

KALAM SAT

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TEAM MEMBERS

1) S SAI SHIVA RAMA KRISHNA-EPS

2) G MADHU-OBC & COMMUNICATION

3) B MANJULA NAIK-PAYLOAD

4) V VISHAL-STRUCTURAL AND DESCENT CONTROL

5) P NAVEEN KUMAR- GUI



SYSTEM OVERVIEW

MISSION SUMMARY

The WCRCWF2021/22 is designed to simulate all aspects of a real Satellite/Space mission, including design, development, testing, launch, operations, and data analysis, by means of teamwork.

- The Rocket launch The Rockets for the launch campaign will be provided by the organizer. The Rocket would deploy its parachute at apogee, together with the CanSat. Just after the apogee (0-2 seconds later), the CanSat would separate from the Rocket and make separate parachute descent.
- Primary and secondary CanSat missions
 - ❖ Primary mission: The team must build a CanSat and program it to accomplish the following compulsory primary mission: To measure AIR POLLUTION after release and during descent and transmit these data as telemetry to the Ground Station at least once every 2 seconds. During the post-flight analysis, it must be possible for the team to analyze the data obtained and display it in graphs.
 - ❖ Secondary mission: Each team through its Ground Station must be able to send a telecommand (uplink) to CanSat, during the descent, which must be possible to register visually by the Jury (e.g. deploy of some parts, fake solar panels, antenna, door, National flag etc.). Literally anything that can be seen from the ground).

STRUCTURE



SPECIFICATIONS

WEIGHT : 42 GRAMS

DIMENSIONS :

HEIGHT : 115 MM

DIAMETER : 66MM

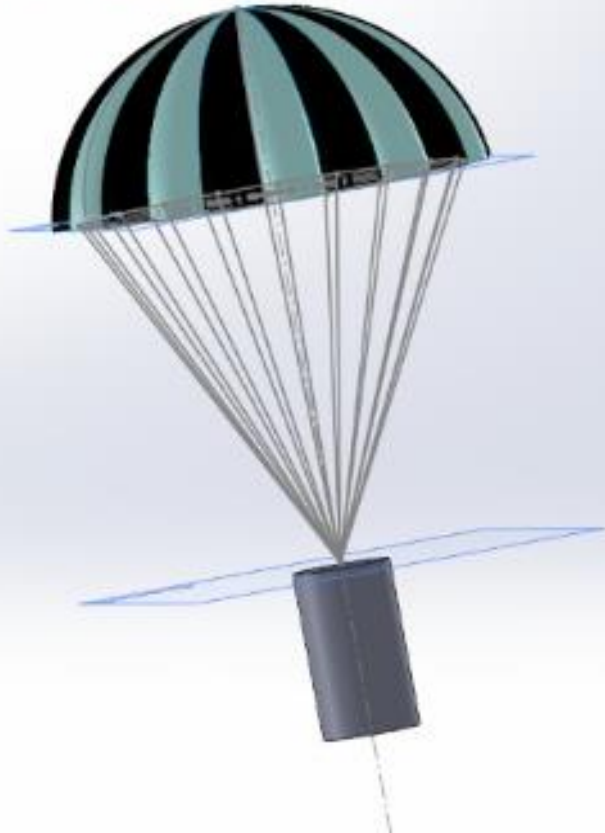
MATERIAL USED : PLA





DESCENT CONTROL SYSTEM

❖ We used three parachute system as a descent control system







PAYLOAD

PAYLOAD : AIR POLLUTION MEASUREMENT

S.NO	SENSOR USED	POLLUTANT MEASUREMENT
1	MICS 6814	NITROGEN DIOXIDE NO2 AMMONIA GAS NH3 CARBON MONOOXIDE CO
2	MQ 131	OZONE GAS O3
3	DHT11	TEMPURATURE HUMIDITY



ON BOARD COMPUTER

❖ ARDUINO NANO

PROCESSOR-ATMEGA328P

PROM-32KB

RAM-2KB

EEPROM-1KB



The background features a network of white lines and dots on a blue-to-green gradient. The lines form various geometric shapes, including triangles and polygons, scattered across the frame. The dots are positioned at the vertices of these shapes. The overall effect is a complex, interconnected pattern that suggests a network or communication system.

