XINGE YANG

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RESEARCH

I am a PhD candidate at KAUST working on computational imaging from hardware to software. My research primarily focuses on two fields: (1) **Differentiable optimization for optical design**, differentiable optics simulation for camera lenses and AR/VR devices, deep learning based automated optical design; and (2) **End-to-end imaging simulation for computer vision**, end-to-end imaging pipeline simulation for synthetic dataset, computational photography algorithms (image restoration, ISP, depth estimation).

I am committed to translating my research into real-world applications. I collaborate closely with optical manufacturers and research teams from both academia and industry. In addition to conducting theoretical work, I also build hardware prototypes to demonstrate my research outcomes in practice. I maintain "DeepLens", an open-source end-to-end differentiable optics codebase to share my work with the wider community.

EDUCATION

- **King Abdullah University of Science and Technology** 08/2020 - 04/2026
  M.S./Ph.D. in Computer Science. *(*M.S. conferred in 06/2022)* Saudi Arabia
  Advisor: Wolfgang Heidrich
- **University of Science and Technology of China** 08/2016 - 06/2020
  B.Sc. in Physics China

EXPERIENCE

- **Meta Reality Labs**, Incoming Research Scientist
  (Offer rescinded due to company's business needs shifting).
- **Meta Reality Labs**, Research Scientist Intern 07/2024 - 11/2024
  Worked with Wenbin Wang, Chuong Nguyen, Ginger Li, Honghong Peng Sunnyvale, CA, US
  Conducted research on smart glasses computational photography algorithms, defocus deblur, denoising, and burst imaging.
- **Meta Reality Labs Research**, Research Scientist Intern 10/2023 - 01/2024
  Worked with Zhaocheng Liu, Zhiming Shi, Jim Bonar, Barry Silverstein Redmond, WA, US
  Conducted research on end-to-end differentiable geometric waveguide coating simulation and optimization.

PUBLICATIONS

First author, corresponding author:

1. **End-to-end Differentiable Design of Geometric Waveguide Displays** 2026
   Xinge Yang, Zhaocheng Liu, Zhaoyu Nie, Qingyuan Fan, Zhimin Shi, Jim Bonar, Wolfgang Heidrich
   arXiv preprint
2. **Task-Driven Lens Design** 2026
   Xinge Yang, Qiang Fu, Yunfeng Nie, Wolfgang Heidrich
   Under review
3. **Efficient Depth- and Spatially-Varying Image Simulation for Defocus Deblur** 2025
   Xinge Yang, Chuong Nguyen, Wenbin Wang, Kaizhang Kang, Wolfgang Heidrich, Ginger Li
   ICCV ECLR Workshop (Oral presentation)
4. **End-to-End Hybrid Refractive-Diffractive Lens Design with Differentiable Ray-Wave Model** 2024
   Xinge Yang, Matheus Souza, Kunyi Wang, Praneeth Chakravarthula, Qiang Fu, Wolfgang Heidrich
   SIGGRAPH Asia
5. **Curriculum Learning for ab initio Deep Learned Refractive Optics** 2024
   Xinge Yang, Qiang Fu, Wolfgang Heidrich
   Nature Communications (Representative work)
6. **Aberration-Aware Depth-from-Focus** 2023
   Xinge Yang, Qiang Fu, Mohammed Elhoseiny, Wolfgang Heidrich
   IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)

Contributor:

1. **High-throughput space-time Fourier ptychography for motile microorganisms** 2025
   Ming Sun, Kaizhang Kang, Yogeshwar Nath Mishra, **Xinge Yang**, Hadi Amata, Wolfgang Heidrich
   Optics Express
2. **End-to-end Optimization of Fluidic Lenses** 2024
   Mulun Na, Héctor Jiménez-Romero, **Xinge Yang**, Jonathan Klein, Dominik Michels, Wolfgang Heidrich
   SIGGRAPH Asia

Short papers, abstract and magazine:

1. **Differentiable Optimization for Automated Optical Design** 2025
   Xinge Yang, Qiang Fu, Wolfgang Heidrich
   SPIE, Optics and Photonics (Invited talk)
2. **An AI Curriculum for Learning Lens Design** 2024
   Xinge Yang, Qiang Fu, Wolfgang Heidrich
   Optica, OPN Year in Review, "Optics in 2024" (Top 30 optics research in the year of 2024)
3. **Deep Learning Improves Lens Design** 2024
   Xinge Yang, Qiang Fu, Wolfgang Heidrich
   KAUST Discovery Magazine
4. **Automatic Lens Design based on Differentiable Ray-tracing** 2023
   Xinge Yang, Qiang Fu, Wolfgang Heidrich
   Optica, Computational Optical Sensing and Imaging (COSI)

INVITED TALKS

Differentiable optical design, Computational camera

- **Jiangmen TechBeat community** 09/2025
  Computational imaging system and AI optical design. Online
- **SPIE Optics and Photonics, Optical Design Automation** 08/2025
  Differentiable optimization for automated optical design. San Diego, CA, US
- **Stanford University Physical AI Journal Clubs** 06/2025
  Differentiable optical design. Online
- **Tongji University** 02/2025
  Differentiable optimization for automated optical design and end-to-end cameras. Shanghai, China
- **CAS Shanghai Institute of Optics and Fine Mechanics** 02/2025.
  Differentiable optimization for automated optical design and end-to-end cameras. Shanghai, China
- **Zhejiang University** 02/2025
  Differentiable optimization for automated optical design and end-to-end cameras. Hangzhou, China
- **Nanjing University** 02/2025
  Differentiable optimization for automated optical design and end-to-end cameras. Nanjing, China
- **CVPR Physics Based Vision meets Deep Learning (PBDL) Workshop** 06/2024
  Deep learning for computational lens design. Seattle, WA, US

SKILLS

- **Computational Photography:** Defocus deblur, Denoising, Depth from focus, Image signal processing
- **Optical Simulation & Design:** ZEMAX/OpticsStudio, Raytracing
- **Graphics & Physically Based Rendering**: Blender, Mitsuba2
- **3D Design & Prototyping:** SolidWorks, Fusion360
- **Programming Language:** Python, PyTorch, C/C++

AWARDS

- **KAUST Ms/PhD Program Fellowship** 2020 - 2025
  Full scholarship supporting the progression of master and doctoral degrees.

- **KAUST CEMSE Dean's List Award** 2023, 2024, 2025
  Awarded to the top students based on recommendations from students' PhD advisors, reflecting their outstanding contributions to the university's academic community.

MISC

- **Reviewer:** Optics Express (2026/2025/2024/2023); CVPR (2026); SIGGRAPH Asia (2025); SIGGRAPH (2025); NeurIPS (2025/2024); ICLR (2026/2025); ICML (2025); AAAI (2026); AISTATS (2026/2025); IEEE TPAMI (2024/2022); IEEE TCI (2024); IEEE TIP (2025/2024); IEEE VR (2025); IEEE OJVT (2025); Optica (2023); Journal of the Optical Society of America A (2023).
- **Teaching assistant:** Chinese Graphics And Mixed Environment Symposium (GAMES) Webinar: 204 Computational Imaging. Instructor: Qilin Sun, Evan Peng