Lintao Peng

Nationality: Chinese | Gender: Male | Birth Date: 12/1996
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Education

Beijing Institute of Technology **Beijing, China**

- **Ph.D. Student** of Information and Communication Engineering, GPA: 3.7/4.0 2020.09 - present
- Co-supervised by Prof. Jun Zhang (Member of Chinese Academy of Engineering) and Dr. Liheng Bian

Columbia University **New York, USA**

- Summer exchange student program 2018.06 - 2018.09

Xidian University **Xi'an, Shaanxi, China**

- **Bachelor** of Computer Science and Technology, GPA: 3.8/4.0 2016.09 - 2020.06

Work Experience

Research Intern, Alibaba Group 2019.06-2019.10

- Developed a lip-reading system based on LSTM.
- Received the honor of **Outstanding Intern.**

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 self-attention mechanisms and uncertainty driven loss to improve the performance of the imaging and sensing networks.

Selected Publications

[1] **Lintao Peng**, Chunli Zhu and Liheng Bian*, “U-shape transformer for underwater image enhancement”, ***IEEE Transactions on Image Processing***, 32, 3066-3079 (2023).

[2] **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.

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

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

Under Review

[5] **Lintao Peng**, Siyu Xie and Liheng Bian*, “Uncertainty-Driven Spectral Compressive Imaging with Spatial-Frequency Transformer”, Under review at ***CVPR2024***.

[6] **Lintao Peng**, Siyu Xie, Hui Lu and Liheng Bian*, “Large-scale single-pixel imaging and sensing”, Under Revision at ***Nature Communications***.

[7] **Lintao Peng**, Siyu Xie, Lin Ye, Fei Xiao and Liheng Bian*, “Uncertainty-Driven Oral Disease Segmentation with Parallel Transformer”, Under Review at ***IEEE Transactions on Medical Imaging***.

Academic Service

Journal Reviewer: IEEE TIP, IEEE TCSVT, Fluctuation and Noise Letters

Conference Reviewer: CVPR, ECCV

Awards & Honors

- The Special Grade Graduate Scholarship (5%) 2023
- The Special Grade Graduate Scholarship (5%) 2022
- Third place in Mobile Intelligent Photography and Imaging (MIPI) challenge (ECCV Workshop) 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

Underwater Image Enhancement

- Proposed a novel U-shape Transformer dealing with the UIE task, in which the designed channel-wise and spatial-wise attention mechanism based on 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 underwater image enhancement techniques.

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.

Large-scale Single-photon Imaging

I focus on the great challenge of high-fidelity super-resolution Single-photon avalanche diode (SPAD) array imaging with low bit depth, low resolution and heavy noise in photon-limited scenarios.

- 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.