Science Presentation

DELTA = CHANGE
ALPHA = FIRST
PAPA = FOUNDER

Making a Change at CSU
Founders of the First Aerospace Program at CSU
CSU Ballooning Program

- Humble Beginnings
- Taylor University & PACER Programs
- Ballooning Course Experience
- Pre-Engineering Summer Camp
- Student Experiences and Reflection
Kite Aerial Photography
Development of a Balloon Tracking System and Payload

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Tracking System

The Payload Tracking System

Tracking:

The Payload Tracking System

Discussion

The Payload Tracking System

Results

Payload

Acknowledgements

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Introduction to High-Altitude Balloon Workshop

- Presented by Taylor University and StratoStar Systems
Summer 2009

Physics & Aerospace Catalyst Experiences in Research
Spring 2010

Lessons Learned
“*@#!?”
Pre-Engineering Camp
What Can Go Wrong Now?
Summer 2010 Flight
So Where is the Silver Lining?
Experiences & Adventure

Columbia Scientific Balloon Facility
Palestine, Texas
Mission Goals & Objectives

• Verifying U.S Standard Atmospheric Model for altitudes up 100,000 ft

• Collect data of temperature, pressure, and photographs using sounding balloon launched in Palestine, TX

• Recruit students at CSU to participate in the PACER program
Science Objectives

- Determining variability in temperature and pressure of the troposphere, tropopause, and stratosphere during the last week in July from 2005-2008

- Compare data collected from the sounding balloon to the U.S Standard Atmospheric Model taking into account with temperature, and variability in Palestine, TX, during the last week in July.
Science Requirements

In order to achieve the goal for the MTPA project, the following requirements must be met:

• Record time through flight once every 60 to 90 seconds.

• Measure temperature in a range of -70° C to 30° C with an accuracy of 3° C.

• Measure pressure in a range of 1000 mbar to 4 mbar with an accuracy of 8 mbar.
Technical Objective

• Implementation of a temperature sensor.
• Implementation of a pressure sensor.
• Implementation of an automated camera.
• Developing a payload for a balloon flight.
Technical Requirements

- A real time clock contained in the payload
- Collect temperature and pressure every 60 to 90 seconds.
- Take photographs at interval between 1 and 3 times per minute.
- Measure pressure between 4 mbar and 1000 mbar accurate to nearest 8 mbar.
- Measure temperature between -70 C and 30 C accurate to nearest 3 C.
- Payload attached to the balloon line via straws 17 cm apart.
- Fit payload within test enclosures
- Implement project be by a team of 4 and cost maximum of 500 dollars.
- Payload not exceed 500 g.
BalloonSat & Sensor circuit board!
Flight Software

- Define variables, constants, pin directions, and ADC channels 0 and 1
- Initialize MAXDATAADDR to max number of bytes on the data EEPROM
  \[ \text{EVENTSIZE} = 0 \]
  \[ \text{MAXDATAADDR} = 0 \text{FFF} - \text{EVENTSIZE} \]
  \[ \text{B3_DATAEEPROMADR} = 0 \]
  \[ \text{COLLECTION_PERIOD 60000} \]
- Retrieve the data EEPROM address from the Basic Stamp EEPROM
- Read RTC
  See readRTC subroutine flowchart figure 16a
- Read ADC channels
  See readADC subroutine flowchart figure 16a
- Write to EEPROM
  See Write_To_EEPROM subroutine flowchart figure 15a
- Display Event
  Format: Addr: Mins:secs:ch0:ch1 (for ADC testing)
  NO DISPLAY FOR FLIGHT
- Pause COLLECTION_PERIOD
  PAUSE VARIES (for ADC testing)
- Is dataEEPROM full
  - NO
  - YES: See LED subroutine flowchart figure 16a
DAP Payload
LAUNCH

07/27/2009
Recovery
Hope you enjoyed the presentation
Any Questions or Comments?

This has been a CSU production
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Electronics- A. Easley
Mechanical- C. Gaither
Software- D. Taylor