Atmospheric Weather Balloon for Near Space Research

Francisco Pastrana, Shane Williams, Devonte Grantham,
William Lewis, Jessy Law, and Jennifer Nason.
Embry Riddle Aeronautical University
600 S. Clyde Morris Blvd, Daytona Beach FL 32114-3900
Advisor Janet Marrnane, marmanej@erau.edu

Abstract

The Society 4 S.P.A.C.E. Club at Embry-Riddle has been working on the development of a weather balloon that will reach a height of 80 to 100 thousand feet and will collect data from the atmosphere. The weather balloon is attached to a Styrofoam box that contains an Arduino board controlling a set of sensors that will measure: temperature, humidity, atmospheric pressure, wind speed and direction. In order to reach space we need to travel through Earth's atmosphere. This research will provide information necessary for further exploration and means of travel even further.

Characteristics

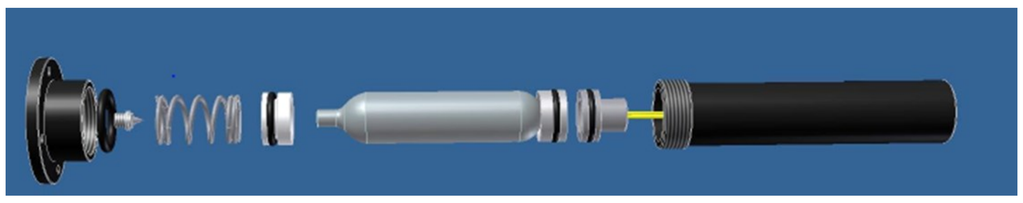
Diameter Balloon: 8 feet
Volume: 261 cubic feet of Helium
Lifting Characteristics: 36 lbs.
Total Weight: 8 Lbs.
2 GoPro Cameras
AVG 180* Remote Control Camera
ARDUINO Mega
8 Different Sensors
Parachute Deployment System

Introduction

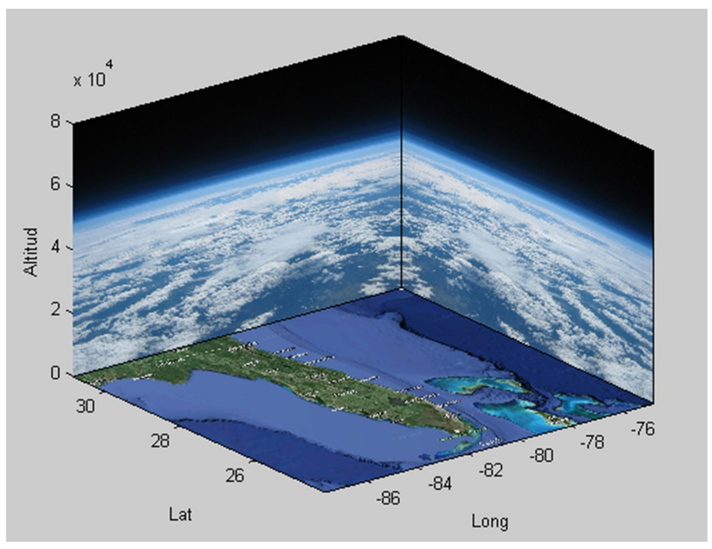
The data from all the sensors will be collected and transmitted through an Xbee antenna that will provide us with remote monitoring capabilities. The data and images gathered will aid understanding of the characteristics and environment that govern our atmosphere. This balloon will burst once it has reached its maximum volume. A deployment apparatus will eject a parachute for safe recovery.

Parachute Deployment System

- Deploy by remote control from the ground.
- Controlled by a relay actuated by ARDUINO Mega.



MATLAB Trajectory Simulation

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VALID 010000Z   FOR USE 2000-0300Z. TEMPS NEG ABV 24000

FT  3000    6000    9000   12000   18000   24000  30000  34000  39000
EYW 0812 1108+15 1507+09 9900+01 2927-13 2627-26 262241 263246 284047
JAX 2811 3316+12 3219+07 3122+00 2917-13 2820-26 272142 262352 302358
MIA 9900 0207+15 3206+09 3209+01 2608-14 2725-25 232441 233050 273548
MLB 3509 3412+14 3116+07 3015+01 2807-13 9900-27 252241 231851 282755
PFN 9900 2106+13 2608+07 2710+01 2815-13 2821-26 302741 303151 316356
PIE 0806 3205+14 2810+08 2911+01 2908-13 9900-27 291741 281551 314052
TLH 9900 9900+13 2911+07 2816+00 2816-13 2819-26 292141 302751 304257
ATL 2307 2913+11 2918+05 2927-01 2717-14 2727-26 273142 273752 274462
CSG 2307 2812+12 2817+05 2825+00 2821-14 2725-26 272842 283552 284360
SAV 3008 3216+10 3218+06 3120+00 2923-13 2828-26 282342 282652 303262
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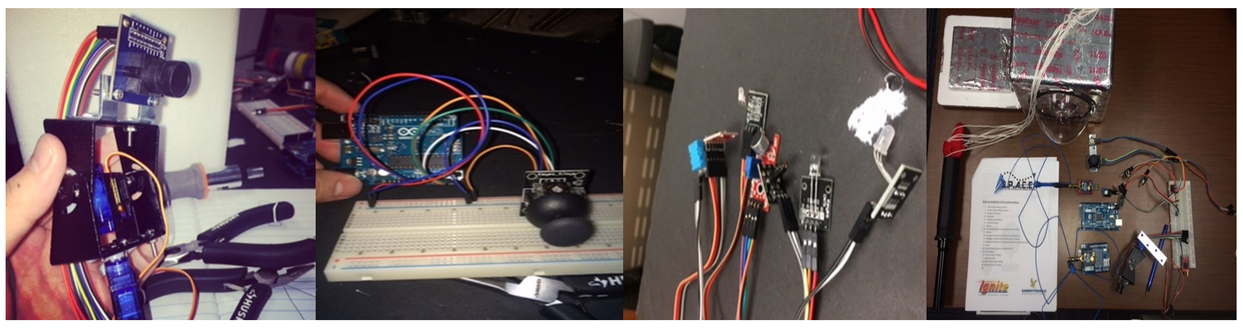
Sensors Controlled by ARDUINO:

- Temperature, humidity, atmospheric pressure, wind speed, wind direction, tilt, longitude and latitude.
- AVG 180 degree Remote Controlled Camera.



Conclusion

As a team everybody has contributed to the final production within the different aspects of the weather balloon. Cooperation and teamwork has been our main objective making sure we utilize each team members' skills. An ethics code as well as respect to members has always been our priority. We have promote diversity and international cooperation because members of team hold different nationalities. Conclusions will be reached when we receive the data. We hope to apply our findings to future weather balloons as well as projects for space commerce.

How we are to communicate the data will be based largely on the type of data we receive and how we plan on using it. This data will allow us to evaluate, prove, and discover different characteristics of our atmosphere. Allowing space club members to gain knowledge and experience in research and development.

Acknowledgment to:

ERAU, IGNITE Office, SGA, Cubco and Society 4 S.P.A.C.E.