COMMUNICATION

KEYPOINTS

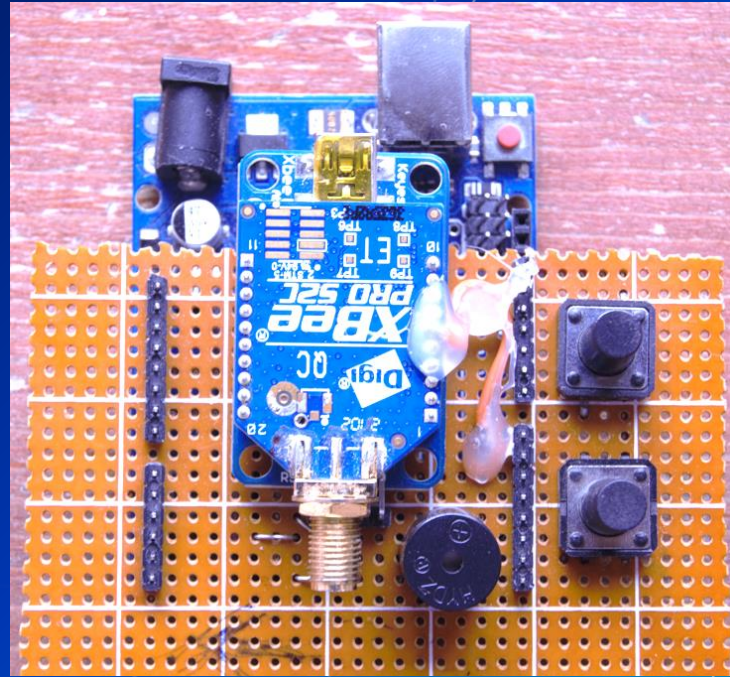
- ❖ RF TRANSMITTER USED: XBEE PRO S2C
- ❖ COMMUNICATION INTERFACE –UART
- ❖ REFERENCE DISTANCE-1000 METER
- ❖ DATA RATE – 100BPS TO 1MBPS
- ❖ FREQUENCY RANGE-2.4GHZ



The background features a complex network of white lines and dots, resembling a molecular structure or a data network. The lines connect various points, creating a series of interconnected polygons and triangles. The overall color scheme is a gradient from dark blue on the left to a lighter teal and green on the right. The text 'GROUND STATION' is centered in a bold, white, sans-serif font.

