

# 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

<b>Areas</b>	Human-AI Interaction, AR/VR, Fabrication, Affective Computing, Aesthetics Computing
<b>Methods</b>	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

<b>HCI Engineering Group, CSAIL, MIT</b> <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
<b>Future Lab, Tsinghua University</b> <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
<b>Pervasive Interaction Laboratory, Tsinghua University</b> <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
<b>Huawei, ID/UX Design Group</b> <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
<b>Beijing Ewaybot Technology, Robot Navigation Group</b> <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

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

SKILLS

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

REFERENCE

<b><a href="#">Yingqing Xu</a> (Master's advisor)</b> Professor Director of the Future Lab Tsinghua University <a href="mailto:yqxu@tsinghua.edu.cn">yqxu@tsinghua.edu.cn</a>	<b><a href="#">Stefanie Mueller</a></b> Associate Professor Head of the HCIE Group Massachusetts Institute of Technology <a href="mailto:stefanie.mueller@mit.edu">stefanie.mueller@mit.edu</a>	<b><a href="#">Chun Yu</a></b> Associate Professor Tsinghua University <a href="mailto:chunyu@tsinghua.edu.cn">chunyu@tsinghua.edu.cn</a>
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