Ray 钱瑞 (Personal website)

Research Field: Robotics / 3D Reconstruction | Graduation: Master in April 2026 |
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Education Backgroud

2020.09 - 2026.03 **Fudan University** **Applied Mathematics** **Master**

- **GPA**：3.57/4.0, research on 3D reconstruction and SLAM in robotics.
- **Research Topics**：Simultaneous Localization and Mapping (SLAM)、Neural Radiance Field (NeRF), Gaussian Splatting (GS).

2017.09 - 2020.07 **Sichuan University** **Philosophy** **Bachlor**

- **GPA**：3.71/4.0, thesis on "*Exploring the Difference Between Artificial Intelligence and Human Mind*".
- **Relevant Courses**：Philosophy of Science, Logic, MInd Philosophy.

2015.09 - 2020.07 **Sichuan University** **Mathematics** **Bachlor**

- **GPA**：3.67/4.0 (TOP 3%), courses on fundamental mathematics and optimization methods.
- **Relevant Courses**： Basic Theories Mathematic Analysis, Advanced Algebra, Complex Functions, Optimization Methods Optimization Theories, Mathematical Modelling.

Research Experiences

2020.09 - 2021.11 **Complex Network** **Physics**

- **Research Content**: the information propagation patterns in complex networks with physics differential equations.
- **Participation Role**: regular meetings with professors from Oxford Uni, accumulating the experiences of international collaboration.

2021.11 - 2022.11 **SLAM** **Robotics**

- **Research Content**: develop a SLAM system with combination of 3D points, lines, and structured lines as geometric features (based on *ORB-SLAM3*), boosting the performance of tracking and mapping in the indoor scenes.
- **Research Result**: published paper "*UL-SLAM: A Universal Monocular Line-Based SLAM via Unifying Structural and Non-Structural Constraints*" in *IEEE Transactions on Automation Science and Engineering* (IF=5.999).

2022.11 - 2024.03 **NeRF Bundle Adjustment** **Robotics**

- **Research Content**: enhancing the efficiency and quality of NeRF reconstrucion while the initial camera poses are noisy.
- **Research Result**: collaboration with *Tsinghua University* and *CAMP Lab* of Technical University of Munich (TUM) on a paper *FA-BARF: Frequency Adapted Bundle-Adjusting Neural Radiance Fields*. at ArXiv.
- **Project with Domestic Company**: collaboration with a autonomous driving company *MOGO* on developing a SLAM system using object NeRFs as the map.

2024.04 - 2025.03 **GS Integrated Traditional SLAM** **Robotics**

- **Research Content**: integrating the GS into *ORB-SLAM3* as an incremental map representation.
- **Participation Role**: collaboration with Tsinghua University and *CAMP Lab* of Technical University of Munich (TUM), developing an GS-Point integrated SLAM system based on *ORB-SLAM3* with C++、CUDA、OpenGL mixed programming. **[github link]**

2025.09 - now **Digital Human (GS)** **Human Modelling**

- **Research Content**: using GS to reconstruct high-quality digital human profile from a single image like *Dream, Lift, Animate* by *Nvidia*, exploring text- and image-driven interaction with vivid facial expressions fine-tuned on self-capture data.

Work Experiences

2025.04 - 2025.08 **Urban Dynamic GS reconstruction** **Autonomous Driving**

- **Internship Content**: optimizing the urban dynamic driving scene reconstruction for simulation system in the company *ZERON*, with the aid of cutting-edge techs like generative model, scene-editing and so on.

2025.08 - now **Calibration** **Autonomous Driving**

- **Internship Content**: taking participation in the role as academic ambassador, promoting the academic brands in the ***Cross-Domain Computing Solutions Division*** of *BOSCH China*, and helping to do the qac coding check and project survey on the offline and online calibarion of the autonomous driving cars' camera system.

Rewards

2024	**China Scholarship Council as a Visiting PhD at TUM**	**Fudan University**
2018	**Second Reword for Mathematic Modelling Competition**	**Sichuan University**
2017	**Second Reward of Mathematic Competition**	**Sichuan University**
2016-2017	**Second Scholarship**	**Sichuan University**
2016-2017	**Excellent Student**	**Sichuan University**

Skills/Hobbies

- **Language skills**: English (TOFEL 104), German (hobby).
- **Computer skills**: Python、C++ (LibTorch)、OpenGL、CUDA.
- **Hobbies**： Workout, Music, Philosophy, Photography, Multi-cultures and languages.