Zenghao Chai

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Education

National University of Singapore *Singapore*
- Ph.D. Student in Computer Science. Apr. 2023 – Jul. 2027 (expected)
- Research Topics: Digital Humans, Text-guided Generation, Generative Visual Retrieval.

Tsinghua University *Beijing, China*
- Master of Computer Technology. Supervisor: Prof. Chun Yuan. Sept. 2020 – Jun. 2023
- Master Thesis: High-Fidelity 3D Face Reconstruction and Its Evaluation. GPA: 3.74/4.00

Beijing Institute of Technology *Beijing, China*
- Bachelor of Software Engineering. GPA: 90.97/100, Rank: 2/185 (**Top 1%**) Sept. 2016 – Jul. 2020

Work Experience

Microsoft Research Asia, *Beijing, China* May. 2022 – Mar. 2023

Research Intern in Machine Learning Group. Topics: 3D Face Reconstruction & Animation.
- Extend the dense landmark optimization framework into learning-based models for detailed 3D face reconstruction.
- Exploit perceptual signals of face attributes to learn high-level representations for expressive coefficient regression.
- Design SD-DeTail Module to decouple static and dynamic factors for synthesizing realistic and animatable details.
- Propose HiFace and loss functions to jointly learn the coarse shape and details from synthetic and real-world data.

Tencent AI Lab, *Shenzhen, China* Mar. 2021 – May. 2022

Research Intern in Digital Human Team. Topics: 3D Face Reconstruction, 3D Face Modeling & Evaluation.
- Unify topology for $2,000+$ 3D scans and construct an expressive 3DMM named HIFI3D^{++} with $500+$ dimensions.
- Construct a region-aware benchmark named REALY and propose a region-aware pipeline for quantitative evaluation.
- Reproduce and evaluate $10+$ state-of-the-art reconstruction models on the benchmark and update the leaderboard.
- Release HIFI3D++, REALY, and evaluation codes for research purposes and contribute to the 3D face community.

Publication & Preprint ("*" indicates equal contribution)

- **HiFace: High-Fidelity 3D Face Reconstruction by Learning Static and Dynamic Details**
  Zenghao Chai, Tianke Zhang, Tianyu He, Xu Tan, Tadas Baltrušaitis, HsiangTao Wu, Runnan Li, Sheng Zhao, Chun Yuan, Jiang Bian.
  IEEE/CVF International Conference on Computer Vision (***ICCV***), 2023. Project Page: project-hiface.github.io
- **SEAM: Searching Transferable Mixed-Precision Quantization Policy through Large Margin Regularization**
  Chen Tang, Kai Ouyang, **Zenghao Chai**, Yunpeng Bai, Yuan Meng, Wenwu Zhu, Zhi Wang.
  ACM International Conference on Multimedia (***ACM MM***), 2023.
- **Towards Effective Collaborative Learning in Long-Tailed Recognition**
  Zhengzhuo Xu*, **Zenghao Chai***, Chengyin Xu, Chun Yuan, Haiqin Yang.
  IEEE Transactions on Multimedia (***TMM***), 2023, *Under Review.*
- **Learning Imbalanced Data with Vision Transformers**
  Zhengzhuo Xu, Ruikang Liu, Shuo Yang, **Zenghao Chai**, Chun Yuan.
  IEEE/CVF Conference on Computer Vision and Pattern Recognition (***CVPR***), 2023.
- **HHF: Hashing-guided Hinge Function for Deep Hashing Retrieval**
  Chengyin Xu*, **Zenghao Chai***, Zhengzhuo Xu*, Hongjia Li, Qiruyi Zuo, Lingyu Yang, Chun Yuan.
  IEEE Transactions on Multimedia (***TMM***), 2022.
- **Semantic-Sparse Colorization Network for Deep Exemplar-based Colorization**
  Yunpeng Bai, Chao Dong, **Zenghao Chai**, Andong Wang, Zhengzhuo Xu, Chun Yuan.
  European Conference on Computer Vision (***ECCV***), 2022.
- **REALY: Rethinking the Evaluation of 3D Face Reconstruction**
  Zenghao Chai*, Haoxian Zhang*, Jing Ren, Di Kang, Zhengzhuo Xu, Xuefei Zhe, Chun Yuan, Linchao Bao.
  European Conference on Computer Vision (***ECCV***), 2022. Project Page: realy3dface.com
- **HyP^2 Loss: Beyond Hypersphere Metric Space for Multi-label Image Retrieval**
  Chengyin Xu*, **Zenghao Chai***, Zhengzhuo Xu, Chun Yuan, Yanbo Fan, Jue Wang.
  ACM International Conference on Multimedia (***ACM MM***), 2022.

