Dr. Chuanxia Zheng

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Research Interests

My research interests focus on computer vision and machine learning, especially for creative AI, aiming to develop systems that perceive, reconstruct, and interact with the physical world. I have done a wide range of work on 2D, 3D, and 4D scene synthesis, with the goal of *synthesizing a physical natural world* via generative AI. In particular, on topics:

- **Physical AI**: Occlusion, Interaction, Motion, and other physics perception and generation.
- **Spatial AI**: 3D and 4D Reconstruction, Decomposition, and Spatial Reasoning.
- **Generative AI**: Physics-aware generative models for images, videos, 3D, and 4D content.

Professional experience

2025– **Nanyang Assistant Professor**, *Nanyang Technological University*, Singapore.
Physical AI and Spatial AI

2024–25 **Marie Skłodowska-Curie Actions (MSCA) Fellow**, *University of Oxford*, UK.
Feed-Forward 3D and 4D reconstruction from sparse views

2022–24 **Postdoctoral Research Fellow**, *University of Oxford*, UK.
2D and 3D scene synthesis

2021–22 **Postdoctoral Research Fellow**, *Monash University*, Australia.
Codebook learning for 2D and 3D synthesis

Education

2017–21 **Doctor of Philosophy (PhD)**.
Nanyang Technological University
School of Computer Science and Engineering, Singapore
Thesis: *Synthesizing Photorealistic Images with Deep Generative Learning*
Outstanding PhD Thesis Award, Advisors: Tat-Jen Cham and Jianfei Cai

2014–17 **Master of Science (MSc) in computer science**.
Beihang University, Beijing, China
Thesis: *Context-based Indoor Scene Understanding for Mobile Robot*
Advisors: Jianhua Wang and Weihai Chen

2010–14 **Bachelor of Science in information engineering**.
Beijing Jiaotong University, Beijing, China
Thesis: *Image Retrieval based on Visual Saliency*
Highest Honours (Outstanding Graduate of Beijing), Advisor: Ze Liu

Research Experience

2022-25 **Research Fellow**, *University of Oxford*, UK, Prof. Andrea Vedaldi.
Research interests: 3D and 4D reconstruction from limited images or videos

2021-22 **Research Fellow**, *Monash University*, Australia, Prof. Jianfei cai.
Research interests: nature scene generation and completion

2017-21 **PhD**, *Nanyang Technological University*, Singapore, Prof. Nadia Thalmann.
Research interests: photorealistic image generation

Awards and other recognitions

2025 Outstanding Reviewer Award, *International Conference on Computer Vision* (ICCV)
2025 **Singapore NRF Fellowship** (SGD $3,078,720)
2024 Germany DAAD Ainet Fellowship, *Postdoctoral Networking Tour in Artificial Intelligence*
2024 **HORIZON Marie Skłodowska-Curie (MSCA) Fellowship** (€236,748)
2023 Outstanding Reviewer Award, *Conference on Computer Vision and Pattern Recognition* (CVPR)
2022 Scholar/Travel Award, Conference on *Neural Information Processing Systems* (NeurIPS)
2022 Outstanding PhD Thesis Award, NTU, Singapore
2021 Outstanding Reviewer Award, IEEE *Transactions on Multimedia* (TMM)
2017 NTU Research Scholarship
2014 Outstanding Graduate of Beijing
2012 Hanergy Scholarship Award (**Top 1%**)
2011 Siemens Scholarship Award (**Top 1%**)

Grants

2025- **National Research Foundation (NRF) Fund Fellowship**, "From Pixels to Physics: Integrating Physical Properties in 3D World Creation", PI, SGD$3,078,720, NRFF17-2025-0148.
2025- NTU White Space Fund (Start Grant of NAP), "C4D: Completed 4D Reconstruction and Decomposition", PI, SGD$250,000.
2025- Sony Focused Research Award, "Vista4D: Feed-Forward 4D Scene Reconstruction from Any Monocular Video", Co-I, $100,000.
2024-25 **HORIZON Marie Skłodowska-Curie (MSCA) Fellowship**, "SYN3D: Synthesizing Photorealistic 3D Scene from Zero to One or Limited Views", PI, €236,748, EP/Z001811/1
2024-25 Bavarian Funding, "Object-Centric 3D Reconstruction and Decomposition", Co-I, €5,910.

