Christy L. Dunlap

Department of Mechanical Engineering

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Education

University of Arkansas **August 2021 - Present**
Ph.D in Mechanical Engineering *GPA: 4.0*

University of Arkansas **August 2017 - May 2021**
B.S. in Mechanical Engineering with Minor in Agricultural Business *GPA: 3.8*
B.S. in Mathematics with an Applied Concentration *Major GPA: 4.0*

Specialized Skills

Programming: Python, MATLAB, C++, Arduino, LaTeX, Java, LabVIEW
Machine Learning: Tensorflow, PyTorch, scikit-learn, SciPy
Relevant Python Packages: Pandas, Matplotlib, numpy, pillow, opencv

Data Analysis Experience

Graduate Research Assistant **May 2021 - Present**
University of Arkansas *Fayetteville, AR*

- Conducted research using Python-based machine learning models to analyze pool boiling image and acoustic data
- First-authored 4 journal articles and co-owner of 2 patents resulting from the research efforts
- Presented research findings at 6 conferences, including 3 paper presentations and 3 poster exhibitions

Computer Vision Projects

- Developed BubbleID; a Detectron2 instance segmentation and ocsort based framework for boiling bubble tracking and analysis (e.g., interface velocity, bubble statistics)
- Combined a custom robot with Mediapipe to mimic human poses for computer vision course project
- Used NeuS to generate 3d models from images of object for deep learning course project
- Applied k-means clustering and classification models (e.g. CNN, Transformer encoder based) to boiling images

Feature Extraction & Dimensionality Reduction

- Utilize PCA and auto encoders for reducing image size and model speed up
- Used correlations to determine relevant acoustic emission features for use in regression models (e.g. RFR, MLP, LSTM)

Temporal Data Projects

- Developed Transformer and Recurrent Neural Network (RNN) models with Connectionist Temporal Classification (CTC) loss for DNA basecalling
- Implemented LSTM models for time series acoustic regression models.

Supercomputing & High-Performance Computing (HPC)

- Benchmarked wafer-scale engine, Neocortex, using a Multi-layer perceptron (MLP) model on CPU and GPU supercomputer, Bridges2, to determine speedup

Arkansas Summer Research Institute **July 2022**

- Participated in a week of courses covering popular statistical tests and data analysis software (e.g. Python, Tableau)

HogHacks Hackathon Participant **Spring 2023**

- Developed an AI-powered solution combining YOLO detection, SORT tracking, and a generative large language model (LLM) for real-time basketball commentary and score keeping
- Placed 5th overall in the hackathon, competing against approximately 30 teams

Experience

Co-Entrepreneurship Lead **January 2024 - March 2024**
National Innovation Corps

- Conducted over 100 customer interviews to create a business model canvas and gain insight into industry thermal problems
- Participated in an 8 week entrepreneurship training course

Graduate Teaching Assistant **August 2021 - May 2022**
University of Arkansas *Fayetteville, AR*

- Led 2-3 weekly mechanical engineering labs, overseeing student activities and progress
- Mentored students in executing successful labs covering a spectrum of topics, including LabVIEW, LJLogUD, heat treatment of metals, and hardness and tensile testing

Undergraduate Teaching Assistant **August 2019 - December 2020**
University of Arkansas *Fayetteville, AR*

- Assessed and provided feedback for linear algebra assignments from an average of 80 students per semester