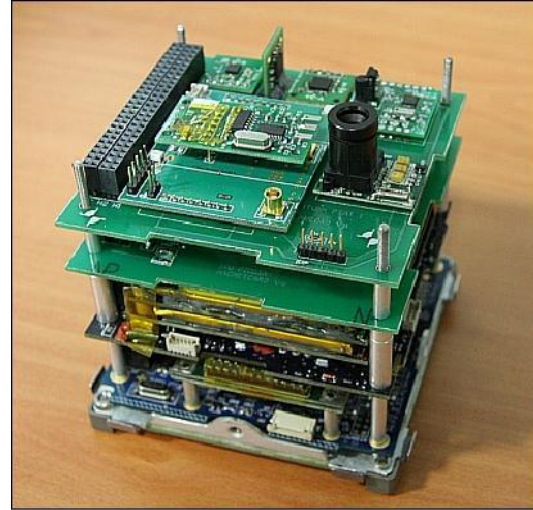


The Path to Open Source CubeSats

Raul Ramirez

Utah State University
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Department of Physics

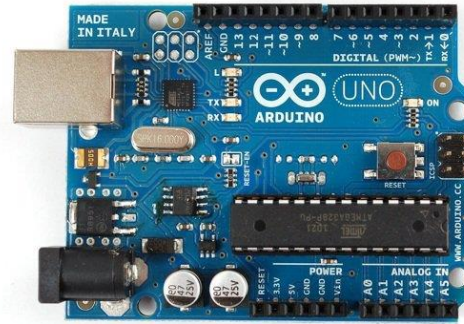
09/07/2018



[1]

What is Open Source?

- Community developed
- Community supported
- Does not only apply to software



[2]

Why Open Source?

- Educational
- Low Cost
- New Ideas



[4]



[3]

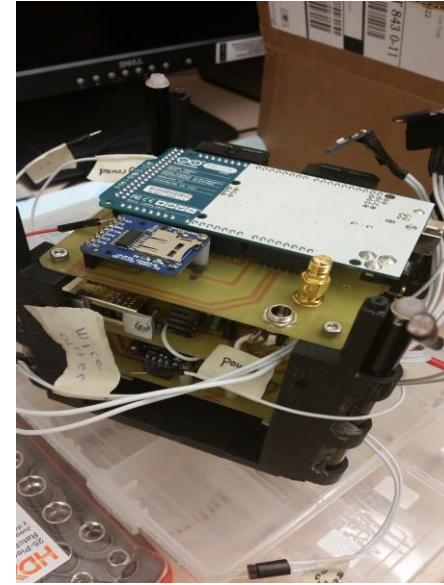
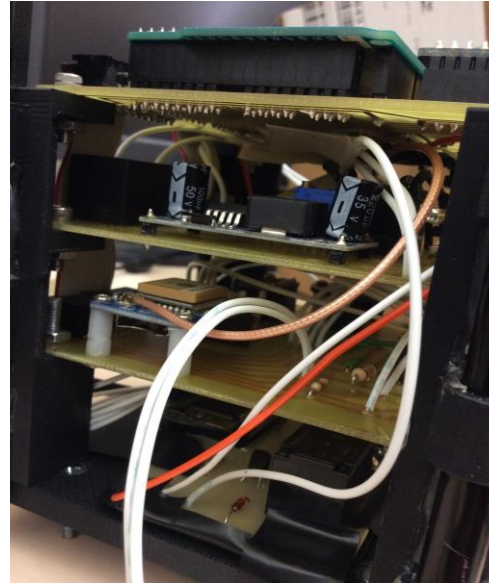
GAS Team and Open Source Projects

- Undergraduate Students
- ERRNO
- Cubium



ERRNO

- Elevated Real-time Research Near-Earth Observer
- Built for High Altitude Balloons
- Software and PCB Available on Github

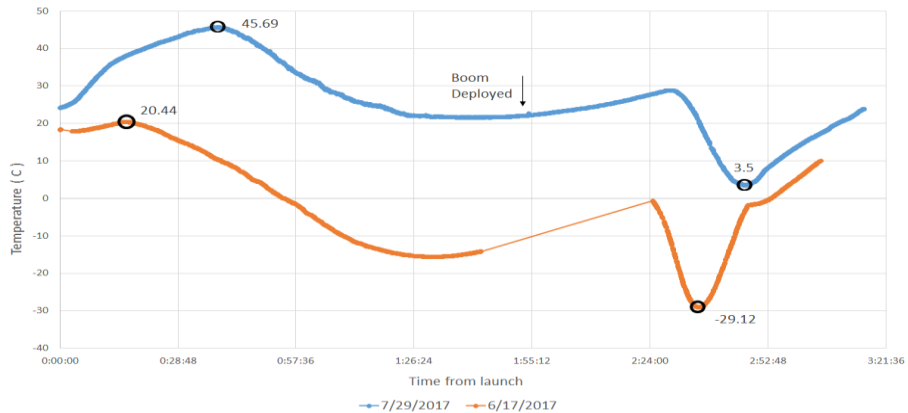


ERRNO is built on Open Source components

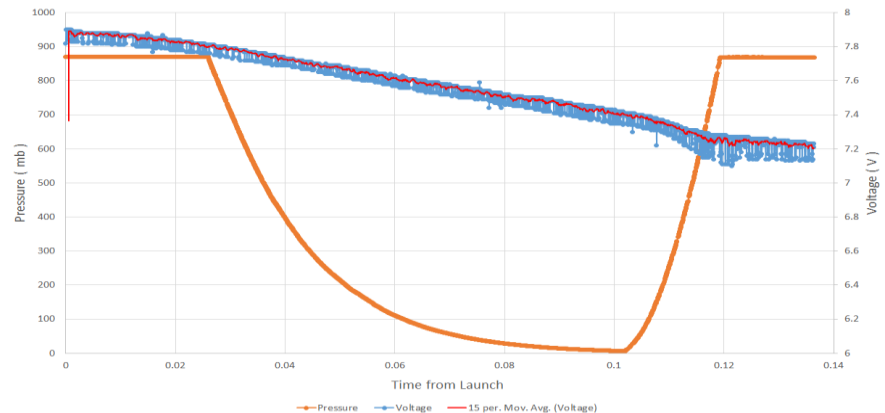
- Built using Adafruit Sensors
- Controlled by Arduino Mega and Raspberry Pi 3.
- Flown on HAB's eight times
- Inspired a "How to fly a High Altitude Balloon" document



Internal Temperature vs Time



Pressure and Voltage vs Time



Cubium

- Plug-in-Play Architecture for Unix
- Backend developed in C/C++
- Front end developed with Python
- Will fly on 1U CubeSat with Raspberry Pi Zero W
- Software available on Github



Goals for Cubium

- Develop for easy implementation
- Test on High Altitude Balloons
- Deliver to the community
- Fly on a CubeSat



What has the GAS Team contributed?

- A basis to start building prototypes
- Software and Schematics that are available to use
- Educational resources for others to read and learn from



What will the GAS Team contribute?

- An Open Source repository for all future CubeSat components
- Detailed documentation on how to build the cube satellite



How does this benefit others?

- Provides a path to begin research
- Provides low-budget universities an alternative
- The development is already done



Special Thanks

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- Kyle Hovey

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- Alex Nelson
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- Sam Dalrymple
- Cara Frischkorn
- Erik Eastham
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