

INTERNSHIP 2022

PROGRESS REPORT FORMAT FOR FLIGHT CONTROL TEAM

NAME: FAITH CHELANGAT

TASKS COMPLETED LAST WEEK

- [#25] ... Testing the reaction wheel with current firmware

~Several tests were done on the reaction
Wheel

~Currently, our program works and the system responds
as expected

~However, there were challenges experienced .

~There was imbalance of masses on the mounting case of our test bench which we are in the process of solving .

~As a result of imbalancing, our test was not as accurate as expected. Gravity caused continuous rotation and thus inability to have the mounting case settle at one specific point and consequently the motor still caused rotation of motor

~We hope to achieve almost perfect balance to ensure that we find more accurate results

PID TUNING RESULTS

~during the tests , we began on the pid tuning

For pid values of:

$K_p=1$

$K_i=0$

$K_d=1$

-We experienced overshoots. Solution: Reduce value of K_p to 0.5

~There was better response and overshoot reduced.



~Since during the earlier test we still had the imbalance we rectified the issue and retested with K_p value of 1. There was an improvement.

PID value of:

$$K_p=2$$

$$K_d=1$$

$$K_i=0$$

~Improved response time and less overshoots

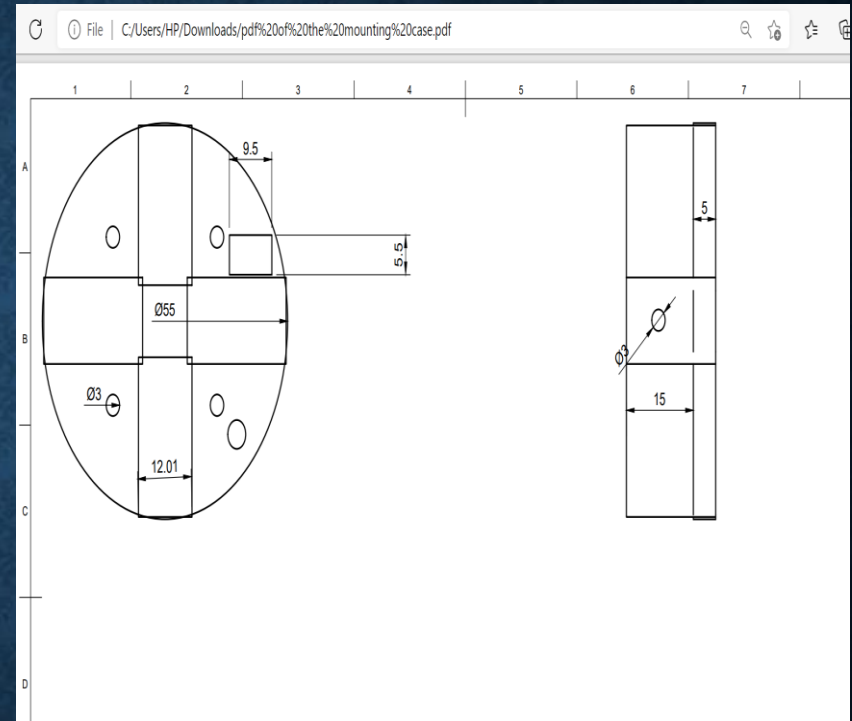
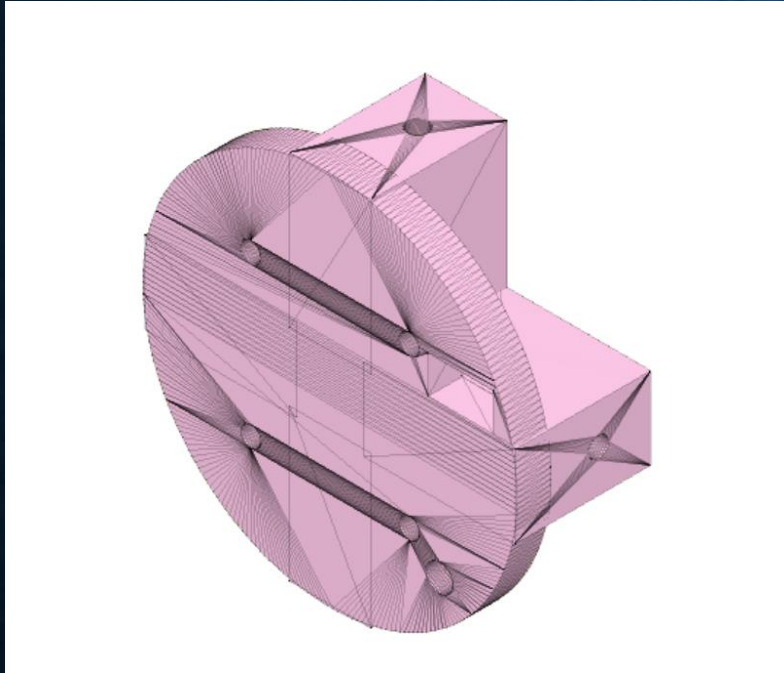
-This is what currently we're using.