GROUND STATION

GROUND STATION






GRAPHICAL USER INTERFACE

GUI creating Process

Java telemetry viewer

Import Libraries



Open program files

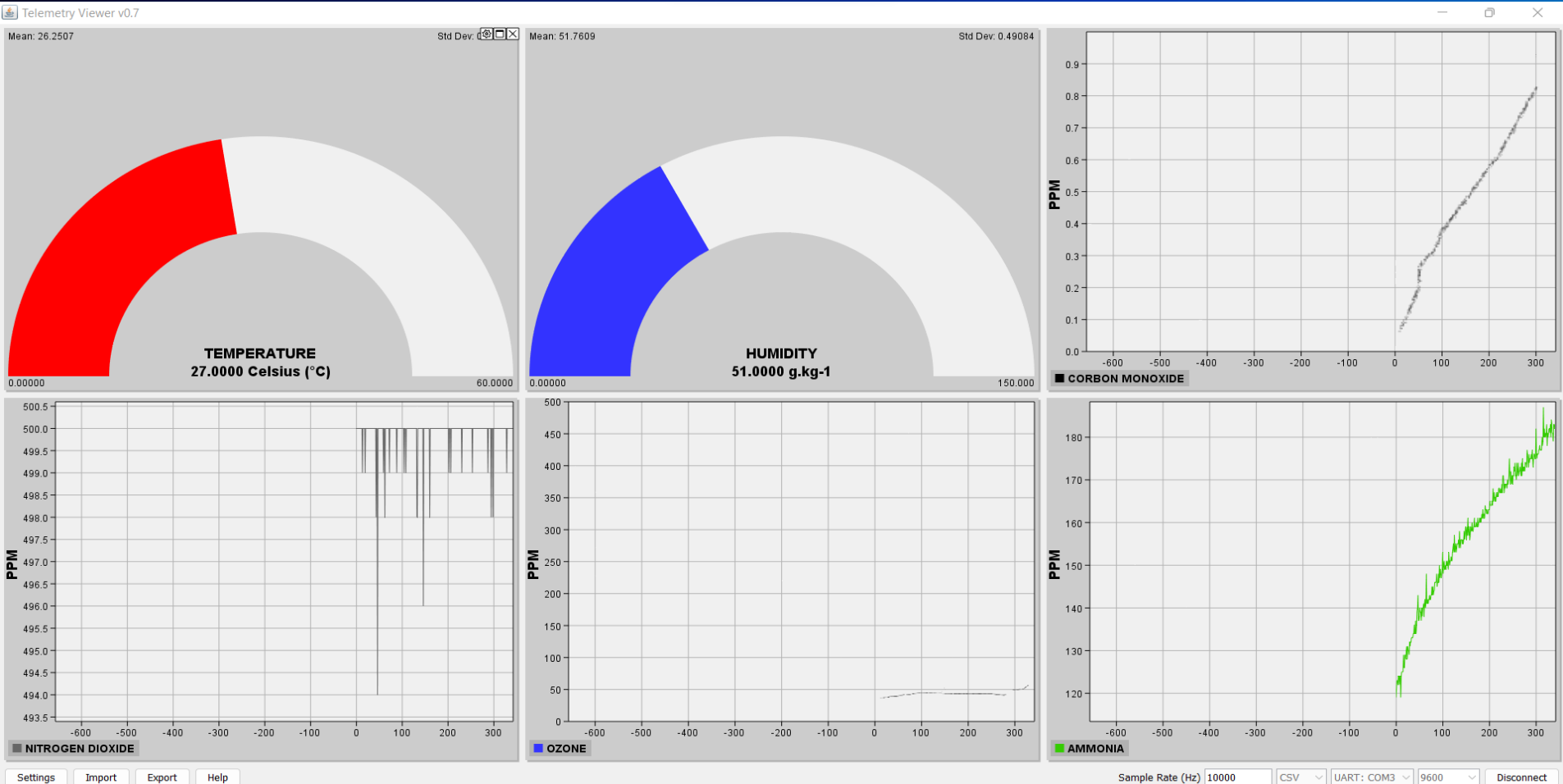
Java libraires



Copy the libraries

Set the path(C:\Program Files (x86)\Common Files\Oracle\Java\javapath\telemetryviewer)

INTERFACE DESIGN



Data saving through .CSV file

The screenshot displays the Microsoft Excel interface with a data table. The ribbon at the top includes File, Home, Insert, Page Layout, Formulas, Data, Review, View, Add-ins, Help, Data Streamer, and Power Pivot. The search bar contains the text "Search (Alt+Q)". The active cell is H174, and the formula bar shows the value 214. The data table has the following columns: Sample, UNIX Timestamp, TEMPERATUF, HUMIDITY, CARBON N, NITROGEN, OZONE (PF), and AMMONIA (PPM). The data is organized into rows, with the first row (row 1) containing the column headers. The subsequent rows (rows 2-31) contain numerical data for each column. The status bar at the bottom shows "Ready" and "Accessibility: Unavailable".

