Shiqi **Chen, Ph.D.**

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Summary

I'm a self-motivated, enthusiastic researcher in optical engineering. My work lies at the intersection of optics, graphics, and computer vision. I led the project of computational optics and deployed the relevant technology into the flagships of Huawei (from Huawei P50). My research interests are optical simulation, end-to-end optimization, learning-based image processing, and the next generation of optical computing methodology.

Education

Zhejiang University
Hangzhou, China

PH.D. IN OPTICAL ENGINEERING — *Sep. 2018 - Jun. 2023*
- Outstanding Graduates (Zhejiang Province and Zhejiang University).
- Awarded with the Outstanding Doctoral Dissertation of the Zhejiang University and the College.
- Applying for the Doctoral Dissertation Award of ACM China and Chinese Optical Society

HUST (Huazhong University of Science and Technology)
Wuhan, China

B.S. IN OPTICAL ENGINEERING — *Sep. 2014 - Jun. 2018*
- Outstanding Graduates (Hubei Province)

Research Experience

Computational Optics with Tolerance
with Huawei

STUDENT PROJECT LEADER — *Jun. 2021 - May. 2022*
- Built the **physical-based camera perturbation model** to predict the deviation of systems, aiming at constructing proxy cameras whose imaging results are close to reality.
- For training the restoring network, used proxy cameras to generate the data pairs that characterize the mapping of optical degradation, thereby **simulating mass production** at minimal computational cost and fast adapting to the data acquisition of new devices with tolerance.
- the proposed perturbation model outperforms optical design program (*e.g., CODE V*) and other SOTA algorithms. The proposed **dynamic post-processing pipeline** shed light on the joint of image signal reception (lens and sensor) and image signal processing (ISP).

Extreme-Quality Computational Imaging for Deviated Camera
with Huawei

STUDENT PROJECT LEADER — *Jun. 2020 - May. 2021*
- Built **the first deep-learning-based calibration** to densely represent the optical degradation of deviated camera.
- With the learned representation, developed the **degradation transfer** framework to generates realistic imaging results of the deviated camera.
- Proposed a new image reconstruction model and integrated it into existing ISP pipeline, realizing **extreme-quality computational imaging**.
- Proving that the imaging quality of **low-end mobile terminal** has the potential to **surpass high-end DSLR**.

Computational Optics for Ideal Optical Design
with Huawei

STUDENT PROJECT LEADER — *Jun. 2019 - May. 2020*
- Built the **Optical PSF Model** based on ray tracing and coherent superposition, considering the geometric propagation and wave properties of light in the meanwhile.
- Engaging with the invertible ISP pipeline, constructed the **imaging simulation framework** to accurately synthetic the performance of optical aberration, which is more reliable than the commercial optical design program (*e.g., Zemax*) and other SOTA algorithms.
- Only **trained with synthetic data**, the proposed deep-learning method is validated to realize **excellent restoration** in the natural scene.

Computational Optics for Separated Optical Aberrations
with Huawei

STUDENT PROJECT MANAGER — *Sep. 2022 - Sep. 2023*
- Developed the **new optics design procedure** to separate various samples of aberrations (*e.g.*, spherical, coma, ...) from one lens prescription.
- Designed the pipeline for analyzing the **sensitivity of different aberrations** to deep-learning-based restoration.
- With the sensitivity analysis and the strategy to automatically assign the aberration weight, successfully **lowered the height** of the lens for the mobile cameras (**reduced 10%**).

Publications

[1] Deep Linear Array Pushbroom Image Restoration: A Degradation Pipeline and Jitter-Aware Restoration Network

AAAI 2024

Zida Chen, Ziran Zhang, Haoying Li, Menghao Li, Zhihai Xu, Yueting Chen, Qi Li, **Shiqi Chen***

2024

 *corresponding author.

[2] Dark2Light: multi-stage progressive learning model for low-light image enhancement

OSA Optics Express

Ruikang Li, **Shiqi Chen***, Zhihai Xu, Yueting Chen, Menghao Li

2023

 *corresponding author.

[3] Design of an optimized Alvarez lens based on the fifth-order polynomial combination

OSA Applied Optics

Zhichao Ye, Jiapu Yan, Tingting Jiang, **Shiqi Chen**, Zhihai Xu, Huajun Feng, Qi Li, Yueting Chen

2023

[4] Revealing the preference for correcting separated aberrations in joint optic-image design

arxiv

Jinwen Zhou, **Shiqi Chen***, Zheng Ren, Wenguan Zhang, Jiapu Yan, Huajun Feng, Qi Li, Yueting Chen

2023

 *corresponding author. Under reviewing of Nature Communications.

[5] Image restoration for optical zooming system based on Alvarez lenses

OSA Optics Express

Jiapu Yan, Zhichao Ye, Tingting Jiang, **Shiqi Chen**, Huajun Feng, Zhihai Xu, Qi Li, Yueting Chen

2023

[6] Mobile image restoration via prior quantization

Elsevier Pattern Recognition Letters

Shiqi Chen, Jinwen Zhou, Menghao Li, Huajun Feng, Yueting Chen, Tingting Jiang

2023

[7] Imaging Simulation and Learning-based Image Restoration for Remote Sensing Time Delay and Integration Cameras

IEEE Transactions on Geoscience and Remote Sensing

Menghao Li, Ziran Zhang, **Shiqi Chen**, Zhihai Xu, Qi Li, Huajun Feng, Yueting Chen

2023

[8] Direct distortion prediction method for AR-HUD dynamic distortion correction

OSA Applied Optics

Fangzheng Yu, Nan Xu, **Shiqi Chen**, Huajun Feng, Zhihai Xu, Qi Li, Tingting Jiang, Yueting Chen

2023

[9] Toward Real Flare Removal: A Comprehensive Pipeline and A New Benchmark

arxiv

Zheyan jin, **Shiqi Chen**, Huajun Feng, Zhihai Xu, Yueting Chen

2023

 Under reviewing of IEEE Transactions on Visualization and Computer Graphics.

