Marco Conati

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Summary

Versatile engineering graduate with skills in machine learning, software, controls, firmware, and hardware interested in challenging technical problems. Creative problem solver and dependable team player hoping to build my knowledge base and have an impact on the larger community through my work.

Education

Harvey Mudd College — *Claremont, California*

B.S. Engineering — *May 2022*

- Graduated with High Distinction
- GPA: 3.8

University of Michigan — *Ann Arbor, Michigan*

M.S. Robotics — *December 2024*

Skills/Coursework

AI: Generative Modeling, Deep Learning, and Reinforcement Learning. Proficient in Pytorch, Huggingface, and OpenAI gym

Programming: Data Structures, Algorithms, Program Development, Computer Architecture and Firmware

Engineering/Robotics: Modern Robotics, Trajectory Optimization, Controls Engineering, Digital Signal Processing, State Estimation

Research Experience

ROAHM Lab — *Ann Arbor, MI*

Graduate Research Assistant — *September 2023-Present*

- Researching methods to improve the dynamic behavior of reachability based projects in the ROAHM lab without compromising mathematical guarentees regarding safety.

Barton Research Group — *Ann Arbor, MI*

Graduate Research Assistant — *September 2023-Present*

- Designing a control strategy for a 3D additive printer specializing in conductive materials. The controller will convert electrical design parameters into physical structures, and incorporate visual feedback to ensure proper printing.

Harvey Mudd Music Information Retrieval Lab — *Claremont, CA*

Research Assistant — *Nov 2021-May 2022*

- Investigated approaches to finetune OpenAI's Jukebox model for MIR tasks with limited hardware resources
- Developed BERT models for a system to generate Chopin pieces from existing left/right hand measures

Professional Work Experience

Trellisware Technologies — *San Diego, CA*

Product Systems Engineer — *June 2022-August 2023*

- Decomposed system requirements into FPGA, DSP, and microprocessor subsystem goals
- Designed and carried out tests to evaluate the performance of new features. and providing support to promote the development of new features

Projects

Michigan Armlab — *Python, ROS2, numpy*

In a group, implemented a computer vision system, forward/inverse kinematics solver, and motion planner for a 5 DoF arm. The arm was able to successfully reach desired positions, and carry out block picking and stacking tasks.

Codified Audio Language Modeling for Instrument Recognition — *Docker, Pytorch, Python*

Used the recent Jukebox model to extract audio features from the OpenMIC dataset. Trained shallow probes to identify the presence of 20 instruments based on Jukebox features. The probes had an average validation accuracy of 92.8%

Neural Nets for Edge Sensors — *Pytorch, C++*

Served as team leader developing a entrance-security system for Syntiant Corporation as a part of Harvey Mudd's clinic program. Our system relies on data from a 9-axis Inertial Measurement Unit deployed on the door of interest and consists of an event classifier and state estimator. The state estimator uses Kalman Filtering to predict door orientation and the event classifier identifies distinct events such as door opening using a convolutional neural network.