TAO HU

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RESEARCH INTERESTS

Human-Centric Interactive Multimodal Generation, 3D Perception and Reconstruction, Controllable Video Generation, Structured Modeling, Digital Human Modeling, Motion Capture, Animation, World Model.

EDUCATION

University of Maryland, College Park, USA. *2018 – 2023*

Ph.D. student in CS Department, working with Prof. Matthias Zwicker.

Research Topic: Dense 3D Reconstructions from Sparse Visual Data. GPA: 3.86/4.0

Beijing Institute of Technology, Beijing, R.P.China. *2011–2015–2018*

B.Eng., M.S. (Digital Performance) at School of Software.

RESEARCH EXPERIENCE

Stability AI USA, Singapore

Research Scientist *Jan. 2025 - Now*

○ Project: Human-centric image, video and 3D generation.

○ Developed multimodal vitrual try-on, one-shot 4D human (SHV4D), 3D-aware video generation (HumANDiff).

Nanyang Technological University. Singapore

Research Fellow with S-Lab, MMLab, manager: Prof. Ziwei Liu *Jun. 2023 - Jan. 2025*

○ Project: Human-centric interactive multimodal visual generation via structured diffusion.

○ Published SurMo (motion modeling) at CVPR 2024, StructLDM (structured diffusion) at ECCV 2024, and developed FashionEngine (interactive multimodal human generation systems).

ByteDance (TikTok) Inc. USA (remote)

Research Intern with Intelligent Creation Lab, mentor: Dr. Hongyi Xu, Dr. Linjie Luo *Dec. 2021 - Jul. 2022*

○ Project: Avatar Generation based on Driving Views.

○ Published HVTR++ in IEEE TVCG 2023, received a U.S. patent.

Tshinghua University Beijing, China.

Research Intern with 3DV Lab, mentor: Prof. Yebin Liu *Apr. 2021 - Nov. 2021*

○ Published hybrid neural rendering for human avatars (HVTR) at 3DV 2022.

Max Planck Institute for Informatics. Saarbrücken, Germany

Research Intern with GVV Group, mentor: Prof. Christian Theobalt *Mar. 2020 - Sep. 2020*

○ Project: Egocentric 3D human motion capture, egocentric telepresence system.

○ Published EgoRenderer at ICCV 2021.

Microsoft Research Asia (MSRA). Beijing, China

Research Intern with Speech group, mentor: Dr. Kai Chen *Jun. 2017 - Nov. 2017*

○ Project: Optimize deep neural networks for Optical Character Recognition (OCR) in the Wild.

SELECTED PUBLICATIONS & MANUSCRIPTS

Tao Hu, Varun Jampani. **HumANDiff: Articulated Noise Diffusion for Motion-Consistent Human Video Generation.** *under review, 2026.*

Shoukang Hu, Fangzhou Hong, **Tao Hu**, Liang Pan, Haiyi Mei, Weiye Xiao, Lei Yang, Ziwei Liu. **Humanliff: Layer-wise 3D Human Generation with Diffusion Model.** *International Journal of Computer Vision (**IJCV**), 2025.*

Tiantian Wang, Chun-Han Yao, **Tao Hu**, Mallikarjun Byrasandra Ramalinga Reddy, Ming-Hsuan Yang, Varun Jampani. **Human Video Generation from a Single Image with 3D Pose and View Control.** *under review, 2025.*

Hongyang Du, Runhao Li, Dawei Liu, Haoyuan Song, Qingyu Zhang, Yubo Wang, Jingcheng Ni, Shihang Gui, Congchao Dong, **Tao Hu**. **A Data-Centric Taxonomy for 3D Vision: Linking Representations, Augmentation, and State-of-the-Art Learning Paradigms.** *Technical Report, 2025.*

Tao Hu, Fangzhou Hong, Zhaoxi Chen, Ziwei Liu. **FashionEngine: Interactive 3D Human Generation and Editing via Multimodal Controls.** *Technical Report, 2024.*

