Xiaofeng Lin

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Education

Boston University   **Boston, MA**
PhD candidate in Systems Engineering   *Sept. 2023 - Current*
Research Interests: Reinforcement Learning, Robotics, Online Learning

University of Michigan   **Ann Arbor, MI**
Master of Science in Robotics   *Jan. 2021 - Apr. 2023*
GPA: 4.0/4.0
Relevant Courses: Mobile Robotics (SLAM), Robotic System Lab, Self Driving Cars, Machine Learning, Computer Vision, Nonlinear Systems and Control, Nonlinear Programming, Flight and Trajectory Optimization

Tianjin University   **Tianjin, China**
Bachelor of Engineering Mechanics   *Sept. 2016 - Jun. 2020*
GPA: 3.7/4.0, Rank: 6/61
Relevant Courses: Theoretical Mechanics, Fundamentals of Computer Software, Probability Theory and Mathematical Statics, Numerical Computational Methods and Matlab, Applied Computer Practice

Research Experience

Intelligent Robotics and Autonomy Lab, University of Michigan | *Research Assistant*   *Dec. 2021 - Current*
Multi-robot Coordination in Unpredictable Environment with Advice from Machine Learning algorithms
- Researched on Metrical Task System problem and Tracking the Best Expert problem and found a connection between these two problems, which can be applied to single-robot decision making.
- Provided a new theorem, which can provide near-optimal performance when ML algorithm is accurate and robustness when ML algorithm is arbitrarily inaccurate.

Perception-Based Target Tracking in Unpredictable Environments
- Set up simulator codes in MATLAB for multi-robot scenarios, enabling multiple robots to localize and mapping in unknown environments by using graph optimization.
- Applied algorithm to enable robots to learn how to coordinate from past observations, and perform asymptotically nearly as good as if they know future as a priori.
- Deployed Square Root Information Filter to update information matrix of robots' poses and targets' positions.

IUSL, Westlake University | *Full Time Research Assistant*   *Sept. 2020 - Jun. 2021*
Drone Catcher
- Developed ground station in C++ and Python with Mavlink protocol for DJI aircraft to monitor its status and send high-level commands including take off and landing.
- Developed an android version of ground station in JAVA based on DJI MSDK to show image information and detection results from our aircrafts, and take photos, record real experiments to provide further analysis.
- Deployed KCF tracking algorithm in ROS to assist drones when perception fails.
- Deployed Extended Kalman Filter using the information from object detection algorithms to get relative position information between our drone and target drone.

Publications

- Z Ning, Y Zhang, **X Lin** and S Zhao. A Real-to-Sim-to-Real Approach for Vision-Based Autonomous MAV-Catching-MAV. Unmanned Systems
- Z Xu*, **X Lin*** and V Tzoumas. Bandit Submodular Coordination in Unpredictable Environments with Untrustworthy External Commands. American Control Conference(ACC) 2024
- Z Xu, **X Lin** and V Tzoumas. Bandit Submodular Maximization for Multi-Robot Coordination in Unpredictable and Partially Observable Environments. Robotics: Science and Systems (RSS) 2023

Project Experience

Road Lane Detection using U-Net and Lovasz-Softmax loss   *Feb. 2022 - May. 2022*
- Engineered a CNN network based on modified U-Net in PyTorch for road lane detection task. The resulting network achieves MIoU of ~0.94 for the test dataset.
- Increased segmentation performance by 15% by utilizing a combination of Lovasz-Softmax and BCE loss.

Re-implementation of Monocular Depth Estimation   *Apr. 2022 - May. 2022*
- Added a small U-Net after decoder of original architecture in PyTorch and second order gradient loss to original training loss. The resulting network achieves L1 loss of ~ 0.6 for the test dataset.

Vehicle Classification using YOLO v1   *Nov. 2021 - Dec. 2021*
- Trained on datasets collected from first-person view of GTA5 on Google Colab.
- Achieved a prediction accuracy of 55% on testing datasets.

Maze Exploration Robot   *Sept. 2021 - Oct. 2021*
- Developed a ground robot with lidar, which can localize, map and explore through an unknown maze.
- Developed particle filter based SLAM to enable robots to localize itself and map.
- Applied A* algorithms to enable robots to navigate in a maze that is built through SLAM.

5-DoF Robot Arm Pick and Place   *Nov. 2021 - Dec. 2021*
- Developed a 5-DoF manipulator with an RGB-D camera that can identify, pick up and place blocks.
- Implemented automatic extrinsic calibration of RGB-D camera by AprilTags.

Biped Robot State Estimation via Fusion of Dynamics Model and Kinematic Constraints   *Mar. 2021 - Apr. 2021*
- Utilized Invariant EKF to estimate biped robot orientation, velocity and position with accuracy in MATLAB.
- Combined IMU and leg kinematics measurements to increase the accuracy of state estimation.

Honors & Awards

Outstanding graduates of Tianjin University (Top 10%)	*May.2020*
Merit Student of Tianjin University (Top 30%)	*Oct.2018 / May.2020*
The 2nd National University Content on Intelligent Robotic Innovations-National Third Prize	*May.2019*
79th Mechanical Alumni Scholarship of Tianjin University (Top 30%)	*Oct.2018*

Professional Skills

Programming: C++, C, Python, MATLAB, JAVA, STM32, Raspberry Pi
Software & Tools: ROS, Gazebo, V-REP, Adams, GTSAM, Linux, Git, Android, Qt, Pytorch, Jupyter Notebook