

Lei Gao

lei.gao.20@ucl.ac.uk | <https://leigao-oriana.github.io/>

 LinkedIn |  Twitter/X

UCL Interaction Center, Multi-Sensory Devices Group, 169 Euston Road, London, NW1 2AE

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.

EDUCATION

- | | | |
|--|---|-------------|
| • University College London | <i>PhD of Computer Science in HCI</i> | 2020 - 2024 |
| ◦ Supervisor: Prof. Sriram Subramanian, Associate Prof. Diego Martinez Plasencia | | |
| ◦ Funded by UCL Research Studentship (EU Horizon 2020 Program) | | |
| • Xidian University | <i>Master of Engineering in Computer Technology</i> | 2017 - 2020 |
| ◦ Supervisor: Prof. Bo Wan | | |
| • Shandong University | <i>Bachelor of Engineering in Digital Media</i> | 2013 - 2017 |

WORK EXPERIENCES

- | | | |
|---|-------------------------------------|------------|
| • University College London | <i>Postdoctoral Research Fellow</i> | 2024 - Now |
| ◦ Funded by Royal Academy of Engineering Chair in Emerging Technologies Grant of Prof. Sriram Subramanian | | |

GRANTS

- | | | |
|---|-----------------|------|
| • UCL Early Career Mini Fellowship | <i>7.8k GBP</i> | 2025 |
|---|-----------------|------|

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.
 - Explore the mechanisms and system design of chemical haptic transmission via acoustic manipulation, and supports the integration of chemical haptics with traditional mechanical haptics, offering a rich and immersive tactile experience
- | | |
|---|-------------|
| • 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. Ceylan Besevli, **Lei Gao**, Narsimlu Kemsaram, Giada Brianza, Orestis Georgiou, Sriram Subramanian and Marianna Obrist. 2025. SONARIOS: A Design Futuring-Driven Exploration of Acoustophoresis. In Proceedings of the 2025 ACM Designing Interactive Systems Conference (**DIS'25**). **Best Paper Award**.
2. Narsimlu Kemsaram, James Hardwick, Jincheng Wang, Bonot Gautam, Ceylan Besevli, Giorgos Christopoulos, Sourabh Dogra, **Lei Gao**, Akin Delibasi, Diego Martinez Plasencia, Orestis Georgiou, Marianna Obrist, Ryuji Hirayama and Sriram Subramanian. 2025. AcoustoBots: A swarm of robots for acoustophoretic multimodal interactions. **Frontiers in Robotics and AI**, 12, 1537101. <https://doi.org/10.3389/frobt.2025.1537101>
3. 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>
4. 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>
5. **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>.
6. **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>.
7. 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>.
8. **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>.
9. 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>
10. **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>
11. **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

- 2025 University of Siena, Food for Thought Seminar, Acoustic Levitation and Beyond Innovations in Food Technology.
- 2024 South West UK Pre-CHI in Bristol, StableLev: Data-Driven Stability Enhancement for Multi-Particle Acoustic Levitation.
- 2024 Cockney Kai in London, StableLev: Data-Driven Stability Enhancement for Multi-Particle Acoustic Levitation.

- 2023 Institute of Software, Chinese Academy of Sciences, DataLev: Mid-air Data Physicalisation Using Acoustic Levitation.
- 2023 University of Copenhagen, Post-CHI XR summer school
- 2023 CHI Workshop in Hamburg, Physicalisation from Theory to Practice.
- 2023 UIST Workshop San Francisco, XR and AI: AI-Enabled Virtual, Augmented and Mixed Reality.
- 2022 Xidian University, Modern Magic Tricks: Mid-air displays using acoustic levitation.

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.