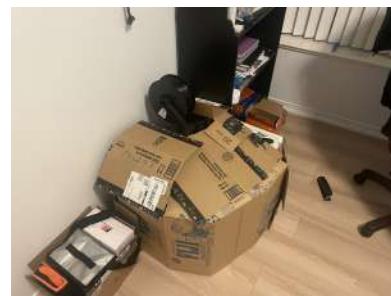


# Jan. 14th

all items have been acquired! listed are

Drone specific mat

- Speedybee F7 V3 Stack
- Lipo battery (6S 1100mAh), charger, bag
- Radio receiver/transmitter
- 4x rotors and motors (1960KV)



new ABS enclosure lol jank af made of drink box + 3x amazon boxes

Tools and accessories

- Sets of M3 screws and allen keys
- Soldering kit
- Screwdriver, ruler, caliper, wrench

Printing Plastics

- Black ABS (tested settings)
- Black PETG (not tested settings)
- White, black, tri PLA (tested settings)

CAD

- Rotor guard files with no frame holes (v2)



warping & scars  
on PLA tf man



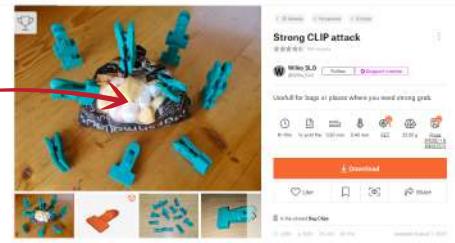
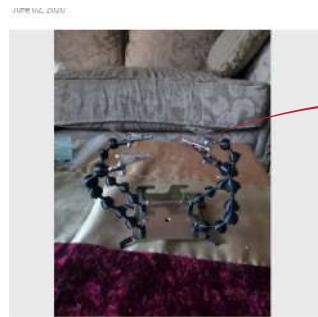
MOTORS!! little boxes look nice

p.s the m3 bolts were too short  
so gotta return that to puraltor tmrw

## GOAL: CAD and print drone frame (ABS)

# Jan. 15th/16th

Very sick. But do drone building isn't a work out so I think it's okay.



printing this helping hands model for soldering...  
don't got alligator clips and don't wanna wrench off the  
Lipro charger so ig we're printing clips

Still need

- Heat Shrink (grab some from UTRA)
- Voltmeter (pick up tmrw)
- zip ties? (can print w PETG, will pick up prob)
- duct tape



## GOAL: Charge lipo, start soldering

printed Black ABS  
Remember to switch to purple next time...  
almost out of this one

# Jan. 17th

still mega sick ! at least we're making a bit of progress



new printed helping hands work great  
just like the virus.

rosin and flux paste smoke  
so much. I hope i keep wearing  
the gas mask.



FIRST WELD DONE AHHHHH THIS TOOK >3HR

why so patchy??  
need to practice  
soldering but  
also this wire  
is huge



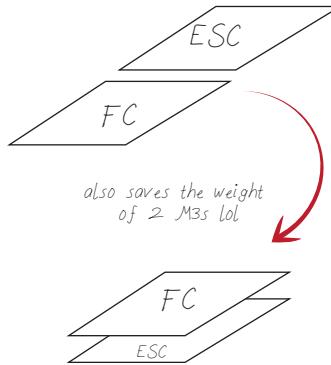
takeaways from soldering

- black/dull tip = not hot enough
- tin the tip every once in a while
- temp should be ~450C
- flux paste for adhesion..?

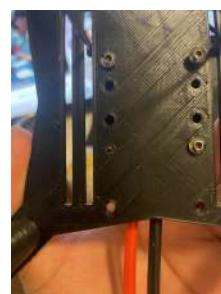
GOAL: FIX THE FIRST  
SOLDER and start  
soldering the motors

# Jan 18th

Changed the arrangement of the fc/esc stack to as displayed because motor orientations

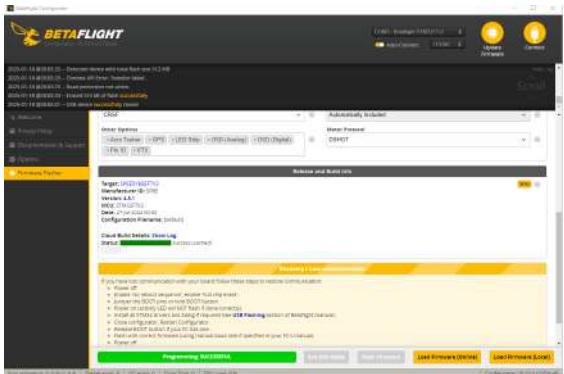


a pro of using ABS frame:  
soldering iron can be used to make  
new holes without reprinting