Sample	UNIX Timestamp	TEMPERATUF	HUMIDITY	CARBON N	NITROGEN	OZONE (PF)	AMMONIA (PPM)
0	1.66411E+12	22	46	0.49	1	15	174
1	1.66411E+12	22	47	0.47	1	15	171
2	1.66411E+12	22	47	0.47	1	15	172
3	1.66411E+12	22	47	0.46	1	15	172
4	1.66411E+12	22	47	0.47	1	15	172
5	1.66411E+12	22	47	0.47	1	15	171
6	1.66411E+12	22	47	0.47	1	15	171
7	1.66411E+12	22	47	0.41	1	15	172
8	1.66411E+12	22	47	0.46	1	15	173
9	1.66411E+12	22	47	0.48	1	15	172
10	1.66411E+12	22	47	0.47	1	15	173
11	1.66411E+12	22	47	0.46	1	15	174
12	1.66411E+12	22	47	0.47	1	15	173
13	1.66411E+12	22	47	0.47	1	15	173
14	1.66411E+12	22	47	0.47	1	15	175
15	1.66411E+12	22	47	0.46	1	15	177
16	1.66411E+12	22	47	0.46	1	15	178
17	1.66411E+12	12	47	0.47	1	15	178
18	1.66411E+12	12	47	0.47	1	15	180
19	1.66411E+12	12	47	0.47	1	15	181
20	1.66411E+12	12	47	0.47	1	15	181
21	1.66411E+12	12	47	0.48	1	15	186
22	1.66411E+12	12	47	0.46	1	17	186
23	1.66411E+12	12	46	0.48	1	17	187
24	1.66411E+12	12	46	0.48	1	17	188
25	1.66411E+12	12	46	0.47	1	17	189
26	1.66411E+12	12	46	0.48	1	17	189
27	1.66411E+12	12	46	0.48	1.4	17	190
28	1.66411E+12	12	46	0.47	1.4	17	191
29	1.66411E+12	12	46	0.47	1.4	17	191

POSITION RETRIEVEL

WHAT IS RSSI ?

- RSSI stands for Received Signal Strength Indicator, and measures how well a Reciever device can hear (receive) a signal.

SIGNAL STRENGTH



Excellent

> -50 dBm



Good

-50 to -60 dBm



Fair

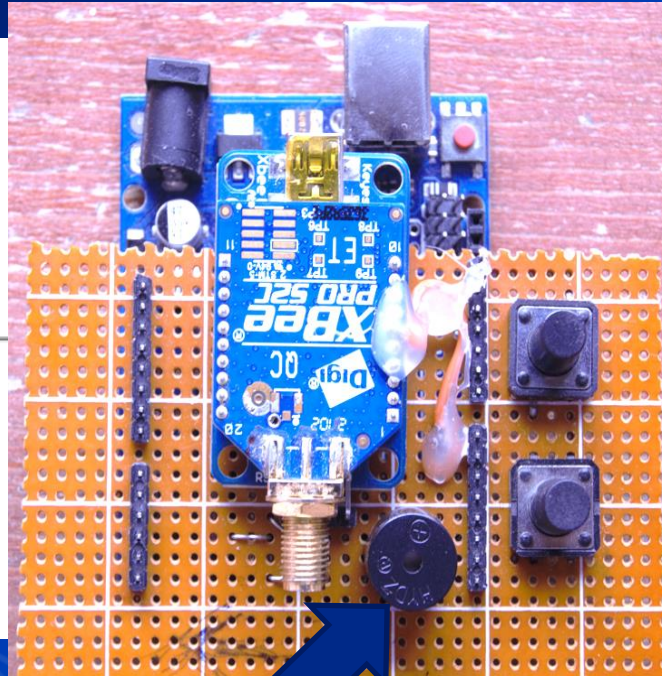
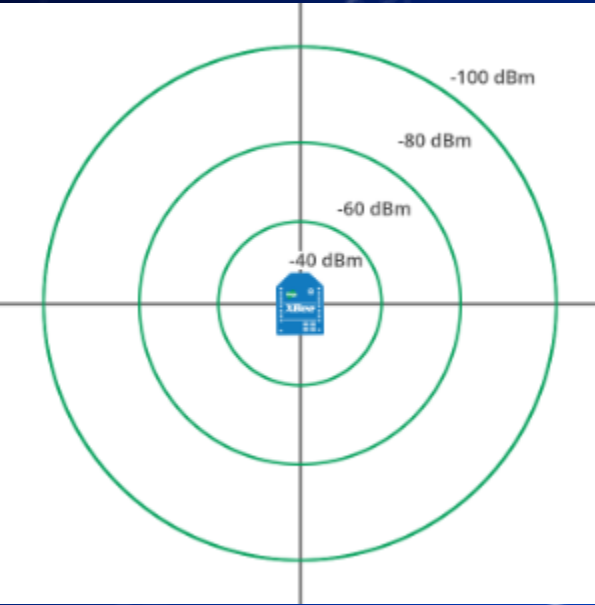
-60 to -70 dBm



Weak

< -70 dBm

WHAT IS RSSI TRACKING?



