Deployment of Cansat using Hydro Rocket Launcher System

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Abstract - *Cansat is a CAN shaped satellite integrated within the quantity and shape of small can .it consists of multi disciplinary work including electronic circuit, design control and programming. cansat is a payload whose body will consist of sensors and power sub system. In this project we use the cansat to study atmospheric parameters such as temperature and pressure using RF sensor and BMP180 respectively, which are embedded in Arduino and the data transferring is ensured by wireless communication module. The parachute is made using polythene material which consumes minimal weight within the cansat body. It is used to deploy cansat using the hydro rocket and launcher system. the hydro rocket is designed using optimization tools to deploy cansat at desired altitude to collect atmospheric parameters. Once the data analysis is done it can be used to determine the atmospheric parameters and its variations with respect to altitude.*
***Keywords**: Cansat, Hydro Rocket, Arduino, Wireless Communication Module*

I INTRODUCTION

A cansat design is considered a fundamental teaching tool for introduction to satellite design and development. Therefore, it is of great importance to understand and experience the whole process of design, test, launch and recovery of cansat. Cansat consists of many disciplines including electronic circuit design, control, aerodynamics, atmospheric physic, communication, programming, etc. A basic cansat consists of microcontroller, accelerometer, pressure and temperature sensors, camera, structure and parachute.

A sustainable development. Measuring the above mentioned atmospheric parameters at high altitude give better prediction by using nano satellites these parameters are recorded and caneven be calculated. A cansatmay be a sort of nano satellite, integrated within the quantity and shape of small can. Our challenge is suit all the main subsystems found in a satellite, like power system, sensors and communication system into this minimal volume. The cansat is then launched to an altitude of a few hundred metres by a rocket and carries out scientific experiment and safe landing is achieved using parachute. Arduino is an open - source ,easy-to-use hardware and software. The recorded data is additionally stored in sd module. The cansat must be developed so as to sustain a while in at few hundred meters. It uses a 9v power supply . The entire system is meant by ensuring the load less than 500grams . The modules utilized in the cansat system are sensitive so as to monitor the minimum variation in atmospheric parameters.

Paper is organized as follows. Section II describes automatic text detection using morphological operations, connected component analysis and set of selection or rejection criteria. The flow diagram represents the step of the algorithm. After detection of text, how

text region is filled using an In painting technique that is given in Section III. Section IV presents experimental results showing results of images tested. Finally, Section V presents conclusion.

II LITERATURE STUDY

[1] In this study, a mini model satellite that measures pressure, the temperature and its location. This project is called as cansat. It is the combined name of the "can" and "satellite" words can sized and can shaped CANSAT it is new trend in Turkey [2] In this thesis work, a complete design and mechanism of a cansat from assembling the payload to development of ground station has been explained. [3] In this project Cansat has been designed and fabricated which measures the atmospheric data like temperature, humidity along with the other data like GPS Co-ordinate, altitude, acceleration. [4]. This study helps to design a descent control system for a cansat that simulates a sensors payload traveling through a Martain atmosphere and sampling the atmosphere.

[5] This paper summarize that the CANSAT is used mainly for analysing weather parameters, for a shorter time withstanding in space. CANSAT is launched using launch vehicle to a height of 750m. The sensors which are interfaced with a cansat module continously sense the data which is then transmitted to the ground station using LoRa module[6] Design and development procedure for water rocket their important components have been established and can be used for further any such design. Team Lightening Drones had been tested and experimented several rockets and parachutes with these parameters for the best systems [7] This papers explains that the pico satellite have been used to demonstrate that they can be a powerful tool if they are combined with the scientific devices for conducting professional experiments.

III METHODOLOGY

The CanSat, which is a small satellite built in the form of a can, must be designed and built to withstand the forces of the launch and the impact of the landing. It should also be equipped with all necessary sensors and instruments to collect data during the mission.

The hydro rocket launcher system, which uses water pressure to launch the CanSat, must be prepared for the launch. This includes filling the water tank and pressurizing the system. The CanSat is loaded into the launcher tube and secured in place. The launcher system is activated, and water pressure builds up to launch the CanSat into the air. The CanSat will typically reach a height of several hundred feet before it deploys its parachute and begins its descent back to the ground. Once the CanSat has landed, it must be located and recovered. This may involve using GPS tracking or other methods to locate the CanSat, and then retrieving it from its landing site. The data collected by the CanSat during its mission can then be analyzed and used to gain insights into the environment and other factors being studied.