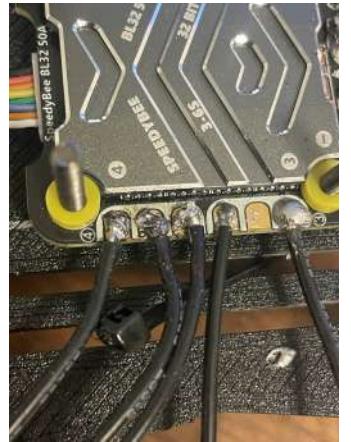


the silver Sharpie looks really  
nice ngl

<https://youtube.com/shorts/OgQfva7J4UE?feature=share>



soldering of motors 4 and 3!  
testing worked out though after  
testing one of the (nicer)  
soldering bits  
fell off T-T



progression of solder can be seen  
the rightmost one looks best,  
though a bit too  
much solder

## GOAL: Fix old motor solders and connect remaining motors

Jan. 20th

New nicer 40/60 solder came in! Will test it next time  
anything needs to be soldered.

The 4 hour midday nap is new though.

Jan. 22th

Finished soldering of motors and strapped down the wires with zip ties, attached radio SBUS receiver

new soldering w 40/60 is  
SO MUCH FASTER these  
were done in like 5 mins



they look kinda ugly but hey  
it worked.

Tinning and solering practices  
are much better though!



S / Signal  
+ / 5V - Power Pin  
- / GND - Ground

## GOAL: Connect Radio and test transmitter on Betaflight

don't the antenna look like ears?

# Jan. 23th

3 HOURS HAS BEEN WASTED TRYING TO GET THE IBUS RECEIVER TO WORK but it works now: Betaflight shows the aux bars. The issue was that the iBus protocol apparently had not been updated onto the F7, so it needed to be flashed.

Sleep schedule has suffered :

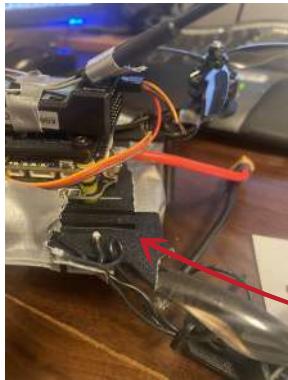
Radio Checklist!

- Wired on FC
- Receiver & Controller are connected
- Serial Port (for F7 is UART2) is turned ON
- Radio protocol is set to iBus, firmware is flashed



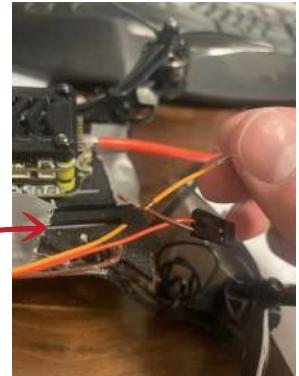
# Jan. 24th

Nothing was progressed except for the fact that arming apparently blasted the motors so arm 3 snapped off, 2/3 of motor 3's wires got unsoldered, and 2/3 of the radio receiver wires got sliced



rewire motor 3

A chance to upgrade the baseplate i guess...



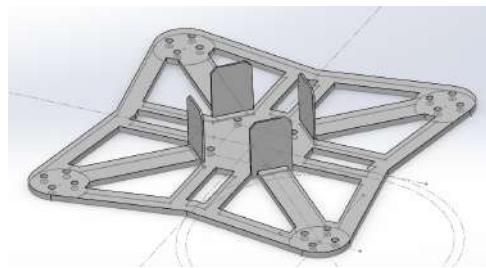
the plan is to:  
- strip wire  
- solder  
- electrical tape  
- hope

GOAL: Repair damages, and design/print new ABS baseframe

## Jan. 24th

new frame CADed and printed in purple ABS this time

- Increased main motor arm thickness
- Added + shaped support for motor arms
- Star shaped outline connecting + and x shapes
- Removed legs (just rests on battery now)
- Added 4x guard walls for electronics from rotors

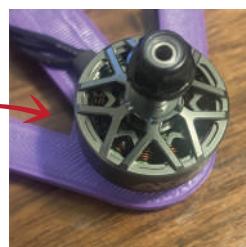


## Feb. 14th

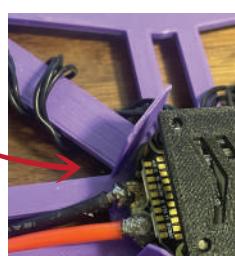


It's so over.

