Marco Yang

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Passionate and fast-learning CS student at Caltech. Previous work: Computer vision research with generative diffusion models and video action recognition in the Caltech Vision Lab, software development for educational video game platform.

EDUCATION

California Institute of Technology *Pasadena, CA* June 2026

Computer Science GPA: 3.91

SKILLS

Languages C, C++, Java, Python, Javascript, Typescript, MATLAB, Mathematica

Frameworks React, Meteor.js, Node.js, MongoDB, Dropwizard, Pytorch, Tensorflow, Selenium, Flask, Langchain, Pinecone

Misc. Linux, Shell scripting, Git, Web scraping, Computer Vision, Generative Diffusion Models, Full-stack, LLM, RAG, AWS

EXPERIENCE

ML Researcher | *Caltech Vision Lab - Dr. Pietro Perona, Dr. Markus Marks* Mar 2024 - Dec 2024

- Researched novel approach to cross-domain video action recognition utilizing generative diffusion models
- Injected into CompVis' Stable Diffusion 1.5 and Hugging Face implementation of Modelscope (text-to-video model)
- Implemented multiple classification heads (MLP, 3D CNN, Transformer) for action classification on diffusion features
- Used PyTorch, WandB, Huggingface

Full Stack Software Developer Intern | *Fathomd* Aug 2021 - Jun 2023

- Developed educational video games for business schools like MIT Sloan, with a focus on the instructor dashboard.
- Performed full-stack development, including creating React components, adding routes for new pages in the frontend using Meteor (Ironrouter), developing REST API endpoints, and modifying DTO/DAO layers in a Dropwizard Java backend.
- Implemented a redesigned instructor dashboard with new "classes" feature, enabling instructors to manage tailored game sessions for different classes.
- Collaborated with a team using tools like Jira and GitLab, gaining experience in agile software development workflows.

PROJECTS

Caltech Course LLM Agent | **github** | **link**

- LLM with retrieval-augmented generation (RAG) that answers Caltech course questions
- Scraped and embedded two years of internal course reviews as well as latest course catalog into vector database
- Custom search algorithm using both vector embedding cosine similarity as well as lexical search (BM25)
- Built with Python, Flask, Langchain/Langgraph, OpenAI API, Deepseek API, Vite, Typescript, React, Shadcn

Astro Duel Clone

- Clone of the local multi-player video game Astro Duel written in C and and compiled to web assembly for browsers
- Coded physics engine for mass, bodies, collision handling, momentum, force, and torque, and graphics using SDL

Tennis Ranker | **github** | **link**

- Production web app that tracks tennis match scores and automatically rank players
- Features: user accounts, multiple tournaments/sessions, automatic leaderboards and skill comparison using BFS
- Built with Meteor, MongoDB, React, Typescript, Tailwind CSS; deployed on Linux server with DigitalOcean + AWS SES

Caltehc Course Graph | **github** | **link**

- Interactive prerequisite finder for Caltech courses by visualizing as a graph using DFS

RELEVANT COURSEWORK

CS 2 (Data Structures), CS 3 (Programming in C), CS 24 (Computing Systems), ACM 104 (Applied Linear Algebra), CS 38 (Algorithms), CS 172 (Distributed Computing), CS 148: (Large Language and Vision Models), CS 159 (Advanced Machine Learning)

HONORS & ACCOLADES

William Lowell Putnam Mathematical Competition | *Top 1000 (scored 19 points)* December 2023

USA Computing Olympiad | *Gold Division* February 2021

American Math Competition/American Invitational Math Exam | *AIME Qualifier* November 2021

- Qualified for American Invitational Math Exam 3 times (top 2.5% of all participants, top 0.1% of pre-college students).
- Highest score of 6 on the AIME (top 1% of participants, top 0.05% of pre-college students)