- **CMS-LSTM: Context Embedding and Multi-Scale Spatiotemporal Expression LSTM for Predictive Learning**
  Zenghao Chai, Zhengzhuo Xu, Yunpeng Bai, Zhihui Lin, Chun Yuan.
  IEEE International Conference on Multimedia and Expo (***ICME***), 2022.
- **MoDeRNN: Towards Fine-grained Motion Details for Spatiotemporal Predictive Learning**
  Zenghao Chai, Zhengzhuo Xu, Chun Yuan.
  IEEE International Conference on Acoustics, Speech and Signal Processing (***ICASSP***), 2022.
- **Towards Calibrated Model for Long-Tailed Visual Recognition from Prior Perspective**
  Zhengzhuo Xu*, **Zenghao Chai***, Chun Yuan.
  Neural Information Processing Systems (***NeurIPS***), 2021.

Invention Patent

- **A 3D Model Error Estimation Method and Apparatus, Device, and Storage Medium**
  Haoxian Zhang, **Zenghao Chai**, Linchao Bao, Di Kang.
  Invention patent, Submitted, 2022.
- **A Retrieval Method and Apparatus, Device, and Storage Medium**
  Chengyin Xu, **Zenghao Chai**, Zhengzhuo Xu, Yanbo Fan.
  Invention patent, Published Application Number: CN115146143A, 2022.
- **A Lightweight Fine-grained Spatiotemporal Predictive Method and System**
  Chun Yuan, **Zenghao Chai**, Zhengzhuo Xu.
  Invention patent, Published Application Number: CN114445463A, 2022.
- **A Move Generation Method for *Game of the Amazons* Based on Deep Convolutional Neural Network**
  Chongyang Shi, Zhaohe Liao, **Zenghao Chai**.
  Invention patent, Authorization Announcement Number: CN111330255B, 2020.

Competition

- **Gold Medal** of ICGA Computer Olympiad, *International Computer Games Association* 2019
- **Meritorious Winner** of MCM/ICM Contest in Modeling, *Consortium for Mathematics and Its Applications* 2019
- **Gold Medal** of International Genetically Engineered Machine Competition, *Massachusetts Institute of Technology* 2018
- **Second Prize** of Computer Games Championship, *Chinese Association for Artificial Intelligence* 2018
- **Second Prize** of National Computer Games Tournament, *Chinese Association for Artificial Intelligence* 2018
- **Third Prize** of Beijing Physics Competition, *Beijing Physical Society* 2017
- **First Prize** of China Mathematics Competition, *Chinese Mathematical Society* 2017
- **First Prize** of Beijing Mathematics Competition, *Beijing Mathematical Society* 2017

Award & Honor

- President's Graduate Fellowship of *National University of Singapore* 2023
- First Prize in Internship Award of *Tsinghua University* (**Top 1%**) 2023
- Award of Excellence in "Stars of Tomorrow" Internship Program of *Microsoft Research Asia* (**Top 5%**) 2023
- National Scholarship of *Ministry of Education* (**Top 0.2%, 3 times**) 2018/2019/2022
- Ping An AI BANK Fellowship (**Top 5%**) 2021
- Outstanding Graduate of *Beijing and Beijing Institute of Technology* (**Top 5%**) 2020
- Teli Xu Fellowship (**Top 0.1%**) 2020
- Beijing Merit Student (**Top 1%**) 2020
- Competition Scholarship of *Beijing Institute of Technology* (**Top 5%, 2 times**) 2019/2020
- Innovation Scholarship of *Ministry of Industry and Information Technology* (**Top 1%**) 2019
- JJWorld Fellowship (**Top 5%**) 2017
- First Prize Scholarship of *Beijing Institute of Technology* (**Top 5%, 6 times**) 2017/2018/2019/2020

Skill & Activity

- **Programming**: Python, PyTorch, PyTorch3D, TensorFlow, LaTeX, WRAP, C/C++, SQL.
- **Language**: Mandarin (Native), English (Fluent, IELTS: 7.0).
- **Talk**: "REALY: Rethinking the Evaluation of 3D Face Reconstruction", MPI-IS, Online, Aug. 2022.
- **Reviewer Service**: TNNLS, PG 2023, NeurIPS 2023, ICCV 2023, CVPR 2023, ECCV 2022.