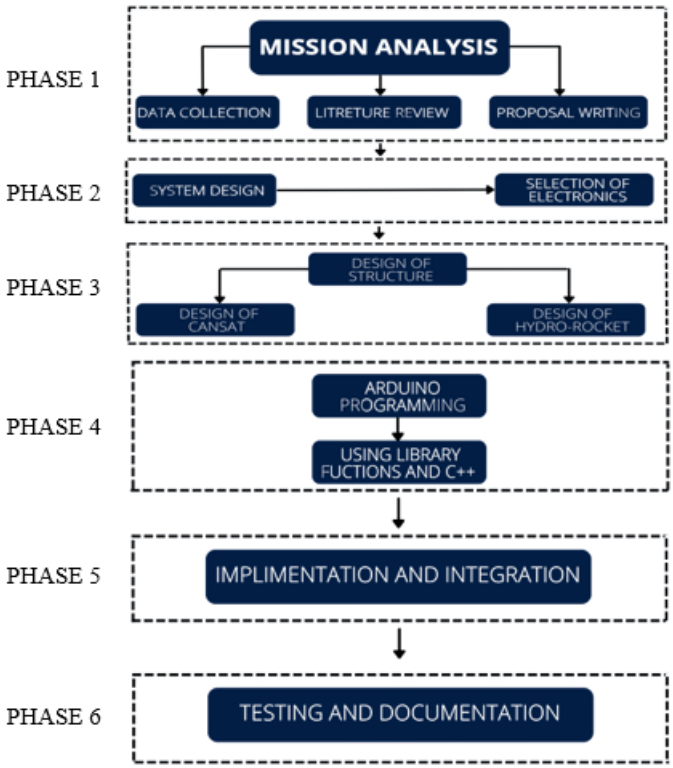
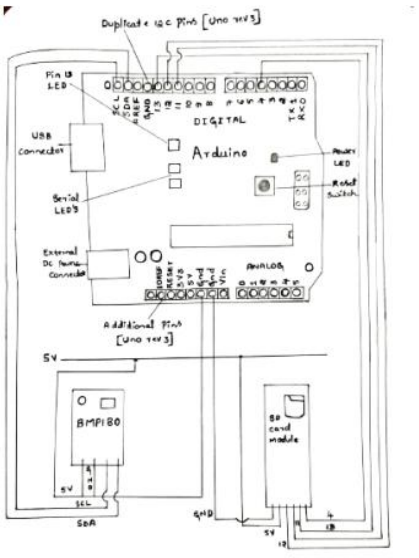


Figure 1(a): Methodology

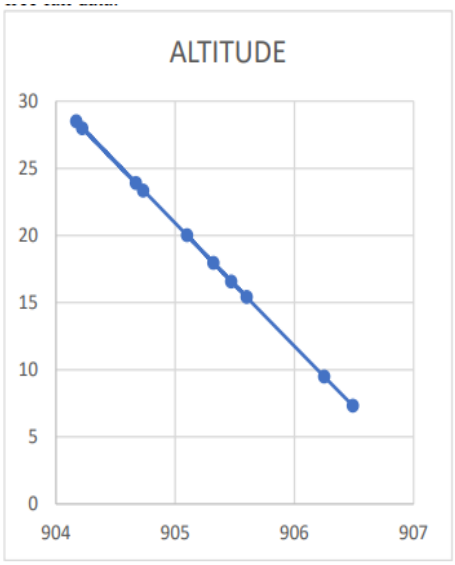
IV EXPERIMENTAL DETAILS

Figures 2a,2b, 2c shows the results of freefall data obtained from the cansat during the first test. Figures 3 (a) shows the variation of the temperature (b) study of variation in altitude during the flight course and (c) shows the pressure variation during the flight course.All the data obtained were studied and tabulated. The two result tables shows how the variation in atmospheric parameters take place with respect to the flight course.

