

About

Computer Vision researcher with 4+ years of experience working on human-centric vision systems across research and industry. My work spans human pose reconstruction, multi-view geometry, and spatio-temporal video understanding, with applications in healthcare monitoring and sports broadcasting. Through the UKRI CDT in Artificial Intelligence, I aim to strengthen my theoretical foundation and pursue doctoral research in inclusive 3D/4D human modelling and motion understanding.

Research Interests

- 3D Human Mesh Recovery (HMR) and Reconstruction from monocular or multi-view camera setup
- Spatio-Temporal motion understanding
- Graph Representation Learning, Geometry-aware computer vision systems, Model Optimization
- Digital Inclusion, Responsible AI

Research Experience

Indian Statistical Institute (ISI) <i>Topic - Distributed Cognitive Systems for Healthcare</i>	Kolkata
Project Linked Junior Research Fellow under Prof. Ashish Ghosh	<i>Oct 2021 - Dec 2022</i>
<ul style="list-style-type: none">Conducted research on abnormal human activity recognition using RGB video and skeletal dataStudied spatio-temporal modelling of human motion for healthcare monitoringFocused on Graph Representation Learning for human skeleton-based action recognitionInvestigated movement patterns related to medical conditions such as falls, fatigue, and prolonged inactivity	
Teaching Assistant	<i>Aug 2022 – Sep 2022</i>
<ul style="list-style-type: none">Machine Learning-I	
Teaching Assistant	<i>Feb 2022 – Jul 2022</i>
<ul style="list-style-type: none">Advanced Image Processing - M.Tech. Computer Science	

Industry Experience

Computer Vision Engineer - Quidich Innovation Labs <i>Building state-of-the-art AI solutions for sports broadcasting</i>	Mumbai <i>March 2024–Present</i>
<ul style="list-style-type: none">Decision Review Systems (DRS)<ul style="list-style-type: none">Developed and deployed real-time automated no-ball and run-out detection systems from high-speed cameras (100–120 fps)StiQy<ul style="list-style-type: none">Designed ground perspective tracking algorithms for real-time (50 fps) virtual graphics overlays on cricket fields, significantly enhancing viewer engagement and experience.AI Keyer- Developed an end to end player segmentation pipeline for accurate keying of players in virtual ads on the ground. Optimized the pipeline with CUDA acceleration to achieve a high fps (>90 fps) inference on NVIDIA RTX 3080 Ti while producing the higher mask accuracyWorked on optimization of SOTA VLM and segmentation models (e.g. SAM-based architectures) for domain specific use cases.HyperView<ul style="list-style-type: none">Developing advanced real-time pose estimation algorithms.Reconstructed 3D player poses using 3D triangulation (90% accuracy) with a calibrated multi-camera setup on the cricket pitch, integrating BVH (BioVision Hierarchy) motion data into 3D graphics and motion builder software (Unreal Engine, Blender, Maya) to enhance realism.	
Junior Data Scientist - HappyMonk.ai <i>Building edge-centric vision models for video surveillance</i>	Bangalore <i>December 2022-January 2024</i>
<ul style="list-style-type: none">Human Activity Recognition<ul style="list-style-type: none">Led the entire project lifecycle, overseeing data collection, preparation, preprocessing, model development to deployment on edge devicesLeveraged SLOWFAST network to develop a spatio-temporal deep learning model to accurately detect human activities within a sceneAutomated the entire pipeline to streamline the production processesSpace Utilization<ul style="list-style-type: none">Employed image processing techniques to implement an algorithm to show the empty spaces within an extensive inventory areaObject detection<ul style="list-style-type: none">Collaborated in multiple projects on developing the dataset, object detection models(e.g. YOLO V5, YOLO v8) across different domains, addressing business problems such as face detection, object counting, emotion recognition, and fire-smoke detection etc.Collaborated with the team to efficiently deploy these models on edge devices	



Skillset

Topics of Interest	Pose Estimation(2D, 3D), Depth Estimation, 3D point cloud, Object detection, 3D Computer Vision, Human Activity Recognition, Object tracking, Semantic segmentation, OCR(Optical Character Recognition),
Tools & Techniques	Machine Learning(Regression, Classification, Decision Trees, Random Forests, Time series Forecasting and Clustering), Deep learning(DNN, RNN, LSTM, Encoder-Decoder Models, ViTs, Diffusion-based models),Graph Representation learning, GNN(Graph Neural Networks), Data Structure, OOPS
Frameworks	Pytorch, Ultralytics, Flask API, Fast API, AWS Lambda, Nvidia-Deep Stream, TAO, Cuda, Cudnn
Data Analysis	Pandas, Numpy, Matplotlib, Seaborn
Model Optimization	Onnx, TensorRT
Programming Languages	Python, C, HTML/CSS, SQL
Technical	Git, Linux, L ^A T _E X, Docker, ngrok, MLOps, CVAT(annotation tool), OpenCV, Jupyter lab, Google Colab


Selected Projects

- SpecsKart - Building a virtual specs try-on platform and recommendation system** [*In collaboration with AI-LENS*]


January 2024-Present

 - Projecting the chosen specs onto the user’s face using facial keypoint features, accommodating various facial orientations.
 - Implementing a recommendation system based on past specs choices.
 - Technologies:** Python3, Matplotlib, MediaPipe, OpenCV, Numpy, Streamlit app, Scipy, Fast api, AWS Lambda
- Surveying Social Distancing in Aerial Videos using Computer Vision**  

May 2021-July 2021

 - Built a web app for monitoring the number of social distancing violations in a video by Multiple object tracking.
 - Worked with a large scale video dataset i.e. Stanford Drone Dataset (link)
 - Used Deep SORT for performing the Multiple object tracking and YOLO-V4 for the detection task
 - Technologies:** Python3, Matplotlib, Seaborn, Pandas, Darknet, Tensorflow, HTML, Flask API
- Quadtree based Image Saliency mapping** 

October 2020-December 2020

 - Proposed a Quadtree Based approach for getting Salient features from an image which can significantly reduce the computational complexity of a CNN model from $O(M^2N^2C)$ to $O(M^2NC)$.
 - Technologies:** Pytorch, Python3
- Video Steganography using LSB Technique by a Unique Frame Selection Method** 

March 2019-May 2019

 - Proposed a unique frame selection method that takes the first number from the pseudo-random number sequences generated by our modular function (a Linear congruential generator) by taking a seed value as the secret key defined by the sender and increased the security.
 - Technologies:** OpenCV, Numpy,Pandas,Python3, Anaconda

Education


- Ramakrishna Mission Vivekananda Educational and Research Institute**

Belur, Howrah

M.Sc in Computer Science

2019-2021

Thesis Grade- 9.43/10

Thesis Project - Surveying Social Distancing in Aerial Drone Videos 


CGPA- 7.16/10
- Ramakrishna Mission Residential College(Autonomous)**

Narendrapur, Kolkata

B.Sc(Hons) in Computer Science

2016-2019

Thesis Grade- 9/10

Thesis Project - Video Steganography using LSB Technique by a Unique Frame Selection Method 

CGPA- 7.49/10 (First Class)

Additional

Selected for Junior Research Fellowship funded by **MeitY(Ministry of Electronics and Information Technology)**, **govt. of India** to support research at Indian Statistical Institute

SVMCM scholarship holder - A scholarship offered by govt. of West Bengal for academic excellence during postgraduate studies.

Languages- Bengali, Hindi, English

Interests- Photography, Graphics Design, Illustration, Music

Experience- Organized ENVISION’19, a first-ever tech event in RKMRC, Narendrapur by Computer Science department