

# Lintao Peng

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

<b>Beijing Institute of Technology</b>	<b>Beijing, China</b>
<ul style="list-style-type: none"><li><b>Ph.D. Student</b> of Information and Communication Engineering</li><li>Co-supervised by Prof. Jun Zhang (Member of Chinese Academy of Engineering) and Dr. Liheng Bian</li></ul>	2020.09 - present
<b>Columbia University</b>	<b>New York, USA</b>
<ul style="list-style-type: none"><li>Summer exchange student program</li></ul>	2018.06 - 2018.09
<b>Xidian University</b>	<b>Xi'an, Shaanxi, China</b>
<ul style="list-style-type: none"><li><b>B.S.</b> in Computer Science and Technology, GPA: 3.8/4.0</li></ul>	2016.09 - 2020.06

## Work Experience

<b>Research Intern, Alibaba Group</b>	2019.06-2019.10
<ul style="list-style-type: none"><li>Developed a lip-reading system based on LSTM.</li><li>Received the honor of <b>Outstanding Intern</b>.</li></ul>	

## 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**, 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 Image Processing*.

## Academic Service

Journal Reviewer: IEEE TIP, IEEE TCSVT, Fluctuation and Noise Letters  
Conference Reviewer: CVPR, ECCV

## Awards & Honors

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- The Special Grade Graduate Scholarship (5%) 2023
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- 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

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### 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 combining 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.

### 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 ( $\sim$ 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 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.