XINGE YANG

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RESEARCH

I am a PhD candidate at KAUST working on computational imaging, focusing on:

- **End-to-end imaging and computer vision**, high-fidelity synthetic dataset generation with optics and sensor simulation, image restoration and depth estimation with regression and generative models, 3D reconstruction with gaussian splatting.
- **Differentiable optical design**, automating the design for complex optical systems through differentiable optimization, including camera and cellphone lenses, VR/AR displays.
- **Camera system prototyping**, building and testing camera systems in real world conditions, running on-device and cloud-based image processing and neural networks.

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. 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

WORKING EXPERIENCE

- **Meta Reality Labs**, Incoming Research Scientist
  - Camera machine learning algorithms (Offer rescinded due to company's business needs shifting).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
  - Built efficient and large-scale synthetic dataset with spatially-varying aberrations, defocus and sensor noise.
  - Developed, trained and tested computer vision algorithms, including defocus deblur, denoising, ISP, and video deblur.
- **Meta Reality Labs Research**, Research Scientist Intern 10/2023 - 01/2024
  Worked with Zhaocheng Liu, Zhiming Shi, Jim Bonar, Barry Silverstein Redmond, WA, US
  - Built differentiable simulation (non-sequential polarization ray tracing) for geometric waveguide from scratch.
  - Developed automated optimization for thousand-scale geometric waveguide coating films.

PUBLICATIONS

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. **Aberration-Aware Depth-from-Focus** 2025
   Xinge Yang, Qiang Fu, Mohammed Elhoseiny, Wolfgang Heidrich
   IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
5. **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

6. **End-to-end Optimization of Fluidic Lenses** 2024
Mulun Na, Héctor Jiménez-Romero, **Xinge Yang**, Jonathan Klein, Dominik Michels, Wolfgang Heidrich
SIGGRAPH Asia

7. **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

8. **Curriculum Learning for ab initio Deep Learned Refractive Optics** 2024
Xinge Yang, Qiang Fu, Wolfgang Heidrich
Nature Communications (Representative work)

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)

SKILLS

- **Deep Learning:** Multi-node, multi-GPU training and inference
- **Computational Photography:** Defocus deblur, Denoising, Depth estimation, ISP
- **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