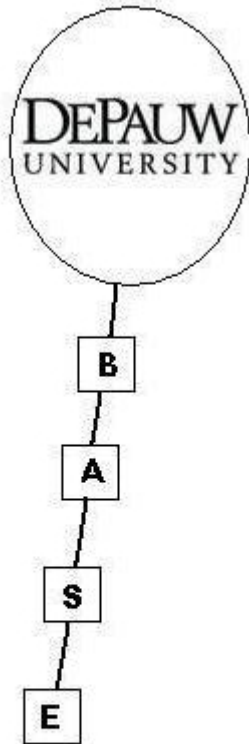


A Multi-wavelength Photometer System



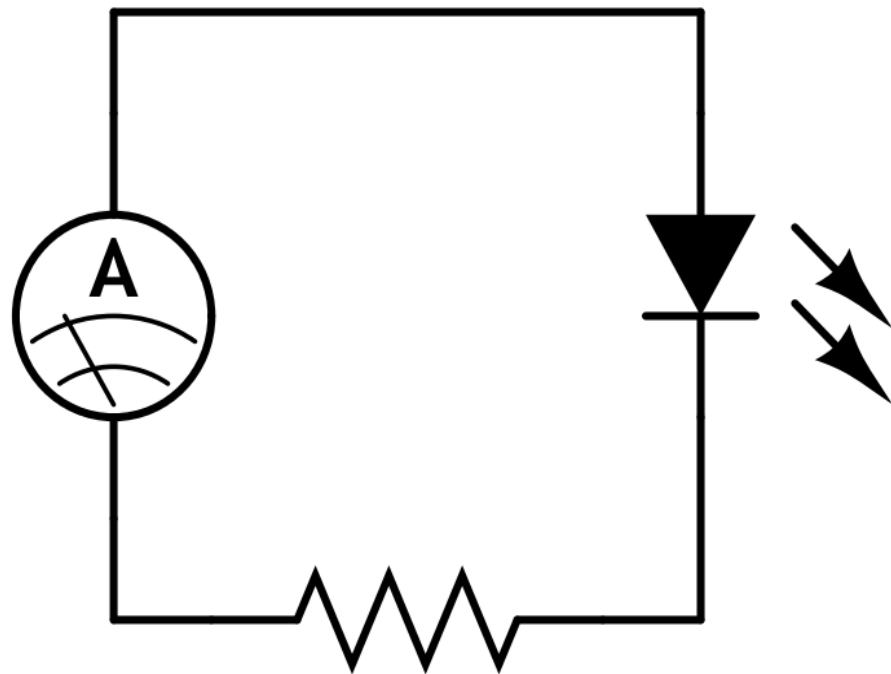
**Balloon
Assisted
Stratospheric
Experiments**

