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Smart Weather Balloon Control System

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Smart Weather Balloon Control System



CGP Technologies

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Introduction

Our goal is to design a smart valve control system that controls the elevation of weather balloons by releasing gas from the balloon. This will prevent the balloon from ascending so high that it bursts, allowing the balloon to stay in the air much longer than normal weather balloons.

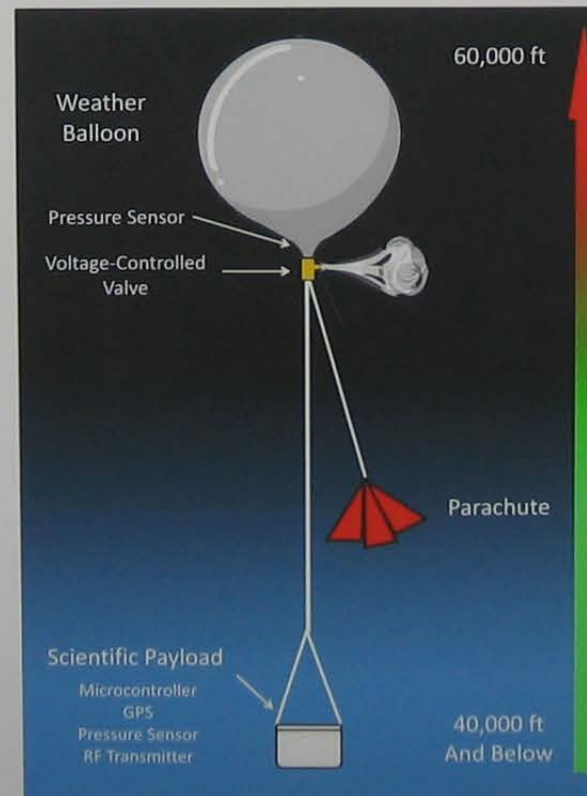
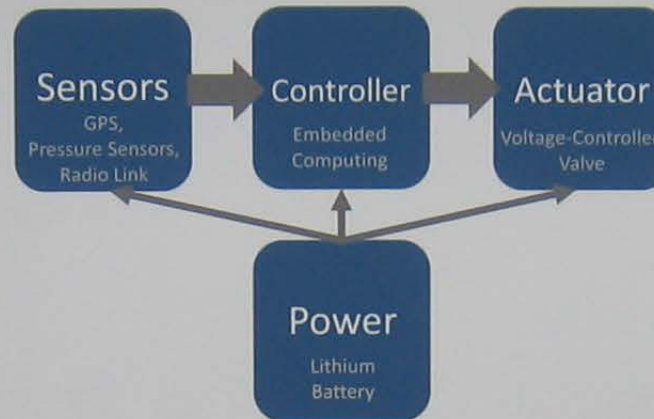
As a balloon rises in altitude, the atmospheric pressure decreases and the balloon expands. Eventually, the balloon reaches an altitude where it bursts, causing each balloon to have a very limited flight time. This is approximately a mere two hours. Our control system will allow a balloon to remain in the air much longer by controlling the release of gas from the balloon. This will decrease the pressure within the balloon, causing it to sink downwards, which will in turn prevent the balloon from reaching burst altitude. The controller will accomplish this task by opening and closing the balloon's gas valve based on altitude, ascending speed, and pressure within the balloon.

This product targets meteorologists and researchers. Our project will allow this audience to gather more data in a single launch by providing a way to keep high-altitude balloons in the air much longer.

Materials



System



Implementation

Sensor Input

The sensors obtain the critical data required for the system to function properly.

GPS Module obtains latitude, longitude, altitude, and horizontal speed.

Temperature Sensor obtains temperature in degrees Celcius.

Pressure Sensor obtains atmospheric pressure in PSI.

Embedded Computing

The microcontroller calculates vertical velocity and acceleration based on the GPS's altitude. Using these values and the information gathered by the sensors, the controller determines the vertical distance and time remaining until the balloon reaches the ideal altitude.

Releasing Gas

Once the controller determines when to release gas, it sends 5 volts to a relay which causes the 12V battery to power on the electric valve. The valve is activated in bursts to prevent releasing too much gas from the balloon.

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