Tao Hu, Fangzhou Hong, Ziwei Liu. **StructLDM: Structured Latent Diffusion for 3D Human Generation.** *European Conference on Computer Vision (**ECCV**), 2024.*

Tao Hu, Fangzhou Hong, Ziwei Liu. **SurMo: Surface-based 4D Motion Modeling for Dynamic Human Rendering.** *Conference on Computer Vision and Pattern Recognition (**CVPR**), 2024.*

Tao Hu, Hongyi Xu, Linjie Luo, Tao Yu, Zerong Zheng, He Zhang, Yebin Liu, Matthias Zwicker. **HVTR++: Image and Pose Driven Human Avatars using Hybrid Volumetric-Textural Rendering.** *IEEE Transactions on Visualization and Computer Graphics (**TVCG**), 2023.*

Tao Hu, Tao Yu, Zerong Zheng, He Zhang, Yebin Liu, Matthias Zwicker. **HVTR: Hybrid Volumetric-Textural Rendering for Human Avatars.** *International Conference on 3D Vision (**3DV**)*, 2022.

Tao Hu, Kripasindhu Sarkar, Lingjie Liu, Matthias Zwicker, Christian Theobalt. **EgoRenderer: Rendering Human Avatars from Egocentric Camera Images.** *International Conference on Computer Vision (**ICCV**)*, 2021.

Tao Hu, Geng Lin, Zhizhong Han, Matthias Zwicker. **Learning to Generate Dense Point Clouds with Textures on Multiple Categories.** *IEEE Winter Conference on Applications of Computer Vision (**WACV**)*, 2021.

Tao Hu, Zhizhong Han, Matthias Zwicker. **3D Shape Completion with Multi-View Consistent Inference.** *AAAI Conference on Artificial Intelligence (**AAAI**)*, 2020. (**Oral**, **top 10%** of accepted papers in 3D vision track)

Tao Hu, Zhizhong Han, Abhinav Shrivastava, Matthias Zwicker. **Render4Completion: Synthesizing Multi-View Depth Maps for 3D Shape Completion.** *ICCV Geometry Meets Deep Learning Workshop,* ***ICCVW*** *2019.* (Oral)

Tao Hu, Gangyi Ding, Lijie Li, Longfei Zhang. **A Parallel Video Player Plugin for CryEngine.** *Highlights of Sciencepaper*, Chinese Journal, May 2016

Tao Hu, Tu Peng. **Multi-angle Evaluations of Test Cases Based on Dynamic Analysis.** *The 10th International Conference on Advanced Data Mining and Applications (ADMA), 2014. pp. 406–420.*

PATENTS & SOFTWARE COPYRIGHTS

Hongyi Xu, **Tao Hu**, Linjie Luo. Avatar Generation based on Driving Views (Extension of the HVTR++ paper).

- **US Patent** 2022 : US12051168B2

Tao Hu, Gangyi Ding, Lijie Li, Longfei Zhang. A Parallel Video Player Plugin for CryEngine.

- Software Copyright 2016 : 2016SR010412

TEACHING

Teaching Assistant, Dept. of Computer Science, UMD.

CMSC425 Game Programming (Prof. Roger Eastman) Fall 2019, Spring 2019

CMSC 216 Introduction to Computer Systems (Mr. Laurence Herman) Fall 2018

REFEREE

CVPR, ICCV, ECCV, NeurIPS, ICML, ICLR, AAAI, IEEE VR, 3DV, WACV, ICPR, ACCV, CFG, CVIU, IVC, PPL.

SELECTED AWARDS & HONORS

National Scholarship (Top 2%), Ministry of Education of China 2016

National Scholarship (Top 2%), Ministry of Education of China 2014

SKILLS & EXPERTISE

Programming Languages: C/C++, Python, C#, Java, PHP, JavaScript, MATLAB.

Software Libraries: PyTorch, OpenGL, OpenGL ES, Blender, Unity, CryEngine, SIMD.