Zian Zeng

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Skills

- **Programming Languages & Frameworks & Libraries:** Typescript, JavaScript, Python, Java, C/C++, HTML, SQL, C#, ASP.NET Core, Angular, React, Meteor, Bootstrap, PyTorchLighting, Hydra, pandas, NumPy, SciPy, Matplotlib, sklearn, seaborn, Unreal Engine, Unity • **Software:** JupyterLab, IntelliJ IDEA, Eclipse, PyCharm, Putty, Google Suite, Microsoft Office Suite, Photoshop, Premiere, Audition, Cubase, Pro Tools, Hitfilm, Polarr • **Hardware:** Meta Quest 3, Arduino, Raspberry Pi, PLC • **OS**: Windows, MacOS, Unix, Linux (Ubuntu) • **Languages:** English, Mandarin, Cantonese

Experience

Student Researcher	**University of Southern California: GLAMOR Lab - Viterbi Summer Undergraduate Research Experience (SURE)**	**06/2024 - 09/2024** *Los Angeles, CA, USA*

- Contributed to developing **neuro-symbolic models** for American Sign Language (ASL) understanding tasks, achieving **91% accuracy on isolated sign recognition (ISR)**, **14% accuracy on unseen sign feature prediction**, and **36% accuracy on Youtube-ASL video topic classification** using the **ASL Knowledge Graph (ASLKG)**.
- Designed and experimented with advanced **data augmentation** techniques (e.g., SMOTE, GAN, ratio tuning) and **decoding algorithms** (e.g., Viterbi, ensemble methods) to enhance model robustness and improve ISR and continuous sign recognition. Experimented with over **40 model architectures**, integrating diverse embedding strategies (e.g., TransE, ComplEx) and input types to optimize performance. Laid groundwork for **phoneme-to-sign prediction pipelines** for continuous and isolated signs.
- Engaged with deaf research groups at the University of Boston to refine models and ensure real-world relevance.

Student Researcher	**University of Missouri – Columbia: VIMAN Lab - Research Experiences for Undergraduates (REU) in Consumer Networking Technologies Program**	**05/2023 -10/2024** *Columbia, MO, USA*

- **Remote Project**: Designed and implemented **Chain-of-Query (CoQ)** prompting method, improving small language models (LMs) for multi-hop open-domain question answering (ODQA). CoQ increased QA performance by up to **5.4% on small LMs** and **11.5% on large LMs**, optimizing retrieval with context-aware subqueries and enhancing real-world cost-effectiveness.
  - **Baseline Model Experiments**: Led experiments of LMs (Qwen2, Llama 2/3, Flan-T5, GPT; 60M–13B) on benchmark datasets (NatureQA, HotPotQA, Fever, MusiQue), achieving high performance and managing all baseline testing.
  - **Optimized Data Processing & Pipelines**: Designed GPU algorithms for the pipeline reducing inferencing time from 300–500 hours to 7–12 hours, solved memory constraints on large datasets, and implemented advanced pipelines for question decomposition and annotation generation.
- **REU Project (in-person)**: To automate the medical research process and improve human performance in domain knowledge discovery - COVID-19 on a publication analytics science gateway - KnowCOVID-19, developed **Vidura Advisor Framework (VAF)**, a chatbot dialog design using **Large Language Models (LLM) for information retrieval, summary and question-answer tasks** that fine-tuned using Reinforcement Learning from Human Feedback (**RLHF**).
  - Helped with the development of the KnowCOVID-19 website, a publication analytics website that mines literature related to the COVID-19 virus, using **Python Flask** services for ML models, **Java Maven microservice** for the application, **Java Spring boot** as the back-end and **Angular** as the front-end.

Student Researcher	**University of Hawaii at Manoa: Hawaii Digital Health Lab**	**08/2023 - Current** *Honolulu, HI, USA*

- Closing a first-author publication that used **explainable AI** methods to enhance and demonstrate the decision-making process of the popular state-of-the-art deep learning models like **CNN** and **VIT** that reach **80-90%** accuracy on Autism Spectrum Disorder (ASD) eye tracking dataset for classification tasks. Also, self-proposed an Institutional Review Board **(IRB) for human subject protocol and conducted IRB experiment.**
- Performed experiments with human action classification datasets and projects.
- Collaborating on **Autism-ADHD HumanInTheLoop crowdsourcing and multimodal** project.

Software Engineer Intern	**Honolulu Fire Department**	*Honolulu, HI, USA* **01/2023 -05/2023**

- Designed and developed an enterprise-level one-stop web dashboard application for *Honolulu Fire Department Headquarter* (mainly for, the fire chiefs, fire prevention office, and public information office) that provides a rich visual

summary of incident and performance-related data powered by the latest technologies of **Angular, C#, ASP.NET Core, Microsoft IIS Databases, Microsoft SQL Server,** Angular Material, ApexCharts, and Google map.

