Task 3 - Hungry Bird

Problem Statement

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- The drone should hold its position at the given point **[0.0, 0.0, 20.0]** as per the WhyCon frame of reference using the PID control algorithm.
- Answer the questions given in Theme Implementation and Analysis.docx in the analysis folder.
- Make a .launch file incorporating all of the elements you have implemented until now.
- You have to emulate the position of the drone in V-REP in the scene task_3_hb.ttt provided to you.

Procedure:

1. Paste the provided WhyCon marker on the marker holder and attach to the drone. Refer Assembling_Drone.pdf in Hardware Testing for more information on this.
2. Create a PID node and name it **task_3_pos_hold.py**. Create and save your node in the src folder of package plutodrone (~/catkin_ws/src/pluto_drone/plutodrone/src). Refer the pluto_drone package to setup the communication between drone and PC/laptop.
3. On executing your node:
    a. The drone should arm.
    b. The drone should take off and hold at position specified in the problem statement above.
    c. **After 30 seconds** from the beginning of the flight, a team member must push the drone by about **20 cm** away from it's position and allow it to stabilize.
    d. An error box of **2.0** in the x, y and z axis is tolerated but not more than that.

Expected Output:

Refer this video for the expected output of the position hold. You should perform the emulation in V-REP simultaenously along with this as well.

Please note the WhyCon coordinate in the video is selected by us. This coordinate is relative and depends on the inner and outer diameter parameters that are set in the launch file of the WhyCon package. Hence, do not assume that our WhyCon coordinates will be the exact same as your WhyCon coordinates. There will be differences in the values of x, y or z at the same point in the arena for us and you. As a result, by extension, the error box of 2.0 (as mentioned above) will depend on the WhyCon coordinate generated. **We strongly advise you to not change the default values given in the launch file.**

Submission Instructions:

Follow the instructions below to submit your Task.

1. **Bag File:**
   a. Add the rosbag record command in your launch file so that the two python scripts and the rosbag begin at the same time. Record your bag file for **60 seconds exactly**. Your rosbag will be saved with a .bag extension. Add the following lines to your launch file to begin recording a rosbag:

   ```
   <node pkg="rosbag" type="record" name="record"
         args="-O /<enter_desired_directory>/<filename>.bag whycon/poses
   --duration=60s" output="screen"/>
   ```

   b. Launch your Hungry Bird package by running the following command **after loading the required nodes and the rosbag record instructions into the launch file**:

   roslaunch hungry_bird hungry_bird.launch

   Make sure your launch file has nodes task_3_pos_hold.py and rosbag record.

   c. Next step is to compress the .bag file that is created before you can upload it. Run:

   rosbag compress –j ~file_name.bag

   d. Rename the compressed bag file as **<team_id>.bag**

2. **Python Codes:**
   a. Rename the python script as **<team_id>_pos_hold.py**

3. **Think and Answer:**
   a. Submit the Think and Answer in **PDF** format only.
   b. Rename it as **<team_id>.pdf**

4. **V-REP scene:**
   a. Rename the scene with the completed script as **<team_id>_task_3_hb.ttt**

5. **Video Submission:**
   a. Using screen record, record video of the drone performing the position hold task. The video should be at most **60 seconds** long.
   b. Your emulation inV-REP should be running and visible on the screen as well.
   c. Begin recording **exactly before** executing your launch file.
   d. Name the video as HB_eYRC#<team_id>_task3
   e. Upload instructions will be provided on the portal.

Store the files mentioned above in a folder and compress the folder into .zip file and rename the folder as <team_id>. Do not place the video within the .zip folder. You must upload that separately on YouTube. Instructions for uploading this video are given on the portal.

NOTE: You must upload all of the following: (i) bag file and (ii) 2 Python script and (iii) Think and Answer.pdf (iv) V-REP scene. Please place all these files inside a .zip file before uploading. You must also upload the video to YouTube.

Please follow the naming convention strictly as specified in each step. Failure to do so may lead to repercussions.

Your final .zip output must be of the following structure:

<team_id>.zip

<team_id> *[folder]*

- **<team_id>.bag**
- **<team_id>_pos_hold.py**
- **<team_id>_task_3_hb.ttt**
- **<team_id>.pdf**

Instructions for uploading the folder will be provided on portal

Good Luck!