Motor 4 has been blown out by arming and recklessly throwing up the throttle. Smoke, and the copper wire is now black yay! Reordered set of four motors. Luckily, no fire started though.



Burnt out motor with a side of smoke



Disconnected battery wire with a side of sparks and panic

## Feb. 22th

It might not be doomed.

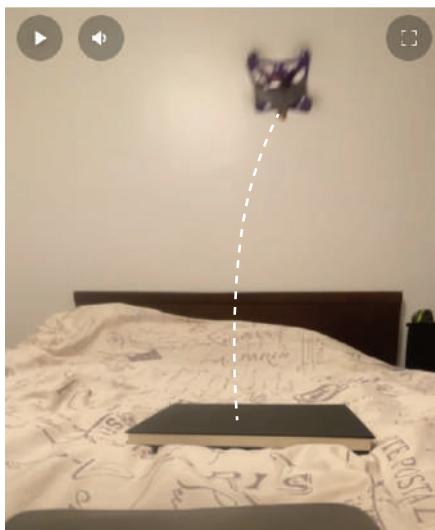
Arming and basic throttle testing with new drone frame.

Additionally, a switch has been installed for battery instead of having to plug and unplug!



<https://youtube.com/shorts/9HKPTjfP8w?feature=share>

Basic arming test with lowest throttle input. All sounds good, but next remember to "crank down the props", as some reddit guy said, as the noise from all tests after the first one have a rattling sound, likely from a loose prop.



<https://youtube.com/shorts/3Fme7q1HXwl?feature=share>

Throttle test went less well... input seemed to work fine, but due to the battery's resting angle, and the fact that ANGLE mode wasn't activated... flight path was not straight. The props have a lot more scratches and scuff's now.

**GOAL:** Design and print feet for the drone so that it can land and takeoff level to wtv surface

Adjust throttle scaling, since right now, the idle throttle is a bit too strong\*

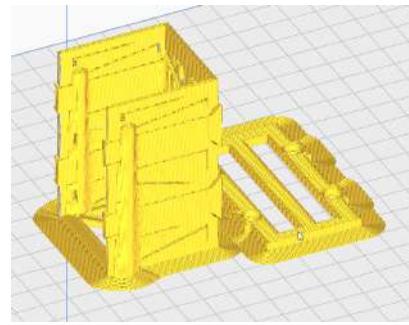
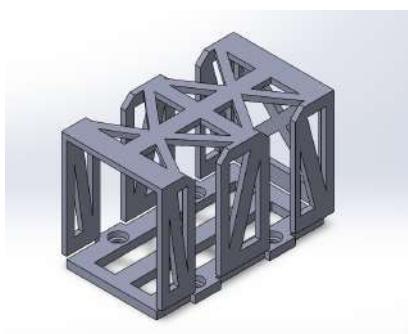
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April 5th

Been a while... ESP is taking its toll but oh well presentation seems to be ready.

Battery cage has been designed and is being printed w white pla pro, which has been calibrated using 'someone's ESP MoS project. Throttle curve has also been adjusted to be max 80%. Idle throttle % remains the same (5% iirc)

Currently battery cage looks like below, and has many trusses to support zip ties for wire. Also, the side cage walls + bottom are printed vertically so that layer adhesion isn't an issue... hopefully that works out :)



## April 7th

Battery box is printed and glue is dried. Battery fits very well in there actually.



Also, stuttering motors has been figured out... straight up issues with soldering the connector to the esc that was so stupid.