Ellie Hoover

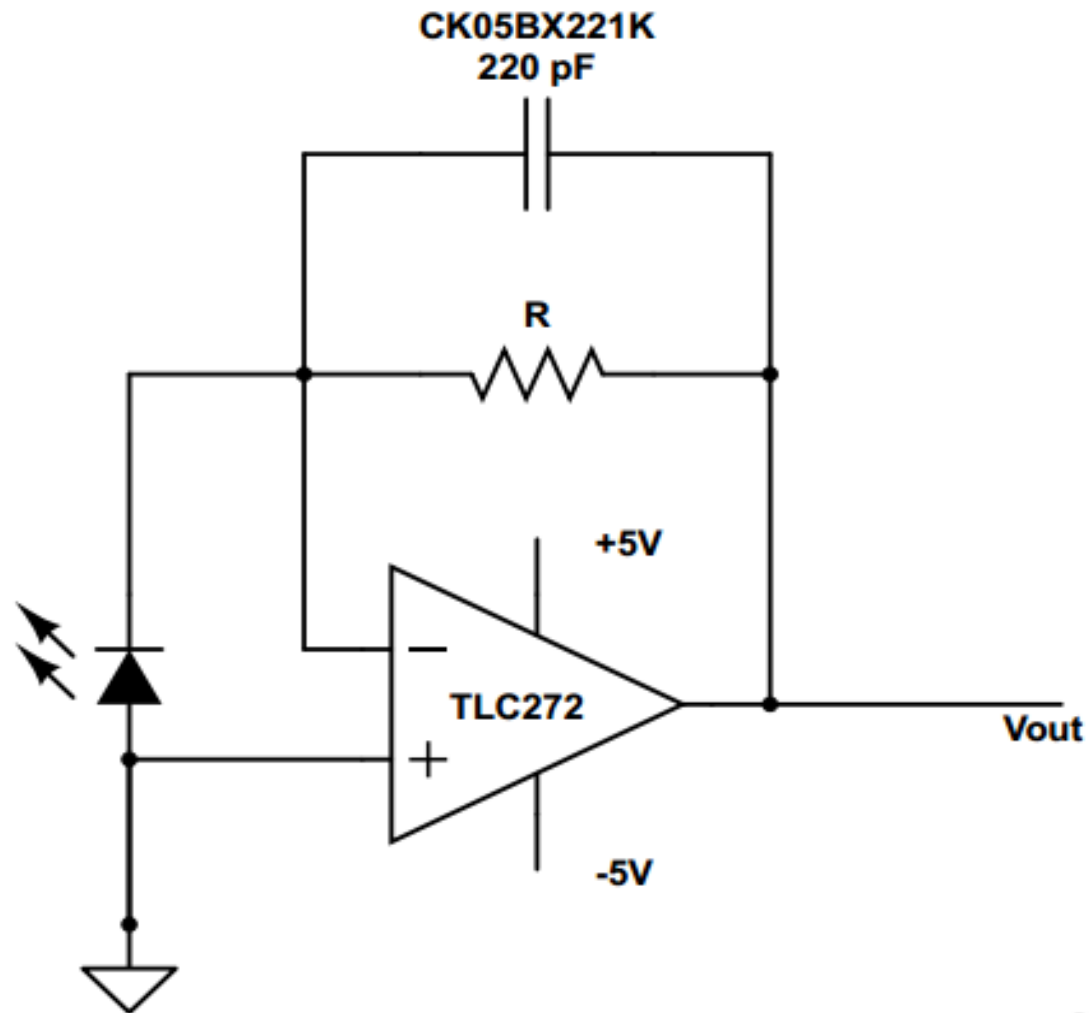
Tao Qian

Advisor: Dr. Howard Brooks

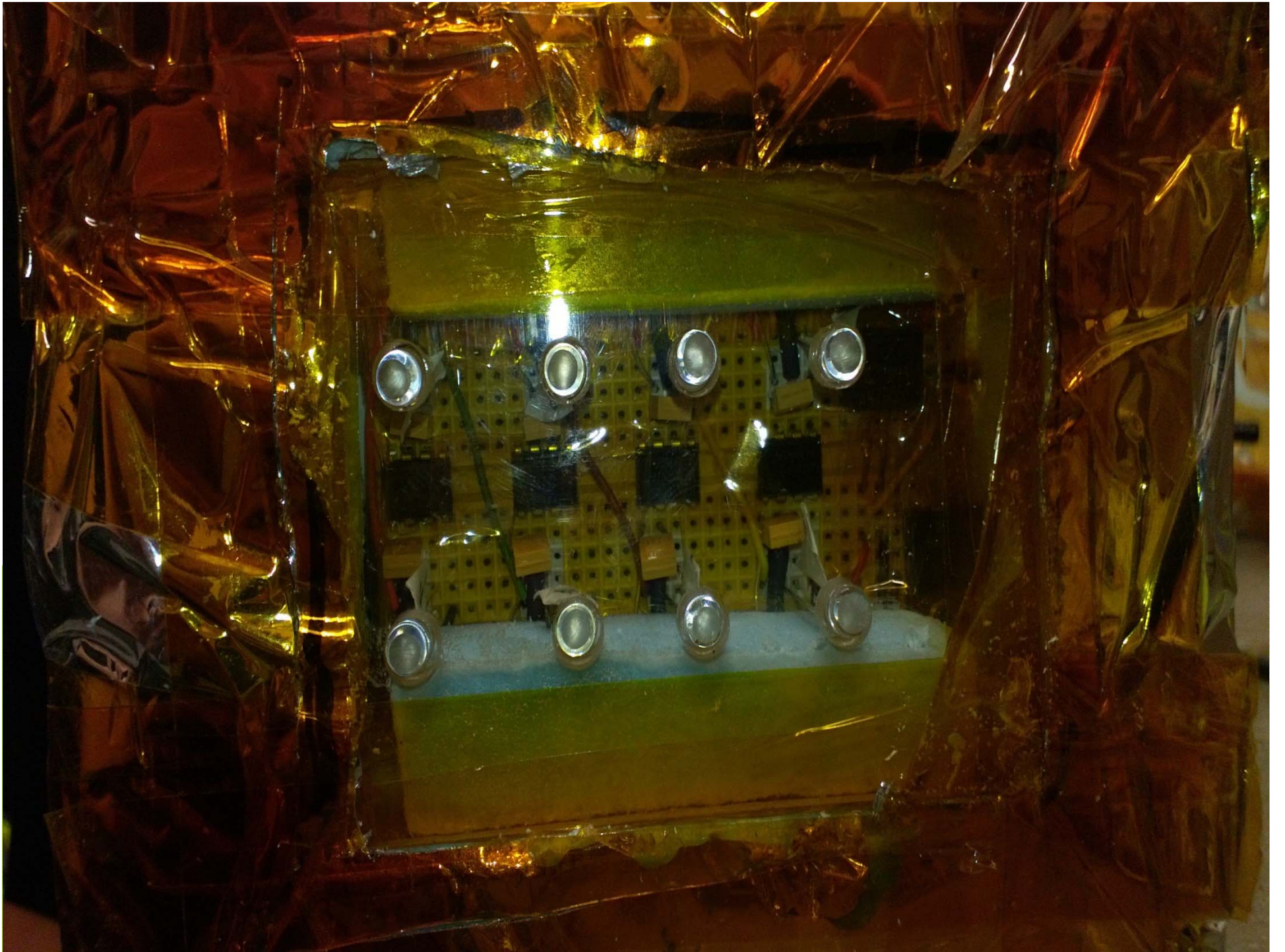
LED



LED Photometer



<http://www.nearsys.com/catalog/sensor/1photoplan.pdf>



Resistors Used

Experiment LED	BASE 71	BASE 72	BASE 73
Infrared	30 M Ω	270 k Ω	1 M Ω
Red	30 M Ω	270 k Ω	1 M Ω
Yellow (1)	30 M Ω	270 k Ω	1 M Ω
Yellow (2)	30 M Ω	270 k Ω	5 M Ω
Green	30 M Ω	1 M Ω	1 M Ω
Blue	30 M Ω	1 M Ω	5 M Ω
Violet	30 M Ω	30 M Ω	30 M Ω
Ultraviolet	30 M Ω	30 M Ω	30 M Ω