Service to the academic community

- **Area Chair.** ACM Multimedia 2024, BMVC 2024, 2025, ICLR 2026.
- **Reviewer for international journals.** IEEE Transactions on Pattern Analysis and Machine Intelligence (**TPAMI**), International Journal on Computer Vision (**IJCV**), IEEE Transactions on Image Processing (**TIP**), IEEE Transactions on Multimedia(**TMM**), Computer Vision and Image Understanding (**CVIU**), The Visual Computer (**TVC**).
- **Reviewer for international conferences.** IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**) 2020-2025, European Conference on Computer Vision (**ECCV**) 2020, 2022, 2024, International Conference on Computer Vision (**ICCV**) 2019, 2021, 2023, 2025 International Conference on Neural Information Processing Systems (**NeurIPS**) 2022-2025, International Conference on Learning Representations (**ICLR**) 2021-2025, International Conference on Machine Learning (**ICML**) 2023, International Conference on Computer Graphics (**SIGGRAPH**) 2021,2022, International Conference on Robotics and Automation (**ICRA**) 2023.

International workshops

2024 "Second Workshop for Learning 3D with Multi-View Supervision" at the IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**) with Abdullah Hamdi, Silvio Giancola, Guocheng Qian, Jinjie Mai, Sara Rojas Martinez, Bernard S. Ghanem, and Yash Bhalgat.

Press Coverage

2024 Hacker News: Zero-Shot Gaussian Splatting from Uncalibrated Image Pairs
2024 Hacker News: MVSplat: Efficient 3D Gaussian Splatting from Sparse Multi-View Images
2023 Sber.ru: MoVQ — 0.1 means a lot for text-image generation Kandinsky 2.1 (Github: 2.8K)
2022 Phys.org: Researchers unravel cell biology through artificial intelligence
2022 NTU News: NTU SCSE Outstanding PhD Thesis Award 2022
2022 Zhuanzhi: How to create photorealistic images? Ph.D. Thesis by Dr. Zheng
2021 kknews, Sohu, NetEase: AgileGAN — a tool for creating stylized portraits (Demo: 10K/week)

Invited talks

2025 **Beyond Visual Geometry: Toward Physical 3D Reconstruction**, *University of Queensland*.
2025 **Beyond Visual Geometry: Toward Physical 3D Reconstruction**, *Zhejiang University*.
2025 **Beyond Visual Geometry: Toward Physical 3D Reconstruction**, *Westlake University*.
2025 **Beyond Visual Geometry: Toward Physical 3D Reconstruction**, *University of Cambridge*, UK, Link.
2024 **Physical Natural World Creation: Feed-forward, generalisable 3D and 4D reconstruction**, *University of Oxford*, UK, Link.
2024 **Physi4D: Physically interactive 4D natural world creation**, *NTU*, Singapore, NTU.
2024 **Natural World Creation based on Generative AI**, *Shanghai Jiaotong University*, China.
2023 **Visiting the Invisible via Generative AI**, *University of Science and Technology*, China.
2023 **Codebook Leaning for Generative AI**, *Harbin Institute of Technology*, China.
2023 **Codebook Leaning for Generative AI**, *NTU*, Singapore.
2023 **Codebook Leaning for Generative AI**, *University of Oxford*, UK.
2022 **Synthesizing Photorealistic Scenes**, *NTU*, Singapore, Link.
2022 **Synthesizing Photorealistic Scenes**, *University of Oxford*, UK.
2022 **Synthesizing Photorealistic Scenes**, *ETH*, Zürich.
2022 **Synthesizing Photorealistic Scenes**, *University of Science and Technology*, China.
2019 **Pluralistic Image Completion**, *NTU*, Singapore.
2018 **Depth Estimation from Single 2D Image**, *Nanyang Technological University*, Singapore.

