高蕾

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伦敦大学学院人机交互中心 (UCLIC), 多感知设备课题组 (Multi-Sensory Devices Group)

研究领域

主要研究方向为人机交互，重点包括新型交互技术和交互界面, 以及多模态自然交互。具体研究内容涵盖基于声学的物体操纵和制造技术，多感官通道融合的实体交互技术等，特别关注其在无接触式三维场景中的应用。此外，还涉及 VR, AR，XR 技术及其交互应用实现。

教育背景

- **伦敦大学学院** (UCL) 计算机科学博士-人机交互方向 2020 - 2024
  - 导师: Prof. Sriram Subramanian, Associate Prof. Diego Martinez Plasencia
  - UCL 全额奖学金 (欧盟地平线 2020 项目)
- **西安电子科技大学** 计算机技术工程硕士 2017 - 2020
  - 导师: 万波教授
- **山东大学** 数字媒体技术工学学士 2013 - 2017

工作经验

- **伦敦大学学院** (UCL) 博士后研究员 2024 - 今
  - 英国皇家工程院新兴技术领域主席 Prof. Sriram Subramanian 项目资助

科研资助

- UCL Early Career Mini Fellowship 7.8k GBP 2025

科研经历

- **博士论文课题：基于超声波悬浮交互技术的原型设计和实现** 2020 - 2024

  研究基于超声悬浮（Acoustophoresis/Acoustic Levitation）的新型计算与交互技术，研究贡献包括:
  - 通过运动规划和数据驱动方法，提出声悬浮系统的可重构性与稳定性算法 **StableLev**，解决声悬浮系统中运动稳定性差、操控灵活性差和精度不足的问题，提升交互系统的稳健性。
  - 开发基于声悬浮的数据物理化方法，设计动态、可重构的多模态物理化展示平台 **DataLev**，通过视、听、触、嗅、味以及多种材料的应用来增强数据物理化的实体表达。
  - 实现声悬浮在计算烹饪中的创新应用，构建新型食品加工与制作方法，实现可食用材料的精确操控，可持续利用和定制化食品制造。
  - 实现声悬浮对化学触觉的无接触传递方式和系统搭建，并支持化学触觉与传统机械触觉的结合，提供丰富的触觉感官体验。
- **硕士论文课题**: **增强现实环境中多用户协同交互** 2019 - 2020
  - 提出了增强现实（AR）中的多用户交互模型，并基于该交互模型开发了 AR 协同多模态交互系统，其系统表现优于传统的协同系统。
- **虚拟现实环境下的文化学习探究** 2018 - 2020
  - 通过用户实验和定量研究比较了虚拟现实（VR）与非虚拟现实场景下的文化学习绩效（知识、行为、态度），对 VR 对文化学习和教育场景下的应用提供理论和实践指导。
- **对 C 语言编程作业的代码分类** 2017 - 2019
  - 设计神经网络算法以检测代码相似性，并基于特征学习开发聚类方法，最终对编程作业的解题方法进行分类。

会议期刊论文

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)**. **最佳论文奖.**

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. (CCF A 类人机交互顶会)

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 CHI Conference on Human Factors in Computing Systems **(CHI'24)**. DOI: https://doi.org/10.1145/3613904.3642286. (CCF A 类人机交互顶会)

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. (CCF A 类人机交互顶会)

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. (CCF A 类图形学顶会)

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. (CCF A 类人机交互顶会)

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. (CCF B 类多媒体期刊)

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(CCF B 类人机交互期刊)

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

短文, Demos 和 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)** (CCF A 类人机交互顶会)

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 (CCF A 类人机交互顶会)

主题报告, 研讨会

- 2025 意大利锡耶纳大学, Food for Thought Seminar, Acoustic Levitation and Beyond Innovations in Food Technology.
- 2024 英国布里斯托大学, South West UK Pre-CHI, StableLev: Data-Driven Stability Enhancement for Multi-Particle Acoustic Levitation.
- 2024 英国伦敦大学学院, Cockney Kai, StableLev: Data-Driven Stability Enhancement for Multi-Particle Acoustic Levitation.
- 2023 中国科学院软件研究所, DataLev: Mid-air Data Physicalisation Using Acoustic Levitation.

- 2023 德国汉堡, CHI Workshop on physicalisation from Theory to Practice.
- 2023 丹麦哥本哈根大学, Post-CHI XR summer school
- 2023 美国旧金山, UIST Workshop on XR and AI: AI-Enabled Virtual, Augmented and Mixed Reality.
- 2022 西安电子科技大学, Modern Magic Tricks: Mid-air displays using acoustic levitation.

教学经历

- 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

学术服务

- 论文审稿: 会议：CHI 2023, ISS 2023, Chinese CHI 2023, TEI 2024. 期刊: Ultrasonics, International Journal of Human-Computer Studies(IJHCS).
- 志愿者: ICRA 2023, London