

Yujia Liu

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EDUCATION

Tsinghua University, Beijing, China

Sep 2022 – July 2025

M.A. in Information Art and Design

- CGPA: 3.92 / 4.00
- Advisor: Prof. Yingqing Xu and Prof. Chun Yu

Tsinghua University, Beijing, China

Aug 2017 – July 2022

BEng in Automation Engineering & BA in Industrial Design (Double Major)

- CGPA: 3.60 / 4.00
- Advisor: Prof. Hong Wang, Prof. Yingqing Xu, and Prof. Lei Zhang

RESEARCH INTERESTS

Areas	Human-AI Interaction, AR/VR, Fabrication, Affective Computing, Aesthetics Computing
Methods	Large Language Models, AI Systems, Engineering, 3D Printing, Grounded Theory

PUBLICATIONS

- [1] 3D-Mirrorcle: Bridging the Virtual and Real through Depth Alignment in Smart Mirror Systems.
Yujia Liu, Qi Xin, Chenzhuo Xiang, Yu Zhang, Lunyiu Nie, Xuhai Xu, Yingqing Xu.
(In submission to ACM CHI'25). [\[PDF\]](#) [\[Video\]](#)
- [2] BrickSmart: Leveraging Generative AI to Support Children's Spatial Language Learning in Family Block Play.
Yujia Liu*, Siyu Zha*, Yuewen Zhang, Yanjin Wang, Yangming Zhang, Qi Xin, Lunyiu Nie, Chao Zhang, Yingqing Xu.
(In submission to ACM CHI'25). [\[PDF\]](#) [\[Video\]](#)
- [3] Mentigo: An Intelligent Agent for Mentoring Students in the Creative Problem Solving Process.
Siyu Zha*, **Yujia Liu***, Chengbo Zheng, Jiaqi Xu, Fuze Yu, Jiangtao Gong, Yingqing Xu.
(In submission to ACM CHI'25). [\[PDF\]](#)
- [4] Xstrings: 3D printing cable-driven mechanism for actuation, deformation, and manipulation.
Jiaji Li, Shuyue Feng, Maxine Alexandra Perroni-Scharf, **Yujia Liu**, Emily Guan, Guanyun Wang, Stefanie Mueller.
(In submission to ACM CHI'25). [\[PDF\]](#) [\[Video\]](#)
- [5] MindShift: Leveraging Large Language Models for Mental-States-Based Problematic Smartphone Use Intervention.
Ruolan Wu, Chun Yu, Xiaole Pan, **Yujia Liu**, Ningning Zhang, Yue Fu, Yuhan Wang, Zhi Zheng, Li Chen, Qiaolei Jiang, Xuhai Xu, Yuanchun Shi.
(ACM CHI'24) In *Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems*. [\[PDF\]](#)
- [6] KeyFlow: Acoustic Motion Sensing for Cursor Control on Any Keyboard.
Yujia Liu*, Qihang Shan*, Zhihao Yao, Qiuyu Lu.
(ACM UIST'24 Poster) In *Adjunct Proceedings of the 37th Annual ACM Symposium on User Interface Software and Technology*. [\[PDF\]](#)
- [7] FlexEOP: Flexible Shape-changing Actuator using Embedded Electroosmotic Pumps.
Tianyu Yu, Yang Liu, **Yujia Liu**, Qiuyu Lu, Teng Han, Haipeng Mi.
(ACM UIST'24 Demo) In *Adjunct Proceedings of the 37th Annual ACM Symposium on User Interface Software and Technology*. [\[PDF\]](#)
- [8] More Than Shapes: Exploring the Tactile Parameters of Art Appreciation for the Visually Impaired.
MingYu Cui, Chao Yuan, **Yujia Liu**, Yingying Zheng.
(ACM UbiComp'24 Workshop) In *Companion of the 2024 on ACM International Joint Conference on Pervasive and Ubiquitous Computing*. [\[PDF\]](#)

PROJECT EXPERIENCE

- [P.1] **[Lead] Enhancing AR in Smart Mirrors with Depth-Aligned 3D Visualization** 08/2022 - Present
As the project leader of this startup project, we initially aimed to create a smart mirror for makeup guidance but encountered a depth mismatch issue with contour displays. To resolve this, we developed 3DMirrorcle system, implementing lenticular grating for a 3D display and developed algorithms for mirror reflection alignment and lenticular grating segmentation to align AR content with users' reflections. Beyond makeup, this system was tested in various user studies, showing superior performance across different motion ranges compared to existing solutions.
This work has been submitted to ACM CHI'25, with me being the first author.

