

# Jong Hoon Park

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## EDUCATION

<b>Carnegie Mellon University (CMU)</b>	Pittsburgh, PA
Master of Science in Mechanical Engineering – Research   GPA: 3.89/4.0	May 2024
Coursework: AI/ML, Big Data Science, Deep Learning, Visual Learning & Recognition, On-Device Machine Learning	
<b>University of California, Davis</b>	Davis, CA
Bachelor of Science, Aerospace Engineering and Mechanical Engineering	Dec 2019

## SKILLS

**Languages & Frameworks:** Python, C++, PyTorch, TensorFlow, Git, Linux, AWS, GCP

**A.I.:** Deep Learning, Computer Vision, Model Optimization, On-Device ML, Multimodal ML, LLMs

## WORK EXPERIENCE

<b>Robot Intelligence Group @ CMU</b>   Graduate Research Assistant	Pittsburgh, PA
<b>Pilot Workload Estimation via Multimodal Machine Learning</b>   Industry Funded Project	May 2023 – Present
<ul style="list-style-type: none"><li>Developing and training multimodal ML models with an \$125B automobile company's research subsidiary to extract and reason on multi-modal representation of biometric data to estimate pilot workload.</li><li>Executed IRB-approved user studies to collect biometric data 28 pilots, including BVP, GSR, fNIRS, and eye gaze.</li><li>Employed SIFT and KNN algorithms to map eye gazes onto flight simulation scenes by identifying matching features.</li><li>Utilized a transformer-based model to segment FPV flight scenes to leverage semantic information as training data.</li><li>Accelerated computation speed by 30 times for assigning priority scores to eye gazes via parallel computing.</li></ul>	
<b>Boeing Airplane Motion Prediction via Airport Context Learning</b>   Boeing Funded Project	May 2023 – Aug 2023
<ul style="list-style-type: none"><li>Transformed airport map images into semantic graph data, analyzing its efficiency and impact on motion forecasting.</li><li>Achieved a 7.8m error in predicting airplane motion within airport by training a MLP with GPT-based attention layers.</li></ul>	
<b>Celerity Consulting Group</b>   Engineering Consultant	Walnut Creek, CA
<b>Transmission Line Upgrade Analysis &amp; Mapping Support</b>	Feb 2020 – May 2022
<ul style="list-style-type: none"><li>Piloted a new project assessing integrity of electric transmission lines and recommended repairs to client company.</li><li>Mentored new hires by providing feedback after quality-checking work and identifying areas for improvement.</li></ul>	

## ACADEMIC PROJECTS

<b>Q&amp;A System with Retrieval-Augmented Generation via LLM</b>   <i>PyTorch, LLM</i>	Jan 2024 – Present
<ul style="list-style-type: none"><li>Built an LLM pipeline integrating Retrieval-Augmented Generation (RAG) to construct a Q&amp;A system using LangChain.</li><li>Used a FAISS database for vector search to leverage non-parametric knowledge to mitigate hallucination.</li><li>Developing a web app for a chatbot with Streamlit to allow users to build a custom RAG pipeline and ask questions.</li></ul>	
<b>Cockpit View Segmentation via Domain Adaptation</b>   <i>PyTorch, ML, Computer Vision</i>	Nov 2023 – Dec 2023
<ul style="list-style-type: none"><li>Fine-tuned a pretrained Mask R-CNN to extend its domain for segmenting real-world cockpit views.</li><li>Created a custom dataset by capturing cockpit view images across four different airplanes using a flight simulator.</li><li>Augmented training images by applying four different weather conditions to prevent overfitting.</li></ul>	
<b>Machine Learning Model Compression on Device</b>   <i>PyTorch, ML, Model Compression</i>	Sept 2023 – Dec 2023
<ul style="list-style-type: none"><li>Deployed and compressed a 73 million-parameter generative AI model into an NVIDIA Jetson Nano.</li><li>Performed knowledge distillation on a sub-model, reducing size by 58% with minimal performance drop.</li><li>Enhanced inference speed on device by 94% on GPU via post-training static quantization to float16 domain.</li><li>Reduced FLOPs by 66.7% with just 2.1% accuracy drop by down sampling input image size by one-fourth.</li><li>Devised a filter-wise structured pruning method and found sensitive convolution kernels among 1,200 in encoders.</li></ul>	
<b>Perception – Vehicle Image Classification</b>   <i>PyTorch, ML, Computer Vision</i>	Apr 2023
<ul style="list-style-type: none"><li>Attained 2nd position in an academic course's Kaggle competition for vehicle image classification.</li><li>Employed end-to-end vehicle image cropping and feature extraction during model training.</li><li>Achieved 69% classification accuracy by fine-tuning a pre-trained ResNet18 model with 7,573 driving scene images.</li></ul>	
<b>Human Facial Emotion Recognition</b>   <i>PyTorch, ML, Computer Vision</i>	Oct 2022 – Dec 2022
<ul style="list-style-type: none"><li>Built a CNN from scratch for emotion prediction from 291,650 facial expressions, attaining 70% prediction accuracy.</li><li>Implemented and showcased real-time emotion recognition and assessed performance via a confusion matrix.</li></ul>	

## LEADERSHIP

<b>LLM (Large Language Model) Project Team Lead</b> , Course 24-782, CMU, Pittsburgh, PA	Jan 2024 - Present
<b>Advanced Modeling Aeronautics Team Section Lead</b> , UC Davis, CA	Feb 2018 – June 2018
<b>Artillery Gun Section Squad Leader</b> , Republic of Korea Army, Paju, South Korea	Sep 2016 – Jul 2017