# Lizhen Wang 王立祯

Postdoc at Tsinghua University

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HomePage: https://lizhenwangt.github.io/
Research Interest: 3D face/body reconstruction, face tracking, styleGAN/NeRF/3D Gaussian-based portrait avatar.

## EDUCATION

**Tsinghua University, Ph.D.** *Aug. 2018-Jun. 2023*
Major in Control Science and Engineering, the Department of Automation
- GPA: 3.7/4.0
- Supervisor: Prof. Yebin Liu
- Teaching assistant of Data Structure course, Second-class scholarship of Tsinghua University

**Tsinghua University, Bachelor of Science** *Aug. 2014-Jul. 2018*
Major in Science of Mathematics and Physics, the Department of Physics
- GPA: 89/100
- Academic Excellence Scholarship of Tsinghua University, Social Work Excellence Scholarship of Tsinghua University
- First Prize of Hebei Province in Chinese Physics Olympiad in senior high school

## EXPERIENCES

**Tsinghua University** | Department of Automation *July. 2023-Present*
*Postdoc*
- Supervisor: Prof. Yebin Liu

**Ant Group** | Alipay Business Line, IoT Division *May. 2020- Jul. 2021 & Jul. 2022- Sep. 2022*
*Research Internship*
Mentor: Dr. Chenguang Ma
- Real-time 3D face tracking using a single RGB camera or RGB-D camera
- FaceVerse in publications: building the high-fidelity Chinese 3D face morphable Model (3DMM) using a hybrid dataset.

**The University of Texas at Austin** | Graphics & AI Lab *Jul. 2017- Sep. 2017*
*Summer Internship*
Advisor: Prof. Qixing Huang

- Manifold CNN structure for 3D objects.

## PUBLICATIONS

[1] **Lizhen Wang**, Xiaochen Zhao, Yuxiang Zhang, Hongwen Zhang, Tao Yu and Yebin Liu
*StyleAvatar: Real-time Photo-realistic Portrait Avatar from a Single Video*
ACM SIGGRAPH 2023 Conference Proceedings

[2] Xiaochen Zhao, **Lizhen Wang**, Jingxiang Sun, Ruizhi Shao and Yebin Liu
*HAvatar: High-fidelity Head Avatar via Facial Model Conditioned Neural Radiance Field*
ACM Transaction on Graphics (ToG), 2023

[3] Yuelang Xu, **Lizhen Wang**, Xiaochen Zhao, Hongwen Zhang and Yebin Liu.
*AvatarMAV: Fast 3D Head Avatar Reconstruction Using Motion-Aware Neural Voxels*
ACM SIGGRAPH 2023 Conference Proceedings

[4] Yuelang Xu, Hongwen Zhang, **Lizhen Wang**, Xiaochen Zhao, Han Huang, Guojun Qi and Yebin Liu.
*LatentAvatar: Learning Latent Expression Code for Expressive Neural Head Avatar*
ACM SIGGRAPH 2023 Conference Proceedings

[5] Jingxiang Sun, Xuan Wang, **Lizhen Wang**, Xiaoyu Li, Yong Zhang, Hongwen Zhang, Yebin Liu.
*Next3D: Generative Neural Texture Rasterization for 3D-Aware Head Avatars*
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2023

[6] **Lizhen Wang**, Zhiyuan Chen, Tao Yu, Chenguang Ma, Liang Li and Yebin Liu
*FaceVerse: a Fine-grained and Detail-controllable 3D Face Morphable Model from a Hybrid Dataset*
IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2022

[7] Jingxiang Sun, Xuan Wang, Yichun Shi, **Lizhen Wang**, Jue Wang and Yebin Liu
*IDE-3D: Interactive Disentangled Editing for High-Resolution 3D-aware Portrait Synthesis*
SIGGRAPH Asia (Journal Track), 2022

[8] **Lizhen Wang**, Xiaochen Zhao, Tao Yu and Yebin Liu
*NormalGAN: Learning Detailed 3D Human from a Single RGB-D Image*
European Conference on Computer Vision (ECCV), 2020

[9] Shi Yan, Chenglei Wu, **Lizhen Wang**, Feng Xu, Liang An, Kaiwen Guo and Yebin Liu
*DDRNet: Depth Map Denoising and Refinement for Consumer Depth Cameras Using Cascaded CNNs*
European Conference on Computer Vision (ECCV), 2018

Arxiv (under submission):

[1] Jingxiang Sun, Bo Zhang, Ruizhi Shao, **Lizhen Wang**, Wen Liu, Zhenda Xie, Yebin Liu
*DreamCraft3D: Hierarchical 3D Generation with Bootstrapped Diffusion Prior*

[2] Zhe Li, Zerong Zheng, **Lizhen Wang**, Yebin Liu
*Animatable Gaussians: Learning Pose-dependent Gaussian Mapsfor High-fidelity Human Avatar Modeling*

