# Yunhui Jiang

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## Research Interests

- Photoacoustic-ultrasound dual-modal imaging and system integration
- Programmable and flexible laser-induced ultrasound sources based on optical absorption structures
- Focused ultrasound for non-invasive biomedical applications

## Education

**ShanghaiTech University** Shanghai, China

*M.Sc. in Electronic Science and Technology* *Sept. 2022 – June 2025*

- GPA: 3.48/4.0
- Supervisor: Prof. Fei Gao, Prof. Xiran Cai
- Thesis: Research on photoacoustic ultrasound dual-modal imaging system based on low-cost opto-acoustic window

**Xi'an University of Posts and Telecommunications** Xi'an, China

*B.S. in Optoelectronic Information Science and Engineering* *Sept. 2017 – June 2021*

- GPA: 3.41/4.0 (Average Score: 85.59/100, Rank: 3/256)
- Thesis: High-Temperature Storage Characteristics of $Ga_2O_3$ with Ti/Al/Pt/Au Multilayer Ohmic Contacts

## Working Papers

1. ***Yunhui Jiang***, Fan Zhang, Yuwei Zheng, Ruixi Sun, Xiran Cai*, and Fei Gao*, "Disposable Opto-Acoustic Window Enabled Plug-and-Play Photoacoustic-Ultrasound Dual-modal Imaging", ***Optics Letters***(2025) [PDF]
2. Sheng Liao, Ruixi Sun, ***Yunhui Jiang***, Fan Zhang, Youshen Xiao, Yuwei Zheng, Hengrong Lan, Fei Gao*, "Photoacoustic tomography of human eye and oxygenation quantification: a feasibility study", ***Optics Letters***(2025) **Under Review**
3. Youshen Xiao, Zhengyuan Zhang, Ruixi Sun, Yiling Shi, Sheng Liao, Fan Zhang, ***Yunhui Jiang***, Xiyu Chen, Arunima Sharma, Manojit Pramanik, Yuyao Zhang*, Fei Gao*, "Resolution Enhancement of Under-sampled Photoacoustic Microscopy Images using Neural Representation", ***IEEE Transactions on Computational Imaging***(2025) [PDF]

## Research Experience

1. **Programmable Laser-Induced Ultrasound Design and Simulation via k-Wave**

   *Principal Investigator, Ongoing* *July 2025 – Present*

   - Designed spatially patterned optical absorbers to generate laser-induced ultrasound with tunable directionality and amplitude under pulsed excitation
   - Applied phased-array principles by encoding spatial phase delays through absorber geometry, enabling programmable beam steering and dynamic acoustic focusing
   - Developed a k-Wave simulation framework to model ultrasound propagation and assess focusing performance in water and heterogeneous tissue-mimicking media
   - Analyzed resolution and energy distribution across different pattern configurations to guide the practical design of flexible acoustic focusing patches

2. **Dual-modal Photoacoustic-Ultrasound Imaging Using Laser-Induced Ultrasound from Black Tape**

   *Principal Investigator, Published in **Optics Letters*** *July 2024 – June 2025*

   - Designed a plug-and-play opto-acoustic window enabling coaxial photoacoustic and ultrasound imaging triggered by a single laser pulse

- Streamlined the fabrication process using black PVC tape, achieved high reproducibility and low cost
- Validated signal stability and dual-modal imaging performance through *ex vivo* and *in vivo* experiments on various phantoms and human tissues

3. **Noninvasive Intracranial Pressure(ICP) Monitoring via Transcranial Photoacoustic Imaging**
   *Co-Investigator, Completed Project* *Aug. 2024 – Feb. 2025*
   - Developed a customized photoacoustic imaging platform integrating a tunable near infrared laser, linear-array ultrasound probe, high-speed DAQ, and a stabilized transcranial probe mount
   - Conducted *in vivo* transcranial photoacoustic imaging experiments on human volunteers with physicians, synchronized with invasive ICP monitoring to enable validation against clinical gold-standard measurements
   - Developed a linear regression model correlating photoacoustic-derived $sO_2$ with measured ICP, demonstrated a strong inverse relationship
4. **Speckle Imaging through Scattering Layers**
   *Primary contributor, Course: Biomedical Photonics and Imaging* *Sept. 2024 – Jan. 2025*
   - Reproduced speckle imaging methods using memory effect for optical reconstruction
   - Evaluated imaging methods for high-resolution, wide-FoV reconstruction, validating performance under dynamic and complex scattering conditions
5. **Development and Integration of Data Acquisition(DAQ) for Real-Time Photoacoustic Imaging**
   *Principal Investigator, Completed and in active use* *Sept. 2023 – June 2024*
   - Diagnosed and resolved key signal acquisition issues in a designed DAQ system for stable data capture
   - Integrated DAQ into the photoacoustic imaging system for optimized performance
   - Conducted *ex vivo* and *in vivo* experiments to validate acquisition stability and imaging quality in functional and structural imaging
6. **Mini Review: Algorithms for Photonic Spiking Neural Networks**
   *Course-based Research Project, Course: Optical Computing and Optical Neural Networks* *Sept. 2022 – May. 2023*
   - Reviewed spiking neuron models in biology and photonics for neuromorphic computing frameworks
   - Analyzed spike encoding and photonic spike timing dependent plasticity mechanisms implemented via semiconductor optical amplifiers and electro-absorption modulators
   - Evaluated photonic spiking neural networks for fully optical implementations and proposed enhancements to spike-based supervised learning algorithms

## Awards and Honours

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| *Outstanding Graduate of ShanghaiTech University* | *2025* |
| *National Graduate Academic Scholarship* | *2022, 2023, 2024* |
| *University-Level Graduate Scholarship* | *2022, 2023, 2024* |
| *Outstanding Graduate of Shaanxi Province* | *2021* |
| *National Encouragement Scholarship* | *2019, 2020* |
| *Shanghai Way-on Semiconductor Co., Ltd. Scholarship* | *2019* |

## Skills

**Programming Language:** Matlab, Python, LaTeX, Markdown

**Professional software:** Solidworks, Comsol, Auto-CAD, Origin, 3D Slicer, 3ds Max, KeyShot

**Languages:** Mandarin (Native), English (Fluent)