Shuowen Li

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Education

Tsinghua University, M.S. in Optical Engineering *Sep. 2023 – Jun. 2026*

- Advisor: Prof. Liangcai Cao
- Overall GPA: 3.64/4.0

Lanzhou University, B.S. in Physics *Sep. 2019 – Jun. 2023*

- Advisor: Prof. Hao Jia
- Ranking: 1/291; Overall GPA: 4.23/5.0
- Awarded the **National Scholarship** in 2020

Research Experience

Human-AI Interaction and Creative Robotics *Sep. 2023 – Present*
Academy of Arts & Design, Tsinghua University (Advisor: Prof. Haipeng Mi)

- Developed a semantic-guided creative tool for artificial life design that enables designers to create and evolve digital lifeforms through natural language prompts. Integrated CLIP-based evaluation and CMA-ES optimization into a real-time simulation engine, allowing the evolution and modulation of artificial life forms. The system supports interactive evolution and multi-agent emergence, offering new possibilities in generative design. A conference paper is under submission.
- Engineered a swarm robotic storytelling platform (PuppetLine) for children's creative expression using Toio robots. Built a natural language–driven robot control system using large language models and a library of action and emotion primitives. The system maps users' narrative input into multi-robot scripts, enabling a novel form of co-creative storytelling. A conference paper is under submission.
- Conceived and developed a wearable puppet robot (Embo) that translates verbal aggression into tactile pressure feedback. Designed for child–robot interaction in empathy education, the system transforms language severity into sensory discomfort, offering emotionally responsive intervention for bullying scenarios. Published a related conference paper.

Computational Imaging and 3D Display Quality Evaluation *Sep. 2022 – Jun. 2025*
Department of Precision Instrument, Tsinghua University (Advisor: Prof. Liangcai Cao)

- Designed and evaluated a hardware and metric framework for autostereoscopic (glasses-free 3D) displays, focusing on human visual comfort, crosstalk levels, and depth perception. Integrated computational imaging models with perceptual evaluation methods, contributing to the development of industry standards for autostereoscopic displays. Participated in drafting a group standard and published a related research paper.
- Developed real-time reconstruction algorithms and a four-aperture telescope array for turbulence-degraded astronomical imaging, enabling high-fidelity atmospheric turbulence removal. Improved and integrated blind deconvolution, deformable convolution, and diffusion model. Filed a patent and published a research paper.
- Conducted a survey on lensless computational imaging, covering optical encoding techniques, image sensor integration, and algorithmic reconstruction strategies. Outlined potential applications in compact and modular imaging systems across scientific and industrial domains. Published a related review paper.

Publications

Academic Papers *(* co-first author)*

1. **Shuowen Li**, Kexin Wang, Minglu Fang, Danqi Huang, Ali Asadipour, Haipeng Mi, and Yitong Sun. "Participatory Evolution of Artificial Life Systems via Semantic Feedback". Submitted to *SIGGRAPH Asia 2025 Art Papers*. Under Review.
2. Ruhan Wang, **Shuowen Li**, Peiran Zhang, Danqi Huang, Yijie Guo, and Haipeng Mi. "PuppetLine: An

Interactive System for Embodied Storytelling with LLM-driven Swarm Robots". Submitted to *TEI 2026*. Under Review.

3. Shihan Qiu*, Yuhan Xie*, **Shuowen Li***, Wei Guo, Xiaoyue Gao, and Yijie Guo. "Embo: A Wearable Robot Transforming Child-Directed Verbal Aggression into Tactile Feedback". In: *Companion of the 2024 ACM/IEEE International Conference on Human-Robot Interaction (HRI '24)* (2024), pp. 857–861.
4. **Shuowen Li** and Liangcai Cao. "Multidimensional crosstalk analysis in autostereoscopic displays: integrating subjective and objective evaluations for image quality assessment". In: *Optics Express* 33.8 (2025), pp. 16911–16924.
5. **Shuowen Li**, Yunhui Gao, Jiachen Wu, Mingjie Wang, Zhangcheng Huang, Shumei Chen and Liangcai Cao. "Lensless camera: Unraveling the breakthroughs and prospects". In: *Fundamental Research* (2024). In Press.
6. **Shuowen Li**, Yunhui Gao, Jiachen Wu and Liangcai Cao. "Blind Deblurring of Astronomical Images Using SCGTV-Based Single-Frame Method". In: *Optics Express* 32.20 (2024), pp. 35579–35593.

Book Translation

1. Geoff Cottrell. "Matter: A Very Short Introduction". Translated by Xiang Liu, **Shuowen Li**, and Jiageng Li. Yilin Press (2024). ISBN: 9787575301671.

Patents

1. Liangcai Cao, **Shuowen Li**, Jiachen Wu. "Single-frame astronomical image reconstruction method, device, electronic equipment and storage medium". Chinese Patent CN202411139297X. Under substantive examination.

Conference Presentations

1. **Shuowen Li** and Liangcai Cao. "Image quality evaluation methods and systems for three-dimensional displays". In: *13th National Conference on Photonics*, Lanzhou, China (2024). Outstanding Oral Presentation.
2. **Shuowen Li** and Liangcai Cao. "Blind deblurring of astronomical image using SCGTV-based single-frame method". In: *SPIE/COS Photonics Asia*, Nantong, China (2024). Oral Presentation.
3. Yunhui Gao, **Shuowen Li** and Liangcai Cao. "Lensless Computational Imaging Framework with Applications to Digital Holography". In: *OPIC OPTICS & PHOTONICS International Congress*, Japan (2024). Poster Presentation.

Honors and Awards

- Tsinghua Friends–Xiaogan Talent Scholarship (2024)
- Outstanding Graduate of Lanzhou University (2023)
- Outstanding Student of Gansu Province Universities (2021)
- National Scholarship (2020)
- First-Class Scholarship of Lanzhou University (2020–2023) (*Awarded consecutively for three years*)

Skills and Interests

- **Languages:** Python, MATLAB, Java, C++
- **Softwares:** Blender, Unity, SolidWorks, Adobe Illustrator, Lumerical FDTD, Zemax
- **Interests:** Amateur photographer, film enthusiast, art exhibitions, sports, coffee

Referee

- **Prof. Haipeng Mi (Acadcmy of Arts & Design, Tsinghua University)**
  Email: mhp@tsinghua.edu.cn
- **Prof. Hao Jia (School of Physical Science and Technology, Lanzhou University)**
  Email: jiahao@lzu.edu.cn