New LEDs

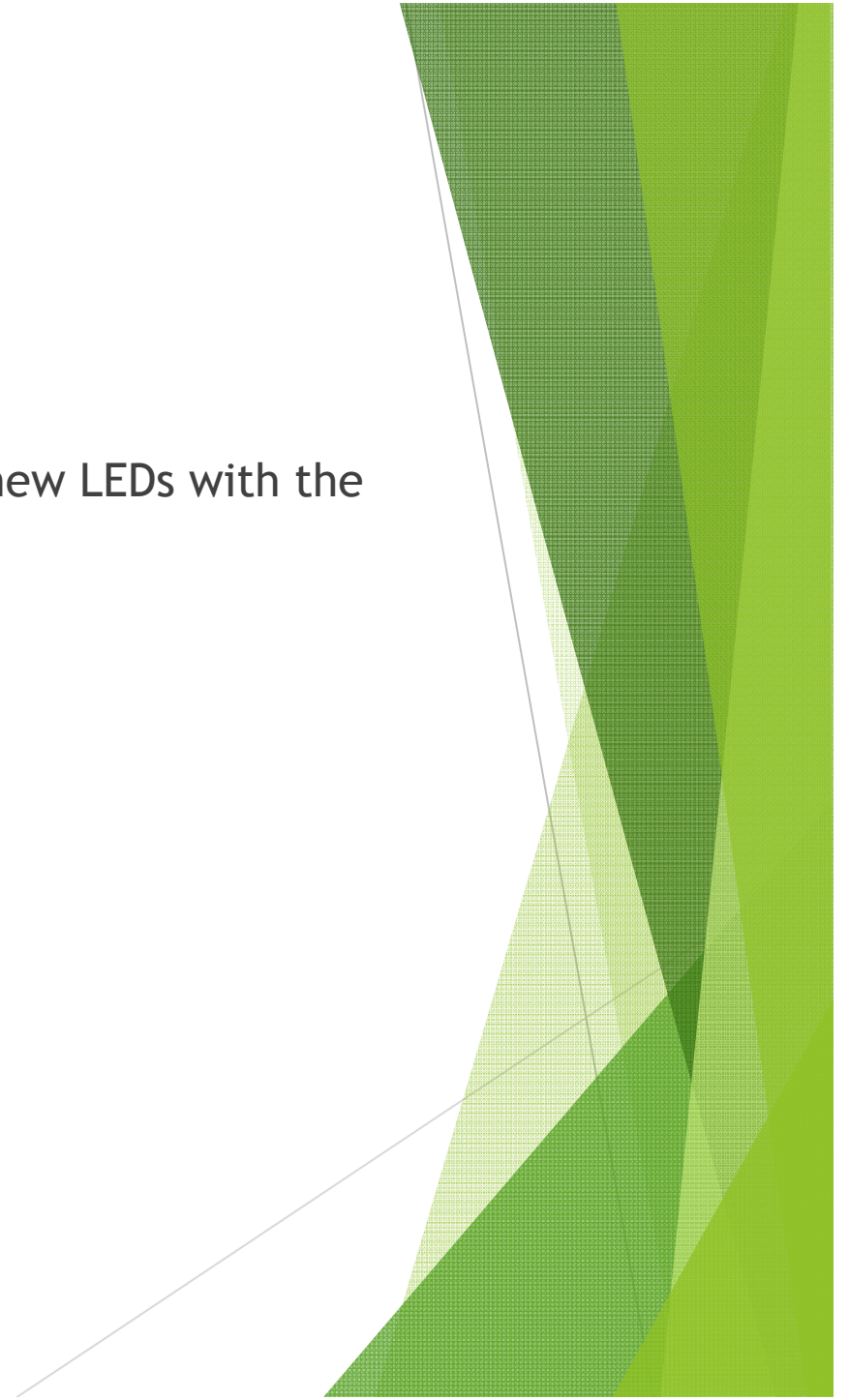
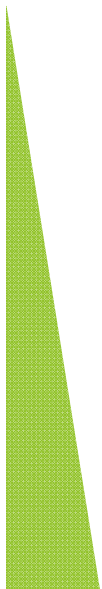
In the flight on Wednesday, we used four new LEDs with the following wave length:

351 nm (UVA)

400 nm (Violet)

830 nm (IR)

940 (IR)



