

Date: 2/12/15 2pm  
Location: ASU SSDFC - field, Tempe  
Weather: Little to no wind with moderate, yet rare breezes  
Pilot: Marc Leatham  
Co-Pilot: None  
Vehicle: Flame Wheel F450

Objective:

- 1) Confirm that Telemetry had been restored and stayed dependable.
- 2) Identify and secure consistent use of the flight modes "stabilize", "altitude hold", and "loiter".
- 3) Determine the drone's accuracy of using these specific modes so as to determine the viability of moving onto "Auto" flight mode and execute auto sorties.

Equipment:

- flame wheel quad + DX8 controller
- android planner on Marc's phone (Nexus 5)
- 3dr antenna + micro usb phone connector

Pre Planned Flight Path:

- 1) Without taking off, confirm that communication between the ground base (android planner) and drone is secure.
- 2) Once in the air, confirm that the "Stabilize" mode is working well. Then swap to "loiter"; confirm that it's behaving. Then swap to "altitude hold" and confirm that it's behaving.
- 3) Possibly move onto autopilot testing.

Checklist:

Actual Flight Path:

1) The drone communicated adequately with the ground station: this was confirmed by seeing the orientation telemetry update on the phone in real time as well as the Drone's GPS lock on the map.

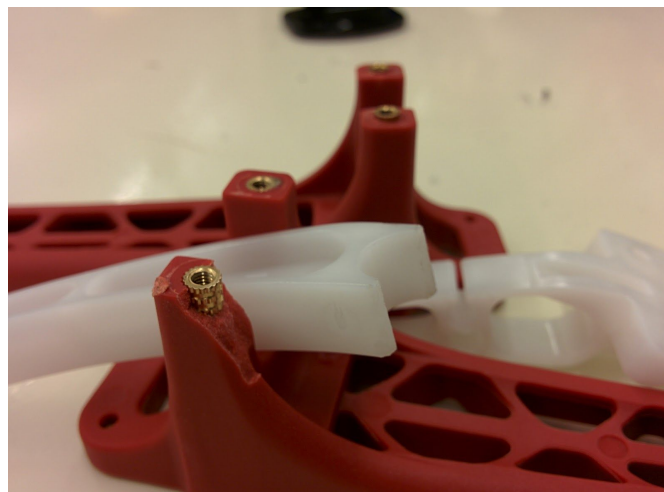
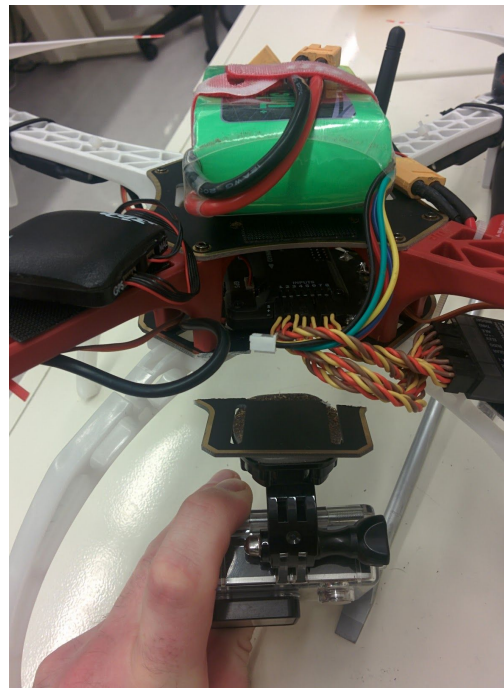
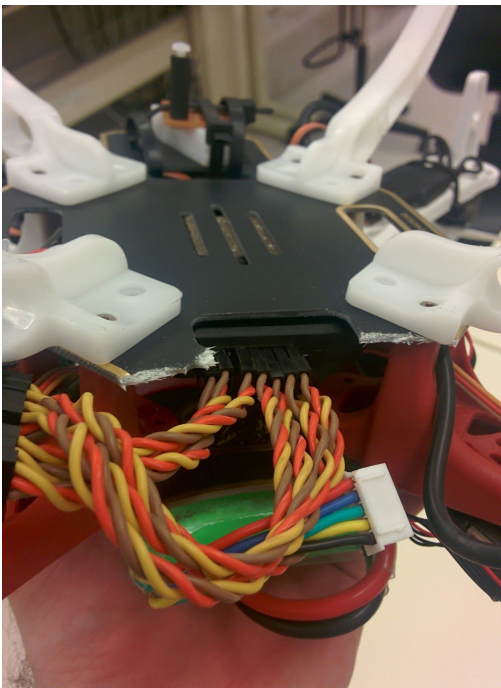
2) Once in the air, stabilize worked perfectly. Flying about back and forth, up and down, and left to right were all very responsive. I could fly circles around my standing location accurately, showing that yaw was working as well.

Swapping to "loiter" caused the drone's flight behavior to become erratic in the vertical sense. Forwards and backwards as well as left and right translations were stable. The drone at this point was startlingly close to the ground, so I instructed the drone to climb as I struggled to reset the drone's flight mode to "stabilize". Me looking down at the controller was just enough time to become disoriented with the drone's orientation. Pilot panic made the switch travel in the wrong direction. This put the drone

into Auto mode, which shut off the motors to the propellers. As the drone awaited for the throttle to be lowered and then raised again in a command to take off and begin the preloaded auto sortie, it reached the apogee of its trajectory and began to plummet. In the time for me to realize what was happening and start up the motors, after swapping the drone back to stabilize, the drone had gained too much downward velocity. The drone had slowed a fair amount before it collided with the ground, but the damage was enough not to finish flight plan 2, let alone flight plan 3.

**Damages:**

Snapped Circuit board (not fatal, removal of GoPro), Snapped landing gear (not fatal, launch and landing difficulties), Two cracked arms (not fatal, stability compromising)



Possible explanations for Flight Anomalies:

APM abnormalities. I really have no clue. More tests will show if the problems persist.

[data]

Corrections to prevent Pilot Error:

Remove "Auto" flight mode from the controller options. Only enter auto flight mode from commands on the base station.

Practice maneuvering through flight modes.

Corrections for mentioned flight Anomalies:

Future flight objectives:

Same as above.