Selected Project Summary

Intro to Intelligent Systems:

- *CNN for Network Intrusion Detection*
  - https://github.com/aporlowski/nids-cnn/blob/main/cnn_for_nids_report.pdf

Big Data Applications/Independent Study:

- *Using Cloudmesh GAS for Speedy Generation of Hybrid Multi-Cloud Auto Generated AI Services (IEEE COMPSAC)*
  - Wrote code and paper sections for multi-cloud application hosting and benchmarking of openapi generated AI services.
  - ***Presented to NIST Big Data Working Group***
  - https://ieeexplore.ieee.org/document/9529524
  - code contributions at: https://github.com/cloudmesh/cloudmesh-openapi
- *Cloudmesh-Queue*
  - A restful service for job queueing and scheduling on hybrid clusters.
  - ***Presented to NIST Big Data Working Group***
  - https://github.com/cloudmesh/cloudmesh-queue
- *Cloudmesh-pi-burn*
  - A tool for burning and provisioning SD cards for Raspberry Pi clusters
  - https://github.com/cloudmesh/cloudmesh-pi-burn
- *Pi Tutorials*
  - Various tutorials for deploying cloud, cluster, and data science technologies on clusters of Raspberry Pis: mpi4py, openapi, Docker, K3s, pi-cluster burning, network scanning, port forwarding, user management.
  - https://cloudmesh.github.io/pi/tutorial/
  - Also, published at other online sources:
    - https://hackaday.io/project/177904-headless-rasbery-pi-cluster-from-macs/details
    - https://opensource.com/article/21/3/raspberry-pi-cluster
    - https://laszewski.medium.com/easy-raspberry-pi-cluster-setup-with-cloudmesh-from-macos-e160ac848bf
    - https://hackaday.io/project/177874-preconfigured-sdcards-for-raspberry-pi-clusters
    - https://laszewski.medium.com/easy-raspberry-pi-cluster-setup-with-cloudmesh-sdcard-burner-a2035dfea22
- *Various contributions to the Cloudmesh libraries:*
  - cloudmesh-mpi
  - cloudmesh-catalog
  - cloudmesh-inventory
  - cloudmesh-common
  - cloudmesh-pi-cluster
  - cloudmesh-azure
  - cloudmesh-aws

- cloudmesh/cloudmesh-cloud
- cloudmesh/get
- cloudmesh/cloudmesh-pi-cluster

Information Visualization:

- *Visualizing Campus Authentication Events What Happens After Two Factor Authentication Failure?*
  - Created novel authentication session parser and Sankey diagram to visualize campus multi-factor authentication failures. Over 10GB of data.
  - Can not post paper publicly.
  - Presentation starts at 11:35 https://drive.google.com/file/d/1yB7sYeG1cRlg82RxpyrE9Q2imBmN8A91/view
- *Visualization of Network Traffic for Network Analysis and Intrusion Detection*
  - Developed and described the use of treemap and chord diagram visualizations to assist network traffic analysis.
  - https://github.com/aporlowski/unhosted_project_results/blob/main/visualization-for-network-analysis-and-intrustion-detection.pdf

Informatics in Disaster and Emergency Response:

- *pi-sdr*
  - Tutorial to build a software defined radio from consumer electronic components that is capable of monitoring P25 emergency radio communications, FM, and NOAA weather radio
  - https://youtu.be/avw6MLh7hUw
  - https://github.com/aporlowski/pi-sdr#pi-sdr
- *Investigation of AI Speech-to-Text Services for P25 Radio Transmission Transcription*
  - Designed experiment to measure cloud AI speech-to-text transcription accuracy for P25 radio. Built a SDR radio system that automatically records transmissions. Tested *Amazon Transcribe* accuracy compared to human transcription.

Intro to Computer Engineering:

- *Shift CNN*
  - Replicated Shift CNN (quantized CNN) algorithm for FPGA using VHDL
  - https://youtu.be/Xfx_n0HLnqk (my part only)
  - https://github.com/aporlowski/shiftcnn/blob/main/SHIFT%20CNN-FINAL.pptx
  - https://github.com/aporlowski/pi-sdr/blob/main/README-Speech-to-Text.md#investigation-of-ai-speech-to-text-services-for-p25-radio-transmission-transcription

Engineering Cloud Computing:

- *Benchmarking AI Services Hosted via Function-as-a-Service.*
  - Implemented Scikit-learn SVM facial recognition example as a FAAS and compared performance to VM and physical machine hosted solutions.

https://github.com/aporlowski/ef-faas

Basic Data Science On-Ramp:

- *SVM and KMeans Clustering for Network Intrusion Detection*
- https://youtu.be/38GlyVSwXqQ
- https://github.com/aporlowski/unhosted_project_results/blob/main/Final_Project.ipynb