

Tianyu Qiu

tianyuqiu@utexas.edu | [GitHub](#) | [LinkedIn](#) | [Website](#) | POB 5.200 201 E 24th St, Austin, TX 78712

Education

Ph.D. Student in Aerospace Engineering Advisor: <i>Prof. David Fridovich-Keil</i> University of Texas at Austin	2023.08 – Present <i>Austin, TX, USA</i>
Master of Engineering Shanghai Jiao Tong University	2023.03 <i>Shanghai, China</i>
Bachelor of Engineering Shanghai Jiao Tong University	2020.08 <i>Shanghai, China</i>

Research Interests

Multi-robot Planning, Game Theory, Robot Navigation

Honors and Awards

Bob E. Schutz, Ph.D. Endowed Presidential Fellowship in Aerospace Engineering	Academic Year 2025-2026
Graduate Outstanding Scholarship	Academic Year 2020-2023
John Wu and Jane Sun Elite Undergraduate Scholarship	Academic Year 2016-2020

Publications

PSN Game: Game-theoretic Planning via a Player Selection Network [[Link](#)]

Authors: **Tianyu Qiu**, *Eric Ouano, Fernando Palafox, Christian Ellis, David Fridovich-Keil*
ArXiv Preprint

Dense Dynamics-Aware Reward Synthesis: Integrating Prior Experience with Demonstrations [[Link](#)]

Authors: *Cevahir Koprulu**, *Po-han Li**, **Tianyu Qiu***, *Tyler Westenbroek, Ruihan Zhao, David Fridovich-Keil, Sandeep Chinchali, Ufuk Topcu*
7th Annual Learning for Dynamics & Control Conference (L4DC 2025)

Inferring Occluded Agent Behavior in Dynamic Games with Noise-Corrupted Observations [[Link](#)]

Authors: **Tianyu Qiu**, *David Fridovich-Keil*
Robotics and Automation Letters (RA-L)

Nash Pursuit Strategy for Nonzero-sum MPC Game via Inverse Optimal Control [[Link](#)]

Authors: **Tianyu Qiu**, *Han Zhang, Jingchuan Wang*
13th Asian Control Conference (2022)

Research Experience

CLeAR Lab, University of Texas Austin Graduate Research Assistant, Advisor: <i>Prof. David Fridovich-Keil</i>	<i>Austin, TX, USA</i> 2021.12 – Present
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PSN Game: Game-theoretic Planning via a Player Selection Network

- Proposed a learning-based method to select valuable players in noncooperative games.
- Evaluated method performance through experiments in simulation and realistic human datasets.
- Reached state-of-the-art in player selection methods in multi-agent planning scenarios.

Dense Dynamics-Aware Reward Synthesis: Integrating Prior Experience with Demos

- Proposed a systematic reward-shaping framework that distills the information contained in 1) a task-agnostic prior data set and 2) a small number of task-specific expert demonstrations and then uses these priors to synthesize dense dynamics-aware rewards for the given task.
- Validated the framework experiments in Pick & Place tasks.
- Accepted by and presented at L4DC 2025.

Inferring Occluded Agent Behavior in Dynamic Games with Noise-Corrupted Observations

- Proposed a dynamic game model to describe agents’ behavior during interactions, further applied inverse dynamic game technique to recover the game model and estimate agents’ trajectory simultaneously.
- Proposed an occlusion-aware contingency game framework for planning in occluded environments.
- Validated our inference framework’s robustness and accuracy and planning framework’s effectiveness throughout Monte Carlo studies.
- Accepted by RA-L and presented at ICRA 2025.

Autonomous Robot Lab, Shanghai Jiao Tong University
 Graduate Research Assistant, Advisor: *Prof. Jingchuan Wang*

Shanghai, China
 2020.09 – 2023.03

Game-theoretic Optimal Collision Avoidance for Mobile Robots

- Proposed a collision avoidance algorithm in social environments based on a forward dynamic game.
- Applied cost function linearization and feedback linearization to solve for optimal control inputs for differential drive robots analytically.
- Implemented the collision avoidance algorithm in ROS and tested the algorithm on real robot platforms.

Pedestrian Trajectory Prediction based on Inverse Dynamic Game

- Proposed a trajectory prediction model to depict pedestrian social behaviors based on an inverse dynamic game.
- Collected and labeled a bird-eye view pedestrian trajectory dataset with VICON to train the prediction model.
- Implemented the training of the prediction model via inverse dynamic game techniques with YALMIP.

Nash Pursuit Strategy for Pursuit-Evasion Games

- Proposed and solved a decoupled pursuit & evasion game model via Model Predictive Control (MPC).
- Implemented the inference of weighting parameters in the game model via inverse optimal control techniques.
- Presented orally the work “Nash Pursuit Strategy for Nonzero-sum MPC Game via Inverse Optimal Control” at the 13th Asian Control Conference (ASCC 2022).

Project Experience

Healthcare Telepresence Robot for the Elderly (Bachelor Capstone Design) [\[Video\]](#)
 Undergraduate Capstone Design
 Advisor: *Prof. Pradeep Ray, Prof. Yunlong Guo*

2019.09 – 2019.12

- Designed the circuit structure and connected all motors and sensors on a Raspberry Pi board for the robot prototype.
- Wrote several Python scripts and used a webpage to control the motion and function of the robot remotely.
- Designed the chassis structure and medicine dispenser of the robot with SolidWorks and 3D-printed the structure.
- Built the robot prototype enabling telepresence talking and medicine dispensation services and demonstrated the prototype at the Design Expo.

Professional Experience

Advanced Intelligent Maintenance Systems (AIMS)
 Hardware Engineer Intern

Hangzhou, Zhejiang Province, China
 2019.12 – 2020.04

Teaching Experiences

University of Texas at Austin
 Teaching Assistant

Austin, TX, USA

- Scientific Computation (undergraduate-level) 2023.08 - 2023.12

Shanghai Jiao Tong University
 Teaching Assistant

Shanghai, China

- Scientific Writing, Integrity and Ethics (graduate-level) 2021.09 - 2021.12
- Science and Technology Innovation (Part 4-E) (undergraduate-level) 2021.02 - 2021.06
- Discrete Maths (undergraduate-level) [\[Link\]](#) 2019.05 - 2019.08, 2020.05 - 2020.08
- Intro to Engineering (undergraduate-level) [\[Link\]](#) 2018.09 - 2018.12, 2019.09 - 2019.12

Voluntary Experiences

UT REACT REU Program [\[Link\]](#)
 Ph.D. Mentor for Undergraduate Students

Austin, TX, USA
 2024.07 - 2024.08

UT STEM Girl's Day [[Link](#)]

Volunteer & Representative of CLeAR Lab

Austin, TX, USA

2024.02

San He Junior High School [[Video](#)]

Voluntary Teacher for 8th Grade Geography

Sanhe County, Yunnan Province, China

2018.12 - 2019.01