Emily Kim
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EDUCATION

Carnegie Mellon University Robotics Institute — Pittsburgh, PA
Doctoral Degree — December 2025
Harvey Mudd College — Claremont, CA
Bachelor of Science – Joint Computer Science-Math — May 2019

HONORS

Uber Presidential Scholarship 2021

GRADUATE RESEARCH

Generalizing Universal Avatars with Multi-view Realistic Synthetic Data (June 2024 -)
- Lead the research as a single first author.
- Implemented a generative model for varying 3D viewpoints using 2D renders of the meshes at desired camera angle, retaining the identity from the reference image.
- Combined diffusion-based image generators with the GAN based image generator to take advantage of the controllability of the diffusion model and the 3D-consistency and realness of the GAN outputs.
- Generated 3D consistent, multi-view images of the reference subject image and control images to expand upon the Ava-256 dataset presented below.

Human Facial Expression Video Dataset for Universal Codec Avatars with Meta Reality Lab (December 2023 - June 2024)
- Made contributions to the code for public release. Implemented tests, cross ID visualization and loss calculation for cross ID evaluation, and configured code for public release. (https://github.com/facebookresearch/ava-256)
- Ran image compression analysis for delivering the data for public release.
- Contributed to data processing for effective training, such as camera, subject, and expression filtering. Dataset is summarized here. (https://about.meta.com/realitylabs/codecavatars/ava256/)
- Accepted for Poster presentation @ NeuRIPS 2024 Datasets and Benchmarks track
- Presented at CVPR Workshop (https://codec-avatars.github.io/cvpr24/)

Adversarial Learning for Identifying Failures in Object Detection Models using 3D Deformation Models (November 2022 - December 2023)
- Implemented an optimization framework that generates data for attacking the object detection model (RetinaNet, YOLO-v5) by attaching small objects on the vehicle by using PyTorch3D.
- Evaluated the model performance for detecting vehicles from satellite images via adversarial attacks using 3D deformation network, detecting failure points from the model. (Submitted to WACV 2025)

Exploring the Impact of Rendering Method and Motion Quality on Model Performance when Using a Multi-view Synthetic Data for Action Recognition (December 2021 - March 2023)
- Presented work at WACV 2024 poster session. (https://humansensinglab.github.io/REMAG/)
- Animated the raw motion capture data as 3D skinned human meshes (SMPL) and generated a neural-based rendered synthetic dataset by using a modified motion imitation model.
- Analyzed the impact of using various types of synthetic datasets in the performance of the action recognition models such as SlowFast, MViT, and X3D.

Automating physical therapy exercise correctness assessment with 3D pose reconstructed from cameras and IMU sensors (May 2021 - December 2021)
- (1) Used 3D pose reconstruction from camera and IMU sensors instead of quantitative values and (2) used thresholding methods to define the criteria for correctness rather than using features found with the machine learning algorithm.

Automating Error Classification for Physical Therapy using a camera and IMU sensors (November 2019 - May 2021)
- Presented work at EMBC 2021.

- Developed a classification model for tracking errors from physical therapy sessions of patients using videos, using OpenPose for tracking patients' motions as 2D keypoints.
- Built a Random Forest classifier to examine the performance of vision-based error detection by taking the clinicians' error annotations on exercises from each patient as labels and 2D keypoints / IMU sensor data as features.

UNDERGRAD PROJECT

Mentor Graphics, a Siemens Business Clinic Project (September 2018 - May 2019)
- Worked on a clinical project of automating the calculation of the silicon wafer yield using the product manufacturing information data via Decision Trees in Machine Learning.
- Managed large scale data using MongoDB and ran basic statistical analysis using Python and SciPy.

WORK EXPERIENCES

Learning Based Image Synthesis course TA (Teaching Assistant) *January 24, 2023 - May 10, 2023*
Carnegie Mellon University Robotics Institute Pittsburgh, PA
- Worked as a teaching assistant for Learning Based Image Synthesis at Robotics Institute, dealing with image modifications, GANs, diffusion models, and style transfer.

Teaching Assistant for Computer Vision *August 28, 2022 - December 19, 2022*
Carnegie Mellon University Robotics Institute Pittsburgh, PA
- Worked as a teaching assistant for a fundamental Computer Vision course at Robotics Institute.

Research Mentor *June 03, 2022 - August 27, 2022*
Lumiere Education Remote
- Mentored two high school students to embark on their first research. The two areas of research that the students studied were: (1) Use machine learning (random forest regression) to predict the trends of different types of cryptocurrencies along with trends of NASDAQ prices and the inflation rates. (2) Use machine learning (random forest classification) to classify the exercises using the data collected from the IMU sensors embedded in smartphones and/or smart watches.

Supply Chain Program Management Intern - SKU Rationalization Project *May 2018 - August 2018*
Juniper Networks, Inc. Sunnyvale, CA
- Used Python instead of Microsoft Excel to organize a massive amount of data in a short amount of time to do statistical analysis for SKU rationalization and presented SKU numbers that did not provide revenue. Presented results to the CFO.

Tutoring & Grading *January 2016 - May 2019*
Harvey Mudd College Claremont, CA
- Tutored for Harvey Mudd Homework Hotline and Harvey Mudd Upward Bound Program.
- Graded and tutored for Intro CS, Data Structures and Program Development, Computer Science for Insight, Computability and Logic and Physics Mechanics, Electricity & Magnetism class.

LEADERSHIP

Mentor Graphics Clinical Project (Project Manager) *May 2018 - January 2019*
Korean Student Association (KSA) *May 2018 - January 2019*
Internet Day (Volunteering Activity) *July 2018 - August 2018*