Mentoring

PhD

2025- Weirong Chen, TUM, co-supervised with Prof. Daniel Cremers and Prof. Andrea Vedaldi
2024- Zeren Jiang, Oxford, co-supervised with Prof. Andrea Vedaldi and Dr. Iro Laina
2023- Brandon Smart, Oxford, co-supervised with Prof. Victor Prisacariu and Dr. Iro Laina
2023- Ruining Li, Oxford, co-supervised with Prof. Andrea Vedaldi and Christian Rupprecht
2023-25 Tianhao Wu, NTU, co-supervised with Prof. Tat-Jen Cham
2022-23 Minghui Hu, NTU, three terms with Prof. Tat-Jen Cham
2021-24 Yuedong Chen, Monash University, co-supervised with Prof. Jianfei Cai

Master

2024-24 Wenbo Ji, TUM, co-supervised with Dr. Yan Xia and Prof. Daniel Cremers

2024-24 Filip Skubacz, TUM, co-supervised with Dr. Yan Xia and Prof. Daniel Cremers

2024-24 Nina Kirakosyan, TUM, co-supervised with Dr. Yan Xia and Prof. Daniel Cremers

2024-24 Michael Neumayr, TUM, co-supervised with Dr. Yan Xia and Prof. Daniel Cremers

Teaching

2023-24 **Teaching Assistant**, *B16: Software Engineering*, Undergraduate, University of Oxford.

2023-23 **Teaching**, *Generative AI*, Graduate, University of Oxford.

2018–20 **Teaching Assistant**, *Advanced Digital Image Processing*, Graduate, NTU.

2018–20 **Teaching Assistant**, *Human-Computer Interaction*, Undergraduate, NTU.

2018–19 **Teaching Assistant**, *Engineering Mathematics*, Undergraduate, NTU.

Publications

[39] Yuedong Chen, Haofei Xu, Qianyi Wu, **Chuanxia Zheng**, Tat-Jen Cham, and Jianfei Cai. Explicit correspondence matching for generalizable neural radiance fields. ***TPAMI***, 2025. URL: https://donydchen.github.io/matchnerf/.

[38] Zeren Jiang, **Chuanxia Zheng**, Iro Laina, Diane Larlus, and Andrea Vedaldi. Geo4d: Leveraging video generators for geometric 4d scene reconstruction. In ***ICCV***, 2025. URL: https://geo4d.github.io/.

[37] Tianhao Wu, **Chuanxia Zheng**, Frank Guan, Andrea Vedaldi, and Tat-Jen Cham. Amodal3r: Amodal 3d reconstruction from occluded 2d images. In ***ICCV***, 2025. URL: https://sm0kywu.github.io/Amodal3R/.

[36] Ruining Li, **Chuanxia Zheng**, Christian Rupprecht, and Andrea Vedaldi. Dso: Aligning 3d generators with simulation feedback for physical soundness. In ***ICCV***, 2025. URL: https://ruiningli.com/dso.

[35] Ruining Li, **Chuanxia Zheng**, Christian Rupprecht, and Andrea Vedaldi. Puppet-master: Scaling interactive video generation as a motion prior for part-level dynamics. In ***ICCV***, 2025. URL: https://vgg-puppetmaster.github.io/.

[34] Huiang He, Minghui Hu, **Chuanxia Zheng**, Chaoyue Wang, and Tat-Jen Cham. Semantix: An energy-guided sampler for semantic style transfer. In ***ICLR***, 2025. URL: https://huiang-he.github.io/semantix/.

[33] Stanislaw Szymanowicz*, Eldar Insafutdinov*, **Chuanxia Zheng***, Dylan Campbell, Joao Henriques, Christian Rupprecht, and Andrea Vedaldi. Flash3d: Feed-forward generalisable scene reconstruction from a single image. In ***3DV***, 2025. URL: https://www.robots.ox.ac.uk/.

[32] Yuzhu Ji, **Chuanxia Zheng**, and Tat-Jen Cham. One-shot human motion transfer via occlusion-robust flow prediction and neural texturing. ***TMM***, 2025.

[31] Yuedong Chen, **Chuanxia Zheng**, Haofei Xu, Bohan Zhuang, Andrea Vedaldi, Tat-Jen Cham, and Jianfei Cai. Mvsplat360: Benchmarking 360-degree generalizable 3d novel view synthesis from sparse views. In ***NeurIPS***, 2024. URL: https://donydchen.github.io/mvsplat360/.