## April 10th

New position setup for radio receiver due to prop noise when spinning up. Below battery cage now. Additionally, green nylon (?) rings are attached between props and nylon nut.



me immediately accidentally turning back and forward and ruining the ring :/

Additionally, I realize i should've done this calculation earlier but here's the simple static thrust calc:

$$4 \times 1300\text{g} / \text{motor (at full throttle)} = 5.6\text{kg}$$

Therefore, for a good ratio, the craft shouldn't go over 2.5kg likely

[https://youtube.com/shorts/mTdX\\_SYA4Cw](https://youtube.com/shorts/mTdX_SYA4Cw)

Additionally, testing got this video (on flat ground). There is a small list of things to check/keep in mind from GPT. Mainly that I should get a CF frame T-T

## Gyro Noise or Vibration

Especially common if your frame is flexy or your flight controller isn't soft-mounted.  
Check the Blackbox (if enabled) or Gyro Graphs (Betaflight Configurator  
>> CLI: set debug\_mode = gyro\_scaled, then watch "debug" in the "Blackbox" tab) for noise spikes.

### Fixes:

Add vibration damping to the FC (rubber standoffs or foam).

Balance your props (especially if 3D printed).

Reduce gyro filtering if needed.

## Too-High DShot Idle Percent / Minimum Throttle

Betaflight may be spinning your motors faster than needed, amplifying vibrations.  
Try lowering motor\_idle\_percent in CLI:

```
set dshot_idle_value = 400
```

Or adjust motor\_idle\_percent (defaults ~5.5%).

You can try 4.5% and see if the oscillation reduces.

## Too-High PID Gains

If your P or D gains are too high, even idle gyroscope noise will cause the PID loop to aggressively react, especially when the quad is still.

Try switching to Profile 2 (defaults) or reducing D gain temporarily to test.

## Prop Wash / Air Feedback Loop

If this happens more after throttle-up or while on the ground, it could be air feedback from the ground messing with sensors.

Lift the quad off the ground while still armed and see if it smooths out (without props for safety).

Or test by placing the quad on soft foam or anti-vibration padding.

## Motor Desync or ESC Settings

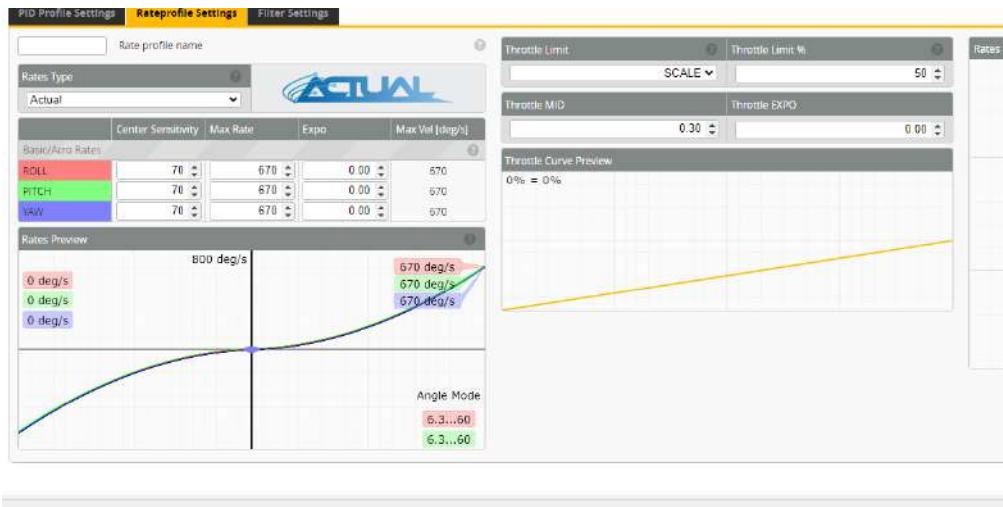
Rare but possible. If using BLHeli\_S or \_32, make sure motor timing is not too low.

Flash latest firmware and test a higher timing (e.g., medium or high).

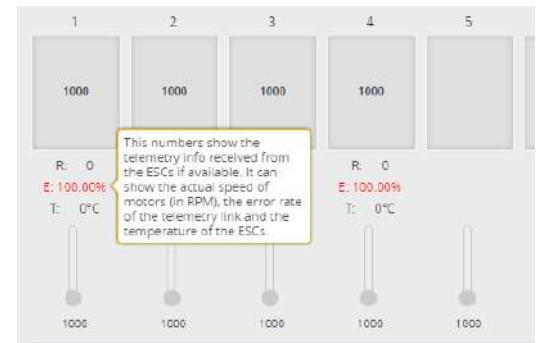
**GOAL: Go through that list and try everything before changing the frame**

