

Qi Yin

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EDUCATION

- **Colorado School of Mines** Golden, CO, US
Ph.D. of Robotics Program Fall 2024 – Present
Core Modules: Reinforcement Learning, Navigation, Quadruped Robot
- **University of Pittsburgh** Pittsburgh, PA, US
Master of Mechanical Engineering Fall 2022 – May 2024
Core Modules: Linear Control System, Paralleling Computing, Machine Learning
- **Zhengzhou University** Zhengzhou, PRC
BEng in Mechanical Engineering Fall 2017 – July 2021
Core Modules: Mechanical Principles, Mechanical Design, Mechanical Dynamics

PROJECTS

- **A Navigation System for Quadruped Robot on Construction Sites**
Supervisor: Yangming Shi, Colorado School of Mines August.2024 - Present
 - Proposed a navigation system that includes a path planning module and a control module to enable quadruped robots to achieve autonomous locomotion, obstacle avoidance in complex and unstructured construction sites;
 - Designed a **cost map-based** path planning module to generate linear velocity and angular velocity commands for goal-directed navigation.
 - Trained the **Unitree A1** for autonomous locomotion using reinforcement learning in Isaac Gym;
 - Created a set of **terrain learning curriculum** incorporating construction site features to training progress and improve the robot's locomotion performance.
- **Pivots: Upskilling Automotive Workers for Future Electrical Vehicle Maintenance and Repair through Immersive Experiential Learning**
Student Lead, NSF ExLENT Project August.2024 - Present
 - Coordinated a multi-university research project with the University of Alabama and Purdue University to design immersive **Electrical Vehicle (EV) maintenance training**;
 - Conducted a Systematic Literature Review to gather EV maintenance knowledge and completed the training curriculum development using **Articulate**;
 - Drafted and submitted Institutional Review Board (IRB) applications for human subject research approval;
 - Recruited stakeholders and organized **co-design** workshops to incorporate end-user insights into learning design.
- **Narrowing the Reality Gap between Simulation and Real of Robotic Arm Grasping**
Supervisor: William W. Clark, University of Pittsburgh Jan.2023 - May.2024
 - Selected the **MUJOCO** physics engine and constructed a **simulation model** of the Xarm1S six-degree-of-freedom robotic arm to approach reality;
 - Utilized Reinforcement Learning with the **Deep Deterministic Policy Gradient** algorithm to efficiently train the simulation model in grasping target blocks over **4000 episodes**;
 - Transferred training data to the Xarm1S, quantified the reality gap, and analyzed the underlying reasons;
 - **Identified the main reason for the reality gap**, attributed to limitations in the computational model of constraint force and contact force.
- **Designing a controller of a MIMO (Multiple Inputs Multiple Outputs) system for an drone**
Supervisor: William W. Clark, University of Pittsburgh Sep. 2022 - Dec. 2022
 - Established a **multi-degree-of-freedom dynamic model** for a MIMO drone system, formulated state equations based on this dynamical system, constructed an open-loop system from these state equations, and achieved motion control of the system;
 - Introduced a full-state and a partial-state feedback closed-loop controller & observer, and harnessed their coordination to accelerate respond speed, reduced linear correlation, thereby altering the zero state positions;
 - Verified and explained the stability, accuracy, and robustness of the controlling system.

PUBLICATIONS

- [1] **Yin, Q.**, Ye, Y., Chen, M., Shi, Y. "A Teacher-Student Learning Approach to Improve Quadruped Robot's Autonomous Locomotion and Obstacle Avoidance on Construction Site." Accepted for presentation at the ASCE International Conference on Computing in Civil Engineering (i3CE), May 2025. To appear in the ASCE Library proceedings.

SKILLS

- **Programming:** C Language, C++, Python(Tensorflow, Pytorch, Numpy),
- **Tools:** Visual Studio, Matlab, Mujoco, IsaacGym, Articulate, Github, Blender, SolidWorks, AutoCAD