# Laboratory Temperature and Humidity Monitoring System
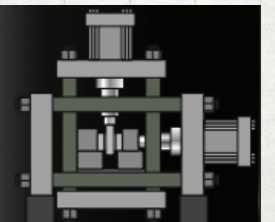


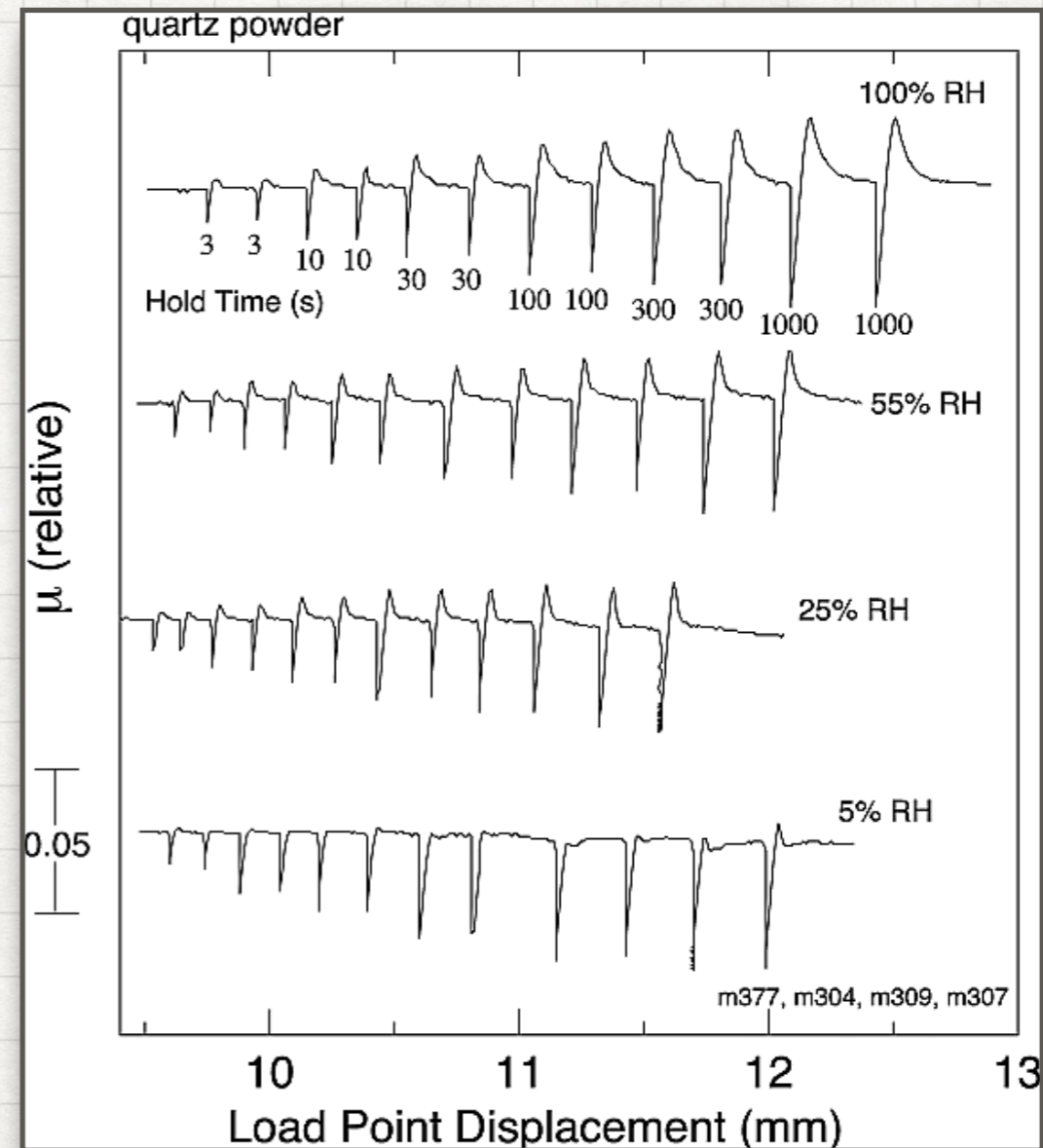## Robert D. Valdez II
12/8/2016

PENN STATE
1855

PENN STATE ROCK AND SEDIMENT
MECHANICS LABORATORY

# Problem

- Shearing experiments are affected by temperature and relative humidity (RH)

