Jong Hoon Park

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EDUCATION

Carnegie Mellon University (CMU) **May 2024**
Master of Science in Mechanical Engineering – Research in AI/ML (GPA: 3.91/4.00)
Coursework: AI/Machine Learning, Deep Learning, On-Device Machine Learning, Big Data, Visual Learning & Recognition

University of California, Davis **Dec 2019**
Bachelor of Science in Aerospace Engineering and Mechanical Engineering

WORK EXPERIENCE

Graduate Research Assistant | Robotics Institute at Carnegie Mellon University **Pittsburgh, PA**
Multimodal Machine Learning for Pilot Mental Workload Estimation **May 2023 – Apr 2024**

- Developed Multimodal Machine Learning pipelines (e.g., data preparation, model development) with Honda Research Institute scientists and academic researchers for supervised classification of pilot workload during flight operations.
- Enhanced accuracy by 12% through data upsampling with traditional ML models (e.g., Decision Trees, XGBoost).
- Utilized Computer Vision (OpenCV feature detection) and Deep Learning image segmentation with eye-tracking cameras to extract features from camera and screen-recorded videos.
- Collected, visualized, and processed time-series biosensor data (e.g., heart rate) from 28 participants using Python.

ACADEMIC PROJECTS

AI Powered Q&A System using RAG and LLMs| *Python, PyTorch, NLP, LLMs, LangChain* **Jan 2024 – May 2024**

- Created a Q&A system with LLMs and RAG that retrieves data from documents to mitigate hallucination.
- Applied NLP methods, including text chunking and vectorization into embeddings, to process texts.
- Evaluated RAG implementation by generating and testing multiple-choice questions, improving accuracy by 30%.

Airplane Cockpit View Image Segmentation | *Python, PyTorch, Computer Vision* **Nov 2023 – Dec 2023**

- Fine-tuned Mask R-CNN to enhance Scene Understanding in new domains (city street views → aerial views), successfully achieving object detection and segmentation on airplane cockpit images.
- Created a custom dataset by segmenting and augmenting over 200 cockpit images using an open-source labeling tool.

Generative AI Model Optimization on Device | *Python, PyTorch, Model Compression* **Sept 2023 – Dec 2023**

- Optimized a large image generation model (73 million parameters) for GPU inference on an NVIDIA Jetson Nano, addressing FLOPs and inference latency across varied input and model sizes via quantization and pruning.
- Implemented knowledge distillation, reducing model size by 58% with minimal performance drop.

Generative AI Modeling for Image Generation | *Python, PyTorch, Computer Vision, Gen AI* **Oct 2023**

- Trained GAN on CUB 2011, refining image generation (38% lower FID) via Wasserstein loss and gradient penalty.
- Built and trained VAE on CIFAR-10, improving image generation (8% lower reconstruction loss) via β-annealing.
- Implemented a diffusion model (DDPM) to optimize image generation compared to VAE, achieving an FID of 63.

Human Facial Emotion Recognition | *Python, PyTorch, Computer Vision* **Oct 2022 – Dec 2022**

- Constructed and trained a CNN model from scratch on 290k images, achieving 70% emotion prediction accuracy.
- Demonstrated emotion recognition using OpenCV for face detection and assessed performance with F1 scores.

SKILLS

Languages: Python (proficient), C++ (intermediate), MATLAB (intermediate)
Frameworks: PyTorch, OpenCV, Scikit-learn, Hugging Face, CUDA, Linux, Git, Docker, SQL, PySpark, AWS, SageMaker

PUBLICATIONS

[1] **VTOL Pilot Workload Estimation by Multimodal Machine Learning on Psycho-physiological Signals** Jong Hoon Park, Lawrence Chen, Ian Higgins, Zhaobo Zheng, Shashank Mehrotra, Kevin Salubre, Mohammadreza Mousaei, Steven Willits, Blain Levedahl, Timothy Buker, Eliot Xing, Teruhisa Misu, Sebastian Scherer, Jean Oh, *IEEE Robot and Human Interactive Communication*, 2024

[2] **AmeliaTF: A Large Model and Dataset for Airport Surface Movement Forecasting** Ingrid Navarro, Pablo Ortega, Jay Patrikar, Haichuan Wang, Zelin Ye, Jong Hoon Park, Jean Oh, Sebastian Scherer, *AIAA Aviation Forum and Ascend*, 2024