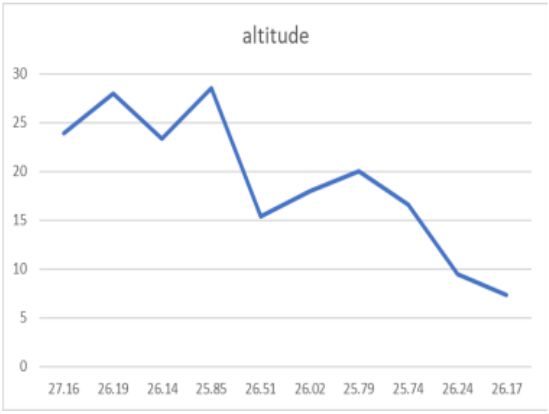
V RESULTS AND DISCUSSION



(a)

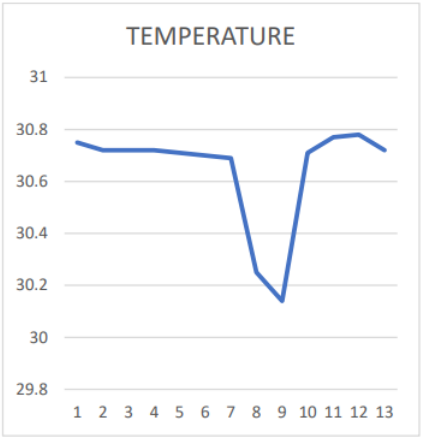


(b)

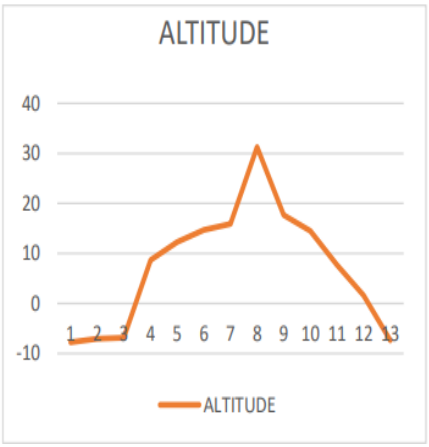


(c)

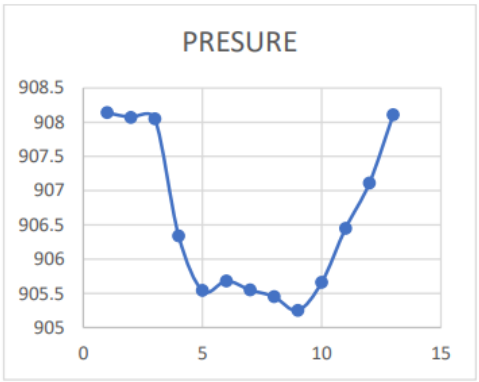
Figure 2: Freefall Data (a) Cansat Circuit Diagram (b) Altitude v/s Pressure and (c) Altitude v/s Temperature



(a)



(b)



(c)

Figure 3: Complete Launch Data (a) Temperature Variation During the Flight Course (b) Altitude Variation During the Flight Course (c) Altitude Variation During the Flight course

Table 1: Temperature, Pressure and Altitude during Free Fall

TEMPERATURE	PRESSURE	ALTITUDE
27.16	904.67	23.9
26.19	904.22	27.99
26.14	904.73	23.34
25.85	904.17	28.5
26.51	905.6	15.43
26.02	905.32	17.95
25.79	905.1	20.01
25.74	905.47	16.58
26.24	906.25	9.49
26.17	906.49	7.33

Table 2: Temperature, Pressure and Altitude during Complete Flight Course

TEMPERATURE	PRESURE	ALTITUDE
30.75	908.14	-7.76
30.72	908.07	-7.04
30.72	908.05	-6.85
30.72	906.34	8.68
30.71	905.54	12.26
30.7	905.68	14.69
30.69	905.55	15.87
30.25	905.45	31.28
30.14	905.25	17.69
30.71	905.66	14.48
30.77	906.45	7.71
30.78	907.11	1.65
30.72	908.11	-7.4

VII CONCLUSION

The CANSAT is used mainly for the analysing weather parameter, for a shorter time withstanding in space. CANSAT is launched using the hydro rocket and the launcher system to a height of about 300ft to 320ft. The sensors that are interfaced with the CANSAT module continuously senses the data which is then dynamically stored into the SD Card using the SD Card module. The data stored in the SD Card is then used to calculate various atmospheric parameters and acknowledgement. The project had several challenges, including the need to ensure the CanSat was stable during launch and descent, as well as the need to design a launcher system that was safe and reliable. However, these challenges were overcome through careful design and testing of the Cansat. The project provides a valuable contribution to the field of amateur rocketry and small satellite development. The hydro rocket launcher system offers a low-cost and accessible way to deploy CanSats, which can be used for a variety of educational and research purposes.

VIII REFERENCES

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