~We will be doing more tests to improve performance



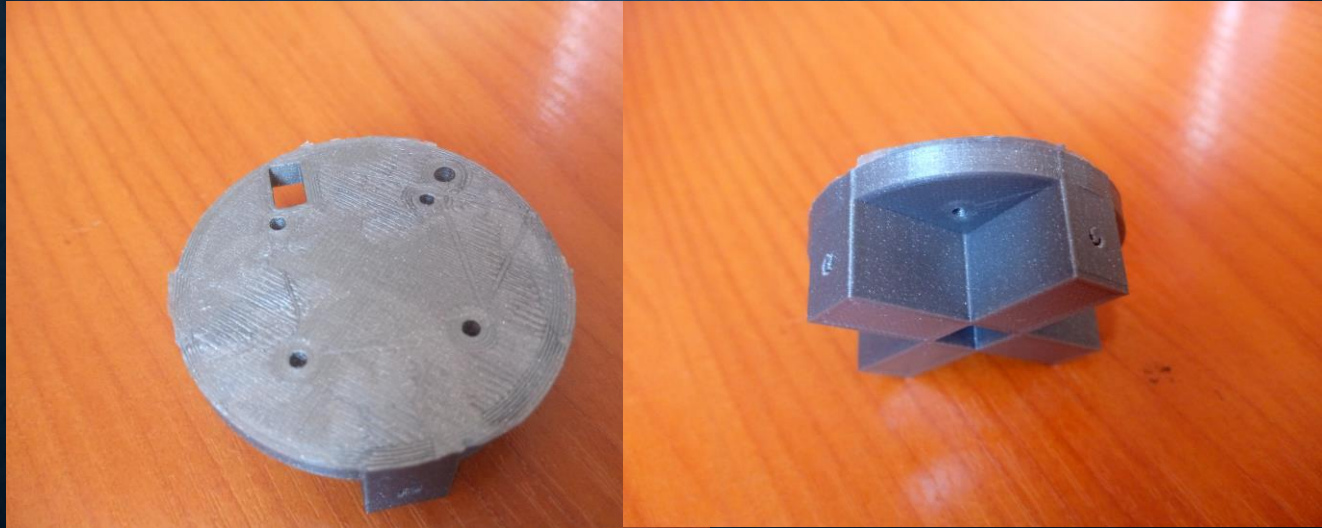
[#26] ... Design of the mounting case

- ~Upon review of the previous design a couple of changes were made to the design of our mounting case
- ~We needed to cut a hole through the case to allow for cabling between the components on the mounting case to the flight computer
- ~The dimensions of the end to be fixed on the airframe were also altered



[#101] ... Fabrication of the mounting case

~Due to changes in design, we 3D printed another mounting case.

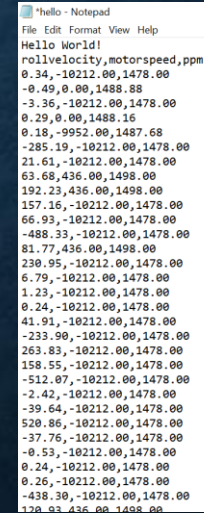


- [#29] ... Logging data

~During, our tests we logged data.

However , logging occurred only at neutral(motor was off)

~We'll look into the issue



A screenshot of a Notepad window titled "hello - Notepad". The window contains a log of data with the header "rollvelocity,motorspeed,ppm". The data consists of multiple lines of three comma-separated values. The first value represents roll velocity, the second represents motor speed, and the third represents power in ppm. The motor speed is consistently -10212.00, and the power is consistently 1478.00. The roll velocity values vary, including 0.34, -0.49, -3.36, 0.29, 0.18, -285.19, 21.61, 63.68, 192.23, 157.16, 66.93, -488.33, 81.77, 230.95, 6.79, 1.23, 0.24, 41.91, -239.90, 263.83, 158.55, -512.07, -2.42, -39.64, 520.86, -37.76, -0.53, 0.24, 0.26, -438.30, and 170.63.

```
*hello - Notepad
File Edit Format View Help
Hello World!
rollvelocity,motorspeed,ppm
0.34,-10212.00,1478.00
-0.49,0.00,1488.88
-3.36,-10212.00,1478.00
0.29,0.00,1488.16
0.18,-9952.00,1487.68
-285.19,-10212.00,1478.00
21.61,-10212.00,1478.00
63.68,436.00,1498.00
192.23,436.00,1498.00
157.16,-10212.00,1478.00
66.93,-10212.00,1478.00
-488.33,-10212.00,1478.00
81.77,436.00,1498.00
230.95,-10212.00,1478.00
6.79,-10212.00,1478.00
1.23,-10212.00,1478.00
0.24,-10212.00,1478.00
41.91,-10212.00,1478.00
-239.90,-10212.00,1478.00
263.83,-10212.00,1478.00
158.55,-10212.00,1478.00
-512.07,-10212.00,1478.00
-2.42,-10212.00,1478.00
-39.64,-10212.00,1478.00
520.86,-10212.00,1478.00
-37.76,-10212.00,1478.00
-0.53,-10212.00,1478.00
0.24,-10212.00,1478.00
0.26,-10212.00,1478.00
-438.30,-10212.00,1478.00
170.63,436.00,1498.00
```


TASKS IN THIS WEEK

- [#25] ...Testing the reaction wheel

~This is a continuous process that will involve more of the PID tuning

~Other than detumbling, we hope to generate a bunch of input values on the motor and log how the plant reacts from the velocity of the mpu 6050. From a bunch of inputs and outputs we can work on generating the plant and generating an optimal PID controller

• [#29] ...Uploading logged data^I

~The data we logged initially weren't comparable.

The speed of motor was in terms of ppm values while the
Roll velocity in rad/s

~Since mapping doesn't work efficiently, we are using IR
sensor to find the exact values of motor speed before
uploading for analysis

TIMELINE

Month	Intern week	Tasks
Jan		
	Week 1	Familiarising with the N1/N2 project Research on the design of reaction wheel
	Week 2	Soldering of prototype flight control PCB
	Week 3	Design of the N2 reaction wheel
Feb	Week 4	Testing of the reaction wheel Finalising on the Design of reaction wheel
	Week 5	Design of safety cage Design mounting case Avionics bay design
	Week 6	Improvement of Kalman Filter Data logging
	Week 7	