Agile Trajectory Generation for Tensile Perching with Aerial Robots

Progress Update

Literature

- RL-based Tethered Perching for Drones (Fabian Hauf FYP 2022)
- Agile Tensile Perching with Micro Aerial Vehicles (Alan Slater FYP 2019)
- Design and Manufacturing of a Passive Advanced Grapple for UAV Perching System (Ronglong Ye 2019)
- An Application of Reinforcement Learning to Aerobatic Helicopter Flight (P. Abbeel 2007)

An Application of Reinforcement Learning to Aerobatic Helicopter Flight (P. Abbeel 2007)

1. Collect Data From Human Pilot -> Learn Model from this data.
2. Find a controller that works in simulation based on the current model
3. Test the controller on real-helicopter. Back to 2.

RL - Linear Quadratic Regulator (MDP)

- Cost for Change in Inputs - penalizes the change in inputs over consecutive time.
- Two phase - first phase cost of change in inputs, second phases penalised change from planned input.
- Reward Function: Apprenticeship learning

General Plans

- Unavailable Dates in README.md on OneDrive.
- Gantt Chart on OneDrive
  - Contains planned allocation of Work.
  - Autumn Term 8hrs p/w

Plans Until Next

Literature

- Apprenticeship Learning via Inverse Reinforcment Learning
- Set of interesting papers that referenced the earlier mentioned paper that specifically relate to drones.
- SAC algorithm
- Deep Q Learning
- An innovative bio-inspired flight controller for quad-rotor drones: Quad-rotor drone learning to fly using reinforcement learning

Plans Until Next

Practical

- Thoroughly go through drone_perching_main repo and attempt to reproduce results:
  - Approaching, Making Contact, Flipping, Setup PX4-Autopilot, QGroundcontrol, Gazebo Simulations