Simulation of life supporting conditions on exoplanets by cansat

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Abstract: Nowadays, our earth has been fast-changing and have a various problem that effect to the ecosystem which has to adaptation but if a human can't adapt to live in the earth, we may have to settle in an exoplanet. So how do we know that it can settle? At present, we have a lot of technology in the survey of various exoplanets but it has many budgets. Would it be better if we can save the budget on this part? So we invent a satellite the size of a can or we call it "CANSAT" to survey and keep various data which can bring to analyze the possibility to live on that planet. We keep various data from CANSAT that are volume of nitrogen, oxygen and carbon, brightness, temperature, pressure, humidity, the volume of ozone, and intensity of UV ray. We designed it to be able to send data to a ground station to prevent data loss if we can't keep CANSAT. We simulate the situation from earth because we can't go to the exoplanet by releasing CANSAT from the sky by drone and rocket that we built. The height of the drone is about 300 meters and the height of the rocket is about 550. Various data bring to analyze and compare with height. The result from the analysis is certain that we can settle because we live on earth and we analyze that data about the origin of life (Abiogenesis) because if have a creature, we may develop to settle on that exoplanet.

Keywords: CANSAT, Exoplanets, Rockets, Deployment

1. Introduction

Our planet is a planet in the solar system that has been discovered to be inhabited. Because the world has a fundamental element essential to the existence of living things. That is, it consists of three main elements: hydrogen, oxygen, and carbon. These three elements are common in cellular organic matter and are made up of molecules. There is an atmosphere that protects the Earth from the sun's rays, which are harmful to living things. There is also a temperature And humidity necessary for life, Therefore, there is no doubt that other planets will have the same effect on life as Earth. Together with the presence of advanced technology This makes it possible to send various space technologies to explore other planets outside the Earth and study trends. The possibility of life on the planet and the right environment for life.

Today our world is changing rapidly and it is faced with many serious problems affecting ecosystems and livelihoods. Which causes some living things to adapt to be able to survive But not all living things are adaptable. So, humans, if the world changes to a point where it is no longer adaptable. We may need to switch to another planet. So how do we know if a planet is suitable for life or not?

To send space technology to explore costs a huge 77 billion baht, so the organizers have come up with the idea of inventing a canning satellite that can explore and store 3 basic elements: hydrogen, oxygen,

and carbon, including the temperature, humidity Ozone in the atmosphere and UV radiation values to be analyzed for suitability. And the possibility of life on the planet

2.Project description

Our objective was to simulate a sample retrieval mission to a potentially habitable exoplanet, where a sample of Analyze the elements in the air as well as numerous data assessing the probability of Earth-like life existing on the planet. The main goal was to condition for it such as the concentration of various gases. Those achievements are necessary for the launch to be considered successful. Other goals were Cansat design that got real information in the air

2.1. Cansat

2.1.1. Materials and structural design

Materials and structural design The main structural body consists of 4 parts, which are base, pillar, air duct, and Grill cover created by 3D printed with plastic PGA

Space inside was filled with various electronic parts and board ESP32. On-air duct, there is a three-sensor.On the Grill cover part, there is a three-sensor and on-base have the motor for open-close the air duct

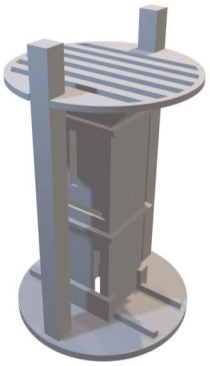

Fig. 1. Design and structure of CANSAT

2.1.2. Final electrical design

The CanSat contained 3 custom PCBs. In the top part three parallel round, PCBs were located. The top one contained sensors:

GPS ublox neo-m8n: This module contains two independent parts: a compass, which communicates via I2C, and the GPS module connected to the serial port.

VEML6070 (ultraviolet): UV light is dangerous for many forms of life and its measuring in different altitudes gives us a chance to estimate the content of the atmosphere. Using the I2C interface.

GY-49 (visible and infrared): From observing received light in different altitudes is possible to estimate the content of the atmosphere. Using the I2C interface.

BME-280: The BME280 is a humidity sensor specially developed for applications low power consumption are key design parameters. The unit combines high linearity and high accuracy sensors and is perfectly feasible for low current consumption, long-term stability, and high EMC robustness.

