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High Altitude Balloon Cut-Down Circuit Research

Jin Seok Youn
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Introduction
Introduce the purpose of this research.

The purpose of the cut-down circuit is to reduce tracking time. Originally, it takes about four hours to track and retrieve the balloon. When we apply the cut-down circuit, it is going to be reduced to 1 hour. In other words, it can maximize efficiency. So we need a cut-down circuit to be able to adjust the location or height to drop and efficiency at the same time. Therefore we can save time tracking and do not have to be in the car for a long time.

Constraints
Introduce the purpose of this research.

These are constraints which can effect cutdown circuit

1. A platinum wire was too thin so it couldn’t stand the bad weather and wind.
2. The sensor (BMP 180) and battery of the cut-down circuit could not work on high altitude or cold environment.

Method
Equipment, Prototypes, Plans and the code of the circuit.

Arduino Uno Jumping wires A solderless breadboard

Potentiometer Main Board Circuit Box

Arduino Uno was connected with the breadboard and Digital Pin 9 is the only way to connect board into the main board (Arduino Uno).

On the if statement, The high for the circuit can be adjust. For this code, if the circuit reaches 2000m, it is going to let the power go through Digital Pin 9. The battery will heat up the platinum wire and cut the road which is connected to the balloon. It is going to try cutdown 5 times 15 seconds each.

Test and improve
Equipment, Prototypes, Plans and the code of the circuit.

1. I first launch in December. The platinum wire was too thin so the platinum line was cut off by itself by strong winds.

This is an image for an explanation.

The thinner the platinum wire is, the hotter it gets.

The thinner wire was used for this reason but broke due to the strong winds during launch.

Conclusion
What should I do in the future? What did I learn?

I didn’t have enough time to find the reason why it was overheating, but I think there is one possible reason, which is, the voltage of the battery. Next time, I will try to use the lower voltage battery for the next flight.

I learned how to code and engineer Arduino and solve problems by thinking differently in multiple ways. It was a great experience for me to be in this research program.

For the March launch, I choose the thicker wire. I also modified the code. I have doubled the integer of the Temperature, Altitude, and Pressure for the accuracy.

I also found out the trigger port has been set wrong so it has been fixed. The elevator test was successful.

For the elevator test, the altitude for cut down was set for 550m which was the high of the 3rd floor. Next, get on the elevator on 1st floor, run the program, and see if it starts to heat up and cut the wire.

However, the test flight couldn’t be done due to overheating (chance of fire) and shortening of the testing period due to COVID 19.