Unmanned Aerial Systems Techology (RMUAST) Spring 2017
University of Southern Denmark

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Module 6: ROS with Gazebo Simulation

1 Introduction

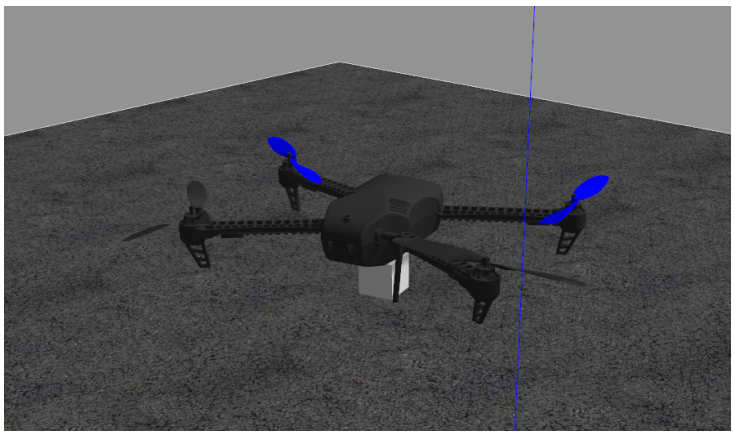
Task of this exercise was to use Gazebo and ROS to simulate drone operation.

2 Assignments

For documentation of assignemnt 1 to 3 we refer you to the videos in our repository.

2.1 Assignment 4.1

To solve this task we changed the iris.sdf file to have a extra joint and link. This was necessary in order to mount a camera on the drone. Inside the link we added the camera module as was instructed on the tutorial provided by Jes. Figure 1 shows the PX4 with the mounted camera.



Figur 1: The PX4 with our mounted link(camera)

2.2 Assignment 4.2 and 4.3

We could not get the markerlocator, which was provided, up and running so we reused one of our own algorithms. We made a red sphere with Gazebo and then used the HSV spectrum to do color segmentation. After color segmentation we used opencv::findContours on the binary image to find the center of the object.

2.3 Assigment 4.4

To reduce complexity when writing the code controlling the drone, we simply made a publish-subcriber relationship between the opencv node and the controlling node, respectively. Opencv node publishes messages with pixel error of sphere location. Control node subscribes to the error message topic. Every

time opencv node publishes new error messages, callback function in control subscriber node is called. In this function pixel error is transformed into control signal of drone. Simple ID controller was used. Even though ID controller doesn't belong into typical controller, it was suitable for this task. The reason was mainly that the control signal in the offboard-node is drone position in the world frame. Every movement of drone or sphere thus integrates into its absolute position.

You can see the simulation at https://youtu.be/u6E3OCPytlU