Jiayuan Liu

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Education

Olin College of Engineering *Sept 2021 – May 2025*
B.S in Electrical and Computer Engineering

- GPA: 3.82/4.0
- Research Advisor: Prof. Andrea Cuadra

Research

LLM Generative Tutor for Online Teaching *Needham, MA*
Student Researcher @ Olin Plai Lab *May 2024 – Present*

- Utilized TSCC online ESL class corpus data as a benchmark to evaluate and compare ChatGPT-4o's ability to display empathy towards students versus human tutors.
- Investigated how varying levels of student personal information disclosure affect the chatbot tutor's responses.
- Enhanced the software system for interacting with the ChatGPT-4o API, enabling conversation simulation and analysis to identify potential biases related to gender and racial groups.
- Evaluated quantitative metrics of simulated conversations between generative students and tutors using various statistical tests.
- Drafted a research paper detailing the methodology and findings of the experiment.

Water Treatment Chemical Detection and Preservation *Fort Myers, FL*
Research and Development Intern @ Watts Water Technologies *May 2023 – Sept 2023*

- Designed and conducted experiments to test a DPD preservation method on a chlorine colorimetry instrument (CLX).
- Designed and prototyped PCBs to automate the detection process of PFAS (Per- and Polyfluoroalkyl Substances) in drinking water.

Batch Reverse Osmosis System Building *Needham, MA*
Student Researcher @ Olin Water Desalination Lab *Oct 2021 – Dec 2023*

- Integrated flowmeters, conductivity probes, and pressure sensors into a customized reverse osmosis (RO) apparatus to model and monitor water chemistry and mechanical characteristics in the desalination cycle.
- Automated batch reverse osmosis process using MATLAB-controlled Arduino and relays to control solenoid valves, and analyzed sensors data collected with DAQ.

Relevant Skills

- **Programming Languages:** Python, MATLAB, C++, Swift, HTML/CSS
- **Hardware Design:** KiCad, SPICE, Microcontroller Programming (STM32, Arduino, Raspberry Pi), VLSI, Verilog HDL, FPGA Programming, PCB Assembly
- **Design & Prototyping:** Figma, Adobe Illustrator, Adobe Photoshop, Human-Centered Design, User Testing, Animation Design, Unity, Phaser, SolidWorks, OnShape, 3D Printing, Laser Cutting

Experience and Activities

Teaching Assistant, Quantitative Engineering Analysis 3 *2023 Fall, 2024 Fall*
Olin College of Engineering

- Developed mini-lectures on solving ODE systems and their applications in engineering.
- Held weekly office hours to provide additional support and answer student questions.

Personal Tutor, Applied Mathematics for Musicians *2023 Fall*
Berklee Online Program

- Helped music students develop math skills related to music theory.

Teaching Assistant, Quantitative Engineering Analysis 1 *2022 Fall*
Olin College of Engineering

- Collaborated with the teaching team to create animations and review materials for better understanding of linear algebra concepts.
- Hosted 5 hours of office hours weekly to assist with projects and homework.

Volunteer Teacher, SPARK Program *2018 - 2024*
China Social Assistance Foundation

- Conducted weekly small-group online lessons for primary students from underserved areas, designing games to make lessons more engaging.

Co-founder, Ethereal Health Media Group *2019 - 2021*

- Created original blog articles and videos to raise social awareness on accessibility, with a focus on education for children with disabilities, accessible product design, and the history of disability activism.

Projects

Affordable Hearing Loss Early Detection Solution *GitHub*
Olin College of Engieering ADE Team & Solar Ear

- Developed PCB board prototype for accessible and affordable early childhood hearing loss detection device in Guatemala.
- Manually assembled and tested mixed analog and digital PCB boards for data acquisition.
- Collaborated with the design team on handheld device prototype testing through co-design interviews.
- **Tools Used**: KiCad, LTSpice, Figma

ASL Immersive Classroom Product Proposal

- Conducted in-depth interviews with various ASL interpreters to understand the needs and values of the ASL community.
- Engaged in iterative co-design with ASL interpreters, resulting in a proposal for an ASL Immersion Classroom model, supported by visual and physical prototypes.
- **Tools Used**: Figma, laser cutter

"Brailldle, Braille Transilator Cell *Brailldle*
MakeMIT Hackathon

- Designed and prototyped a computer vision-based Braille translator in a 24-hour hackathon, aimed at helping new Braille learners translate visual text into physical information.
- **Tools Used**: Python(OpenCV) Arduino, servo motor

MOSFET Simulator for Microelectronics Learning Visualization *MOSFET Simulator*

- Assisted in designing a MOSFET circuit simulator that animates current and voltage changes across five basic circuit configurations, enhancing visualization for introductory microelectronics students.
- **Tools Used**: Javascript

"Prism Pines", Youth Gender Education Game *Prism-Pines*
Olin PInT Group & OUT Maine

- Designed a 2D web-based educational RPG, "Prism Pines," for children aged 9-13 to learn about gender identity, in collaboration with OUT Maine, an organization supporting LGBTQ+ youth.
- Conducted in-depth interviews with users and volunteers to ensure diverse gender representation in the game.
- **Tools Used**: C#, Unity, Adobe Photoshop

Awards and Scholarship

1st Place, 2022 MakeMIT Hackathon *$600*
1st Place, National MWLC Competition (Olin Water Desalination Lab) *$150,000*
Recipiant, Merit-Based Olin Tuition Scholarship (Annual) *$30,000*