

Lei Gao

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RESEARCH INTERESTS

I'm focusing on Human-Computer Interaction (HCI), especially in creating new interactive systems using advanced techniques like Acoustic Levitation. I'm also interested in Haptics, VR/AR/XR systems, and using data-driven methods to develop effective applications.

WORK EXPERIENCE

- **University College London** 2024 - Now
Postdoctoral Research Fellow London, UK
 - Funded by Royal Academy of Engineering Chair in Emerging Technologies Grant of Prof. Sriram Subramanian

EDUCATION

- **University College London** 2020 - 2024
PhD of Computer Science in HCI London, UK
 - Supervisor: Prof. Sriram Subramanian, Associate Prof. Diego Martinez Plasencia
 - Funded by UCL Research Studentship (EU Horizon 2020)
- **Xidian University** 2017 - 2020
Master of Engineering in Computer Technology Xi'an, China
 - Supervisor: Prof. Bo Wan
- **Shandong University** 2013 - 2017
Bachelor of Engineering in Digital Media Jinan, China

RESEARCH EXPERIENCES

- **Designing and Prototyping Applications Using Acoustophoretic Interfaces (PhD thesis)** 2020 - 2024

It addresses both technical challenges of acoustic levitation and provides innovative implementation solutions for multimodal applications in the real-world Human-Computer Interaction.

Key contributions include:

- To enhance the stability and robustness of real-world applications, I build **StableLev**, a data-driven pipeline for the detection and amendment of instabilities in multi-point acoustic levitation.
- Combining with data physicalization, I develop and present **DataLev**, a design framework and building platform that enables mid-air data physicalizations with enriched materiality, multi-modal interactions, and mixed-reality animations.
- Combining with digital gastronomy, I propose three novel techniques enabled by programming acoustophoretic interface that enables computational food processing and fabrication by precise control food materials.
- **Multi-user interactions in Augmented Reality (Master thesis)** 2019 - 2020
 - Propose multi-user interaction model in Augmented Reality (AR) and develop a collaborative AR system enabling multimodal interactions, showcasing advancements over conventional collaboration methods.
- **Culture learning in Virtual Reality** 2018 - 2020
 - Compare the culture learning performance (knowledge, behavior, attitude) in VR and non-VR scenarios through quantitative studies.
- **Code classification for C programming assignments** 2017 - 2019
 - Design a neural network-based algorithm to detect code similarity and develop a clustering method that categorizes solutions for programming assignments

FULL PAPER PUBLICATIONS

1. Hongnan Lin, **Lei Gao**, Shengsheng Jiang, Hongyu Yue, Ziyi Fu, Jinyi Luo, Chengxiao Wu, Teng Han, Feng Tian, and Sriram Subramanian. 2025. Slip-Grip: An Electrotactile Method to Simulate Weight. In Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems (**CHI '25**). <https://doi.org/10.1145/3706598.3713361>
2. Tor-Salve Dalsgaard, Arpit Bhatia, **Lei Gao**, Ryuji Hirayama, Sriram Subramanian, Joanna Bergström, and Kasper Hornbæk. "Ultrasound can deliver chemical stimulants to the skin and modulate their perception." **Nature Scientific Reports** 15, no. 1 (2025): 10297. DOI: <https://doi.org/10.1038/s41598-025-94463-7>
3. **Lei Gao**, Giorgos Christopoulos, Prateek Mittal, Ryuji Hirayama, and Sriram Subramanian. 2024. StableLev: Data-Driven Stability Enhancement for Multi-Particle Acoustic Levitation. In Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems (**CHI'24**). DOI: <https://doi.org/10.1145/3613904.3642286>.
4. **Lei Gao**. 2024. Designing and Prototyping Applications Using Acoustophoretic Interfaces. In Extended Abstracts of the 2024 CHI Conference on Human Factors in Computing Systems (**CHI EA'24**). DOI: <https://doi.org/10.1145/3613905.3651135>.
5. Giorgos Christopoulos, **Lei Gao**, Diego Martinez Plasencia, Marta Betcke, Ryuji Hirayama, Sriram Subramanian. Temporal acoustic point holography. ACM SIGGRAPH 2024 Conference Papers (**SIGGRAPH'24**) DOI: <https://doi.org/10.1145/3641519.3657443>.
6. **Lei Gao**, Pourang Irani, Sriram Subramanian, Gowdham Prabhakar, Diego Martinez Plasencia, and Ryuji Hirayama. 2023. DataLev: Mid-air Data Physicalisation Using Acoustic Levitation. In Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (**CHI'23**). DOI: <https://doi.org/10.1145/3544548.3581016>.
7. Xianbing Zhao, Yixin Chen, Wanting Li, **Lei Gao**, and Buzhou Tang. "MAG+: An Extended Multimodal Adaptation Gate for Multimodal Sentiment Analysis." In IEEE International Conference on Acoustics, Speech and Signal Processing (**ICASSP 2022**), pp. 4753-4757. IEEE, 2022. DOI: <https://doi.org/10.1109/ICASSP43922.2022.9746536>
8. **Lei Gao**, Bo Wan, Gang Liu, Guojun Xie, Jiayang Huang, and Guanglan Meng (2021). Investigating the effectiveness of virtual reality for culture learning. *International Journal of Human-Computer Interaction (IJHCI)* 37.18 (2021): 1771-1781. DOI: <https://doi.org/10.1080/10447318.2021.1913858>
9. **Lei Gao**, Bo Wan, Cheng Fang, Yangyang Li, and Chen Chen (2019). Automatic Clustering of Different Solutions to Programming Assignments in Computing Education. In Proceedings of the ACM Conference on Global Computing Education (**CompEd '19**). ACM, New York, NY, USA, 164-170. DOI: <https://doi.org/10.1145/3300115.3309515>

