Lei Gao

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

Education

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

Research experiences

- 2020 – Present **Building Applications Using Acoustophoretic Interfaces** (PhD thesis topic)
  - My research seeks to adopt the acoustophoretic technique to build effective design and technical solutions tailored to real-world application scenarios, making reconfigurable and multi-modal prototypes and artifacts with diverse tangible materials.
    a). 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.
    b). 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.
    c). 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.
- 2019 – 2020 **Multi-user interactions in Augmented Reality** (Master thesis topic)
  - Propose multi-user interaction model in Augmented Reality (AR) and develop a collaborative AR system enabling multimodal interactions, showcasing advancements over conventional collaboration methods.
- 2018 – 2020 **Culture learning in Virtual Reality**
  - Compare the culture learning performance (knowledge, behavior, attitude) in VR and non-VR scenarios through quantitative studies.
- 2017 – 2019 **Code classification for C programming assignments**

- Design a neural network-based algorithm to detect code similarity and develop a clustering method that categorizes solutions for programming assignments

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Paper publications

[1] **Lei Gao**, Giorgos Christopoulos, Prateek Mittal, Ryuji Hirayama, 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)**. https://doi.org/10.1145/3613904.3642286

[2] Giorgos Christopoulos, **Lei Gao**, Diego Martinez Plasencia, Marta Betcke, Ryuji Hirayama, Sriram Subramanian. Temporal acoustic point holography. ACM SIGGRAPH 2024 Conference Papers (**SIGGRAPH'24**) https://doi.org/10.1145/3641519.3657443 (**CCF A 类图形学顶会**)

[3] **Lei Gao.** 2024. Designing and Prototyping Applications Using Acoustophoretic Interfaces. In Extended Abstracts of the CHI Conference on Human Factors in Computing Systems **(CHI EA '24)**. https://doi.org/10.1145/3613905.3651135

[4] **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)**. https://doi.org/10.1145/3544548.3581016

[5] 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.

[6] **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.

[7] **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.

Demo, workshop

[1] **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**)

[2] **Lei Gao**. Domain-specific data physicalisations enabled by DataLev (**CHI'23 Workshop**)

[3] **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**). https://doi.org/10.1145/3526114.3558638

Visiting, invited talks, symposium

- Modern Magic Tricks: Mid-air displays using acoustic levitation. (2022/May/25 visiting Xidian University)
- DataLev: Mid-air Data Physicalisation Using Acoustic Levitation. (2023/May/25 visiting Institute of Software, Chinese Academy of Sciences)
- Post-CHI XR summer school (2023/May/2-3 at University of Copenhagen)
- Symposium of Extended Reality (2023/May/4 at University of Copenhagen)

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

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Academic services

- Peer reviewing: CHI 2023 Late breaking work and Alt.chi
- Peer reviewing: ISS 2023
- Peer reviewing: Chinese CHI 2023
- Volunteer: ICRA 2023, London
