

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). [\[PDF\]](#) [\[Video\]](#)
- [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, received ARR in round 1). [\[PDF\]](#) [\[Video\]](#)
- [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, received RR in round 1). [\[PDF\]](#)
- [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, received ARR in round 1). [\[PDF\]](#) [\[Video\]](#)
- [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
- Led the development of 3DMirrorcle, a system addressing depth mismatch in AR smart mirrors using lenticular grating for a 3D display and algorithms for mirror reflection alignment and lenticular grating segmentation to align AR content with users' reflections.
 - Conducted user studies across various tasks and scenarios, demonstrating superior performance in user experience compared to existing solutions.
 - First author of work.

- [P.2] [Lead] 3D Block Play Instruction Generation and Conducting in real family learning.** 10/2023 - Present
- Led a project to generate personalized block play instructions for creativity and eco-friendly reuse of bricks.
 - Designed an AI Agent for children's spatial language learning in family block play, using LLMs and Gen-AI.
 - Conducted a lab experiment with 24 parent-child pairs (children aged 6-8), demonstrating the system's effectiveness in enhancing spatial language skills.
 - First author of work submitted to ACM CHI'25, received ARR (4/5) in round 1.
- [P.3] [Lead] LLM Agent for Mentoring Students in the Creative ProblemSolving Process.** 05/2024 - Present
- Co-led the development of Mentigo, an interactive agent using LLMs to mentor middle school students through the creative problem-solving (CPS) process, with dataset of real classroom interactions and an agentic workflow.
 - Tested effectiveness through a comparative experiment with 12 students and feedback from 5 expert teachers, showing significant improvements in student engagement and creative outcomes.
 - Co-first author of work submitted to ACM CHI'25, received RR (3/5) in round 1.
- [P.4] [Main Contributor] 3D Printing Cable-Driven Mechanism** 06/2024 - Present
- We developed Xstrings, a method for 3D printing cable-driven mechanisms in a single process, enabling four types of interactions: bend, twist, coil, and compress, activated by applying force to the cables.
 - Investigated the impact of various printing parameters on maximum tensile strain and the repeatability of interactions without cable failure.
 - This work has been submitted to ACM CHI'25, received ARR in round 1. 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
- Led the development of 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.
 - First author of work published at ACM UIST'24 Poster.
- [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
- 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 the system was 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 to develop an intelligent video editing system 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 aligning musical elements with the film's style, identifying musical climaxes and video key moments, and creating rhythm, flow, and timing for cuts and transitions.
- [P.10] [Lead] Adaptive Music and Lighting Systems for Emotional Well-being** 03/2022 - 03/2023
- I led this industry-academic collaboration project, developing a smart home system that dynamically adjusts music and lighting to enhance the living experience.
 - 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 [\[Video\]](#)

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.

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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