SHORT PAPERS, DEMOS, AND WORKSHOPS

1. **Lei Gao**, Yutaka Tokuda, Shubhi Bansal, Sriram Subramanian. Computational Gastronomy and Eating with Acoustophoresis. In Companion Publication of the 26th International Conference on Multimodal Interaction (**ICMI'24 Companion**). DOI: <https://doi.org/10.1145/3686215.3686218>.
2. **Lei Gao**, Pourang Irani, Sriram Subramanian, Gowdham Prabhakar, Diego Martinez Plasencia, and Ryuji Hirayama. 2023. DataLev: Mid-air Data Physicalisation Using Acoustic Levitation. (**CHI'23 Interactivity demo**)
3. **Lei Gao**. Domain-specific data physicalisations enabled by DataLev (CHI'23 Workshop on physicalisation from Theory to Practice)
4. **Lei Gao**, James Hardwick, Diego Martinez Plasencia, Sriram Subramanian, and Ryuji Hirayama. 2022. DATALEV: Acoustophoretic Data Physicalisation. In Adjunct Proceedings of the 35th Annual ACM Symposium on User Interface Software and Technology (**UIST'22 Demo**). DOI: <https://doi.org/10.1145/3526114.3558638>

INVITED TALKS, SYMPOSIUM

- StableLev: Data-Driven Stability Enhancement for Multi-Particle Acoustic Levitation. 2024 South West UK Pre-CHI in Bristol
- StableLev: Data-Driven Stability Enhancement for Multi-Particle Acoustic Levitation. 2024 Cockney Kai in London
- DataLev: Mid-air Data Physicalisation Using Acoustic Levitation. 2023 in Institute of Software, Chinese Academy of Sciences
- Modern Magic Tricks: Mid-air displays using acoustic levitation. 2022 in Xidian University
- 2023 CHI Workshop on physicalisation from Theory to Practice in Hamburg
- 2023 Post-CHI XR summer school in Copenhagen
- 2023 UIST Workshop on XR and AI: AI-Enabled Virtual, Augmented and Mixed Reality in San Francisco

TEACHING EXPERIENCES

- COMP0160 Perception and Interfaces (23-24), University College London
- PSYC0095 Future Interfaces (22-23), University College London
- COMP0113 Virtual Environments (21-22), University College London
- COMP0021 Interaction Design (20-21), University College London

ACADEMIC SERVICES

Peer reviewer for conferences including CHI 2023, ISS 2023, Chinese CHI 2023, and TEI 2024, as well as journals such as Ultrasonics and the International Journal of Human-Computer Studies.