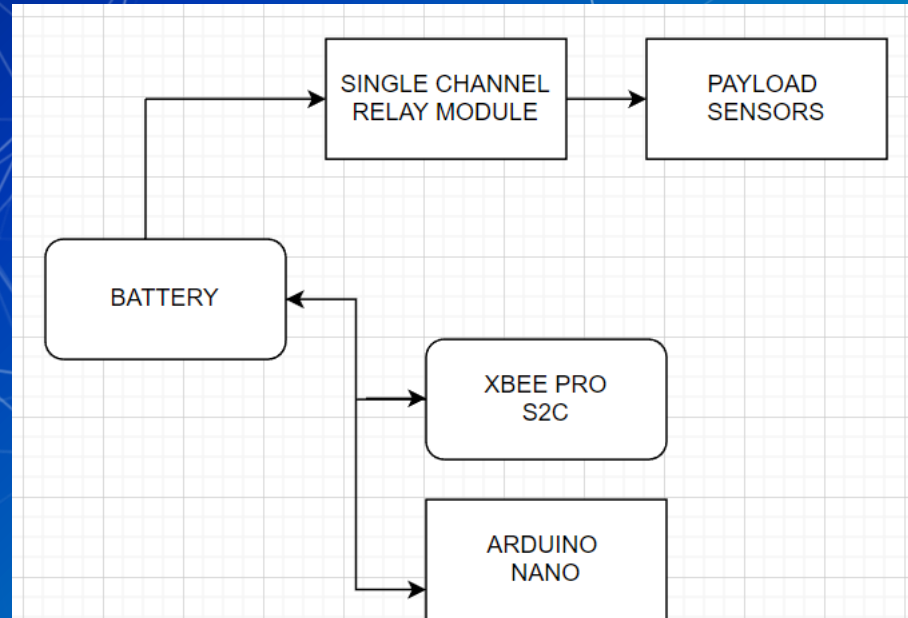
```
rssisignal =pulseIn(rpin,LOW,20A0);  
if((rssisignal<=20) && (rssisignal!=0)){  
    digitalWrite(BUZZER,HIGH);  
    delay(50);  
    digitalWrite(BUZZER,LOW);  
    digitalWrite(BUZZER,HIGH);  
    delay(50);  
    digitalWrite(BUZZER,LOW);  
}  
if((rssisignal<=50) && (rssisignal>=20)){  
    digitalWrite(BUZZER,HIGH);  
    delay(100);  
    digitalWrite(BUZZER,LOW);  
    digitalWrite(BUZZER,HIGH);  
    delay(100);  
    digitalWrite(BUZZER,LOW);  
}  
if((rssisignal<=150) && (rssisignal>=50)){  
    digitalWrite(BUZZER,HIGH);  
    delay(200);  
    digitalWrite(BUZZER,LOW);  
    digitalWrite(BUZZER,HIGH);  
    delay(200);  
    digitalWrite(BUZZER,LOW);  
}  
}
```



ELECTRICAL POWER SYSTEM

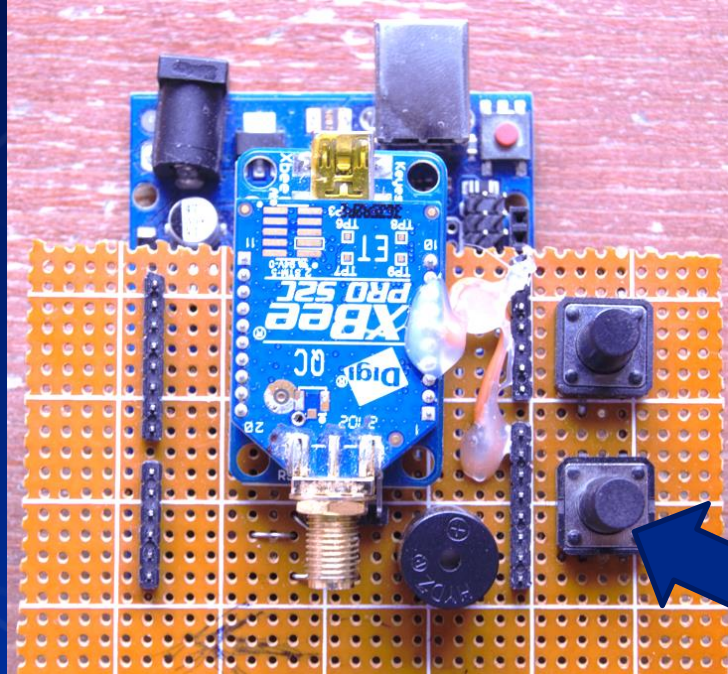
KEY POINTS OF EPS :

