Frank Liu

I am a Ph.D. Student at Arizona State University, advised by Robert LiKamWa in the Meteor Studio. I am interested in enhancing human computer interaction experiences through mixed reality and machine learning, advancing education and encouraging overall health and wellness. I enjoy working on projects that incorporate my diverse skillset in signal processing, physical prototyping, machine learning and human-computer interaction.

PhD Candidate
Electrical, Computer & Energy Engineering
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EDUCATION

PhD 2018 - Present	Computer Engineering, Arizona State University Advisor: Robert LiKamWa
BS 2014 - 2018	Electrical Engineering – with Departmental Honors, University of Washington Advisor: Hanchuan Li, Shwetak Patel
Summer 2020	Lean Six Sigma Green Belt
Summer 2016	University of California, Berkeley Courses taken: Python and Big Data, Biostatistics

SELECTED PEER-REVIEWED PUBLICATIONS

P4 *Geppetteau: Enabling haptic perceptions of virtual fluids in various vessel profiles using a string-driven haptic interface*
Shahabedin Sagheb*, **Frank Wencheng Liu***, Alex Vuong, Shiling Dai, Ryan Wirjadi, Yueming Bao, Robert Likamwa
TEI '23: Proceedings of the Seventeenth International Conference on Tangible, Embedded, and Embodied Interaction, Warsaw, Poland

P3 *Spatial Audio Empowered Smart speakers with Xblock - A Pose-Adaptive Crosstalk Cancellation Algorithm for Free-moving Users*
Frank Wencheng Liu*, Anish Narsipur*, Andrew Kemeklis, Lucy Song, Robert Likamwa
CPS-IoT Week '23: 2nd ACM International Workshop on Intelligent Acoustic Systems and Applications, San Antonio, Texas

P2 *SWISH: A shifting-weight interface of simulated hydrodynamics for haptic perception of virtual fluid vessels*
Shahabedin Sagheb, **Frank Wencheng Liu,** Alireza Bahremand, Assegid Kidane, Robert LiKamWa
ACM UIST 2019, New Orleans, Louisiana

P1 *SoberComm: Exploring the Feasibility of Facilitating Alcohol Dependent Patients to Improve Family Communication using Mobile Phones*
Chuang-Wen You, Hung-Yeh Lin, Yaliang Chuang, Yi-Ching Huang, Jui-Ting Tsai, Shan Jean Wu, Chia-Hua Kuo, Ming-Chyi Huang, **Frank Wencheng Liu**, Jane Yung-Jen Hsu, Hui-Ching Wu.
ACM Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT) September 2019

HONORS & AWARDS

Dean's Fellowship, Arizona State University
- Awarded to top 4% of admitted graduate students with significant leadership and research capabilities

Peter E. Crouch Excellence Fund, 2020-2021, Arizona State University
Ira A. Fulton Fellowship, 2019-2020, Arizona State University
Herbold Foundation Fellowship, 2019-2020, Arizona State University
Engineering Graduate Fellowship, 2019-2021, Arizona State University

Priscilla and Melvin Wilson Endowed Scholar, University of Washington
IEEE HKN Honors Society, University of Washington
- Scholastic achievement in the top 30% of graduating class

Husky Leadership Certificate, University of Washington

WORKING EXPERIENCE

Summer 2022	OPPO (InnoPeak Technology), Pal Alto, California Research Intern Worked on developing state-of-the-art gesture recognition for smartwatch applications
Summer 2020	Mochi Fresh, Tempe, Arizona Independent Consultant Utilizing DMAIC, I developed workflow optimizations to reduce restaurant variability and waste. Through my contributions, Mochi Fresh nearly doubled revenue and halved drink making times.
Summer 2019	Clobotics, Bellevue, Washington Computer Vision and Machine Learning Research Intern. Shipped an end to end price tag decoding system for price and barcode reading for both android and GCP Created and labeled US retail price tag dataset for training and testing.
Summer 2018	National Taiwan University - IoX Center, Gongguan, Taiwan Research Intern. Mentor: Professor Bing You Award of Excellence: Significant contributions in shipping android application SoberComm, allows alcohol dependent individuals and their family members to monitor alcohol usage.
Spring 2018	Roxy Device, Seattle, Washington Startup Intern. Lead generation and public outreach for customer acquisition. Built, assembled, and QA tested Roxy Device hardware systems.
Winter 2017	Microsoft, Redmond, Washington Consultant. Created labs, lessons and course content for the “Introduction to Device Programming” EDX (MICROSOFT COURSE) [DEV295X] using Microsoft’s IOT Pack for Raspberry Pi for audience of thousand+ students.

