Zijie Cai

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EDUCATION

University of Maryland, College Park — Aug 2024 – May 2025
*Master of Science in Computer Science; **GPA: 3.67 / 4.00*** — *College Park, MD*

University of Maryland, College Park — Aug 2020 – May 2024
*Bachelor of Science in Computer Science – Machine Learning Specialization; **GPA: 3.67 / 4.00*** — *College Park, MD*
- Minor in Mathematics; GPA: 3.72 / 4.00
- Dean's List (Multiple Semesters)
- Relevant Coursework: Machine Learning, Deep Learning, Computer Vision, Computational Imaging, Computational Biology, Algorithms, Data Structures, Parallel Computing, Applied Probability, Linear Algebra

RESEARCH EXPERIENCE

Intelligent Sensing Laboratory, University of Maryland | *Website* — College Park, MD
Research Assistant – Multimodal Foundation Models & Machine Perception — *Apr 2023 – Present*
- **Master's Paper:** *Underwater Monocular Metric Depth Estimation: Benchmarks and Fine-Tuning* [arXiv]
- Developed deep learning models for underwater depth estimation using aligned RGB and sonar data.
- Led experiments and benchmarking using synthetic and real-world RGB-D and acoustic sonar datasets.
- Presented weekly progress and co-authored publications under Prof. Christopher Metzler.
- Collaborated on multi-modal pipelines for Autonomous Underwater Vehicle-based underwater perception.

WORK EXPERIENCE

Internal Drive Inc. | *Website* — College Park, MD
Program Lead – AI & Machine Learning — *May 2025 – Present*
- Delivered project-based instruction on **Python**, **machine learning**, and **prompt engineering**, teaching students to build AI tools using the **OpenAI API**, **Keras**, **NumPy**, and **Pandas**.
- Designed and led hands-on labs in **computer vision**, **natural language processing**, and **text/image/audio generation** with tools including **Teachable Machine**, and **TTS/STT** APIs.
- Mentored diverse student teams through full ML pipelines—data preprocessing, model development, API integration, debugging, and iterative refinement—while fostering technical communication and collaboration.

PROJECTS

Gesture Control for Apple TV – *OpenCV, MediaPipe, Numpy | GitHub*
- Developed a real-time gesture control interface using **MediaPipe**, **OpenCV**, and a webcam stream to detect and classify custom hand gestures for Apple TV interaction.
- Integrated with **pyatv** to send remote commands over Wi-Fi; implemented multithreaded control logic for smooth performance, with optimizations for gesture stability and input latency.

Interactive Class Planning Tool – *JavaScript, HTML/CSS, Web Scraping | Website*
- Designed and deployed a responsive, student-facing web app for visualizing class schedules, commute times, and time conflicts using a dynamic interface and persistent state.
- Built frontend with **HTML/CSS/JavaScript** and integrated backend course datasets via **Python scraping pipelines**, **JSON APIs**, and custom data parsers; focused on UX and decision-making clarity.

Protein Structure Prediction with LLMs – *ESM-2, Biopython, Colab | Colab*
- Built an interactive Colab tool to evaluate protein contact map predictions from Meta's **ESM-2** models across varying parameter sizes (150M–15B) against multiple sequence alignments from the **Pfam** database.
- Automated MSA retrieval, model inference, and contact map visualization; implemented precision/recall and overlap metrics with threshold tuning to quantify alignment consistency across ESM-2 model scales.

SKILLS

Technical: Git, Linux, Docker, SQL, Jupyter, PyTorch, TensorFlow, Scikit-learn, NumPy, Pandas, Microsoft Office
Languages: English (Professional), Mandarin (Native)