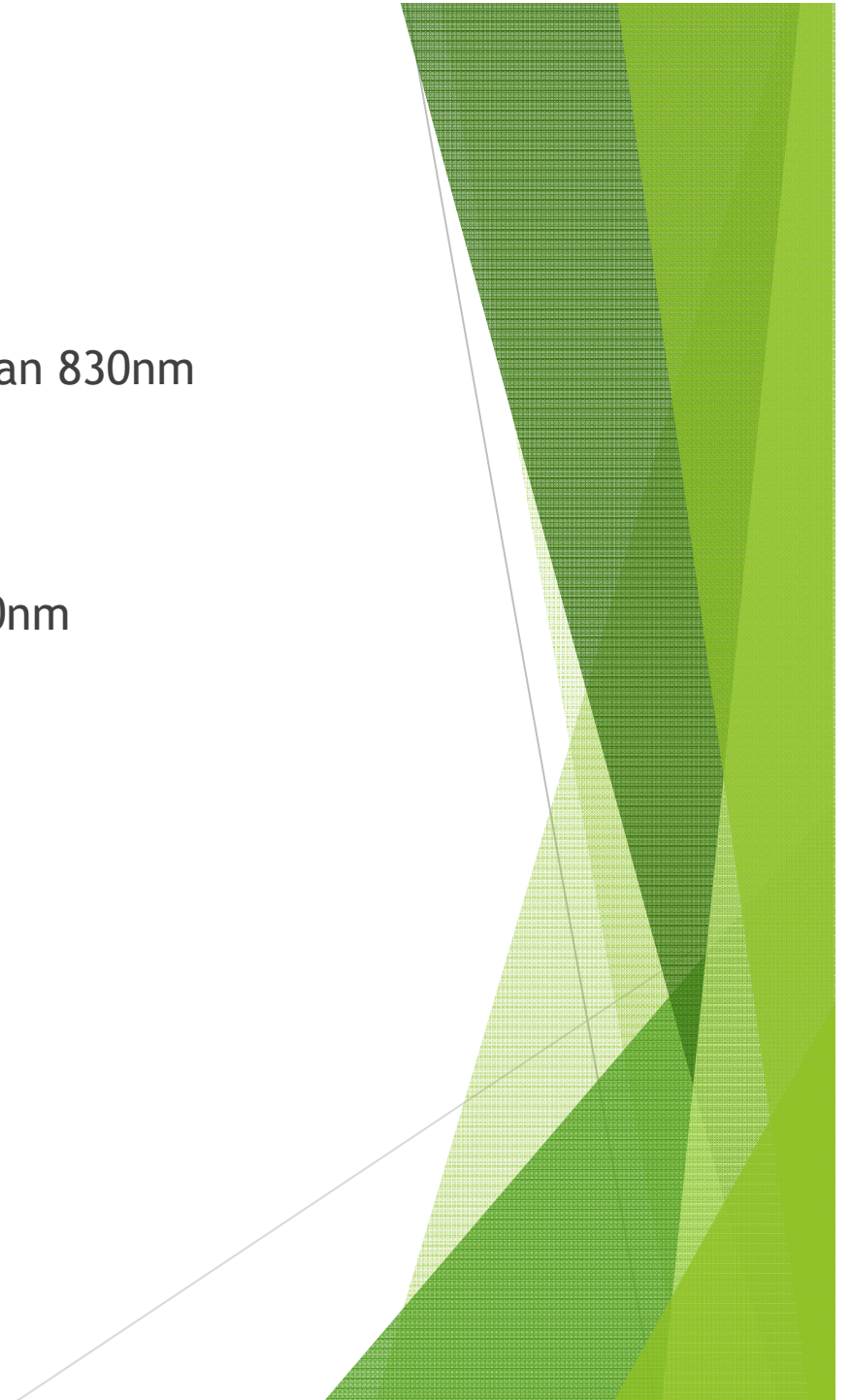
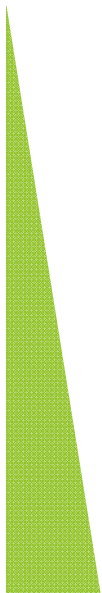
New LEDs

Water vapor absorbs more 940nm light than 830nm

-> measure intensity of water vapor

Ozone absorbs more 351nm light than 400nm

-> measure intensity of ozone

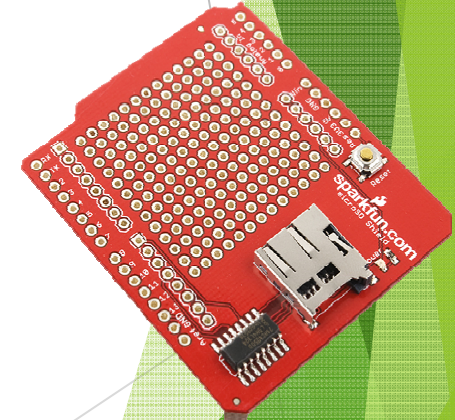
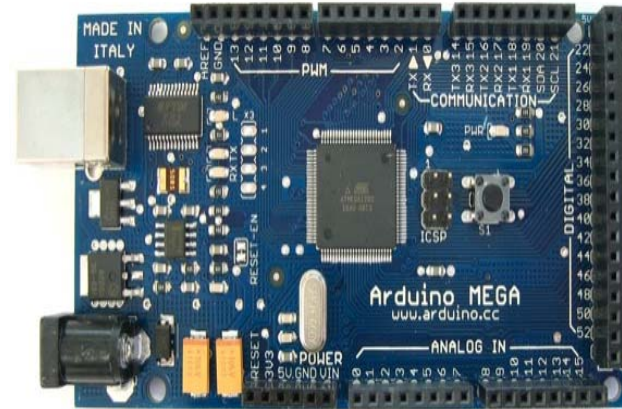


Microcontroller

Arduino Mega 2560 R3

5 mV accuracy

SD card shield with a 2G Micro SD Card



Compass & GPS

A tilt compensated compass (LSM303DLH)

GPS receiver (GPS-11466)

