useful in robot localization and mapping (in conjunction with autonomous systems)
- Implemented 2D - 2D and 3D - 2D visual odometry using classical vision techniques

Structure from Motion (SfM) [Code]

July 2020 – September 2020

- Implemented camera pose estimation in world coordinates and sparse 3D reconstruction of an ordered set of images and known calibration matrix, to enable mapping of an environment for robot perception and visual localization

Indian Number Plate Detection and Recognition using a Single Camera [Code][Video]

May 2020 – July 2020

- Trained YOLOv4 for detection, on a mix of Indian number plates from Kaggle and manually annotated images
- One of the winners of the Smart India Hackathon (Software Edition 2020), winning a cash prize of Rs.100,000

Image Stitching and Panorama [Code]

December 2019 – February 2020

- Developed and implemented a pipeline for generating a panorama from the camera footage of a room (known calibration matrix)
- Stitched images with homography matrix for partial panorama and translational stitching for cylindrical panorama

Health Estimation of an Electrical Machine Using an Optimal Estimator [Draft]

July 2021 – May 2022

- Developed and implemented various estimators for determining health of a three phase distribution transformer as a part of my Bachelor's thesis

Skills

Languages: Python, C/C++, MATLAB+Simulink
Software Tools: PyTorch, LaTeX, Git, COLMAP, MeshLab
Libraries: NumPy, SciPy, Matplotlib, OpenCV, Open3D, Pandas, scikit-learn

Area Relevant Courses

UdS (ongoing): Realistic Image Synthesis, Seminar and Master's thesis
UdS (completed): Image Processing and Computer Vision, Computer Graphics, Machine Learning, High-Level Computer Vision, Convex Analysis and Optimization, Image Acquisition Methods
VNIT: Single and Multivariable Calculus, Matrix Theory, Infinite Series and Ordinary Differential Equations, Integral Transforms and Partial Differential Equations, Numerical Methods and Probability Theory, Statistics and Optimization Techniques, Signals and Systems, Control System I and II, Digital Signal Processing and its Applications, MATLAB programming and simulation.

Achievements

- Bagged first prize at the Smart India Hackathon, 2020 (Software Edition, Team IvLabs (Website))
- Received Academic Excellence Prize for securing 2nd highest CGPA in B.Tech. Electrical and Electronics Engg. program (2018 – 2022)
- Received Academic Excellence Prize for exhibiting the best performance in the 3rd year of B.Tech. Electrical and Electronics Engg. program

Extracurriculars

At VNIT:

- Core Member at IvLabs [Link], Robotics and AI Lab of VNIT, Nagpur
- Conducted workshops on Image Processing under IEEE VNIT Student Branch with more than 100 students
- Mentor Coordinator at Avanti Fellows VNIT Chapter
- Elected as a student mentor for 15 freshmen on college and academic related issues