Task 2A: Waypoint Navigation

blogpost-style

codingcoffee #1 October 17, 2022, 3:12pm

@sd22

Task 2A Flying the Quadcopter through Way Points

Aim

The aim of this task is to write a wrapper over the existing **PID** control system, written in Task 1 to fly the quadcopter through a list of set points in the simulation environment in Gazebo.

Prerequisites

It is presumed that you have successfully completed Task 1 and the prerequisites of the same. No new resources, apart from task 1 are needed for this task, however do not limit yourself with the same, the internet is a vast ocean of knowledge, make use of it!

Installations

We've pushed new code to the exisiting package. You simply need to pull it and run catkin build

```
cd ~/catkin_ws/src/sentinel_drone
git pull
catkin build
```

Problem Statement

- The quadcopter should move through each set point in the gazebo environment
  -Takeoff
  - [0,0,23]
  - [2,0,23]

- [2,2,23]
- [-2,2,23]
- [-2,-2,23]
- [2,-2,23]
- [2,0,23]
- [0,0,23]

- A waypoint will be considered success if the drone gets within the error range of **±0.2m** in all the coordinate axis **for even one instance**

Procedure

- Launch the Gazebo world containing the quadcopter and the overhead camera by typing the following command

```
roslaunch sentinel_drone task_2.launch
```

- Make a new pyhton script *waypoint_navigation.py* in the *catkin_ws/src/sentinel_drone/sentinel_drone/scripts* folder and complete the script to fly the drone through the mentioned set points.
- Potentially use the PID values from task 1 to achieve optimal performance of the quadcopter flight in your python script.
- Follow the recording and submission instructions to submit your task

Recording and Submission instructions

- Step 1: Use the PID controller and complete the python script for flying the drone

- Step 2: Tune the P, I and D values from task 1 (or tune again if needed) for roll, pitch and throttle appropriately in your code. And add in a wrapper over your code to fly the drone through the mentioned setpoints and finally stabilize on the last setpoint.

- Step 3: Now you need to record your submission, a tool named rosbag helps to record rostopics just as a video. When you feel confident with the performance of your PID controller and you are ready to record the submission, use another launch file which will run the same things as in task_1.launch as well as start the position_controller.py and a node to record rosbag after 5 seconds delay so that gazebo starts and drone is spawned.
  Update the sentinel drone ros package

```
cd ~/catkin_ws/src/sentinel_drone
git pull origin main
```

  After the package is updated, you can find a new launch file named
  `task_2_submission.launch`

- Step 4: Now use this launch file to implement the task and record a bag file for 2 minute i.e. 120 seconds

```
roslaunch sentinel_drone task_2_submission.launch
```

- Step 5: This will generate a bag file named `waypoint_navigation_<date_time>.bag` in the scripts folder, change the name to `SD_<team_id>_waypoint_navigation.bag`, you need to make a zip file containing this bag file and the python script, change the name of python script to `SD_<team_id>_waypoint_navigation.py`.

  > NOTE: The zip should contain only 2 files in the root directory, DO NOT make a folder and then zip, directly zip the two files. You can use this command to zip the file. Use this command only after you have renamed both the files. replace <team_id> with your team id, for eg. if your team id is 1234, then the file names should be `SD_1234_waypoint_navigation.bag` and `SD_1234_waypoint_navigation.py`

  ```
  zip -r SD_<team_id>.zip SD_<team_id>_waypoint_navigation.bag SD_<te
  ```

  This should be the structure of zip file
  |__SD_1234.zip
  … |__SD_1234_waypoint_navigation.bag
  … |__SD_1234_waypoint_navigation.py

- Step 6: Submit this zip file on the portal in the place of Task 1A and check your score.

Deadline

Deadline for Task 2A is 27th October 23:59 hrs

All the best !!

2 Likes

Smit closed #2 October 18, 2022, 10:51am

Task 2 has launded