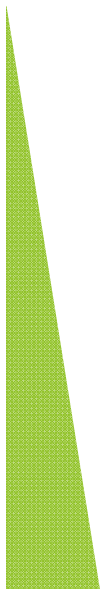


Data Collected

15 MB because of taking data 8 times/s

Averaged readings from LEDs and compass

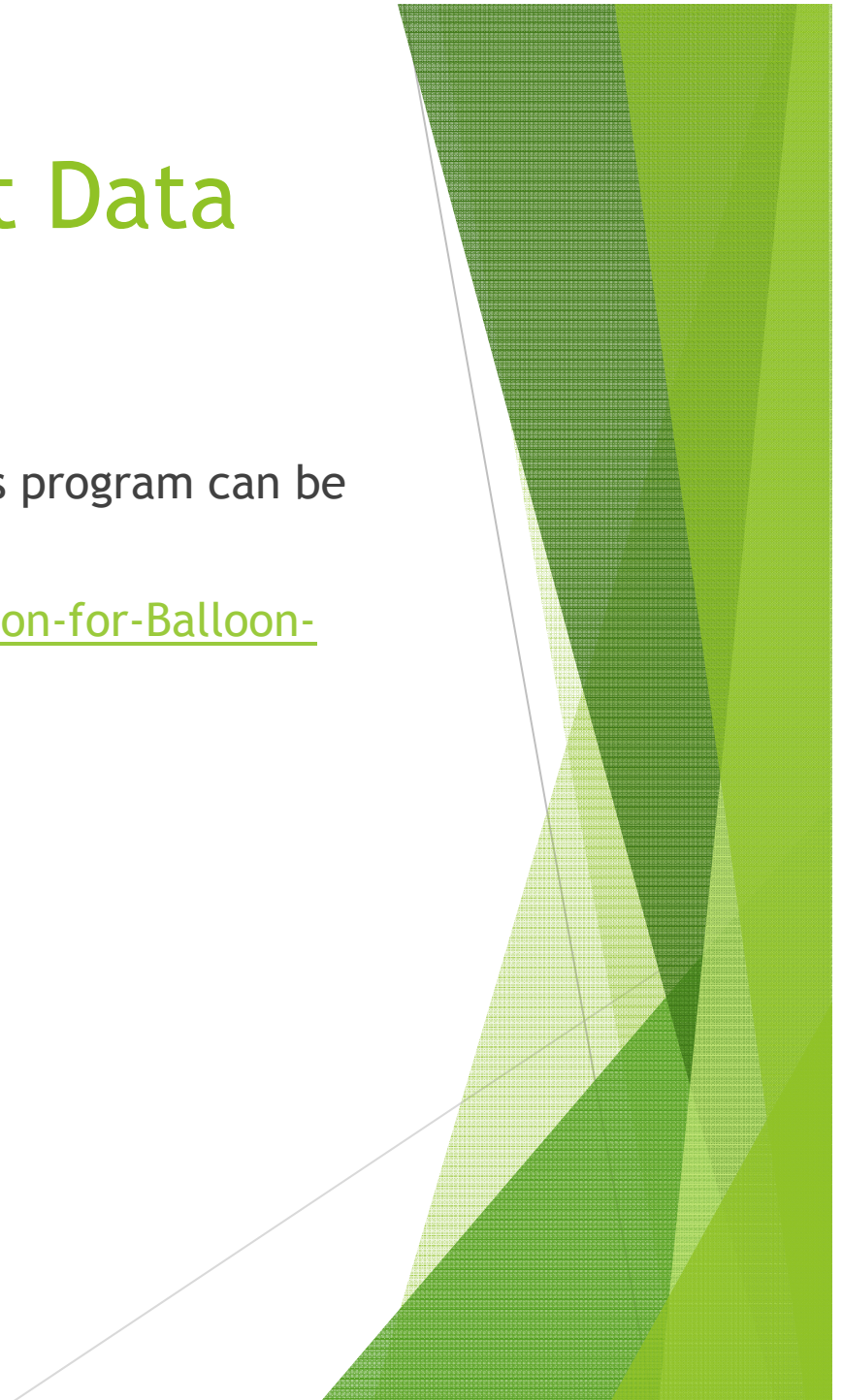
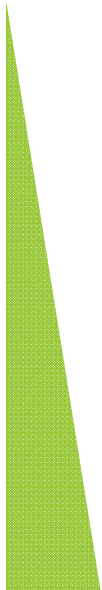
1.5MB after processing



Visualization of Flight Data

Source code for data visualization/analysis program can be found at:

<https://github.com/qtstc/Data-Visualization-for-Balloon-Assisted-Stratospheric-Experiments>



Future Work

Use filters

Use other light sensors

Analyze the data

