

Shiqi Chen

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Summary

I'm a self-motivated, enthusiastic researcher in low-level computer vision. 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 flagship of Huawei. My research interests are optical simulation, end-to-end optimization, learning-based image processing, and the next generation of imaging systems.

Education

Zhejiang University

PH.D. IN OPTICAL ENGINEERING

Hangzhou, China

Sep. 2018 - Now

HUST(Huazhong University of Science and Technology)

B.S. IN OPTICAL ENGINEERING

Wuhan, China

Sep. 2014 - Jun. 2018

- Graduated with distinction.

Research Experience

Computational Optics with Tolerance

Project 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).
- Implement relevant technologies of Computational Optics into **Huawei P50** and **the subsequent flagship**.

Extreme-Quality Computational Imaging for Deviated Camera

Project 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

Project 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

Project with Huawei

STUDENT PROJECT MANAGER

Sep. 2022 - Now

- 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 flagships (**reduced 10%**).

Publications

[1] Optical Aberrations Correction via Prior Quantization

SHIQI CHEN, JINWEN ZHOU, HUAJUN FENG, YUETING CHEN, TINGTING JIANG

arXiv

2023

[2] 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

[3] 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

[4] Optical Aberrations Correction in Postprocessing using Imaging Simulation

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

ACM SIGGRAPH

2022

[5] 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

[6] 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.

[7] Single Image Super Resolution with Diffusion model

HAOYIN LI, YIFAN YANG, SHIQI CHEN, MENG CHANG, HUAJUN FENG.

Elsevier Neural Computing

2022

[8] 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

[9] 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

2022 1st prize, Huawei Academic Star Competition

Shanghai, China

2022 Finalist, 19th Wang Daheng Optical Award

Beijing, China

2022 Finalist, Top Ten Students of College

Hangzhou, China

Presentation

IPPF (International Postgraduate Photonics Forum) 2022

PRESENTER

Hangzhou, China

Oct. 2022

- Computational Optics for Mobile Terminals in Mass Production

SIGGRAPH 2022

PRESENTER

Vancouver, Canada

Aug. 2022

- Optical Aberrations Correction using Imaging Simulation

Huawei Terminal Workshop

PRESENTER

Hangzhou, China

Jun. 2022

- Optical simulation for low-level computer vision

Professional service

ACM TOG, OSA OE, Elsevier PRL, Wiley IPR, CVPR, ECCV, SIGGRAPH

PEER REVIEWER