2015

Tethered Aerostat Program

CMN • UW – FV • WTC

LEAD STUDENT INTERN WORKSHOP #1 - FEBRUARY 21, 2015

UNIVERSITY OF WISCONSIN – STEVENS POINT

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Contents

Welcome – 8:45 AM

- Wisconsin Space Grant Consortium – Christine Thompson
- Introduction

What TAP is?

- From NASA point of view e.g. funding ideology by Christine
- From Scientific point of view e.g. what are the possibilities by Dan

Workshop Schedule

8:00	Arrival Continental Breakfast (Yogurt, Fruit, Bagels, Banana Bread, Juice, Coffee/Tea)
8:45	Welcome and Program Introduction
9:00	Basic Equipment & Electronics
10:00	Break
10:15	About Payloads
10:45	Research and Draft New Payloads
11:45	Lunch (Soda, Chili, Turkey and Cheddar or Hummus, Peppers, Cucumbers, and Feta Sandwich on Ciabatta roll w/lettuce and tomato, Mixed Greens w/Vinaigrette Dressing, Potato Chips)
12:30	Basic Soldering and Tools
1:00	Working with and Programming Micro Controllers
2:45	Break/Snack (Cheese/Crackers, Fresh Vegetables w/Dip and Beverage)
3:00	Mock Payload Build and Electronic Integration
4:00	Mock Payload Aerostat Launch
5:00	Wrap Up
5:15	Farewell

Basic Aerostat Equipment & Electronics – 9:00 AM

- Tethered aerostat

- 7’ ball balloon, tether, patch kit, & gas filling device

- Aerostat payload

- Stand, board, payload equipment, vane, bubble level, & hanging mechanism

Aerostat Payloads (Current Ideas) – 10:15 AM

- Non-Vegetative Index e.g. green space to non-green space for urban sprawl and habitat monitoring

- Quad Copter Recharging Station in support of NWIC-NOAA whale pod health monitoring

- Ka-Band power beaming demonstration in support of International Space Station/ XISP BitSat Demo

- Carbon counting test of the Menominee Nation Sustainable Forest in partnership with the Sustainable Development Institute

- Volcanic pyroclastic characterization from volcanoes all around the world in support of FAA and commercial jet airline transportation industry

Payload Research (New Ideas) 10:45 AM

This space is reserved for up to seven more additional ideas that we will talk about and discuss as a group…

1.

2.

3.

4.

5.

6.

7.

Basic Soldering (Hands-On) – 12:30 PM

In this section we will demonstrate electronic confidence.

- Soldering two wires together

- Soldering a Thru-Hole component to a circuit board

- Demonstrating a breadboard technique to light a LED

Working with and Programming Micro Controllers - 1:00 PM

Arduino Uno Sketches (Basic)

In this section we will demonstrate microcontroller confidence.

http://arduino.cc/en/tutorial/blink

- Arduino Setup and bread boarding

- Flashing an LED e.g. taking a photograph every 5 seconds

```
   /*
  Blink
  Turns on an LED on for one second, then off for one second,
repeatedly.

  This example code is in the public domain.
 */

// Pin 13 has an LED connected on most Arduino boards.
// give it a name:
int led = 13;

// the setup routine runs once when you press reset:
void setup() {
  // initialize the digital pin as an output.
  pinMode(led, OUTPUT);
}

// the loop routine runs over and over again forever:
void loop() {
  digitalWrite(led, HIGH);   // turn the LED on (HIGH is the
voltage level)
  delay(1000);               // wait for a second
  digitalWrite(led, LOW);    // turn the LED off by making the
voltage LOW
  delay(5000);               // wait for five seconds
}
```

Mock Payload Integration - 3:00 PM

In this section we demonstrate integrating payload equipment. Onboard solar panel, battery pack, & charging circuit with a load

- Calibrate weather station compass and setup Bluetooth capability with laptop

- Calibrate spectral imager using Teflon plate

- Use AIM XTRA transmitter and setup base station receiver to laptop

Mock Aerostat Payload Launch – 4:00 PM

In this section we demonstrate filling the aerostat and preparing the harness for attaching the payload board.

- Balloon ground protection, fill, & lift capacity

- Weighing the payload & determining the weight to lift ratio e.g. 1.5:1 i.e. 7.5lbs net lift and 5# payload

- Attaching the payload to the aerostat

- Arming the payload

- Releasing the payload from the stand

- Payload ascent rate at 1.5:1 is 1,000 feet per minute

Wrap-Up – 5:00 PM

In this section we discuss who and what science experiments to focus on and a timeframe to accomplish tasks and set a schedule for possible launch dates. This page is provided for wrap-up notes.

Laboratory Notebook

TAP Laboratory Notebook

Issued to: _____

TAP group: _____

Guidelines for using the Laboratory Note Books

This Note Book has been specially printed to facilitate the keeping of a valid record of your work, which will help you prove when particular experiments were done, when you had particular ideas and how the risks were assessed. In order to maximize the likelihood of this Note Book constituting effective evidence of the above, the TAP strongly recommends that you adhere to the following guidelines:

1. **Complete the date and signature boxes**
   Ensure a date is entered for each experiment and that it is signed and counter-signed.
2. **Always use ink, not pencil**
3. **Fix attachments permanently**
   Any attachments, e.g. spectra or photographs, must be dated and signed across the border. Supporting data which cannot be secured in the Note Book should be cross-referenced, signed and witnessed as above, and filed carefully.
4. **Work directly in the Note book**
   Enter experiments, data and observations directly into the Note Book. Do not use another note book for a rough copy.
5. **Include full details and conclusions for each experiment**
   Information should be sufficient for someone else to ***repeat*** your work.
6. **Do not leave blank spaces**
   Diagonally cross through any blank pages or blank spaces left on a page. Sign and witness in the usual way.
7. **Do not tamper with entries**
   Do not use correction fluid or remove pages. Incorrect entries should be struck through with a single line.
8. **Storage**
   Note books should not be permanently removed from TAP program.
9. **Ownership Rights**
   All note books are owned by WSGC.

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Name of Assessor:		Name of Co-signatory:		Continued on page:
…… Signed	…./……/…. Dated	…… Signed	…./……/…. Dated	

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