- time-dependent frictional healing is reduced at low RH

- Increasing RH can result in velocity-weakening gouge



quartz powder
100% RH
3   3   10  10   30  30   100 100  300 300  1000 1000
Hold Time (s)
55% RH
μ (relative)
25% RH
0.05
5% RH
m377, m304, m309, m307
10   11   12   13
Load Point Displacement (mm)

[Frye & Marone, 2002]
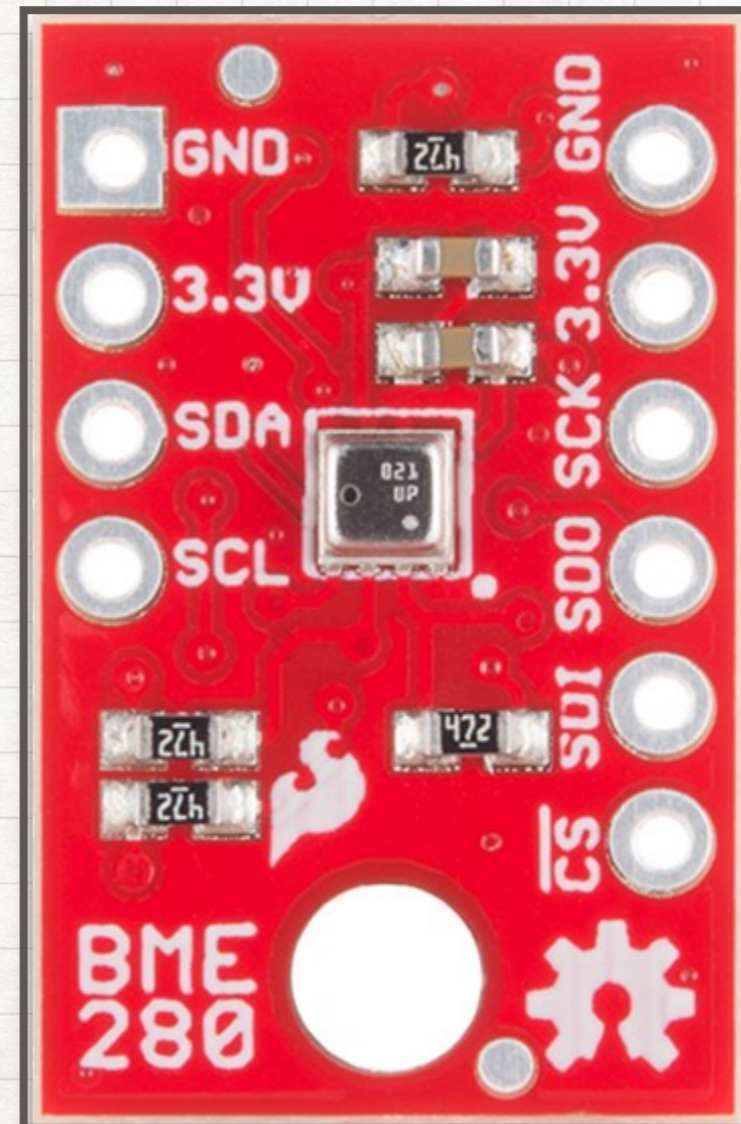
# Instrumentation

- Atmospheric Sensor Breakout - BME280

- Temperature, humidity, atmospheric pressure, and altitude all in one

- Ranges:

