William Cai

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Education

Stanford University, CA, *Class of 2023*

B.S. candidate | Engineering Physics (Specialty Area: Materials Science)
B.S. candidate | Mathematics
M.S. candidate | Computer Science (Artificial Intelligence Specialization)
B.S. Cumulative GPA: 3.9/4.0 || M.S. Cumulative GPA: 3.8/4.0

Skills & Interests

Skills: C, C++, Python (PyTorch), MATLAB, Git, Azure, Linux, HTML, CSS, Fusion 360, Solidworks, 3D Printing, Laser Cutting, Milling, Lathe, Metal Forming, KiCad
Interests and Activities: Hiking, Obstacle Course Racing, Airsoft

Research Experience

Stanford University, Austin Sendek (Honor Thesis Advisor) ***Sep 2022 - Current***
This Honors Thesis Project for Engineering Physics aims to build a pipeline that can make accurate predictions of the synthesizability of unlabeled datasets using a physics-based machine-learning approach that is powered by multi-task learning and meta-learning (language: Python).

Stanford University, Kwabena Boahen's Group (Stanford's Brains in Silicon lab) ***Apr 2022 - Jan 2023***
Constructed a pipeline to explore the neurons-dendrites' connectivity in Cortical mm^3 Dataset from Machine Intelligence from the Cortical Networks program to validate the super-linear memory capacity of the sequence-detecting neuromorphic computing architecture (language: Python).

Stanford International Genetically Engineered Machine competition ***Apr 2021 - Nov 2021***
Determined the theoretical yield rate of CYP6B1 protein in genetically engineered Brewer's yeast; worked on codon optimizations in Brewer's yeast for CYP6B1 from Black swallowtail and P450 Reductase from Housefly (language: MATLAB).

Stanford University, Evan Reed's Materials Computation and Theory Group ***Apr 2020 - Jun 2021***
Constructed an automated pipeline to extract desired data from the Materials Project Database and Inorganic Crystal Structure Database; used Sherlock HPC Cluster to apply unweighted and weighted Elkanoto Classifiers to predict the synthesizability of 2D inorganic materials (language: Python).

Stony Brook University, Nuclear Chemistry Laboratory (Roy Lacey's Group) ***Jul 2018 - Jun 2019***
Implemented a pipeline using the ROOT framework to quantify the background insensitivity of a correlator in measuring the chiral magnetic effect produced in the deuteron-gold and gold-gold collisions at the Relativistic Heavy Ion Collider (language: C++).

Coursework Projects

ME 102 Foundations of Product Realization, Stanford University ***Sep - Dec 2022***
This built a stamping machine using 3D printing and laser cutting. Fusion 360 was extensively used to design prototypes, simulate prototypes' mechanisms, and generate exploded assembly views.

CS 330 Deep Multi-task and Meta Learning, Stanford University ***Sep - Dec 2022***
This project applied the multitask-learning technique and Model-Agnostic Meta-Learning to train a search identification network on Azure to identify camouflaged animals (language: Python).

CS 229 Machine Learning, Stanford University ***Mar - Jun 2022***
The project entailed seagull activity classification in the Canadian and Alaskan regions and forecasting the future location of a given seagull by running an LSTM on Azure (language: Python).

MATSCI 161 Energy Materials Laboratory, Stanford University ***Mar - Jun 2022***
Made dynamic windows based on a representative electrochromic material system; characterized the windows using scanning electron microscopy (SEM), x-ray photoelectron spectroscopy (XPS), four-point probe measurements of conductivity, and electrochemical measurements (cyclic voltammetry).

ME 210 Introduction to Mechatronics, Stanford University ***Jan - Mar 2022***
The project involved building the robot's circuitry and configuring the robot's Teensy LC board that enabled it to collect balls, navigate toward a basket, and shoot balls into the basket (language: C++).

CS 224N Natural Language Processing with Deep Learning, Stanford University ***Jan - Mar 2022***
The project implemented coattention, self-attention, answer pointer network, and character embeddings into an encoder-attention-decoder architecture and evaluated it on the SQuAD dataset(language: Python).

CS 110 Principles of Computer Systems, Stanford University ***Sep - Dec 2021***
Projects involved: (1) Stanford Shell, (2) RSS News Feed Aggregation, (3) Implementing a multithreaded HTTP proxy and cache, and (4) Implementing a MapReduce framework (language: C/C++).

EE 134 Introduction to Photonics, Stanford University ***Sep - Dec 2021***

Built a Michelson interferometer and used it to measure the index of refraction of materials; in particular, the primary sample material was indium tin oxide (ITO) conducting glass.

CS 107 Computer Organization and Systems, Stanford University ***Jun - Aug 2021***

The project involved implementing two types of heap allocators from scratch: Implicit Free List Allocator and Explicit Free List Allocator. Utilizations of both types average out at > 50% (language: C).

CS 361 Engineering Design Optimization, Stanford University ***Mar - Jun 2021***

The project optimized the Weighted Elkanoto Classifier in the inorganic material synthesizability prediction problem through hyperparameter tuning (language: Python).

Extracurricular Activities

Stanford Data and Mapping for Society (Naval Sea Systems Command Project) ***Oct 2022-Current***

Project Team lead. Building a visualization platform that assists the engineers to perform predictive maintenance by applying unsupervised learning techniques on data from the auxiliary systems on vessels.

Stanford Student Robotics (Mars Rover Team) ***Sep 2019-Current***

Member of the team. Designed the camera mounts of the Rover; constructed a testing site to test the Rover's SCARA arm. University Rover Challenge (URC) Finals Qualifier in 2020. Currently working on designing and prototyping chassis for a robot that builds sand castles.

Contracted Electronics Developer (Greenberg Cosme, Woodbury, NY, US) ***Feb - May 2019***

Worked with a plastic surgeon to design and prototype a small disposable vibrating medical device that reduced pain during cosmetic surgery through vibrations. Contacted electronics manufacturers to source parts that reduced the device's cost from $3.54 to $0.63.

Awards

International Genetically Engineered Machine competition (iGEM) Silver Medal Reward, *November 2021*

University Rover Challenge (URC) 2020 Finals Qualifier, *April 2020*

AMS Certificate of Outstanding Achievement for Excellence in Atmospheric or Related Sciences, *March 2019*