RECOVERY TEAM REPORT

WEEK 9

PROJECT TITLE

Project name: Nakuja-3
Project Lead: Dr. Aoki

Project Start: Tue,2-May-2023
Display Week: 9

TASK	ASSIGNED TO	PROGRESS	START DATE	END DATE	DURATION
Introduction	N/A	100%	2-May-23	5-May-23	3
Change the piston cylinder to steel	E/T	100%	8-May-23	12-May-23	4
Implement the OTA updates to the system	V/C/B	100%	15-May-23	19-May-23	4
Rectifying the code for the piston test	S/B	100%	17-May-23	19-May-23	2
Design the Mechanism for holding the flight computer	B/E	30%	12-Jun-23	14-Jun-23	2
Design and fabrication of the ejection cap	B/E	50%	22-May-23	30-Jun-23	39
Determine the amount of crimson powder to be used	E/T	30%	22-May-23	7-Jul-23	46
Design and fabricate the PCB for the flight computer	P/C	90%	9-Jun-23	1-Jul-23	22
Design the mechanism to hold the piston in the rocket	B/E	70%	5-Jun-23	30-Jun-23	25
Test the ejection system with the nose cone		10%	28-Jun-23	5-Jul-23	7
Test how to log data from the flash memory		10%	1-Jul-23	7-Jul-23	6
Research the best time to eject the parachute	V/T	50%	22-May-23	9-Jul-23	48
Test the flight computer		50%	7-Jul-23	12-Jul-23	5
Test the communication system		0%	4-Jul-23	7-Jul-23	3
Video transmission from the rocket		15%	23-Jun-23	5-Jul-23	12

KEY:
B-Barbara
E-Erick

WEEK OBJECTIVES

1. Soldering components on the PCB
2. 3D printing of the piston and casing
3. Piston Test

Soldering Components on PCB
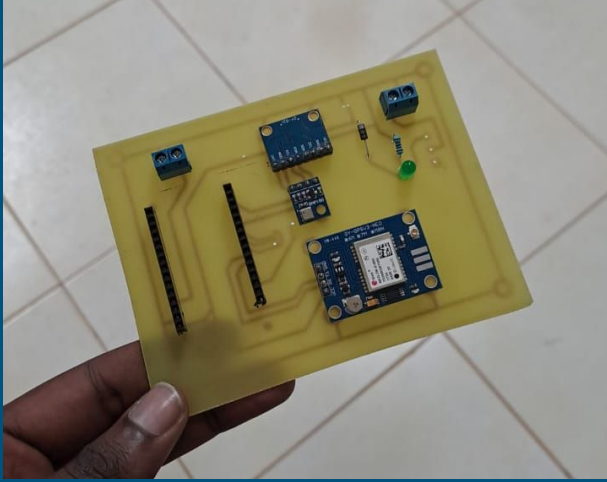
We were able to drill the holes for the through hole components.

The components are yet to be soldered.

SENSOR SAMPLE RATE

```
void setup() {
  Serial.begin(115200);
  t1=millis();
  // read mpu
  Adafruit_MPU6050 mpu;
  sensors_event_t acc, gyr, temp;
  a_x = acc.acceleration.x;
  a_x = acc.acceleration.y;
  a_x = acc.acceleration.z;
  g_x = gyr.gyro.x;
  g_x = gyr.gyro.y;
  g_x = gyr.gyro.z;

  // // read Bmp
  // Adafruit_BMP085 bmp;
  // float altitude=bmp.readAltitude(SEA_LEVEL_PRESSURE);
  // delay(10);
  t2=millis();

  // sample rate
  t_diff=t2-t1;
  Serial.println(t_diff);

  Serial.print("SPI ");
  sample_rate = N / t_diff;

  Serial.println(sample_rate );

}
```

Code used to get raw sample rate of the BMP and MPU sensors.

```
PROBLEMS    OUTPUT    DEBUG CONSOLE    TERMINAL


rst:0x1 (POWERON_RESET),boot:0x13 (SPI_FAST_FLASH_BOOT)
configsip: 0, SPIWP:0xee
clk_drv:0x00,q_drv:0x00,d_drv:0x00,cs0_drv:0x00,hd_drv:0x00,wp_drv:0x00
mode:DIO, clock div:2
load:0x3fff0030,len:1184
load:0x40078000,len:12776
load:0x40080400,len:3032
entry 0x400805e4
1
SPI 7.00
```
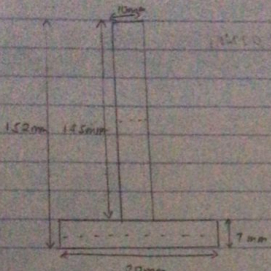
The raw sample rate for the sensors was determined to be 7 kHZ.

The delay settled upon was 10 ms, giving an ultimate sample rate of 100 Hz.

