Lintao Peng

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Education

Nanyang Technological University   **Singapore**
- **Joint Ph.D. Student** of School of Electrical and Electronic Engineering   2024.10 - present
- Supervised by Prof. Cuong Dang

Beijing Institute of Technology   **Beijing, China**
- **Ph.D. Student** of Information and Communication Engineering   2020.09 - present
- Co-supervised by Prof. Jun Zhang (Member of Chinese Academy of Engineering) and Dr. Liheng Bian

Xidian University   **Xi'an, Shaanxi, China**
- **B.S.** in Computer Science and Technology   2016.09 - 2020.06

Research Interest

My current research interests are mainly about **computational imaging and sensing**. Specifically, I focus on deep-learning-based imaging and sensing techniques in complex environments. Also I investigate deeper with various novel self-attention mechanisms and loss functions to improve the performance of the imaging and sensing networks.

Selected Publications

[1] **Lintao Peng**, Chang Li, Wenhui Liu, Siyu Xie, Xue Chen, Fei Xiao*, Liheng Bian*, "Boosting bacterial detection with hyperspectral mining," *Optica*, 2025, vol. 12, no. 3, pp. 315-324.

[2] **Lintao Peng**, Wenhui Liu, Siyu Xie, Lin Ye, Peng Ye, Fei Xiao, Liheng Bian*, "Uncertainty-driven parallel transformer-based segmentation for oral disease dataset," *IEEE Transactions on Image Processing*, 2025, vol. 34, pp. 1632-1644.

[3] **Lintao Peng**, Chunli Zhu and Liheng Bian*, "U-shape transformer for underwater image enhancement", *IEEE Transactions on Image Processing*, 32, 3066-3079 (2023). *ESI "Highly Cited Paper" and "Hot Paper"*

[4] **Lintao Peng**, Siyu Xie, Hui Lu, Liheng Bian*, "Large-scale single-pixel imaging and sensing," *Advanced Photonics Nexus*, 2025, vol. 4, no. 2, pp. 026010.

[5] **Lintao Peng**, Liheng Bian*,"Adaptive dual-domain learning for underwater image enhancement," *Proceedings of the AAAI Conference on Artificial Intelligence* 39 (6), 6461-6469 (2025).

[6] **Lintao Peng**, Siyu Xie and Liheng Bian*, "Uncertainty-Driven Spectral Compressive Imaging with Spatial-Frequency Transformer", *European Conference on Computer Vision*, 54-70 (2024).

[7] **Lintao Peng,** Siyu Xie, Tong Qin, Lu Cao, and Liheng Bian*, "Image-free single-pixel object detection", *Optics Letters*, 48, 2527-2530 (2023).
Highlighted by Editor's pick.

Reported by Optica News: Researchers detect and classify multiple objects without images.

[8] **Lintao Peng**, Liheng bian*, Tiexin Liu, and Jun Zhang, "Agile wide-field imaging with selective high resolution", *Optics Express*, 29, 35602-35612 (2021).

[9] Liheng Bian, Haozhe Song, **Lintao Peng**. *et al.* "High-resolution single-photon imaging with physics-informed deep learning", *Nature Communications*, 14, 5902 (2023).

[10] Yongqi Cao, Hui Bao, **Lintao Peng**. *et al.* Single-Photon-Camera-Based Time and Spatially Resolved Electroluminescence Spectroscopy for Micro-LED Analysis. *ACS Photonics*, 2024, vol. 11, no. 2, pp. 731–736.

[11] Liu Sitian, **Lintao Peng**, Xuyang Chang and Chunli Zhu*. "Adaptive dual-domain learning for hyperspectral anomaly detection with state space models." *IEEE Transactions on Geoscience and Remote Sensing* (2025).

[12] Sitian Liu, Chunli Zhu, **Lintao Peng** and Xinyue Su, et al. "Wavelet-based diffusion with spatial-frequency attention for hyperspectral anomaly detection." *International Journal of Applied Earth Observation and Geoinformation* (2025), 142: 104662.

Academic Service

Journal Reviewer: IEEE TIP, IEEE TCSVT, IJCV, OE, OL

Conference Reviewer: CVPR, ECCV, AAAI, ICCV, ACM MM

Awards & Honors

- China National Scholarship   2024
- The Special Grade Graduate Scholarship (5%)   2023
- The Special Grade Graduate Scholarship (5%)   2022
- Excellent Graduation Thesis of Xidian University   2020
- First Prize in the China Undergraduate Physics Tournament (CUPT)   2018
- Silver Medal in the International Collegiate Programming Contest (ICPC)   2018

Research Experiences

Computational Imaging and Sensing

I focus on large-scale single-pixel imaging and sensing (SPIS) technique that enables high-quality single-pixel imaging and highly efficient image-free sensing with a low sampling rate.

- Proposed a small-size optimized pattern sampling method which achieves better sampling performance with fewer pattern parameters (~one order of magnitude).
- Reported a novel uncertainty-driven loss function to train the SPIS network. It can reinforce the network's attention to the texture-rich regions and edge regions, thus improving the imaging and sensing performance of these regions.

Underwater Image Enhancement (UIE)

- Proposed a novel U-shape Transformer dealing with the UIE task, in which the designed channel-wise and spatial-wise attention mechanism based on the transformer enables to effectively remove color artifacts and casts.
- Designed a novel multi-color space loss function combing the RGB, LCH and LAB color-space features, which further improves the contrast and saturation of output images.
- Released a large-scale dataset containing 4279 real underwater images and the corresponding high-quality reference images, which facilitates further development of UIE techniques.

Large-scale Single-photon Imaging

I focus on the great challenge of high-fidelity imaging using single-photon avalanche diode (SPAD) array in extreme low-light environments.

- Studied the complex photon flow model of SPAD electronics to accurately characterize multiple physical noise sources, and collected a real SPAD image dataset to calibrate noise model parameters.
- Built a deep transformer network with a content adaptive self-attention mechanism and gated fusion modules, which can dig global contextual features to remove multi-source noise and extract full frequency details.