# April 11th

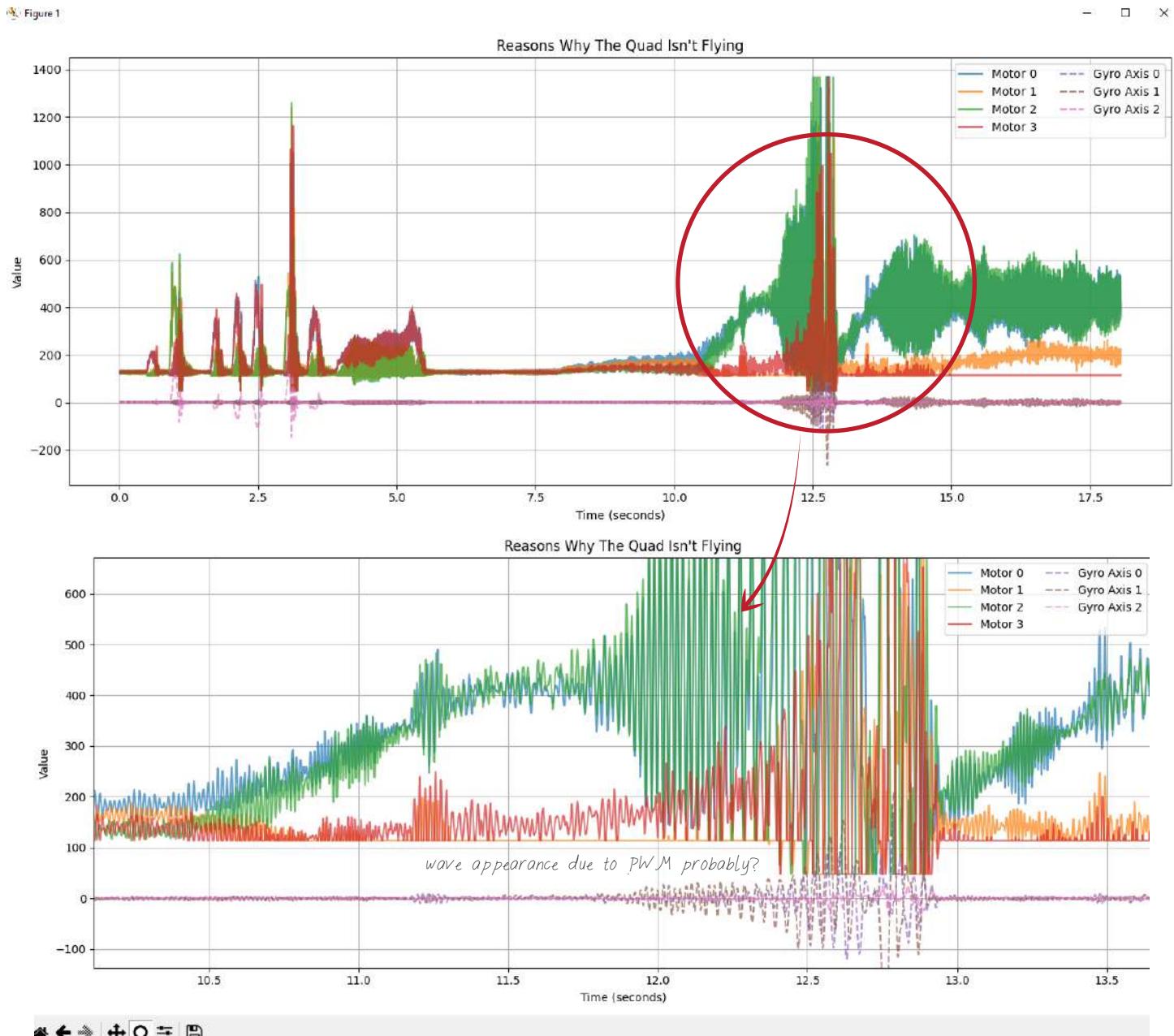
- Changed initial throttle to be 4.6%
  - Decreased PR sensitivity by 10%
  - Finally activated proper blackbox (GYRO\_SCALED)
- Will troubleshoot tomorrow im tired lol



Mildly interesting that the motors tab reads 100% error in bidirectional DShot when motors are all off



Using a bookmarked blackbox viewer with presents from UAV Tech,  
 Matplotlib, MPLcursor, and Pandas to  
 make Python visual of motor RPM and Gyros