[3] Yufan Chen, **Lizhen Wang**, Qijing Li, Hongjiang Xiao, Shengping Zhang, Hongxun Yao, Yebin Liu
*MonoGaussianAvatar: Monocular Gaussian Point-based Head Avatar*

[4] Yuelang Xu, Benwang Chen, Zhe Li, Hongwen Zhang, **Lizhen Wang**, Zerong Zheng, Yebin Liu

*Gaussian Head Avatar: Ultra High-fidelity Head Avatar via Dynamic Gaussians*

[5] Yibo Xia, **Lizhen Wang**, Xiang Deng, Xiaoyan Luo, Yebin Liu
*GMTalker: Gaussian Mixture based Emotional talking video Portraits*

[6] Xiaochen Zhao, Jingxiang Sun, **Lizhen Wang**, Jinli Suo, Yebin Liu
*InvertAvatar: Incremental GAN Inversion for Generalized Head Avatars*

[7] Xiang Deng, Zerong Zheng, Yuxiang Zhang, Jingxiang Sun, Chao Xu, Xiaodong Yang, **Lizhen Wang**, Yebin Liu. *RAM-Avatar: Real-time Photo-Realistic Avatar from Monocular Videos with Full-body Control*

## PROJECTS EXPERIENCES

**3D face morphable model—FaceVerse and 3D face reconstruction** **Primary Investigator**
Combining a large number of facial depth maps with high-precision 3D head models, a high-precision 3D face template called MetaFace is established. The paper proposes a single-image 3D face reconstruction algorithm based on this template, published in CVPR 2022 as FaceVerse.
Github: https://github.com/LizhenWangT/FaceVerse

**Real-time face tracking using a single RGB/RBG-D camera** **Primary Investigator**
Achieving high-precision facial expression and pose tracking in real-time using differentiable rendering and the FaceVerse template.
Github: https://github.com/LizhenWangT/FaceVerse

**Real-time High-Fidelity Digital Face Generation and Animation** **Primary Investigator**
Real-time high-fidelity digital face animation using a single video, employing a StyleGAN-based image mapping network architecture and face template tracking algorithm. Published in SIGGRAPH 2023 as StyleAvatar.
Github: https://github.com/LizhenWangT/StyleAvatar

**3D human body reconstruction from a single RGB-D image** **Primary Investigator**
Utilizing color and depth images captured by consumer-grade depth cameras to achieve high-precision complete 3D human body model reconstruction. Published in ECCV 2020 as NormalGAN.
Github: https://github.com/LizhenWangT/NormalGAN

**Speech-Driven Digital Face Generation** **Contributor + Guidance**
Predicting facial expression parameters using speech to drive the FaceVerse model, rendering 3DMM images, and applying them to real-time high-fidelity digital face animation. Generating emotion-controllable and interpolatable high-fidelity 2D or 3D speech-driven digital human videos using GMM for emotion encoding.
Project Page: https://bob35buaa.github.io/GMTalker

**3D NeRF-based Face Generation and Animation** **Contributor**
Generating a 3D digital human face model from multi-view video input that can be rendered from free viewpoints. Papers including HAvatar for general 3D face generation, LatentAvatar for emotion-optimized 3D face animation, and AvatarMAV for fast reconstruction of digital faces within 5 minutes, all published in TOG 2023 and SIGGRAPH 2023.
Github: https://github.com/XChenZ/havatar
Github: https://github.com/YuelangX/LatentAvatar
Github: https://github.com/YuelangX/AvatarMAV

**3D Gaussian splatting-based Face Generation and Animation** **Contributor**

High-definition human or facial digital reconstruction and animation based on 3D Gaussian splatting.
Project Page: https://animatable-gaussians.github.io
Project Page: https://yuelangx.github.io/gaussianheadavatar
Project Page: https://yufan1012.github.io/MonoGaussianAvatar

**Depth Map Denoising and Optimization** **Contributor**

Using a cascaded convolutional network structure, denoising and optimizing depth maps from consumer-grade depth cameras using shadow information from RGB images. Contributed to the publication of ECCV 2018 paper DDRNet.
Github: https://github.com/neycyanshi/DDRNet

**Text-to-3D Model Generation** **Minor Contributor**

3D model generation based on image-based large models + text or image input.
Github: https://github.com/deepseek-ai/DreamCraft3D

## LEADERSHIP AND ACTIVITIES

**Student Union**, Department of Physics **|** Vice President *Jul. 2016 – Jun. 2017*
·Responsible for the life rights and interests of students in our department
·Responsible for the financial management and materials management of the student union

## SKILLS

**Languages**: Chinese, English, Japanese
**Programming Languages**: C&C++ (OpenGL/CUDA/TensorRT), Python, Java, Matlab
**Deep Learning Platforms**: PyTorch, TensorFlow

Solid mathematics and physics knowledge
Solid computer programming skills
Github：https://github.com/LizhenWangT

CVPR, ICCV, ECCV, SIGGRAPH Asia reviewer