Rao FU | Ph.D. Student

✉ rao_fu@brown.edu 🔊 +1 401-808-9798
Homepage: https://freddierao.github.io
Fourth floor, 115 Waterman Street, Providence, RI 02912

Education

Brown University | Dept. Computer Sciences   **Providence, RI, USA**
Computer Science Ph.D. Student   *Sept. 2021 – Jun. 2026(expected)*

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University of Chinese Academy of Sciences | Dept. Computer Sciences   **Beijing, China**
Bachelor of Computer Science   *Sept. 2017 – Jun. 2021*
National Inspirational Scholarship & Outstanding Thesis Awards.
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University of California, San Diego | Jacobs School of Engineering   **San Diego, CA, USA**
Visiting Scholar   *May. 2020 – Nov. 2020*

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

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

Employment

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

Autodesk Inc. | AI Research Group   **Toronto, Canada.**
Research Intern   *May. 2022 – Nov. 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]: 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.***(CVPR2023)** paper link

[2]: 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.***(NeurIPS2022)** paper link

[3]: 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.***(NeurIPS2021)** paper link

Manuscripts

[1]: Scene-LLM: Extending Language Model for 3D Visual Understanding and Reasoning. ***Rao Fu**, Jingyu Liu, Yixin Nie, Xilun Chen, Wenhan Xiong*
In Submission

[2]: AnyHome: Open-Vocabulary Generation of Structured and Textured 3D Homes. ***Rao Fu*, Zehao Wen*, Zichen Liu*, Srinath Sridhar.***
In Submission

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

[4]: RISA-Net: Rotation-Invariant Structure-Aware Network for Fine-Grained 3D Shape Retrieval. ***Rao Fu**, Jie Yang, Jiawei Sun, Fanglue Zhang, Yu-Kun Lai, Lin Gao.*
CoRR paperlink

Professional Service

Conference Reviewer: ICLR 2024(3), NeurIPS 2023(3), ICCV 2023(2), RSS 2023(2), CVPR 2023(4), ICLR 2023(4), NeurIPS 2022(2), TVCJ(2)
Google explore CSR: Ph.D. mentor 2022, 2023
Invited Talk: New England Computer Vision(Oral), 2022. ICT Turing Seminar, 2022.

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 Scene Understanding and Generation . . . .

Research on 3D-Visual-Language Model.   **Meta Research**
Research Group: GenAI   *May. 2023 – Nov. 2023*
  ○ Propose a 3D-Visual-Language Model for interactive 3D scene understanding and reasoning.

Research on Text-to-Scene Generation.   **Brown University**
Research Group: Brown Visual Computing   *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 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.
  ○ Finished a technical paper as a co-author and the paper was submitted to CVPR2021.

Learning Based Graphics, Vision and Geometry Processing. . . . .

Research on Emotional Talking Head Generation.   **TAL Education; 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.
  ○ Finished a technical paper as first author and the manuscript was submitted to CVPR2021.

Research on Fine-grained 3D Shape Retrieval.   **Alibaba; 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.

- ○ Contributed to *Alibaba* 3D Online Shopping system.
- ○ Completed an academic paper as first author and the manuscript was submitted to IEEE TPAMI.

Research on Single Image Reconstruction.   **Institute of Computing Technology, CAS**
Guide: Prof. Lin Gao.   *Jul. 2019 – Sept. 2020*
- ○ Combined parameterized modelling methods in traditional graphics algorithms with neural networks to reconstruct outdoor scene from a single image.

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.