Kaustav Mukherjee

415-216-5804 | kaustav.mukherjee2020@gmail.com | linkedin.com/in/kaustavmu | github.com/kaustavmu

Education

Carnegie Mellon University, School of Computer Science (CMU) — Pittsburgh, USA
Masters of Science in Computer Vision — *Aug 2024 – Dec 2025*

National University of Singapore (NUS) — Singapore
BEng in Mechanical Engineering, 2nd Major in Innovation and Design (First Class Honours) — *Aug 2020 – May 2024*

Work Experience

Kaliber Labs — San Francisco, USA
AI Engineer — *Jan 2024 - Jul 2024*
- Fine-tuned Llama-3-8B on surgical data, achieving 84% of GPT-4o's performance for 2% of the operational cost
- Accelerated convergence of camera pose estimation algorithm by 10 times with particle swarm optimization (PSO)
- Developed intra-operative camera registration algorithm taking under 10 seconds utilizing neural radiance fields
- Implemented methods for digital linear and geodesic measurements between points with above 90% accuracy

Software Engineering Intern — *Jan 2023 - Dec 2023*
- Spearheaded development and prompt engineering for a new multi-modal patient chat-bot - combining surgical image model outputs, RAG with patient data, and LLMs - with Flask, NextJS, AWS, and Langchain
- Fine-tuned stable diffusion to generate synthetic training data, expanding surgical tool datasets by up to 5 times
- Employed synthetic data generation and augmentation to train multiple image classifiers to above 97% accuracy
- Trained pix2pix for modality conversion and added interpolation pipeline to multiply MRI dataset size by 10 times

F-Drones — Singapore
Systems Engineering Intern — *May 2022 – Oct 2022*
- Programmed Lua scripts and modified Ardupilot code for additional safety and control features
- Led team of 3 to overhaul drone communication system, increasing drone delivery consistency to over 95%
- Set up simulation-in-the-loop with Ardupilot, enabling diagnosis of a critical bug in under 4 hours after a crash

Scifie Robotics — Singapore
Robotics Engineering Intern — *Mar 2021 - Aug 2021*
- Tested use of Nvidia Jetson Nano for computer-vision-based navigation with Tensorflow and PyTorch
- Prototyped and designed a 10 kPSI nozzle and magnetic mounting bracket for under 50% the cost of stock parts

Leadership

Chief Engineer | *Team AeroNUS* — Jul 2021 – Apr 2022
- Led team of 10 to create an aeroplane for the AIAA DBF 2022 competition, achieving NUS's highest report score
- Created a Multi-Disciplinary Design Optimization (MDO) program on MATLAB to determine plane sizing, calculating flight characteristics for over 100000 planes with 4 independent variables and over 20 outputs
- Established training program for future team, improved next year's overall ranking by 15 spots

Projects

Drone Perception System at CMU Airlab | *Python, OpenCV, Computer Vision* — Aug 2024 –
- Using Python, OpenCV, and multi-camera computer vision techniques to create a perception system for a drone with a 2-degree-of-freedom robotic arm.

Neural Plane Optimization | *Python, Keras, Matlab, Non-Differentiable Optimization* — Apr 2024 – May 2024
- Utilized a neural network and PSO to speed up a pre-existing aeroplane optimization program over 100 times
- Increased design space by over 1000 times by training a DNN with Keras for 2D to 3D aerodynamic estimation

PPE Detection with Invigilo AI | *Python, PyTorch, YOLOv5, OpenCV* — Aug 2021 – Nov 2021
- Fine-tuned YOLOv5 for helmet, vest, ladder, and platform detection in construction sites for startup Invigilo AI, improving performance over raw images by 58% through OpenCV image grey scaling and histogram equalization

Skills

Machine Learning and Computer Vision: PyTorch, Tensorflow, Keras, NumPy, OpenCV, Prompt Engineering, LLM Fine-tuning, Image Generation and Classification, Non-Differentiable Optimization
Software Engineering: Python, JavaScript, C++, React, Flask, NextJS, AWS, Linux, Git