- [P.2] [Lead] 3D LEGO Instruction Generation and Conducting in real family learning.** 10/2023 - Present
This is also a startup project I led, initially focusing on using generative models to create personalized LEGO instructions, promoting creativity and eco-friendly reuse of LEGO bricks. We later expanded the app to support children's spatial language learning in family block play using LLM and Gen-AI technology. A lab experiment with 24 parent-child pairs (children aged 6-8) demonstrated its effectiveness in enhancing spatial language skills. This work has been submitted to ACM CHI'25, with me being the first author.
- [P.3] [Lead] LLM Agent for Mentoring Students in the Creative ProblemSolving Process.** 05/2024 - Present
Co-led by Siyu Zha and me, this project aims to use LLMs to support education. We developed Mentigo, an interactive agent designed to guide middle school students through the creative problem-solving (CPS) process. The system is built on a dataset of real classroom interactions and an agentic workflow. Its effectiveness was tested through a comparative experiment with 12 students and reviewed by five expert teachers, showing significant improvements in student engagement and creative outcomes. This work has been submitted to ACM CHI'25, with me being the co-first author.
- [P.4] [Main Contributor] 3D Printing Cable-Driven Mechanism** 06/2024 - Present
We developed the Xstrings method to 3D print cable-driven mechanisms in a single process, enabling four types of interactions: bend, twist, coil, and compress, activated by applying force to the cables. We investigated the impact of various printing parameters on maximum tensile strain and the repeatability of interactions without cable failure. Application examples include manipulable gripping, bionic robot manufacturing, and dynamic prototyping. This work has been submitted to ACM CHI'25. My work included mathematical derivation, test printing parameters, engineering the prototype, and writing parts of the paper.
- [P.5] [Lead] Using Acoustic Motion Detection for Cursor Control on Keyboard** 05/2024 - 07/2024
We developed KeyFlow, a system that integrates mouse functionality into keyboards using machine learning, enabling users to control the cursor by gliding their fingers across the surface without pressing keys. Our research shows that KeyFlow reduces hand movement by 78.3%, significantly enhancing typing efficiency. This work has been published on ACM UIST'24 Poster, with me being the first author.
- [P.6] [Main Contributor] Flexible Shape-changing Actuator using Embedded Electroosmotic Pumps** 04/2024 - 07/2024
We developed FlexEOP, a method for creating fully flexible electroosmotic pumps, enabling adaptable, self-contained shape-changing actuators. FlexEOP's versatility is demonstrated in applications such as flexible displays, panels, curved surfaces, and soft robotic fibers. This work has been published on ACM UIST'24 Demo. My work contributions include experimental design and testing, modeling and rendering, and writing parts of the paper.
- [P.7] [Main Contributor] An Aesthetic Education Workshop for the Visually Impaired** 04/2024 - 07/2024
We enhanced art education for the visually impaired by focusing on Impressionist paintings through workshops. Experts translated key painting elements (layout, content, color, lighting, brushwork) into tactile forms, using clay modeling to help participants experience, analyze, and create art, enriching their engagement. This work has been published on ACM UbiComp'24 Workshop. My work was method development, paper writing.
- [P.8] [Main Contributor] Leveraging LLMs for Context-Aware Interventions in Digital Wellbeing** 11/2022 - 09/2023
In this project, we developed *MindShift*, a mobile app that uses LLMs to create dynamic, personalized content aimed at reducing problematic smartphone use, adapting to user context and mental states. Wizard-of-Oz and interview studies were conducted to identify key mental states, and these insights were validated in a 5-week field trial with 25 participants, showing significant improvements in smartphone usage patterns. This work was published on ACM CHI'24. My work included conducting the Wizard-of-Oz studies and the field trial, data analyzing, and illustrating the findings.
- [P.9] [Lead] Automated Video Editing with Semantic Analysis and Aesthetic Evaluation** 11/2021 - 04/2023
I led this industry-academic collaboration project with another team member, Qianyu Liang. We developed an intelligent video editing framework that transforms photos and videos from users' smartphones into captivating highlight reels. Using film editing principles, we crafted coherent narratives, emphasized key moments, and ensured seamless harmony between music and visuals. My work was to establish the correspondence between music and visuals, aligning musical elements with the film's style, matching music changes with editing techniques, identifying musical climaxes and video key moments, creating rhythm and flow, timing cuts and transitions.
- [P.10] [Lead] Adaptive Music and Lighting Systems for Emotional Well-being** 03/2022 - 03/2023
This is an industry-academic collaboration project, and I was the research team leader. We focused on developing a smart home system that dynamically adjusts music and lighting to enhance the living experience. To achieve harmony, we analyzed the relationship between music elements, light parameters, and their emotional impact. Based on this analysis, we developed a framework that aligns music-emotion-light and implemented a demo using the Philips Hue system. My work included literature review, creating music-emotion-light framework, and realizing the demo.

