

YUANHAO WANG

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RESEARCH INTERSETS

Yuanhao's research interests encompass a wide range of topics in computational photography, including **image processing (ISP)**, **3D particle tracking velocimetry(PTV)**, and **neural representation for tomography**. Currently, he is focusing on applying neural representation to tomography, specifically in the acceleration, reconstruction, and denoising of cryo electron tomography (cryo-ET) datasets.

EDUCATION

King Abdullah University of Science and Technology
Ph.D. in Electrical and Computer Engineering

Sept. 2016-Sept. 2023
Advisor: Dr. Wolfgang Heidrich

Tsinghua University
M.Eng. in Integrated Circuits Engineering

Sept. 2013-July 2016
Advisor: Dr. Shuguo Li

Beijing University of Posts and Telecommunications
B.Eng. in Communication Engineering

Sept.2009-July 2013
Advisor: Dr. Yitong Liu

SOFTWARE SKILLS

Computer Programming Tools & APIs C++, Libtorch, Cuda, Python, Pytorch, C, Matlab, Verilog, etc.
Paraview, Blender, Avizo, etc.

SELECTED PUBLICATIONS

- [1] **Wang, Yuanhao** and Idoughi, Ramzi and Rückert, Darius and Li, Rui and Heidrich, Wolfgang, "Adaptive differentiable grids for cryo-electron tomography reconstruction and denoising," *Bioinformatics Advances (under revision)*, 2023.
- [2] **Wang, Yuanhao** and Idoughi, Ramzi and Heidrich, Wolfgang, "Learning adaptive tensorial density fields for clean cryo-et reconstruction," *Submitted to NIPS 2023 (under review)*.
- [3] **Wang, Yuanhao** and Idoughi, Ramzi and Heidrich, Wolfgang, "Joint motion-correction and reconstruction in cryo-em tomography," in *ICIP 2022 (Oral)*, 2022, pp. 1101–1105, [paper](#).
- [4] D. Rückert and **Wang, Yuanhao** and Li, Rui and Idoughi, Ramzi and Heidrich, Wolfgang, "NeAT: Neural Adaptive Tomography," *ACM Trans. Graph.*, vol. 41, no. 4, Jul. 2022, [paper](#).
- [5] R. Li, D. Rückert, and **Wang, Yuanhao** and Idoughi, Ramzi and Heidrich, Wolfgang, "Neural adaptive scene tracing (nascent)," *VMV 2022*, <https://arxiv.org/abs/2202.13664>.
- [6] G. Qian* and **Wang, Yuanhao*** and Gu, Jinjin and Dong, Chao and Heidrich, Wolfgang and Ghanem, Bernard and Ren, Jimmy S, "Rethinking learning-based demosaicing, denoising, and super-resolution pipeline," in *ICCP 2022 (equal contribution)*, [paper](#).
- [7] **Wang, Yuanhao** and Idoughi, Ramzi and Heidrich, Wolfgang, "Stereo event-based particle tracking velocimetry for 3d fluid flow reconstruction," in *ECCV 2020*, 2020, pp. 36–53, [paper](#).
- [8] **Wang, Yuanhao** and Li, Shuguo, "A high-speed digital true random number generator based on cross ring oscillator," *IEICE Trans. on Fund.of Elec., Com. and Com. Sci.*, vol. 99, no. 4, pp. 806–818, 2016, [paper](#).

RESEARCH EXPERIENCE

Neural representation of cryo-ET [1, 2] | C++, Libtorch, CUDA
Visual Computing Center, KAUST

June 2021-Current

- Proposed an adaptive Density Field/Tensorial Density Field for efficient and large cryo-ET dataset.
- Proposed an Isotropic Fourier Prior to effectively mitigate the presence of peak patterns in the reconstruction.

Motion compensation cryo-ET [3] | C++, OpenMP Mar. 2020-June 2021
Visual Computing Center, KAUST

- Considered beam-induced motion during the reconstruction.
- Utilized a plug-and-play prior to address noise in the electron tomography data.

Neural Adaptive tomography [4] | C++, Libtorch June 2021-Feb. 2022
Visual Computing Center, KAUST

- Played a key role in formulating the differentiable model and designing relevant priors.
- Visualized the reconstructed volume with Avizo.

Rethink ISP pipeline [6] | Python, Pytorch June. 2020-June 2022
Visual Computing Center, KAUST

- Proposed a Denoising(DN) → Superresolution(SR) → Demosaicking(DM) worked best in all sequential pipelines.
- Released a PixelShift200 dataset, which sampled all the color channels using the PixelShift technique.
- Proposed that the joint approach of DN+SR → DM outperforms other learning-based methods, both joint and sequential.

Stereo Event-Camera Particle Tracking Velocimetry [7] | Matlab Oct. 2019-Mar.2020
Visual Computing Center, KAUST

- Proposed the first event-camera-based stereo-PTV setup for measuring time-resolved fluid flow.
- Proposed an optimization framework to retrieve dense fluid velocity field from the event data.

True Random Number Generator [8] | Verilog July 2014 - July 2016
Institute of Microelectronics, Tsinghua University

- Designed a Cross Ring Oscillator based TRNG (CRTRNG). The CRTRNG gains **240Mbps** random number, while consuming only about **3000** logic elements on Altera Cyclone IV.
- Designed a **1Gbps** Cross Ring Oscillator based TRNG circuits based on SMIC 65nm.

ACADAMIC SERVICE

Reviewer CVPR, ECCV

AWARDS

The Second Prize in China Undergraduate Mathematical Contest in Modeling (2012)

Honorable Mention of Interdisciplinary Contest in Modeling(2012)

JDSU special Awards (aimed at the innovative programs, 2012)

SERVICE

Student Reporter Tsinghua University News Center Sept. 2014-July 2015
Vice-Minister School's Youth League Committee in Tsinghua University Mar. 2015-2016