  - T: -40C to 85C

  - Humidity: 0 - 100%

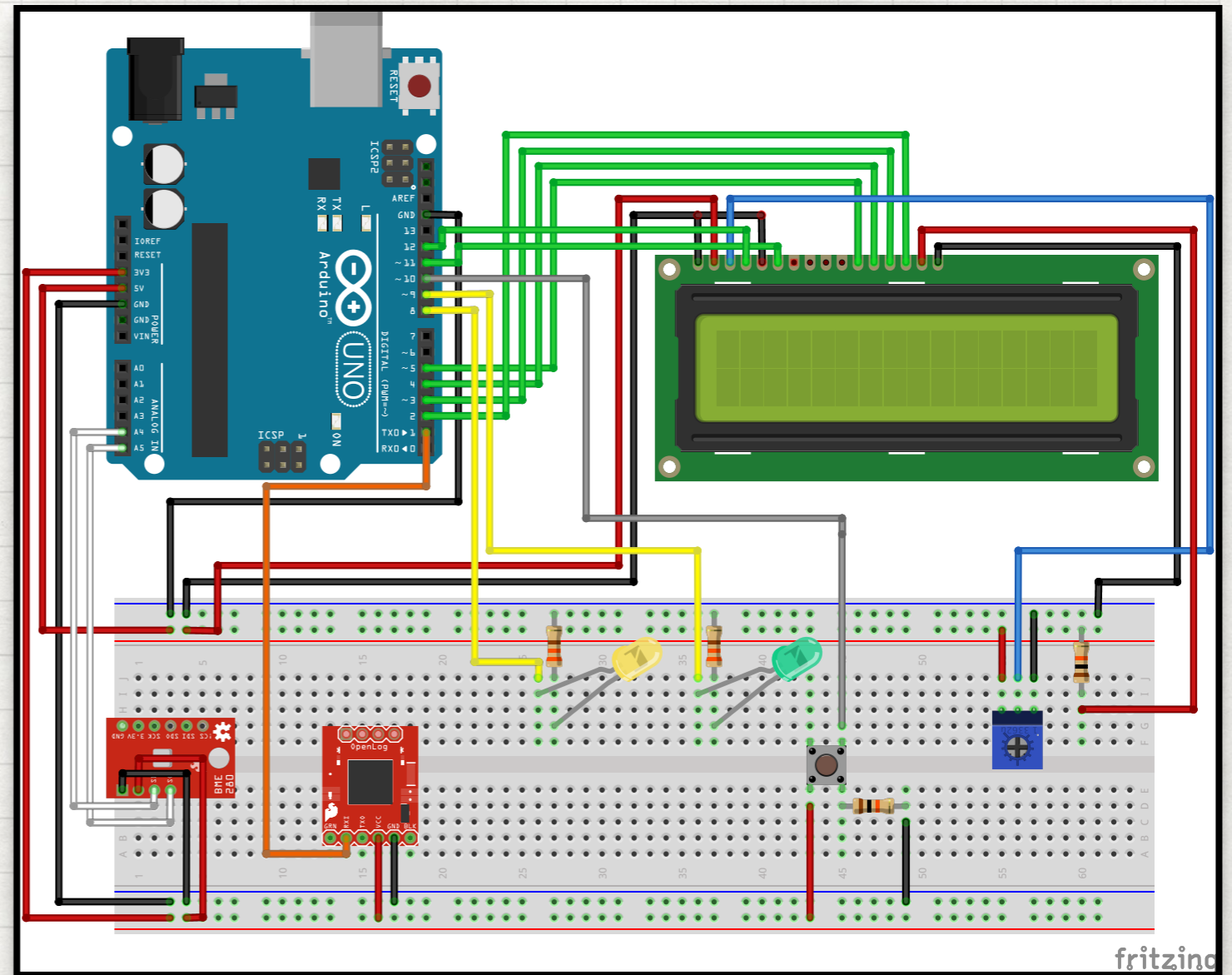  - Pressure: 30,000Pa to 110,000Pa

  - Altitude: 0 to 9.2 km

# Monitoring System: Setup

- Schematic of the electrical circuit

- LED lights: green for successful upload and flashing yellow when each data point is displayed

