Hongrui Cai

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Email: hrcai AT mail.ustc.edu.cn **Homepage**: rainbowrui.github.io **GitHub**: RainbowRui 1.8k+ star

Research Interests

Computer Vision & Graphics: Digital Avatars, 3D Reconstruction, Structure-from-Motion, Geometry Learning, Image & Video Generation.

Experience

Ant Group Hangzhou, China
Research Intern @ Interaction Intelligence Lab May. 2023 – Present
Mentor: Dr. Xuan Wang

Education

University of Science and Technology of China Hefei, China
Ph.D. in Data Science Sep. 2019 – Present
Mentor: Prof. Juyong Zhang. GPA: 91.0/100

South China University of Technology Guangzhou, China
B.S. in Mathematics and Applied Mathematics Sep. 2015 – Jun. 2019
Ranking: 1/46. GPA: 92.2/100

Papers

Hongrui Cai, Wanquan Feng, Xuetao Feng, Yan Wang, Juyong Zhang. Neural Surface Reconstruction of Dynamic Scenes with Monocular RGB-D Camera. *NeurIPS*, 2022 (Spotlight). NDR 510+ star

Hongrui Cai, Yudong Guo, Zhuang Peng, Juyong Zhang. Landmark Detection and 3D Face Reconstruction for Caricature using a Nonlinear Parametric Model. *Graphical Models (GMOD)*, 2021. CaricatureFace 570+ star

Hongrui Cai*, Yuting Xiao*, Xuan Wang, Jiafei Li, Yudong Guo, Yanbo Fan, Minghui Yang, Yujun Shen, Shenghua Gao, Juyong Zhang (*equal contribution). HERA: Hybrid Explicit Representation for Ultra-Realistic Facial Avatars. Under review.

Zhuang Peng*, **Hongrui Cai***, Juyong Zhang (*equal contribution). Self-Supervised Topology-Aware Non-Rigid Point Cloud Registration. Under review.

Wanquan Feng, Jin Li, **Hongrui Cai**, Xiaonan Luo, Juyong Zhang. Neural Points: Point Cloud Representation with Neural Fields for Arbitrary Upsampling. *CVPR*, 2022. NeuralPoints 230+ star

Wanquan Feng, Juyong Zhang, **Hongrui Cai**, Haofei Xu, Junhui Hou, Hujun Bao. Recurrent Multi-view Alignment Network for Unsupervised Surface Registration. *CVPR*, 2021. RMA-Net 200+ star

Xin Huang, Dong Liang, **Hongrui Cai**, Juyong Zhang, Jinyuan Jia. CariPainter: Sketch Guided Interactive Caricature Generation. *ACM MM*, 2022.

Yuting Xiao, Xuan Wang, Jiafei Li, **Hongrui Cai**, Yanbo Fan, Nan Xue, Minghui Yang, Yujun Shen, Shenghua Gao. Bridging 3D Gaussian and Mesh for Free-view Video Rendering. Under review.

Xin Huang, Dong Liang, **Hongrui Cai**, Yunfeng Bai, Juyong Zhang, Feng Tian, Jinyuan Jia. Double References Guided Interactive 2D and 3D Caricature Generation. *ACM Transactions on Multimedia Computing Communications and Applications (TOMM)*, 2024.

Wanquan Feng, **Hongrui Cai**, Junhui Hou, Bailin Deng, Juyong Zhang. Differentiable Deformation Graph based Neural Non-rigid Registration. *Communications in Mathematics and Statistics (CIMS)*, 2023.

Yudong Guo, Juyong Zhang, Yihua Chen, **Hongrui Cai**, Zhangjin Huang, Bailin Deng. Real-time Face View Correction for Front-facing Cameras. *Computational Visual Media (CVM)*, 2021.

Projects

Self-supervised Topology-aware Non-rigid Point Cloud Registration
Research project — Jun. 2022 – Apr. 2023
Developed an advanced non-rigid registration system that maximizes performance through a topology-aware feature extraction method and a self-supervised training strategy. This innovative approach significantly improves registration accuracy, particularly in dynamic topology regions.

Monocular RGB-D based Wound Surface Modeling
Vertical R&D project — May. 2022 – Jun. 2022
Developed a highly automated algorithm using monocular RGB-D video sequences to reconstruct high-fidelity wound surfaces. This algorithm facilitates precise measurement of both wound area and depth.

Audio driven Talking Head Synthesis
Horizontal R&D project — Jul. 2020 – Oct. 2020
Developed a cutting-edge deep learning based head reconstruction system that utilizes differentiable rendering with RGB, RGB-D, or video input for precise and high-quality results.

Real-time Face View Correction for Front-facing Cameras
Horizontal R&D project — Nov. 2019 – Oct. 2020

Developed an automatic face view correction system using a single RGB(-D) camera, effectively solving video distortions like 'upward nose' and 'big face' caused by disparities between camera location and face orientation.

Landmark driven Facial Expression Recognition

Open source project 230+ star Sep. 2020 – Oct. 2020

Developed a landmark-driven method on Facial Expression Recognition (FER).

Reviewers

Conferences: CVPR, ICCV, ECCV, SIGGRAPH, GMP

Journals: IEEE TPAMI, IEEE TMM, IEEE CGA, C&G

Selected Honors

Excellent Graduate Student, by USTC	2024
First-class Academic Scholarships for Postgraduates, by USTC	2019 - 2023
Excellent Undergraduate Thesis Award, by SCUT	2019
Excellent Undergraduate Student, by SCUT	2019