Rao FU | Ph.D. Candidate

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Education

Brown University | Computer Sciences — **Providence, RI, USA**
Computer Science Ph.D. Candidate — *Sept. 2021 – June. 2026*

Brown University | Computer Sciences — **Providence, RI, USA**
Master of Science — *Sept. 2021 – May. 2024*

University of Chinese Academy of Sciences | Computer Sciences and Engineering — **Beijing, China**
Bachelor of Computer Engineering — *Sept. 2017 – Jun. 2021*
National Inspirational Scholarship & Outstanding Thesis Awards.

University of California, San Diego | Jacobs School of Engineering — **San Diego, CA, USA**
Visiting Scholar — *May. 2020 – Nov. 2020*

University of Southern California | Viterbi School of Engineering — **Los Angeles, CA, USA**
Visiting Student — *Jan. 2020 – May. 2020*

Beijing National Day School — **Beijing, China**
Student — *Sept. 2011 – Jul.. 2017*

Employment

Meta Inc. | GenAI, Llama Team — **Menlo Park, CA, US.**
Research Scientist Intern — *June. 2023 – Oct. 2023*
Manager: Wenhan Xiong.

Autodesk Inc. | AI Lab — **San Francisco, CA, USA.**
Research Scientist Intern — *May. 2022 – Dec. 2022*
Manager: Hooman Shayani, Aditya Sanghi.

Microsoft Research, Asia | Vision Group & Speech Group — **Beijing, China.**
Research Intern — *Mar. 2021 – Jul. 2021*
Manager: JingDong Wang, Yuhui Yuan, Weihong Lin.

Publications

[1]: Scene-LLM: Extending Language Model for 3D Visual Understanding and Reasoning. ***Rao Fu***, *Jingyu Liu, Yixin Nie, Xilun Chen, Wenhan Xiong*
The Winter Conference on Applications of Computer Vision **(WACV 2025)** paper link

[2]: AnyHome: Open-Vocabulary Generation of Structured and Textured 3D Homes. ***Rao Fu****, *Zehao Wen*, Zichen Liu*, Srinath Sridhar.*
*The European Conference on Computer Vision 2024***(ECCV 2024)** paper link

[3]: CharacterMixer: Rig-Aware Interpolation of 3D Characters. *X. Zhan,* ***Rao Fu****, D. Ritchie*
*Annual Conference of the European Association for Computer Graphics 2024***(Eurographics 2024)** paper link

[4]: CLIPSculptor: Zero-shot Generation of High Fidelity and Diversity Shapes from Text. *A. Sanghi,* ***Rao Fu****, V. Liu, K. Willis, H. Shayani, A. H. Khasahmadi, S. Sridhar, D. Ritchie*
*Conference on Computer Vision and Pattern Recognition.***(CVPR 2023)** paper link

[5]: ShapeCrafter: A Recursive Text-Conditioned 3D Shape Generation Model. ***Rao Fu****, X. Zhan, Y.W. Chen, D. Ritchie, S. Sridhar.*
*Conference on Neural Information Processing Systems.***(NeurIPS 2022)** paper link

[6]: HRformer: High-resolution vision transformer for dense predict. *Yuhui Yuan, **Rao Fu**, Lang Huang, Weihong Lin, Xilin Chen, Jingdong Wang.*
*Conference on Neural Information Processing Systems.***(NeurIPS 2021)** paper link

[7]: ROSA-Net: Rotation-Robust Structure-Aware Network for Fine-Grained 3D Shape Retrieval. ***Rao Fu**, Jie Yang, Jiawei Sun, Fanglue Zhang, Yu-Kun Lai, Lin Gao.*
*Computational Visual Media Conference.***(CVM 2024)** paperlink

Manuscripts

[1]: GigaHands: A Massive Annotated Dataset of Bimanual Hand Activities. ***Rao Fu**, D. Zhang, A. Jiang, W. Fu, A. Funk, D. Ritchie, S. Sridhar*
submission to appear paper link

[1]: NeuralODF: Learning Omnidirectional Distance Fields for 3D Shape Representation. *T. Houchens, C.Y. Lu, S. Duggal, **Rao Fu**, S. Sridhar*
Technical Report paper link

Invited Talk

New England Computer Vision Workshop, 2023.: AnyHome: Open-Vocabulary Generation of Structured and Textured 3D Homes.
New England Computer Vision Workshop, 2022.: ShapeCrafter: A Recursive Text-Conditioned 3D Shape Generation Model.
ICT Turing Seminar, 2022. : Text-conditioned 3D Shape Generation.

