Yuelang Xu

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EDUCATION

Department of Automation, Tsinghua University **Sep. 2020 - Jun. 2025**
Ph.D. Student *Beijing, China*

Department of Engineering Mechanics, Tsinghua University **Sep. 2016 - Jun. 2020**
Bachelor of Engineering *Beijing, China*

EXPERIENCE

GrUVi Lab, Simon Fraser University **Oct. 2019 - Feb. 2020**
Visiting Student *Vancouver, Canada*

- Work content: Research on deep learning based point cloud edge detection method.
- Published paper: *Pie-Net: Parametric Inference of Point Cloud Edges.*

Central Media Technology Institute, Huawei **Jun. 2019 - Oct. 2019**
Internship *Beijing, China*

- Work content: Research on head avatar reconstruction method from a monocular video.

PROJECTS

- **[Primary Contributor] 3D Gaussian Parametric Head Model.**
  From a large-scale dynamic head video data set, a Gaussian representated parameteric head template is trained, with controllable appearance and expression. Such template can be used for head avatar reconstruction from a single image. The paper is submitted to the conference ECCV 2024.
- **[Personal Project] A framework for fitting 3DMM models to multiview (monocular) videos.**
  This is a very fast offline fitting framework, which fit 3DMM model by via landmarks. And currently commonly used 3DMM models: BFM, FaceVerse and FLAME are supported.
  Github: https://github.com/YuelangX/Multiview-3DMM-Fitting
- **[Primary Contributor] Ultra high-fidelity (2K resolution) 3D head avatar reconstruction from sparse-view videos.**
  Input 8-view synchronized videos of a dynamic human head, and an ultra high-fidelity head avatar leveraging Gaussian representation is reconstructed, which ensures high-resolution rendering while recovering complex expressions. The paper is published at the conference CVPR 2024.
  Project page: https://yuelangx.github.io/gaussianheadavatar
- **[Contributor] Reconstructing high-fidelity 3D head avatar with fine-grained geometry from a monocular video.**
  Unlike the previous use of a global expression code as condition, this method introduces spatially-varying expression conditioning, which can deal with intricate facial expressions and model geometry details. The paper is published at the conference AAAI 2024.
  Project page: https://minghanqin.github.io/AvatarSVE
- **[Primary Contributor] Reconstructing 3D head avatar with significant expression capability from a monocular video.**
  This method learns a latent expression space as the avatar's driving signal instead of using the expression coefficients of templates, enabling the avatar animation to get rid of expression and tracking issues. The paper is published at the conference SIGRAPPH 2023.
  Project page: https://www.liuyebin.com/latentavatar
- **[Primary Contributor] Minute-level 3D head avatar reconstruction from a monocular video.**
  Explicit voxel grid (4D tensor) is utilized for the NeRF-based 3D head avatar and its dynamic expression modeling, thus accelerating the NeRF training time to 5 minutes. The paper is published at the conference SIGRAPPH 2023.
  Project page: https://www.liuyebin.com/avatarmav

- **[Primary Contributor] Estimating the 3D model of the object based on the pose parameters of the manipulator.**
  Through the pose parameters of the manipulator, the physical geometric parameters of the corresponding target object are estimated, and further the 3D model of the is estimated. It solves the problem of low robustness caused by relying on pure visual methods for 3D reconstruction when the robot grasps objects. The research result is listed into the national patent.
- **[Primary Contributor] Reconstruct the 3D model for an object from a single image.**
  First, a template of a certain category of objects represented by implicit SDF is learned from large-scale dataset. Then a single image of an object of this category is input, a 3D model of the object matching the image is recovered. The research result is listed into the national patent.
- **[Primary Contributor] Differentiable parametric clothing model production and the parameter optimization strategy.**
  Input a video of a human body, a rough model is reconstructed. On this basis, the clothes, the outer pants and the inner body are modeled separately, such that a two-layer fully parameterized model with high accuracy and high realism is generated. The research result is listed into the national patent.
- **[Contributor] Deep learning based robust point cloud edge detection.**
  An end-to-end learnable technique to robustly identify feature edges as a collection of parametric curves in 3D point cloud data. The paper is published at the conference NeurIPS 2020.
  Github: https://github.com/wangxiaogang866/PIE-NET
- **[Primary Contributor] Neural rendering based facial avatar reconstruction from a monocular video.**
  Through a U-net convolutional network, the feature map rendered by the face template with neural texture is converted into a high-fidelity facial image of the avatar.

PUBLICATIONS

- **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.
  IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2024.
- Minghan Qin, Yifan Liu, **Yuelang Xu**, Xiaochen Zhao, Yebin Liu, Haoqian Wang.
  High-Fidelity 3D Head Avatars Reconstruction through Spatially-Varying Expression Conditioned Neural Radiance Field.
  AAAI Conference on Artificial Intelligence, 2024.
- **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.
- **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.
- Xiaogang Wang, **Yuelang Xu**, Kai Xu, Andrea Tagliasacchi, Bin Zhou, Ali Mahdavi-Amiri, Hao Zhang.
  Pie-Net: Parametric Inference of Point Cloud Edges.
  Conference on Neural Information Processing Systems (NeurIPS), 2020.

TECHNICAL SKILLS

Languages: Chinese, English

Programming Languages: C, C++, CUDA, Python, Matlab

Libraries and Tools: PyTorch, Tensorflow, OpenCV, OpenGL