- [P.11] [Main Contributor] Design of Tactile Vibration Experience for Smartphones

11/2022 - 02/2023

This industry-academic collaboration project aimed to study vibration experiences across different smartphones. We developed a framework that maps task urgency, importance, and metaphorical meaning to vibration timing, duration, intensity, frequency, and variability, based on a user study comparing smartphones from six brands.

My work involved conducting literature research, developing the framework, and designing the user study.
- [P.12] [Main Contributor] User's Color Preferences of Pictures Across Diverse Displays

10/2021 - 12/2022

This industry-academic collaboration project involved six expert interviews and a user study with 89 participants to identify color preferences for various image types across different smartphone hardware. We developed a framework to optimize picture color on specific smartphone hardware for improved aesthetics and user experience.

My work included designing and conducting the user study, adjusting images, and analyzing the data.
- [P.13] [Lead] Ferrofluid Speaker Design Based on Emotion-Mapped Musical Elements

09/2021 - 06/2022

This was my undergraduate graduation project, where I designed and built a ferrofluid speaker that visually responds to music. The ferrofluid inside the speaker moves in sync with the audio, displaying a range of motions, including linear, rotational, and pulsating patterns. These movements dynamically change with the rhythm and sound of the music. [\[Video\]](#)

RESEARCH INTERNSHIP EXPERIENCE

HCI Engineering Group, CSAIL, MIT <i>Visiting Student / Advisor: Prof. Stefanie Mueller</i> Worked on the project of Xstring [P.4], which focuses on 3D printing cable-driven mechanisms in a single process, enabling four types of interactions: bend, twist, coil, and compress.	06/2024 - Present
Future Lab, Tsinghua University <i>Research Assistant / Advisor: Prof. Yingqing Xu</i> Led research project of 3D-Mirrorcle [P.1], BrickSmart [P.2], Mentigo [P.3] and industry-academic collaboration project of music-lighting [P.10], and automated video editing [P.9]. Contributed to research projects [P.6] and [P.7], industry-academic collaboration project [P.11] and [P.12].	08/2021 - Present
Pervasive Interaction Laboratory, Tsinghua University <i>Research Assistant / Advisor: Prof. Yuanchun Shi, Prof. Chun Yu</i> Contributed to the MindShift [P.8], using large language models to develop interventions for healthier smartphone use, enhancing digital well-being.	10/2022 - 06/2023
Huawei, ID/UX Design Group <i>Research Intern / Advisor: Qianhui Liang</i> Engaged in Metaverse project, conducting market research, user analysis, and system design to inform strategic development and enhance user experience in virtual environments.	07/2021 - 10/2021
Beijing Ewaybot Technology, Robot Navigation Group <i>Summer Intern / Advisor: Bowei Tang</i> Participated in Navigation algorithm research, optimizing code and conducting tests in virtual environments to improve accuracy and efficiency.	06/2020 -08/2020

EXTRACURRICULAR ACTIVITIES

Student Association for Science and Technology, Xinya College, Tsinghua University Led the association as the President, enhancing academic culture through events and innovative promotions.	2017 - 2021
Tsinghua Red Cross Society Engaged in educational support to underprivileged rural children and organized blood donation drives.	2017 - 2018

SKILLS

CS	Python, LLM Implementation, Machine Learning, C++, C#, MATLAB, HTML, JavaScript.
EE	Embedded Systems, Arduino, Circuit Design.
Design	Rhino, AutoCAD, Solidworks, Keyshot, Adobe Suite (proficient in PS & PR), Figma, Procreate.
Fabrication	3D Printing, Laser Cutting, CNC, Silicone Casting, Heat Sealing.

REFERENCE

Yingqing Xu (Master's advisor) Professor Director of the Future Lab Tsinghua University yqxu@tsinghua.edu.cn	Stefanie Mueller Associate Professor Head of the HCIE Group Massachusetts Institute of Technology stefanie.mueller@mit.edu	Chun Yu Associate Professor Tsinghua University chunyu@tsinghua.edu.cn
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