CCS-881: It is a sensor that can measure various pollutant loads (CO2, O3, O2) efficiently by inputting data via I2C.

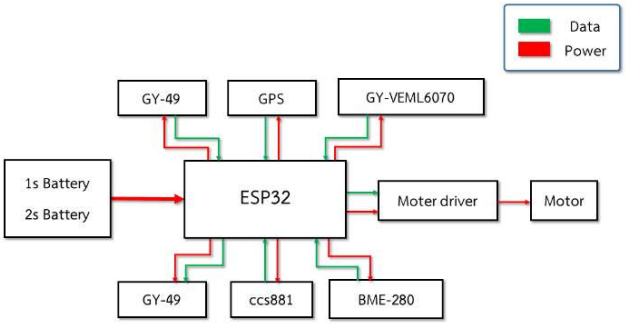

Fig. 2. Block diagram

3. Objective

To create a CANSAT that can measure and collect data for temperature, humidity, pressure, gas content (CO_2, O_3, O_2), and UV values to analyze the possibility of life on the planet.

Develop a program that can collect data of temperature, humidity, pressure, UV, and gas values for the detection of living organisms and tell their existence trends.

To create a CANSAT that can simulate basic data collection for applications such as signal searching. of life on exoplanets

4. Method

Sending CANSAT to the sky to keep various data have 2 methods is sending by drone at height 1-300 meter and when need to know data at greater height will be sent by a rocket which designed by ourselves with Open Rocket program. When the rocket is at the apogee it will release CANSAT to keep data and to prevent discrepancies from rocket smoke so we designed CANSAT to be able to open and close the door which is the air passageway. Data obtained from CANSAT is a position, height, brightness, humidity, temperature, the volume of gas in air, volume of ozone, and intensity of UV ray and compare these data with height for analyzing the possibility of living and about the origin of life (Abiogenesis).

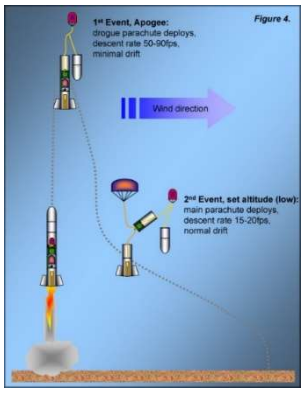

Fig. 3. Rocket launch mechanism and CANSAT launch

5. Results

Low Temperature: Chemical reaction Of living things will happen slowly

High Temperature: Cells will be destroyed Protein molecules and Carbohydrates and DNA structures are destroyed.

Low Pressure: Resulting in the body lacking oxygen And gas bubbles in the body

High Pressure: Resulting in the body unable to accept the pressure

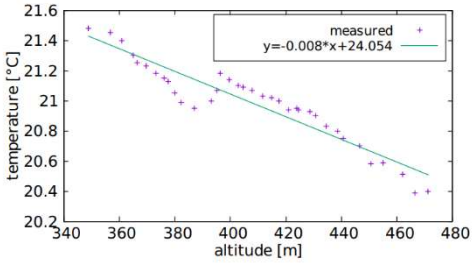

Fig. 4. Non-deviating data-points of the measured temperature

6. Conclusion

We successfully proved all the necessary conditions for life to exist we could think of. The atmosphere is most likely nice and everything else is with near certainty. We found microscopic life - some bacteria - and macroscopic life a plant and a bug. This is a final proof of habitability.

7. Application

CANSAT - ROCKET It can be used to explore Collecting and analyzing a wide variety of information, the information obtained will be useful in many areas of study It also includes the situation of the country that is faced with this epidemic state. The canned satellite may be used to survey and observe anomalies in the spread of disease. It is used to predict the likelihood of the next epidemic in each area. Used in mapping to identify changes that occur daily. To observe anomalies that could lead to an epidemic Data obtained from canned satellites are also used in conjunction with Internet data to track epidemics and use them with terrestrial data. To demonstrate the possibility of a suitable environment With the occurrence of that epidemic The data obtained from canned satellites will be of great benefit to governments and related agencies in countries at risk of pandemic disease. Because the obtained data can be analyzed and summarized for risk assessment Including finding ways to plan the prevention of the disease that occurs effectively. Without having to spend a large amount of money and reduce the risk of contracting the disease in sending personnel or equipment to explore Since canned satellites are used a much smaller budget and still able to obtain effective data.

8. Acknowledgement

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