[30] Guanqi Zhan, **Chuanxia Zheng**, Weidi Xie, and Andrew Zisserman. A general protocol to probe large vision models for 3d physical understanding. In ***NeurIPS***, 2024.

[29] Yuedong Chen, Haofei Xu, **Chuanxia Zheng**, Bohan Zhuang, Marc Pollefeys, Andreas Geiger, Tat-Jen Cham, and Jianfei Cai. Mvsplat: Efficient 3d gaussian splatting from sparse multi-view images. In ***ECCV***, 2024. URL: https://donydchen.github.io/mvsplat/.

[28] Ruining Li, **Chuanxia Zheng**, Christian Rupprecht, and Andrea Vedaldi. Dragapart: Learning a part-level motion prior for articulated objects. In ***ECCV***, 2024. URL: https://dragapart.github.io/.

[27] Tianhao Wu, **Chuanxia Zheng**, Tat-Jen Cham, and Qianyi Wu. Clusteringsdf: Self-organized neural implicit surfaces for 3d decomposition. In ***ECCV***, 2024. URL: https://sm0kywu.github.io/ClusteringSDF/.

[26] **Chuanxia Zheng**, Guoxian Song, Tat-Jen Cham, Jianfei Cai, Linjie Luo, and Dinh Phung. Bridging global context interactions for high-fidelity pluralistic image completion. ***TPAMI***, 2024. URL: https://chuanxiaz.com/picformer/.

[25] **Chuanxia Zheng** and Andrea Vedaldi. Free3d: Consistent novel view synthesis without 3d representation. In ***CVPR***, 2024. URL: https://chuanxiaz.com/free3d/.

[24] Guanqi Zhan, **Chuanxia Zheng**, Weidi Xie, and Andrew Zisserman. Amodal ground truth and completion in the wild. In ***CVPR***, 2024. URL: https://www.robots.ox.ac.uk/ vgg/research/.

[23] Minghui Hu, Jianbin Zheng, **Chuanxia Zheng**, Chaoyue Wang, and Tat-Jen Cham. One more step: A versatile plug-and-play module for rectifying diffusion schedule flaws and enhancing low-frequency controls. In ***CVPR***, 2024. URL: https://jabir-zheng.github.io/OneMoreStep/.

[22] Tianhao Wu, **Chuanxia Zheng**, and Tat-Jen Cham. Panodiffusion: 360-degree panorama outpainting via diffusion. In ***ICLR***, 2024. URL: https://sm0kywu.github.io/panodiffusion/.

[21] Minghui Hu, Jianbin Zheng, Daqing Liu, **Chuanxia Zheng**, Chaoyue Wang, and Tat-Jen Cham. Cocktail: Mixing multi-modality control for text-conditional image generation. In ***NeurIPS***, 2023. URL: https://mhh0318.github.io/cocktail/.

[20] **Chuanxia Zheng** and Andrea Vedaldi. Online clustered codebook. In ***ICCV***, 2023. URL: https://chuanxiaz.com/cvq/.

[19] Long Tung Vuong, Trung Le, He Zhao, **Chuanxia Zheng**, Mehrtash Harandi, Jianfei Cai, and Dinh Phung. Vector quantized wasserstein auto-encoder. In ***ICML***, 2023.

[18] Minghui Hu, **Chuanxia Zheng**, Heliang Zheng, Tat-Jen Cham, Zuopeng Yang, Chaoyue Wang, and Ponnuthurai N. Suganthan. Unified discrete diffusion for simultaneous vision-language generation. In ***ICLR***, 2023. URL: https://mhh0318.github.io/unid3/.

[17] **Chuanxia Zheng**, Tung Vuong, Jianfei Cai, and Dinh Phung. Movq: Modulating quantized vectors for high-fidelity image generation. In ***NeurIPS***, 2022. URL: https://chuanxiaz.com.

[16] Jyothsna Vasudevan*, **Chuanxia Zheng***, James G. Wan, Tat-Jen Cham, Lim Chwee Teck, and Javier G. Fernandez. From qualitative data to correlation using deep generative networks: Demonstrating the relation of nuclear position with the arrangement of actin filaments. ***PloS one***, 17(7):e0271056, 2022.

