

# Agile Trajectory Generation for Tensile Perching with Aerial Robots

Yanbin Liang, Yuxin Chen,  
Yanping Chen, Yueshan Chen,  
Yanping Chen, Yueshan Chen,  
Yanping Chen, Yueshan Chen

Department of Mechanical Engineering,  
Tsinghua University, Beijing 100084,  
China

liangyb17@mails.tsinghua.edu.cn,  
chenyx17@mails.tsinghua.edu.cn,  
chenyp17@mails.tsinghua.edu.cn,  
chenys17@mails.tsinghua.edu.cn,  
chenyp17@mails.tsinghua.edu.cn,  
chenys17@mails.tsinghua.edu.cn

Abstract: This paper presents a novel agile trajectory generation method for tensile perching with aerial robots. The method is based on a deep reinforcement learning framework, which can learn the optimal trajectory for tensile perching in a high-dimensional state space. The method is evaluated on a series of simulations and experiments, showing its effectiveness in generating agile trajectories for tensile perching.

Keywords: Agile trajectory generation, Tensile perching, Aerial robots, Deep reinforcement learning

1. Introduction

2. Related Work

3. Method

4. Results and Discussion

5. Conclusion

# Progress Update

- Returned to PyBullet utilising demo trajectory
  - Repackaged the C++ Bullet Engine to get the joint type that I wanted.
  - Changed to dimensions/weights used in the previous experiment
  - Demo
  - Currently with 25 segments - looks reasonably realistic and works quite well.
  - I can collect data with 100 segments but the graphics don't display well and cause a lot of lag.
  - But works well with GUI disabled for training purposes.

# Overall Plans

- Drone Dynamics Model (25th Feb) (1/4 Weeks)
  - Towards the end of this when I had originally planned.
  - Will require refinement with further dynamics data when available.
- Demonstration Data Collection (10th March) - main item I have to discuss today.
- Learning from Demonstrations Model (21st April)

# Plans Until Next

- Over the next two weeks until Exam Break (8th March - 23rd March)
  - Start integrating existing demonstration data algorithms along with the analytical solutions previously calculated to learn from this model.

# Questions

- Demonstration Data Collection.