ISHAN MAMADAPUR

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EDUCATION

Carnegie Mellon University - MS in Mechanical Engineering - ***Artificial Intelligence Research*** *track* | **GPA 4.0 / 4.0** **Pittsburgh, PA**

- *Coursework: Deep Learning, Machine Learning, Trustworthy AI, ML in Production, Visual Learning and Recognition* **Dec 2024**
- *Recipient of the prestigious **JN Tata Scholarship** for the Higher Education of Indians*

University of Mumbai - Bachelor of Engineering in Mechanical Engineering | **GPA 9.32 / 10** **Mumbai, India | Oct 2020**

SKILLS

ML Development: Python, PyTorch, TensorFlow, Scikit-learn, NumPy, OpenCV, YOLO, WandB, TensorBoard, SQL, Pandas, XGBoost, C++
ML Deployment: Git, Linux, GCP, AWS EC2, Docker, Kubernetes, Jenkins, MLFlow, Grafana, TensorRT, ONNX, Hugging Face, LangChain

RESEARCH AND PROFESSIONAL EXPERIENCE

Machine Learning Engineer Intern | Disney Research @ Walt Disney Imagineering **Jun 2024 - Aug 2024**

- Developed **real-time 6-DoF pose estimation pipeline for novel objects** with no prior data, handling end-to-end training and deployment
- Achieved 85% accuracy on the data-scarce CV task, by **developing synthetic data generation** strategies and **domain adaptation** finetuning
- Optimized model for **real time deployment with TensorRT**, reducing memory footprint and inference time by 60%

Deep Learning Research Assistant | Human Sensing Lab @ The Robotics Institute, Carnegie Mellon University **Feb 2023 - Present**

- Built an **end-to-end PyTorch computer vision pipeline** for human segmentation, analyzing 10+ research papers, sourcing and processing large datasets, distributed parallel model training and fine-tuning and developing visualization tools for streamlined evaluation
- Integrated specialized **Transformer and CNN models** for image matting and multiclass segmentation and landmark detection, increasing accuracy by 15% through targeted data augmentation on 200,000+ images and custom loss function implementation
- Enhanced video segmentation performance by 30% using **quantization aware training, advanced hyperparameter tuning**, and a custom detect-and-track system for improved temporal consistency, utilizing TensorBoard and WandB for in-depth performance monitoring

Teaching Assistant - Deep Learning (11-785) | School of Computer Science, Carnegie Mellon University **Nov 2023 - May 2024**

- Instructed MLPs, CNNs, RNNs, Transformers, GANs, and LLMs through weekly recitations and office hours, and comprehensive support for 250+ students in CMU's flagship deep learning course, fielding over 750 queries on the online class forum

Mechanical Engineer and ML Engineer Trainee | Robotics R&D @ Miko Robotics **Feb 2021 - Dec 2022**

- Led the development of a semi-autonomous social robot's **multi-DoF head mechanism, obstacle detection and self-docking** functionalities
- Engineered an **emotion detection classifier** using Fast.ai and PyTorch, for low-cost portable hardware integrating OpenCV and Dlib for face extraction, resulting in 14% accuracy improvement through effective **feature engineering and transfer learning**

Co-Founder and Machine Learning Engineer | 3DtoHome **Apr 2020 - Dec 2022**

- Co-founded 3D printing venture specializing in generative design, deploying real-time **computer vision based ML quality control** systems, achieving 10% efficiency gain through automated failure detection and optimizing designs for strength-to-cost ratio

LEADERSHIP EXPERIENCE

Team Captain (Lead) | DJS Skylark, SAE Aero Design Competition 2018/19/20, USA **Jun 2017 - Apr 2020**

- Led 30-member team to podium finishes at the international event (**2nd** in aircraft design, **3rd** overall from 75 global teams), while leading design optimization and technical documentation, authoring an award-winning technical design paper

PROJECTS

Large Language Models (LLMs) with PyTorch and Hugging Face **Sep 2024 - Nov 2024**

- Built decoder-only Transformer language model with masked attention, positional embeddings, and BPE tokenization, implementing autoregressive sampling, weight tying, and mixed precision training to achieve sub-50 perplexity under FLOPs constraints
- Engineered retrieval-augmented generation (RAG) system with LoRA-based parameter-efficient fine-tuning on Pythia-1B, integrating calculator tool and dense retrieval to achieve 30% improved accuracy on mathematical and factoid queries

Movie Recommendation System for Streaming Platform with One Million Simulated Users **Feb 2024 - May 2024**

- Built a collaborative filtering system using matrix factorization achieving 18% improvement in engagement metrics through A/B testing
- Architected scalable MLOps infrastructure with Jenkins-based CI/CD, containerized model serving with zero-downtime deployments, and comprehensive Prometheus/Grafana monitoring for real-time system health and model performance metrics

Experimental Evaluation of Generative Models for Synthesizing Realistic Images **Feb 2024 - Apr 2024**

- Developed a model training and evaluation pipeline exploring major generative AI techniques including GANs (Vanilla and WGANs), Auto-Encoders, VAEs, and Diffusion models, comparing FID scores, reconstruction, and KL divergence losses

Dynamic Background Blurring with Monocular Depth Estimation, Precise Masking and Image In-painting **Sep 2023 - Dec 2023**

- Integrated MiDaS depth estimation with a custom OHEM Cross Entropy loss and reduced computational overhead by 35% through depth plane clustering, earning a 100% peer review score. Achieved 80% higher preference over Google Photos (SOTA) in blind user studies (n=30)

Face Recognition and Verification Model with Deep CNNs and Contrastive Losses **Oct 2023 - Nov 2023**

- Engineered a face recognition system from scratch using ResNet-50 architecture and ArcFace contrastive loss fine-tuning, leveraging advanced augmentations using Augmentations to achieve 91.9% accuracy (top 2% of 250+ students)

Heart Disease Diagnosis Classifier Using Decision Trees and Gradient Boosting **Feb 2023 - Apr 2023**

- Implemented and experimented with XGBoost, random forests with bagging and iterative pruning to achieve 89% prediction accuracy