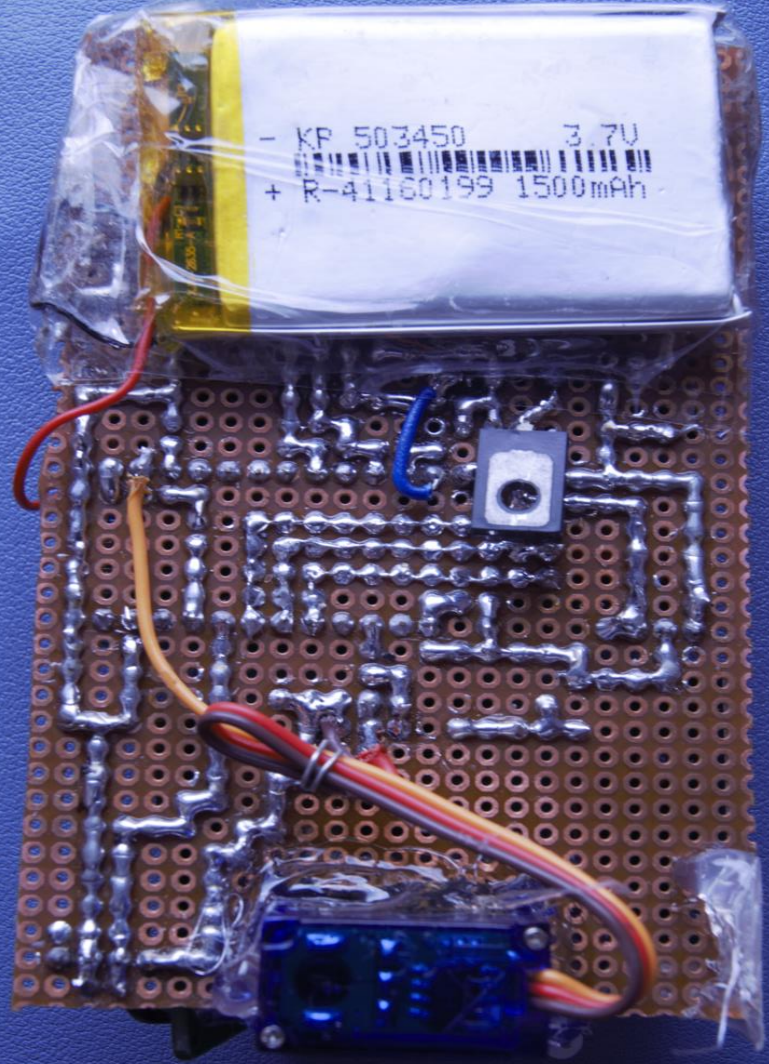
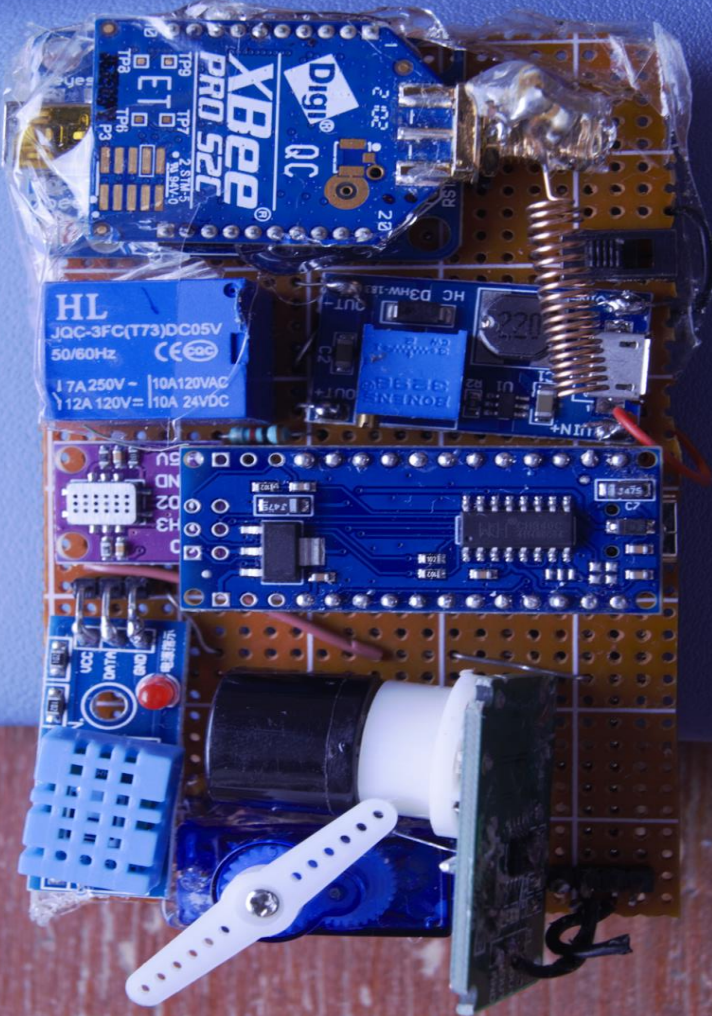
1. ALL SUBSYSTEMS WORKS UNDER 5V
2. EPS MODULE SHOULD GIVE CONTINUOUS SUPPLY OF 5V
3. POWER SAVING METHODS ARE IMPLEMENTED TO SAVE BATTERY POWER