- Push button to display pressure reading

# Monitoring System: Demonstration

- Time for a quick demonstration

- Text file produced by CoolTerm

  - http://freeware.the-meiers.org/

# Monitoring System: Demonstration
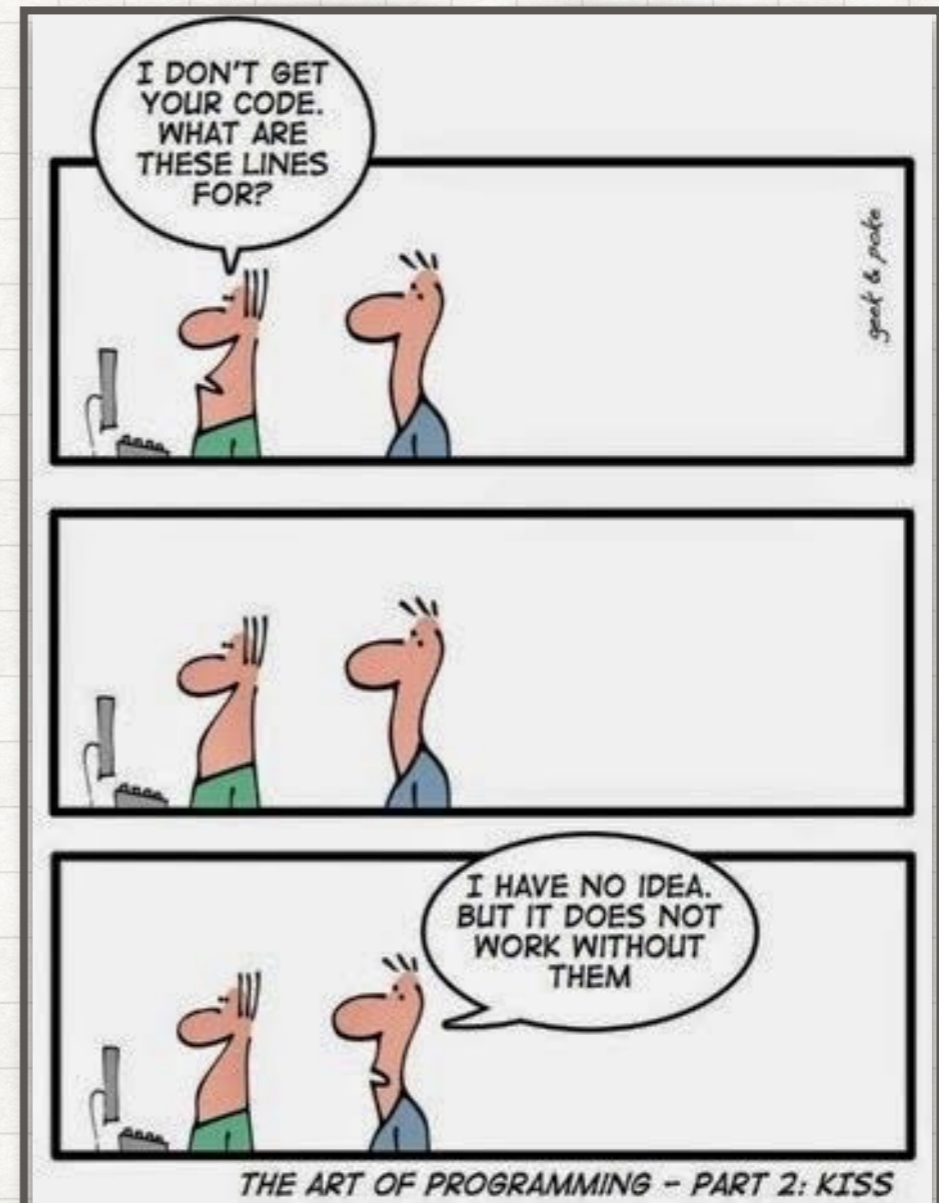
- Examples of data (~ 1 hr time frame)