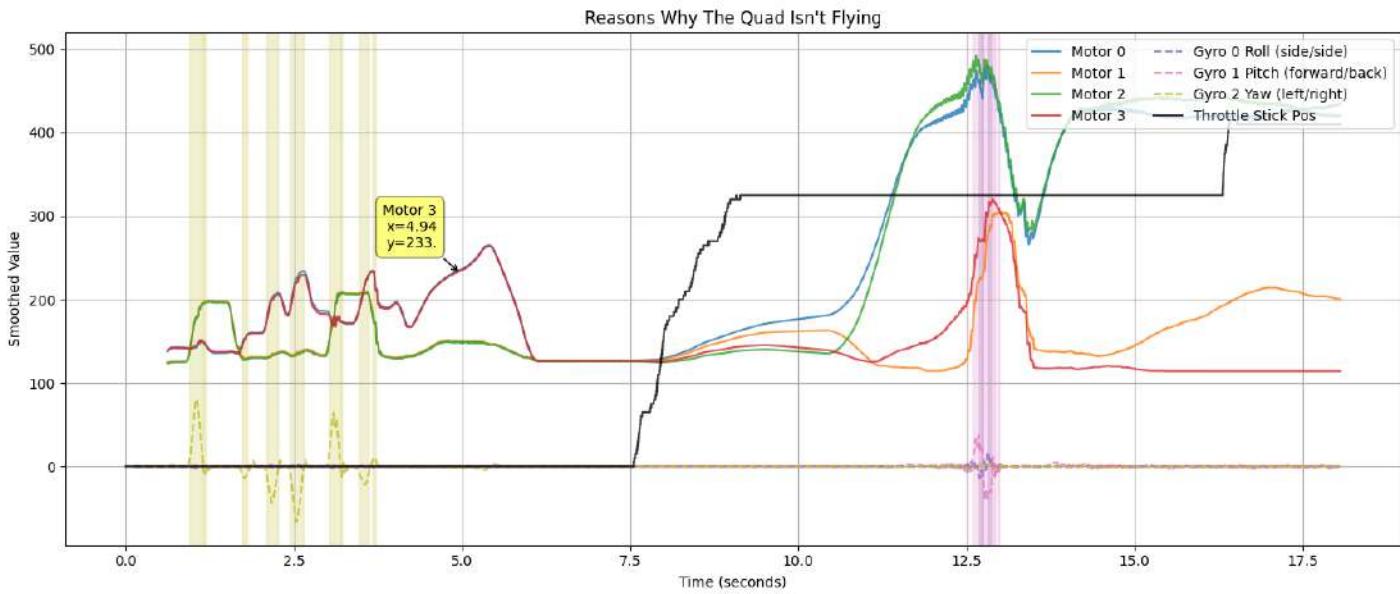
Amazing Motor RPM line :/

Well at Least the problem was proved to not just be my hearing

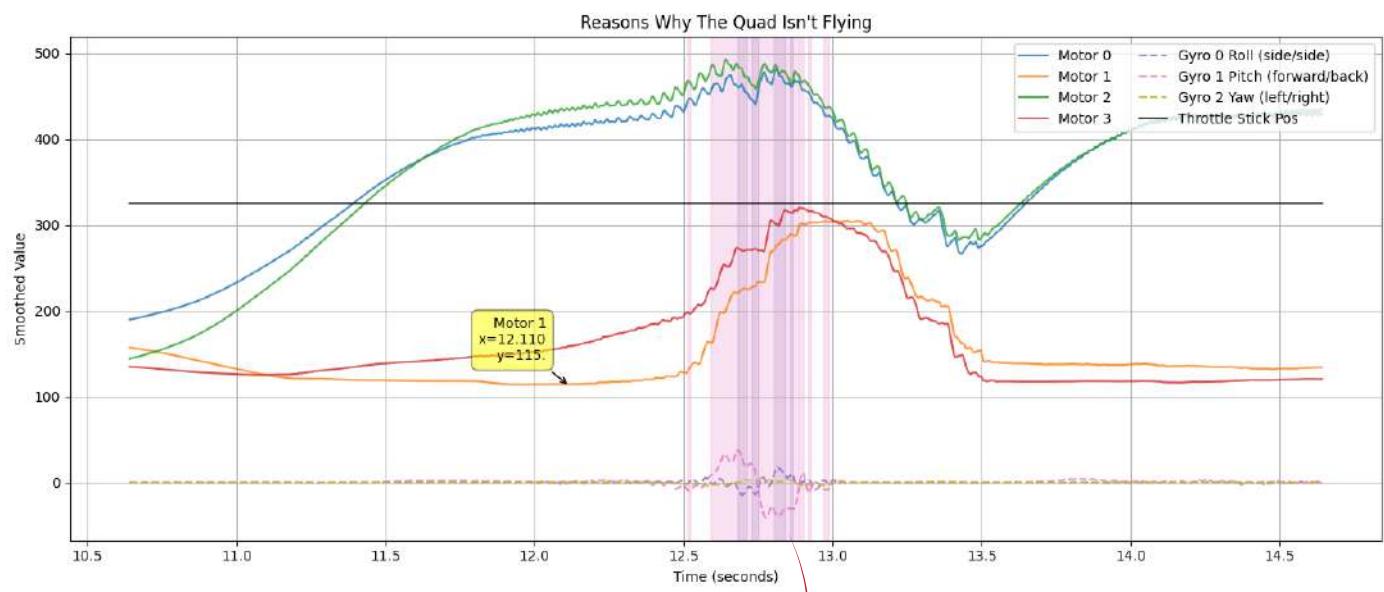
# April 13th

Developed the Python a little bit more (back to CS it is i guess)

- to deal with PWM oscillation used moving window average (gyro's window < motor window)
- Highlight gyro extremes in respective colour
- Renamed gyros to be actual axis instead of just numbers
- Added throttle stick (though I have reason to believe this MAY be inaccurate check transmitter)



Highlighted gyro colours are for  $> 8\text{rad/s}$  deviation from 0



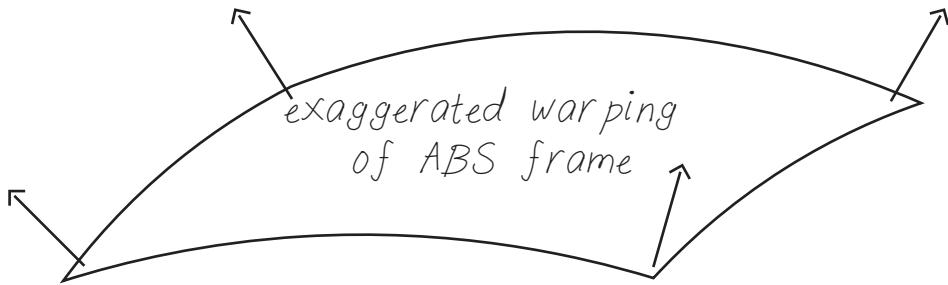
