# Qingyuan Jiang

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## Expertise

Comprehensive in robotics: From perception-aware **motion planning** (human motion prediction) to robot **control** (Reinforcement Learning); **Generative model** for robotics; 3D Computer Vision.

Hands-on experience in robot **system building**: mobile robot and drone.

## Education

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| 2019 – present | **University of Minnesota**, *Minneapolis, Minnesota*,<br>Ph.D. in Computer Science and Engineering, Advisor: Volkan Isler,<br>Courses: CSCI 5551: Robotics, CSCI 5561: Computer Vision, CSCI 5563: 3D Computer Vision, EE 5271: Robot Vision, EE 5940: Optimal Control and Reinforcement Learning. |
| 2015 – 2019 | **Tsinghua University**, *Beijing, China*,<br>B.A. in Mechanical Engineering. |

## Publications

### Conference Papers

[C.1] **Jiang, Q.**, Susam, B., Jun-Jee C., & Isler, V. (2024). Map-Aware Human Pose Prediction for Robot Follow-Ahead. International Conference on Intelligent Robots and Systems (**IROS 2024**). Project page: https://qingyuan-jiang.github.io/iros2024_poseForecasting/ (**Oral Presentation**)

[C.2] Engin, S., **Jiang, Q.**, & Isler, V. (2021, September). Learning to play pursuit-evasion with visibility constraints. In 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (**IROS**) (pp. 3858-3863). IEEE.

[C.3] **Jiang, Q.**, Song, S., & Zhang, W. (2017). A novel parallel and self-adaptive robot hand with triple-shaft pulley-belt mechanisms. In Intelligent Robotics and Applications: 10th International Conference, ICIRA 2017, Wuhan, China, August 1618, 2017, Proceedings, Part II 10 (pp. 752-763). Springer International Publishing.

### Manuscripts

[I.1] **Jiang, Q.**, Jun-Jee C., & Isler, V. (2025). Diffusion-based Robot planning with Recursive Bayesian Filter. [Title modified to ensure blind review] Submitted to Robotics: Science and System (RSS) 2025

[I.2] **Jiang, Q.**, & Isler, V. (2023). Onboard View Planning of a Flying Camera for High Fidelity 3D Reconstruction of a Moving Actor. arXiv preprint arXiv:2308.00134.

## Research Experience

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| 03/2024 – 02/2025 | **Research assistant**, *University of Minnesota*, advised by Dr. Volkan Isler,<br>Project: Diffusion-based Human motion prediction and closed-loop robot motion planning.. |

- **Generative model** for human motion prediction: Using **diffusion** models to predict the future human motion distribution, conditioned on the environment and past human trajectory.
- Closed-loop planning with posterior observation: Update the estimated human motion distribution using a recursive Bayesian filter and importance sampling technique. Plan the robot motion by updating the predicted distribution in a closed-loop manner with posterior human motion observations. Solve the robot planning problem. Outcome: [I.1]

03/2023 – **Research assistant**, *University of Minnesota*, advised by Dr. Volkan Isler,
03/2024 Project: Robot cinematography navigation with human pose prediction..
- **Human motion forecasting**: Proposed a GRU-based method that predicts the human motion (3D skeleton poses) conditioned on the map information. Compared to the SOTA methods, we improve the accuracy while greatly shortening the inference time.
- **Robot Follow-ahead**: Build a robot that follows the human in the front. The robot can navigate through an indoor environment with an **SLAM** module while predicting the 3D skeleton poses of a dynamic human. Outcome: [C.1]

03/2021 – **Research Intern**, *University of Minnesota*, advised by Dr. Volkan Isler,
09/2022 Project: View planning for high-fidelity 3D reconstruction of a dynamic human..
- **View planning for 3D reconstruction**: Propose viewing quality metric (Pixels-Per-Area) and design view planning strategy for tracking multiple dynamic actors online and 3D reconstructing offline.
- **Drone system**: Build a drone system that localizes a moving human, plans views to maintain viewing quality, and reconstructs offline by fusing consecutive views.
- **Simulation**: Evaluate the method in the Airsim (Unreal Engine) simulation environment and compare 3D reconstruction results with state-of-the-art methods.

01/2018 – **Research Intern**, *University of Minnesota*, advised by Dr. Volkan Isler,
08/2018 Project: A Camera-assisted Manipulator for Fruit-picking.
- **RL-based manipulation**: Train a Reinforcement Learning (RL) agent for a grasping task (fruit-picking) with tactile feedback. Benchmark with RRTs (implement from scratch) and other motion planning algorithms from the Open Motion Planning Library (OMPL). Simulate the manipulation in V-REP (CoppelisSim).
- **Hardware integration**: Integrated **tactile** sensors into the manipulation system and conduct hand-eye calibration for the on-hand camera.

## Work Experience

05/2024 – **Plus.AI**, *Research and Development Internship*,
08/2024 **Reinforcement Learning** for autonomous driving vehicle **control**.
- Implement Offline Reinforcement Learning (Offline-RL) algorithms for the vehicle controller, including **Decision Transformer**, Conservative Q-Learning (CQL), etc. Benchmark with imitation learning results and classical controllers such as pure pursuit.
- Collect large-scale datasets for the RL agent training from the existing driving database. Decode data points of desired features from ROS bags, synchronize between topics, and pre-process the data.
- Integrate the trained agent into the vehicle ROS system in C++ by exporting the model to **ONNX** and loading it with **TensorRT**. Conduct multiple unit tests and evaluate the performance in the simulator.

01/2022 – **SportsVision**, *Founder*,
06/2023 Automatic highlight extraction for basketball games,
Used by 10K users; Deployed in 3 basketball courts with 8 cameras.
- Install cameras around the basketball court and provide auto-clipped highlights for players.
- Automatic goal detection using Yolo for basketball and human detection and designed algorithm.
- Multiple object tracking (MOT) for assigning highlight clips to different users.
- WeChat mini-App as the front end for users to select and download the clips.

## Honors and Awards

2019 University of Minnesota: 3M Graduate Student Fellowship (4-year)
2015 Tsinghua University: School Year Academic Scholarship (top 10%)
2015 Tsinghua University: Civic Engagement and Sports Scholarship

## Technical Skills

Robotics ROS1 & ROS2; Mechanical design and manufacturing: Solidworks, AutoCAD, 3D printing
Simulation Gazebo, Mujoco, Unreal Engine 4 & Blender
Programming Python, C++, Java, Lua, and Matlab
Language Fluent in English; Native in Chinese