- Data extracted using **C# MVC Web API** from SQL databases for **Computer Aided Dispatch (CAD) system**, **Records Management System (RMS)**, and **Geographic Information System (GIS)**.
- Developed <u>Public Information Office (PIO) Monitored Major Incidents Email Alert **C# Console App**</u> in addition to the internal dashboard which can send monitored incident information in a table format and an auto-generated report for the PIO team to get the first-hand information at the scene on their mobile phone through email.
  - The application was developed using custom-made **C# API** similar to the dashboard and extracted data from the same sources. Also, it used the **SMTP** approach to send emails and Windows task scheduler to trigger the app on the server.
- Developed an <u>Outlook Email Fetch Python program</u> that calculates the number of incident inquiries received from the media and measures the Public Information Office's response time. It also has the ability to find specific emails and their contents based on keyword searches.

| **Supplementary Instruction Leader** | **Windward Community College** | *Kaneohe, HI, USA* | **12/2020 - 12/2022** |

- Facilitated weekly group study sessions with intriguing group activities and office hours for ICS 111 - Intro to Computer Science (mainly focused on Java).
- Helped over 40+ students over 6 semesters. Students who attended the sessions <u>showed a half to 2 letter grade increase</u> compared to their previous semester and students who did not attend. In addition, on average, students generally learn at least two transferable skills.

| **Math Lab Tutor** | **Windward Community College** | *Kaneohe, HI, USA* | **01/2022 - 12/2022** |

- Assist students with all levels of math <u>up to calculus II in a one-to-one setting</u>.
- Helped over 20+ students over 3 semesters.
- Hosted the math lab independently throughout the entire duration of the summer semester.

| **IT Assistant** | **Blue Planet Energy** | *Honolulu, HI, USA* | **12/2018 - 07/2019** |

- Interned and transitioned to work part-time
- Assisted in designing and developing the prototype of a monitoring dashboard and control system on external display panels of a high-voltage solar battery system and extracting data from outdated web applications by employing **Python**, **Raspberry Pi,** and **PLC**
- Managed and updated inventory & sales data through business level cloud serviced software

Education

| **Computer Science Major, Business Minor** | **University of Hawaii at Manoa** | *Honolulu, HI, USA* | **08/2020 - Current** |

- **GPA**: **3.87**/4   • Data Science Track

Publication

- Lee Kezar, Nidhi Munikote, <u>**Zian Zeng**</u>, Zed Sehyr, Naomi Caselli, Jesse Thomason. "The American Sign Language Knowledge Graph: Infusing ASL Models with Linguistic Knowledge." Findings of *Annual Conference of the Nations of the Americas Chapter of the Association for Computational Linguistics (NAACL) 2025*. <u>Accepted</u>.
- Rithika Akula, Roland Oruche, <u>**Zian Zeng**</u>, Yuanxun Zhang, Marcos Zampieri, and Prasad Calyam. "Chain-of-Query Prompting for Efficient Small Language Models in Multi-Hop Open-Domain Question Answering". *From Theory to Practice: Workshop on Large Language and Foundation Models, 2024 IEEE International Conference on Big Data (**IEEE BigData**). November 2024*. <u>Accepted</u>.
- Roland Oruche, Xiyao Cheng, <u>**Zian Zeng**</u>, Audrey Vazzana, Md Ashraful Goni, Wang Shibo, Keerthana Goruganthu, Kerk Kee, and Prasad Calyam. "Chatbot Dialog Design for Improved Human Performance in Domain Knowledge Discovery". *IEEE Transactions on Human-Machine Systems (**IEEE THMS**). December 2024.* <u>Accepted.</u>
- <u>**Zian Zeng**</u>, Peter Yiğitcan Washington. "Exploring Human and. AI Performance in ASD Diagnosis: A Comparative Study of Explainability Methods in CNN and Vision Transformers Using Eye-Tracking Data". Under review at the Journal of Medical Internet Research (**JMIR**).

Certificates/Awards

- **Dean's List** - University of Hawaii at Manoa (2021-Present)
- **AI4ALL** - Discover AI, Apply AI, Change Maker: Certificate of Competence (2022, 2023)
- College Reading & Learning Association (**CRLA**) Certified Level 1 Tutor (2022)
- Agri-Pharmatech Plant-Food Production and Technology: Certificate of Competence (2020)
- High School Film Festival Best Picture 2018, 2019; Best Editing (personal award) 2018