

# Kaustav Mukherjee

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## EDUCATION

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<b>Carnegie Mellon University, School of Computer Science (CMU)</b> <i>Masters of Science in Computer Vision</i>	Pittsburgh, USA Aug 2024 – Dec 2025
<b>National University of Singapore (NUS)</b> <i>BEng in Mechanical Engineering, 2nd Major in Innovation and Design (First Class Honours)</i>	Singapore Aug 2020 – May 2024

## WORK EXPERIENCE

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<b>Kaliber Labs</b> <i>AI Engineer</i>	San Francisco, USA Jan 2024 – Jul 2024
<ul style="list-style-type: none"><li>Fine-tuned Llama-3-8B on surgical data, achieving 84% of GPT-4o's performance for 2% of the operational cost</li><li>Accelerated convergence of camera pose estimation algorithm by 10 times with particle swarm optimization (PSO)</li><li>Developed intra-operative camera registration algorithm taking under 10 seconds utilizing NERFs</li><li>Implemented methods for digital linear and geodesic measurements between points with above 90% accuracy</li></ul>	
<b>Software Engineering Intern</b>	Jan 2023 – Dec 2023
<ul style="list-style-type: none"><li>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</li><li>Fine-tuned stable diffusion to generate synthetic training data, expanding surgical tool datasets by up to 5 times</li><li>Employed synthetic data generation and augmentation to train multiple image classifiers to above 97% accuracy</li><li>Exported models with ONNX and used quantization to reduce memory usage by 40%.</li></ul>	
<b>F-Drones</b> <i>Systems Engineering Intern</i>	Singapore May 2022 – Oct 2022
<ul style="list-style-type: none"><li>Programmed Lua scripts and modified Ardupilot code for additional safety and control features</li><li>Led team of 3 to overhaul drone communication system, increasing drone delivery consistency to over 95%</li><li>Set up simulation-in-the-loop with Ardupilot, enabling diagnosis of a critical bug in under 4 hours after a crash</li></ul>	
<b>Scifie Robotics</b> <i>Robotics Engineering Intern</i>	Singapore Mar 2021 – Aug 2021
<ul style="list-style-type: none"><li>Tested use of Nvidia Jetson Nano for computer-vision-based navigation with Tensorflow and PyTorch</li><li>Prototyped and designed a 10 kPSI nozzle and magnetic mounting bracket for under 50% the cost of stock parts</li></ul>	

## LEADERSHIP

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<b>Chief Engineer</b>   <i>Team AeroNUS</i>	Jul 2021 – Apr 2022
<ul style="list-style-type: none"><li>Led team of 10 to create an aeroplane for the AIAA DBF 2022 competition, achieving NUS's highest report score</li><li>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</li><li>Established training program for future team, improved next year's overall ranking by 15 spots</li></ul>	

## PROJECTS

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<b>AvatarsFTW: 3D Human Avatars From the Wild</b>   <i>PyTorch, Image Generation</i>	Oct 2024 –
<ul style="list-style-type: none"><li>Created pipeline to improve performance of SOTA 3D human avatar generation models on in-the-wild images</li><li>Developed novel method for human keypoint estimation to condition diffusion models for human image generation</li></ul>	
<b>Drone Perception System at CMU Airlab</b>   <i>Python, OpenCV, ROS, Computer Vision</i>	Aug 2024 – Nov 2024
<ul style="list-style-type: none"><li>Using Python, OpenCV, ROS, and multi-camera computer vision techniques to create a perception system for a drone with a 2-degree-of-freedom robotic arm</li></ul>	
<b>PPE Detection with Invigilo AI</b>   <i>Python, PyTorch, YOLOv5, OpenCV</i>	Aug 2021 – Nov 2021
<ul style="list-style-type: none"><li>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</li></ul>	

## SKILLS

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