  - Temperature and humidity
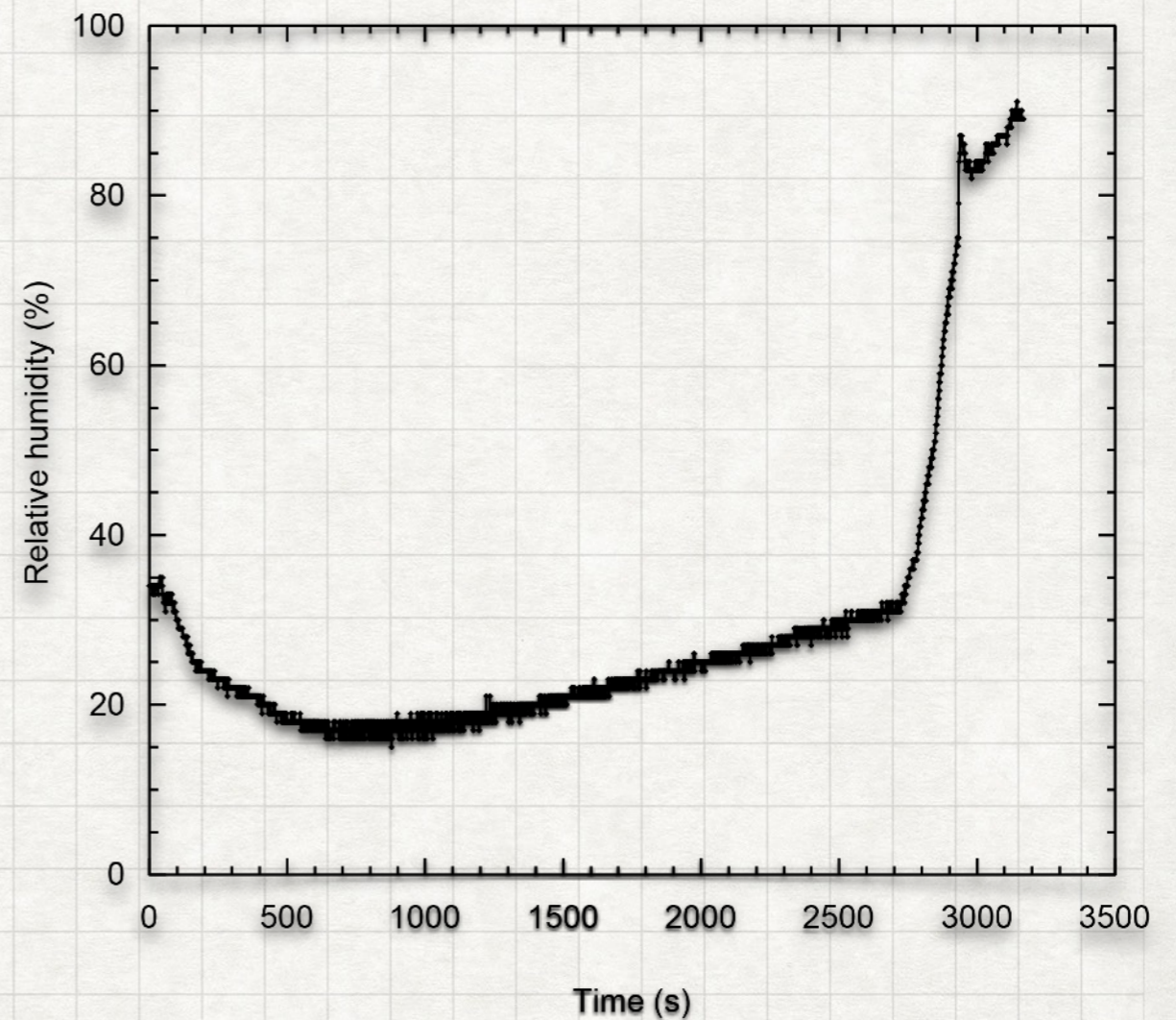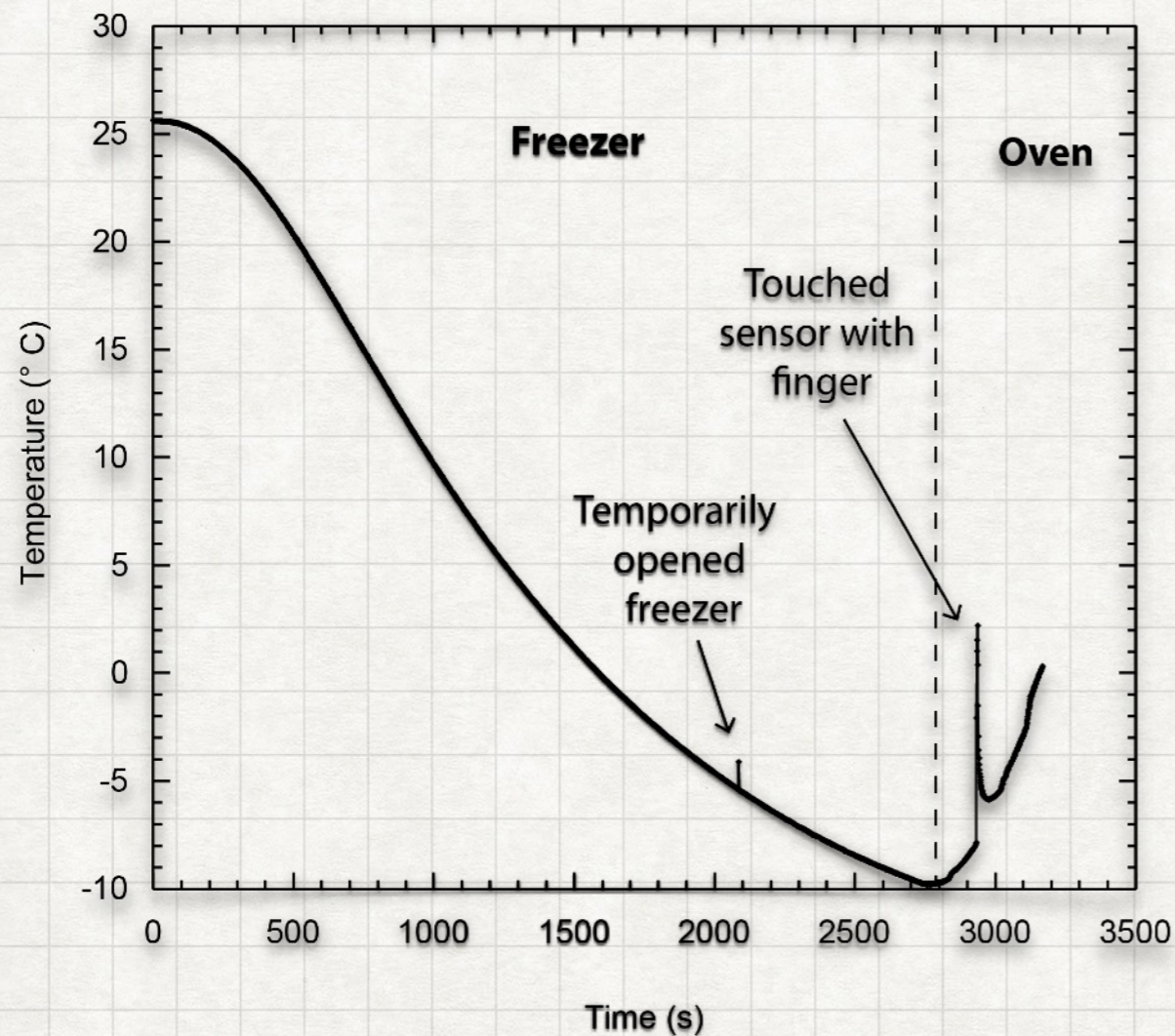
# Monitoring System: Challenges