POWER SAVING METHODS IMPLEMENTED

- ❖ We used single channel relay module to control the outflow of power from battery to subsystems





SNO	TECHNICAL REQUIREMENTS	OUTCOME
1	All the components of the CanSat must fit inside a standard soft drinks can (115 mm height and 66 mm diameter),	HEIGHT-115MM DIAMETER-66MM
2	The antennas, transducers and other elements of the CanSat cannot extend beyond the cans diameter until it has left the launch vehicle.	NO ANTENNA LEFT OUT BEFORE LAUNCH
3	The mass of the CanSat must be between a minimum of 100 grams and a maximum of 150 grams.	MASS-147 GRAMS
4	Explosives, detonators, pyrotechnics, and inflammable or dangerous materials are strictly forbidden.	NO EXPLOSIVES ARE USED
5	The CanSat must have a recovery system (a 3 parachutes attached to the CanSat), capable of being reused after launch.	3 PARACHUTE SYSTEM IS USED
6	Inclusion of a positioning system for retrieval (beeper, radio beacon, GPS, etc.) is recommended.	RSSI TRACKER IS USED FOR RETRIEVAL
7	The CanSat must be powered by a battery	BATTERY IS USED FOR POWER
8	The opening of the CanSat parachutes will be scoring. The strength of the parachute must be tested to ensure that the system will operate nominally.	PARACHUTE IS OPENED SUCCESSFULLY