Professional Service

Conference Reviewer: Siggraph Asia 2024(2) /2023(1), ICML 2024(6), ICLR 2024(3) /2023(4), NeurIPS 2023(3) /2022(2), ICCV 2023(2), ECCV 2024(4), CVPR 2024(5) /2023(4), RSS 2023(2), TVCJ(2)
Google explore CSR: Ph.D. mentor 2022, 2023
Department PhD Admissions Committee Member: 2023

Grants

08.2024 - 08.2025: OpenAI Research Program Access Grant($5,000).

Awards and Honors

07.2021: UCAS Outstanding Undergrad Thesis Awards(Advisor: Prof. Xilin Chen).
09.2019: National Inspirational Scholarship.
09.2017: National College Entrance Exam: Top 1‰

Research Lead Experience

3D Hand Motion Dataset

Research on 3D Hand Motion Dataset Construction. **Brown University**
Research Group: GenAI *Jan. 2023 – Now.*

- Constructing Large-Scale 3D Hand Motion Dataset with Marker-less Motion Capturing System.
- Showcasing diverse applications including 3D hand motion generation, hand motion captioning for both 3D sequences and videos, motion retargeting to robotic grippers, dynamic semantic scene reconstruction, and multitasking capabilities.

3D Scene Understanding and Generation

Research on 3D-Visual-Language Model. **Meta Research**
Research Group: GenAI *May. 2023 – Nov. 2023*

- Extending Llama-2 for a 3D-Visual-Language Model for interactive 3D scene understanding and reasoning.

Research on Text-to-Scene Generation. **Brown University**
Research Lead *May. 2023 – Nov. 2023*

- Propose a text-to house-scale scene generation method.
- The generation is structured and textured. Featuring control-ability with text and user inputs.

Language and 3D Shapes

Research on Zero-shot Text-conditioned 3D Shape Generation. **Brown University**
Guide: Prof. Aditya Sanghi *May. 2023 – Dec. 2023*

- Develop zero-shot text-conditioned shape generation method using 3D diffuison-based model.
- The generated shape set if of high diversity and quality.

Research on Text-conditioned 3D Shape Generation. **Brown University**
Guide: Prof. Srinath Sridhar *Sept. 2022 – Present.*

- Proposed a NLP-based method that augment one-to-one text-shape pairs to many-to-many correspondence.
- Propose a method that generates and edits high-quality 3D shapes with language.

Machine Perception

Research on High-Resolution Transformer. **Microsoft Research, Asia**
Research Group: Visual Computing *March. 2021 – July. 2021*

- Proposed a transformer-based neural network for dense prediction tasks.
- Achieved state-of-the-art performance on COCO human pose estimation benchmark.

Learning Based Robotics

Research on Articulation Grasping for Fast Exploration. **University of California, San Diego**
Guide: Prof. Hao Su *May. 2020 – Nov. 2020*

- Studied the problem of geometric based manipulation for efficient exploration.
- Proposed a novel neural network architecture that predicts grasp proposals efficiently and effectively.

Learning Based Graphics, Vision and Geometry Processing

Research on Emotional Talking Head Generation. **Institute of Computing Technology, CAS**
Guide: Prof. Dinesh Manocha; Prof. Yu-Kun Lai; Prof. Lin Gao *Sept. 2020 – Nov. 2020*

- Designed a pipeline that generates high-quality speech-driven talking head video with expressive emotion.
- Contributed to *TAL Education Group* Online School project.

Research on Fine-grained 3D Shape Retrieval. **Institute of Computing Technology, CAS**
Guide: Prof. Fanglue Zhang; Prof. Yu-Kun Lai; Prof. Lin Gao *Sept. 2019 – May. 2020*

- Proposed a deep architecture for rotation-invariant fine-grained 3D shape retrieval.
- Constructed and released a fine-grained 3D shape retrieval dataset.

Mathematics

A Geometric Solution to Multi-person Meeting Problem. **Beijing National Day School**
Guide: Tiehan Li *Jan. 2017 – Feb. 2017*

- Solved the multi-person meeting problem by formulating a dynamic programming problem into a high-dimensional geometric problem.

A Concise Discriminant of Cubic Real Coefficient Equations. **Beijing National Day School**
Guide: Tiehan Li *Sept. 2016 – Dec. 2016*

- Proposed a concise discriminant of cubic real coefficient equations. The method is applicable when the equation has one real root and two imaginary roots, more applicable than Cardano formula.