Why is pitch at -40? no idea. to be troubleshooted

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April 16th

Gyros are reading weird/noisy sometimes. A possible (or small) cause of this could be due to the bowed frame due to (improper) printing.

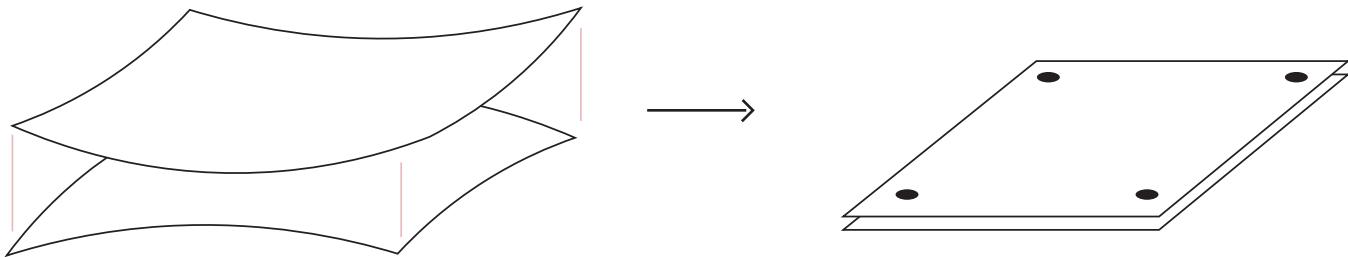
The frame is warped downwards at corners, likely at different rates so could have caused motors to actually create a bit of RPY



I'll design and grab a CF frame next time UTRA orders, but for now,

Slight redesign of frame.

- multiply height by .6 so that I can print two, then screw together to deal with bowing issue



Does also increase weight for bolts