[10] Let Segment Anything Help Image Dehaze

arxiv

Zheyan jin, **Shiqi Chen**, Huajun Feng, Zhihai Xu, Yueting Chen

2023

 Under reviewing of Elsevier Neurocomputing.

[11] Snapshot hyperspectral imaging based on equalization designed DOE

OSA Optics Express

Nan Xu, Hao Xu, **Shiqi Chen**, Haiquan Hu, Zhihai Xu, Huajun Feng, Qi Li, Tingting Jiang, Yueting Chen

2023

[12] DR-UNet: dynamic residual U-Net for blind correction of optical degradation

Conference on Infrared, Millimeter, Terahertz Waves and Applications

Jinwen Zhou, **Shiqi Chen**, Qi Li, Tongle Li, Huajun Feng

2023

[13] Reliable Image Dehazing by NeRF

ZHEYAN JIN, **SHIQI CHEN**, HUAJUN FENG, ZHIHAI XU, YUETING CHEN

arxiv

2023

Under reviewing of ACM Transactions on Graphics.

[14] Epistemic Uncertainty Based Divide-and-Conquer Network for Single Image Super-Resolution

JIAQI YANG, **SHIQI CHEN**, QI LI, YUETING CHEN, JING WANG

MDPI Electronics

2022

[15] Computational Optics for Mobile Terminals in Mass Production

SHIQI CHEN, TING LIN, HUAJUN FENG, ZHIHAI XU, QI LI, AND YUETING CHEN

IEEE Transactions on Pattern Analysis and Machine Intelligence

2022

[16] Optical Aberrations Correction in Postprocessing using Imaging Simulation

SHIQI CHEN, DEXIN PAN, HUAJUN FENG, ZHIHAI XU, QI LI, AND YUETING CHEN

ACM SIGGRAPH

2022

[17] Hyperspectral Image Reconstruction Based on the Fusion of Diffracted Rotation Blurred and Clear Images

HAO XU, HAIQUAN HU, **SHIQI CHEN**, ZHIHAI XU, QI LI, TINGTING JIANG, YUETING CHEN.

Elsevier Optics and Lasers in Engineering

2022

[18] Non Blind Optical Degradation Correction via Frequency Self-adaptive and Finetuning Tactics

TING LIN, **SHIQI CHEN***, HUAJUN FENG, ZHIHAI XU, QI LI, AND YUETING CHEN

OSA Optics Express

2022

*corresponding author.

[19] SRDiff: Single image super-resolution with diffusion probabilistic models

HAOYIN LI, YIFAN YANG, MENG CHANG, **SHIQI CHEN**, HUAJUN FENG, ZHIHAI XU, QI LI, YUETING CHEN.

Elsevier Neurocomputing

2022

[20] Extreme-Quality Computational Imaging via Degradation Framework

SHIQI CHEN, KEMING GAO, HUAJUN FENG, ZHIHAI XU, AND YUETING CHEN

IEEE International Conference of Computer Vision

2021

[21] Optical Aberrations Correction in Postprocessing using Imaging Simulation

SHIQI CHEN, HUAJUN FENG, DEXIN PAN, ZHIHAI XU, QI LI, AND YUETING CHEN

ACM Transactions on Graphics

2021

Honors & Awards

2023	2nd **prize**, National Optics and Optical Engineering Doctoral Academic League Finals	*Changchun, China*
2023	1st **prize**, National Optics and Optical Engineering Doctoral Academic League (Strait Division)	*Hangzhou, China*
2022	1st **prize**, Terminal Academic Star Competition	*Shanghai, China*
2022	**Finalist**, 19th Wang Daheng Optical Award	*Beijing, China*
2022	**Finalist**, Top Ten Students of College	*Hangzhou, China*

Presentation

Pujiang Lab Workshop

Shanghai, China

PRESENTER

Sep. 2023

- Image Enhancement and Optical Simulation for Mobile Terminals

China Optical Academic Conference

Wuhan, China

PRESENTER

Jul. 2023

- Computational Optics for Mobile Terminals

IPPF (International Postgradudate Photonics Forum) 2022

Hangzhou, China

PRESENTER

Oct. 2022

- Computational Optics for Mobile Terminals in Mass Production

SIGGRAPH 2022   Vancouver, Canada (on site)

PRESENTER   *Aug. 2022*

- Optical Aberrations Correction using Imaging Simulation

Huawei Mobile Terminal Workshop   *Hangzhou, China*

PRESENTER   *Jun. 2022*

- Optical simulation for low-level computer vision

Professional service

Nature Communications, ACM TOG, IEEE TCSVT, OSA OE, Elsevier PRL, Wiley IPR, CVPR, ICCV, ECCV, SIGGRAPH

PEER REVIEWER