

Nathan Zhao

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EDUCATION

Stanford University, School of Engineering | *B.S. in Computer Science* | Stanford, CA Sep. 2023 – Jun. 2026

- **Relevant Coursework:** Transformers United V3, Computer Organization & Systems, Polya Problem Solving Seminar, Modern Mathematics: Discrete Methods, Introduction to Probability Theory, Machine Learning, Design and Analysis of Algorithms, Deep Learning for Computer Vision
- **International/National Honors:** 3x AIME Qualifier, USA Computing Olympiad Gold (**International Top 2000**), 2x US National Chemistry Olympiad Finalist (**National Top 50**), 2x USA Biology Olympiad Semifinalist (**National Top 10%**), *Facebook Hacker Cup* 2nd Round Qualifier, Coca-Cola Scholarship Finalist, President's Volunteer Service Award Bronze
- **Research Conferences:** MIT Undergraduate Technology Research Conference, American Physics Society March Meeting, Society of Engineering Science Annual Technical Meeting, Sigma Xi Student Research Conference

TECHNICAL EXPERIENCE

Stanford Cardiac MRI Research Group | *Undergrad Researcher* | Stanford, CA September. 2023 – Present

- * Developing RegressionCNN with Pytorch to find Right Ventricular insertion points for American Heart Association Segmentation model, implementing keypoint transformations with affine matrices. Designed batch submission system in Bash

University of Delaware | *Computational Materials Research Intern* | Newark, DE Feb. 2021 – Dec. 2022

- * Led independent investigation and ran quantum simulations in Linux supercomputer for exploring anisotropy with Prof. Hossain
- * Processed and visualized large amounts of text data with MATLAB using data science and data analysis libraries. Preprint live on ChemRxiv regarding research with application in flexible electronics; Conducted additional research on defective phosphorene

Purdue University | *Biochemistry Research Intern* | West Lafayette, IN June 2022 – Aug. 2022

- * Analyzed inhibitor/enzyme activity data of *Ustilago maydis* Cdc14 Phosphatase with wet lab procedures and Excel
- * Modeled protein homologs simulation and optimized inhibitors using drug-discovery tool Molecular Operating Environment

Upwork | *Full-stack Developer & Freelancer* | Newark, DE Jul. 2020 – Nov. 2020

- * Utilizing prior experiences in competitive programming with data structures and algorithms knowledge, developed ad hoc programming problems, test cases, and solutions to train Natural Language Processing model in solving similar problems
- * Developed dynamic web applications for various initiatives and nonprofits using React and Bootstrap

PROJECTS

Commissions Website: *Full-stack website for artists, displaying gallery of works and accepting commission payments*

- Built a fullstack project with the Next.js/Tailwind/React development package with Stripe to accept real payments for various commission types, Firebase to display a creative writing/music portfolio, and MailJet for email notifications. Express, Node

Trackgrounds: *Webapp for music enthusiasts to display dynamic, animated, song-related visuals for now-playing Spotify tracks*

- Harnessed Next.js/Tailwind/React development package to create fullstack webapp displaying animated graphics from color-picking algorithm from album images. Pending Spotify API quota extension request for expanding webapp user-base

Arbitrage Bet Finder: *Command line tool for finding no-risk, profitable bets in various sports betting markets*

- Utilized Odds API in Python to request in-season sports' bookmakers pricing data. Calculated 100+ regions' no-risk arbitrages
- Wrote-up strategy for arbitrage betting accounting for vigorish, describing implicit odds, and created CLI installation

LittleLemon API Project: *Back-end developer capstone; RESTful APIs for handling HTTP requests for restaurant data*

- Employed software development lifecycle with the CI/CD pipeline to develop a Django REST with JWT authentication and a functional admin dashboard. Utilized version control, unit testing, and relational database schema for big data in MySQL
- Explored software engineering practices such as Docker, Kubernetes, cloud computing, and scalable server architectures

Curriculum Learning Equality: *Natural language model as a pedagogical tool for generating curriculum recommendations*

- Developed a model with HuggingFace BERT transformers with token-masks to match related videos, articles, and problems.
- Model testing and hyperparameter finetuning executed with hyperparameter grid search and Weights & Biases sweeps
- Engineering a retriever-reranker pipeline in Pytorch, processed data with a KNN unsupervised model to generate candidates for similar content. Then, passed candidates through supervised model, pruning for more specific course recommendations

Wheat Head Object Detection: *Computer vision for detecting wheat in images to calculate harvest yield and identify disease*

- Implemented YOLOv5 object detection computer vision model on Colab GPU with Tensorflow and HuggingFace
- Cleaned wheat head image dataset, utilizing pandas and OpenCV to format YAML data into Darknet annotations for labeling
- Assessed model accuracy in comparison to existing object detection models such as EfficientDet-D7x with mAP@[.5:.95]

WeSee: *Android app to provide a pair of eyes for the visually-impaired using speedy, lightweight, on-device object detection*

- Utilizing Kotlin and XML, with on-device computations with PyTorch object detection model to quickly characterize images from video stream. Applied image transformations and bitmappings for data preprocessing to reduce model inference time

SKILLS & INTERESTS

Computer Languages: MATLAB, Python, Java, Kotlin, HTML, CSS, JavaScript, LaTeX, Bash, Excel, C, C++ | **Tools:** Keras, Tensorflow, sklearn, PyTorch, OpenCV, pandas, Firebase, React Native, React.js, Selenium, Git, Django, REST APIs, SQL, Next.js, Tailwind, Stripe | **Languages:** English, Spanish, Mandarin | **Interests:** Finance, Algorithms, Distributed Systems, Low Latency