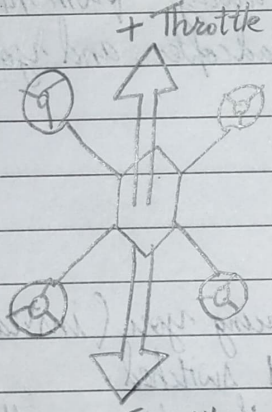
Experiment - 6

Name - Pratik Rajesh Jade
Roll no - A72

Title - Study of Throttle control in Quad Copter and ITS Controlling

Introduction -

Throttle controls the vertical up and down motion of the drone. Positive throttle will make the drone fly higher & negative throttle will make the drone fly lower. Yaw is the left and right rotation of the drone. Positive yaw will make the drone turn to the right and negative yaw will make the drone turn to the left.



Throttle operational event

Throttle - To increase, push the left stick forwards. To decrease, pull the left stick backwards. This adjusts the altitude, or height of the quadcopter.

Control - With any of these controls, the harder you push the stick, the stronger your quadcopter will move in either direction. When you first start out, push the sticks very gently so the quadcopter performs slight movements.

As you get more comfortable, you can make sharper movements.

There are four main quadcopter controls:

Roll
Pitch
Yaw
Throttle

Throttle - Gives the propellers on your quadcopter enough power to get airborne. When flying you will have the throttle engaged constantly. To engage the throttle, push the left stick forwards. To disengage, pull it backwards. Make sure not to disengage completely until you're a couple inches away from the ground. Otherwise you might damage the quadcopter, and your training will be cut short.

Important note-

1. When the quadcopter is facing you (instead of facing away from you) the controls are all switched.
2. Pushing the right stick to the right moves the quadcopter to the right (roll)
3. Pushing the right stick forward moves the quadcopter forward (pitch)
4. Pushing the right stick backward moves the quadcopter backward (pitch)

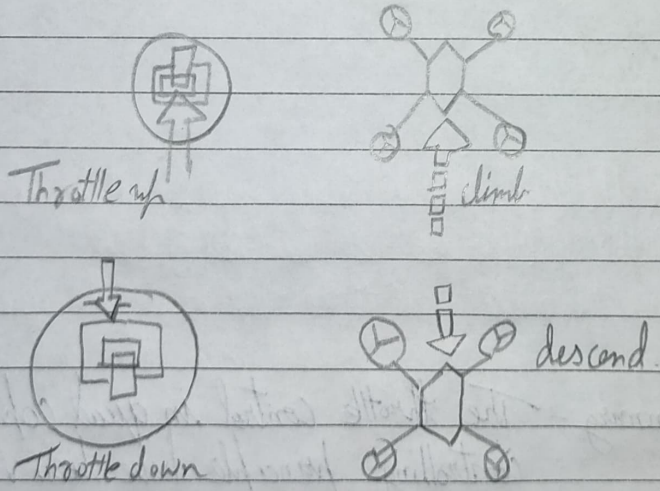
Powering up.

1. Turn on transmitter / remote control and open up DJI Go 4 app
2. Turn on aircraft
3. Verify established ~~com~~ connection between transmitter and aircraft
4. Position antennas on transmitter toward the sky
5. Verify display panel/FPV screen in functioning properly.
6. Calibrate Inertial Measurement Unit (IMU) as needed.
7. Calibrate compass before every flight

8 Verify battery / fuel levels on both transmitter and aircraft
9 Verify that the VAS has acquired GPS location from at least Six Satellites

Taking off.

1 Take-off to eye-level altitude for about 10 - 15 seconds
2 Look for any imbalances or irregularities.
3 Listen for abnormal sounds
4 Pitch, roll and yaw to test control response and sensitivity.
5 Check for electromagnetic interference or other software warning.
6 Do one final check to secure safety of flight operations area
7 Proceed with flight mission



climb & descend events.

Thrust Moment

The m-thrust is a part of the external moments acting on the system, described by the propeller thrust F-thrust and the distance 'l' from CG to the centre of the propeller:

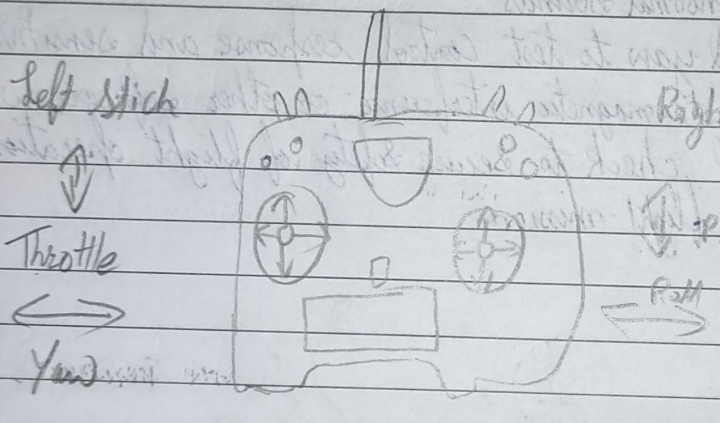
$$\underline{M}_{thrust} = \begin{bmatrix} M_x \\ M_y \\ M_z \end{bmatrix}$$

$M_x = [F_4 - F_3] \cdot l$

$M_y = (F_2 - F_1) \cdot l$

$M_z = (-F_1 - F_2 + F_3 + F_4) \cdot T_q$

T_q is a constant which converts the thrust into movement.



Representation of various activity in manual control system

Summary - The throttle control in quad copter as well as its controlling principle have been verified in this experiment.