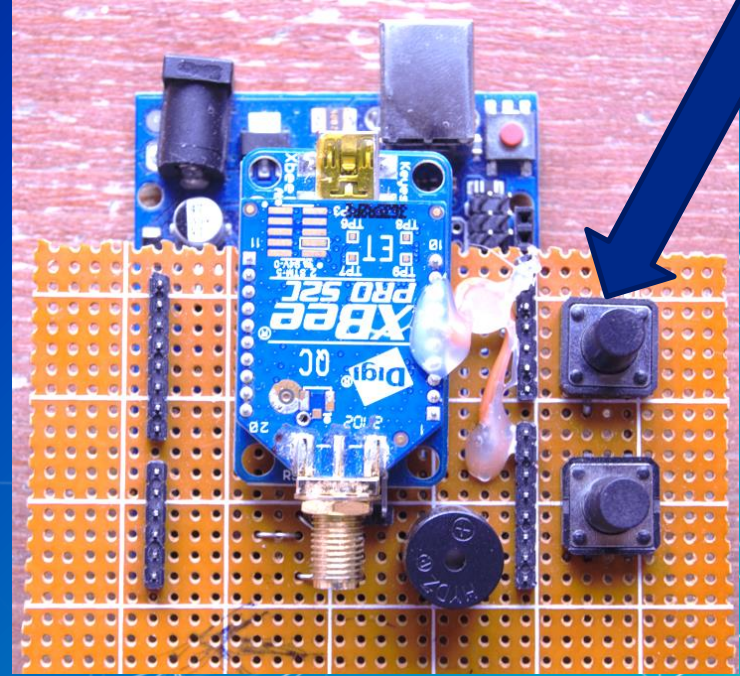
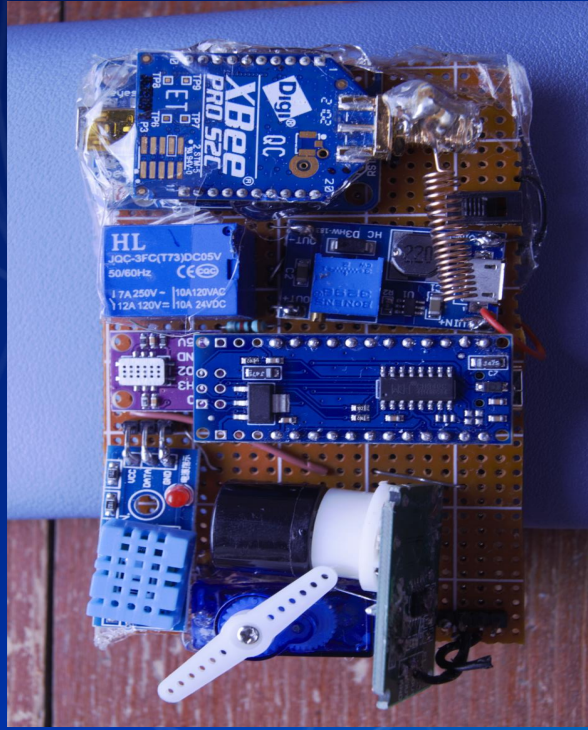
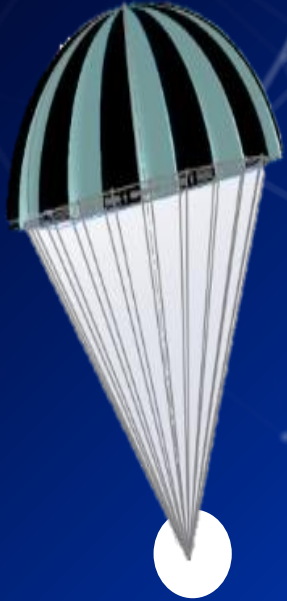
PRIMARY MISSION:

➤ MESAUREMENT OF AIR POLLUTION

OUTCOME:

B	C	D	E	F	G	H	
X Timestamp (TEMPERATURE	HUMIDITY	CARBON MON	NITROGEN	OZONE (PP	AMMONIA (PP	
1.66411E+12	22	46	0.49	1	15	174	
1.66411E+12	22	47	0.47	1	15	171	
1.66411E+12	22	47	0.47	1	15	172	
1.66411E+12	22	47	0.46	1	15	172	
1.66411E+12	22	47	0.47	1	15	172	
1.66411E+12	22	47	0.47	1	15	171	
1.66411E+12	22	47	0.47	1	15	171	
1.66411E+12	22	47	0.41	1	15	172	
1.66411E+12	22	47	0.46	1	15	173	
1.66411E+12	22	47	0.48	1	15	172	
1.66411E+12	22	47	0.47	1	15	173	
1.66411E+12	22	47	0.46	1	15	174	
1.66411E+12	22	47	0.47	1	15	173	

SECONDARY MISSION: SENDING A TELECOMMAND



A close-up, monochromatic blue image of a person wearing a VR headset. The person's eyes are closed, and their mouth is slightly open. A white, glowing network of lines and nodes is overlaid on the image, creating a digital or network-like aesthetic. The background is a gradient of blue, with the network lines appearing to connect various points across the scene.

THANKS!