[15] Qianyi Wu, Xian Liu, Yuedong Chen, Kejie Li, **Chuanxia Zheng**, Jianfei Cai, and Jianming Zheng. Object-compositional neural implicit surfaces. In ***ECCV***, 2022. URL: https://wuqianyi.top/objectsdf/.

[14] Yuedong Chen, Qianyi Wu, **Chuanxia Zheng**, Tat-Jen Cham, and Jianfei Cai. Sem2nerf: Converting single-view semantic masks to neural radiance fields. In ***ECCV***, 2022. URL: https://donydchen.github.io/sem2nerf/.

[13] **Chuanxia Zheng**, Tat-Jen Cham, Jianfei Cai, and Dinh Phung. Bridging global context interactions for high-fidelity image completion. In ***CVPR***, pages 11512–11522, June 2022. URL: https://chuanxiaz.com/tfill/.

[12] **Chuanxia Zheng**, Duy-Son Dao, Guoxian Song, Tat-Jen Cham, and Jianfei Cai. Visiting the invisible: Layer-by-layer completed scene decomposition. ***IJCV***, 129(12):3195–3215, 2021. URL: https://chuanxiaz.com/vinv/.

[11] Yujun Cai, Yiwei Wang, Yiheng Zhu, Tat-Jen Cham, Jianfei Cai, Junsong Yuan, Jun Liu, **Chuanxia Zheng**, Sijie Yan, Henghui Ding, Xiaohui Shen, Ding Liu, and Nadia Magnenat Thalmann. A unified 3d human motion synthesis model via conditional variational auto-encoder. In ***ICCV***, pages 11645–11655, 2021.

[10] **Chuanxia Zheng**, Tat-Jen Cham, and Jianfei Cai. Pluralistic free-form image completion. ***IJCV***, 129(10):2786–2805, 2021. URL: https://chuanxiaz.com/pic/.

[9] Guoxian Song, Linjie Luo, Jing Liu, Wan-Chun Ma, Chunpong Lai, **Chuanxia Zheng**, and Tat-Jen Cham. Agilegan: stylizing portraits by inversion-consistent transfer learning. *ACM Transactions on Graphics (**TOG**)*, 40(4):1–13, 2021. URL: https://guoxiansong.github.io.

[8] **Chuanxia Zheng**, Tat-Jen Cham, and Jianfei Cai. The spatially-correlative loss for various image translation tasks. In ***CVPR***, 2021. URL:https://chuanxiaz.com/flsesim/.

[7] **Chuanxia Zheng**, Tat-Jen Cham, and Jianfei Cai. Pluralistic image completion. In ***CVPR***, pages 1438–1447, 2019. URL: https://chuanxiaz.com/pic/.

[6] Tianyi Zhang, Jingyi Yang, **Chuanxia Zheng**, Guosheng Lin, Jianfei Cai, and Alex C Kot. Task-in-all domain adaptation for semantic segmentation. In ***VCIP***, pages 1–4, 2019.

[5] **Chuanxia Zheng**, Tat-Jen Cham, and Jianfei Cai. T2net: Synthetic-to-realistic translation for solving single-image depth estimation tasks. In ***ECCV***, pages 767–783, 2018. URL: https://chuanxiaz.com/synthetic2real/.

[4] **Chuanxia Zheng**, Jianhua Wang, Weihai Chen, and Xingming Wu. Multi-class indoor semantic segmentation with deep structured model. ***TVCJ***, 34(5):735–747, 2018.

[3] Jianhua Wang, **Chuanxia Zheng**, Weihai Chen, and Xingming Wu. Learning aggregated features and optimizing model for semantic labeling. ***TVCJ***, 33(12):1587–1600, 2017.

[2] **Chuanxia Zheng**, Jianhua Wang, Weihai Chen, and Xingming Wu. Semantic segmentation based on aggregated features and contextual information. In ***ROBIO***. IEEE, 2016.

[1] Jianhua Wang, **Chuanxia Zheng**, Weihai Chen, and Xingming Wu. Learning contextual information for indoor semantic segmentation. In ***ICIEA***, pages 1639–1644. IEEE, 2016.