RESEARCH FUNDING

Principal Investigator, 2023 ASU Changemaker Community Action Grant (Awarded)
Project Description: VR Club addresses the challenge of inadequately equipped classrooms and low-resource schools by pioneering virtual and augmented reality science labs. In underserved communities, where traditional lab equipment is scarce, this initiative harnesses augmented and virtual reality to provide immersive scientific experiences. Through these virtual labs, students can conduct experiments, visualize intricate concepts, and engage in interactive learning, all without physical apparatus limitations. This innovative solution not only overcomes resource constraints but also ensures equal access to quality education. We empower students to cocreate their own science educations, developing technology literacy and reinforcing science concepts. We envision educators using the experiences that the students have built in the classroom to empower other students learning.

Funding Amount: $2,500

Mentor, 2023-2024 ASU Athletics Research Grant, won by Micaela Leong
Project Description: The "VR Brain" project tackles the challenge of limited student exposure to real brains until medical school and the spatial constraints of traditional textbook images. Utilizing Virtual Reality (VR) technology, the initiative provides students with an immersive, three-dimensional experience, addressing the shortcomings of conventional methods. By offering early access to neuroanatomy through dynamic VR simulations, VR Brain aims to bridge the knowledge gap, allowing students to explore and understand the complexities of the brain's structure and functionality in an interactive and comprehensive manner. This marks an advancement in neuroanatomy education towards a more engaging and accessible learning experience.

Funding Amount: $1,500

PATENTS

US 11,462,128 B2: **Method and Apparatus for Simulated Hydrodynamics in Mixed – Reality Fluid Vessels**
Robert LiKamWa, Shahabedin Sagheb, Alireza Bahremand, Byron Lahey, **Frank Wencheng Liu**, Assegid Kidane

TEACHING EXPERIENCE

Arizona State University	Fall 2023: Teaching Assistant for AME 494: “Spatial Audio for XR” and AME 360 "Designing Mixed-Reality Experiences” Fall 2022, Spring 2023: Co-Instructor for AME551, “Designing Extended-Reality Experiences” Fall 2019: Teaching Assistant for AME 494, “Musical Microprocessors” Spring 2019: Teaching Assistant for AME 394, “Introduction to Mixed Reality”
University of Washington	Fall 2016, Spring 2017, Spring 2018: Grader and Teaching Assistant for EE215, “Introduction to Circuits”
Coding with Kids	Spring 2017, Classroom Instructor Taught coding course curriculum for scratch at local Seattle elementary schools.

SERVICE

Lead	2023, Led an interdisciplinary GenAI Student Committee at ASU, fostering discussions among PhD students to address AI-related concerns and shape university policies, enhancing support for graduate research involving AI tools like GenAI and ChatGPT.
Volunteer	Hotmobile 2022, Poster and Demo Student Organizer TEI 2019
Mentor	Summer 2019, Advanced Robotics at the University of Washington Summer 2019. Hacklodge Seattle
Member	Fall 2017 – Spring 2018, The College of Engineering Student Advisory Council at University of Washington Interviewed students and faculty about mental health on campus and prepared a recommendation report

INVITED TALKS

March 2024	Keynote Speaker Panel: "Student Perspective on the Future of Education" For the Future of Learning Community Fest at ASU
December 2023	Exploring Generative AI in Education Through a Student Lens Speaker panel presented at Empowering Learners in AI Conference
October 2023	VR Club – Teaching VR in Highschools and Developing the Next Generation of Learners Presented for EdPlus at ASU
April 2023	A Stem Education You can Feel: Bringing Chemistry, Fluids, and Haptics into VR Learning
April 2022	Digital Culture Speaker Series: A metaverse you can feel, building haptics for mixed reality
Scholar-Donor	From my exemplary leadership and service on campus, I was personally invited by Michael Bragg, Dean of the College of Engineering at UW, as a speaker for the 2017-2018 Scholar-Donor Recognition Luncheon.

LEADERSHIP

TedXASU Organizing Team Spring 2019	Event with 1000+ tickets sold. Advised the development for the TedxASU application on android and iOS. Assisted in speaker selection, providing insights to the rest of the organizing team. Served in full capacity for event setup and takedown
Sunhacks Organizing Team Fall 2018	Lead marketing campaigns selling out tickets for 300+ participants Organized the largest hackathon in Phoenix Area; Sunhacks, ASU's 36-hour hackathon
Advanced Robotics at the University of Washington Spring 2017 – Summer 2018	Annotated meetings and weekly sprints coordinating 90 members Raised over 18,000 in funding through philanthropy efforts and sponsorships Refiller Robot Lead; Designed and conducted CAD reviews; wrote embedded software (C, C++, Arduino) for robot control systems Summer 2018 Placed 3rd in International Regionals| Summer 2017 Placed 31st out of 241 at International DJI Robomasters competition in Shenzhen, China

REFERENCES

Robert LiKamWa	likamwa@asu.edu
Mina Johnson-Glenberg	Mina.Johnson@asu.edu
Shwetak Patel	shwetak@cs.washington.edu