

William Cai

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Education

Stanford University, CA, Class of 2024

B.S. candidate | Engineering Physics (Specialty Area: Materials Science)
B.S. candidate | Mathematics
M.S. candidate | Computer Science (Artificial Intelligence Specialization)
Undergraduate Cumulative GPA: 3.88/4.0 || Graduate Cumulative GPA: 3.78/4.0

Skills & Interests

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

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 - Current

Constructed a pipeline to explore the neurons-dendrites' connectivity in Cortical mm³ 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