3D Printing of Piston And Casing

Diameter of the piston was increased to 10mm.

Safety Factor chosen is 1.5.

Acceptable stress is 2.53 MPa.
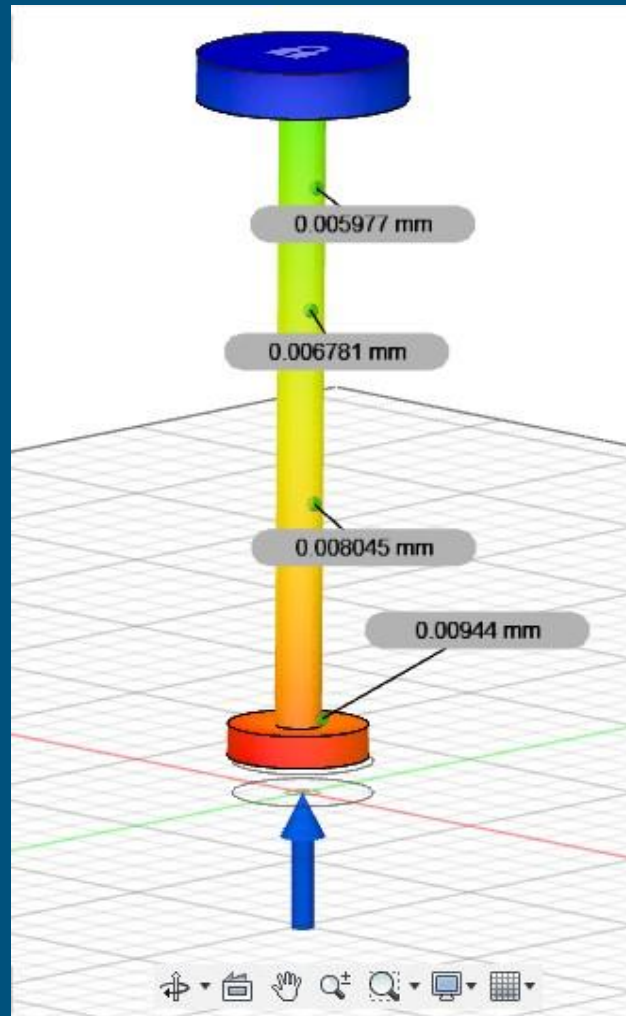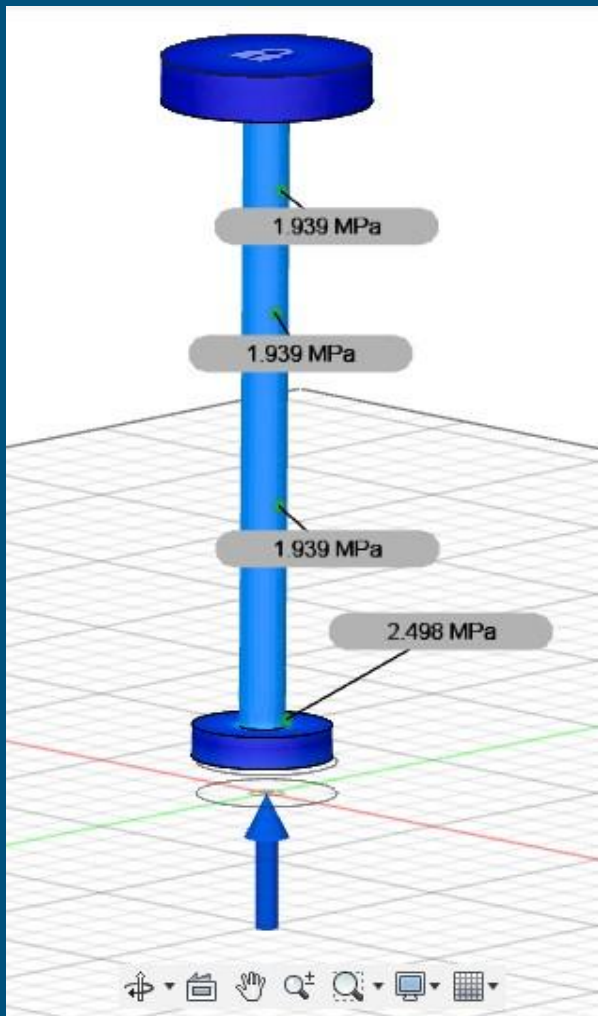
Force applied was 150N (High end estimate)

Maximum stress simulated was 2.498 MPa. (Left Photo)

Maximum displacement simulated was ~ 0.01mm which is << 4%. (Right Photo)

Piston Test

- The test is yet to be conducted. (Awaiting Fabrication)

NEXT WEEK OBJECTIVES

- Complete soldering of PCB
- Test the Kalman Filter with the higher sample rate
- Complete fabrication of the piston