- Failure to implement data logger and wifi into current system

- Mainly a problem with coding and syncing errors

# Monitoring System: Limitations
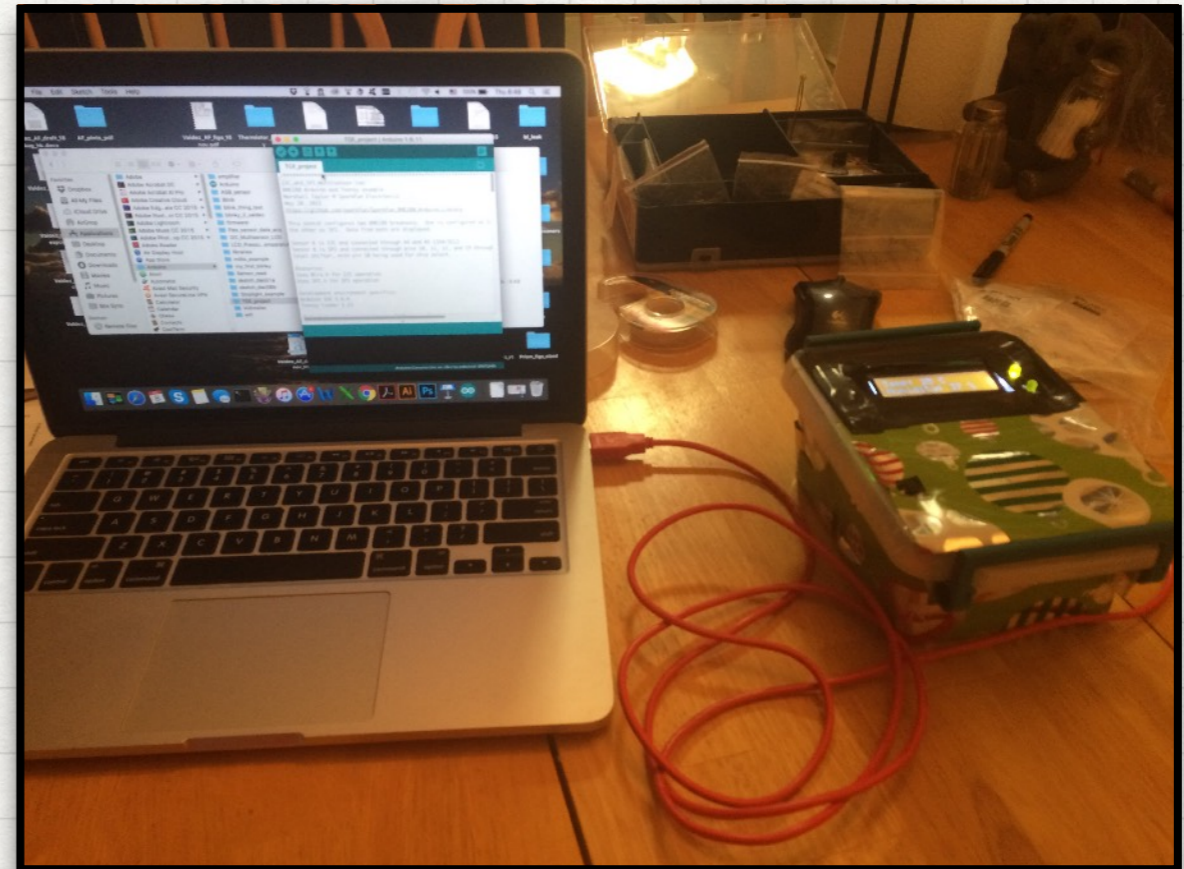
- No built in data logging component

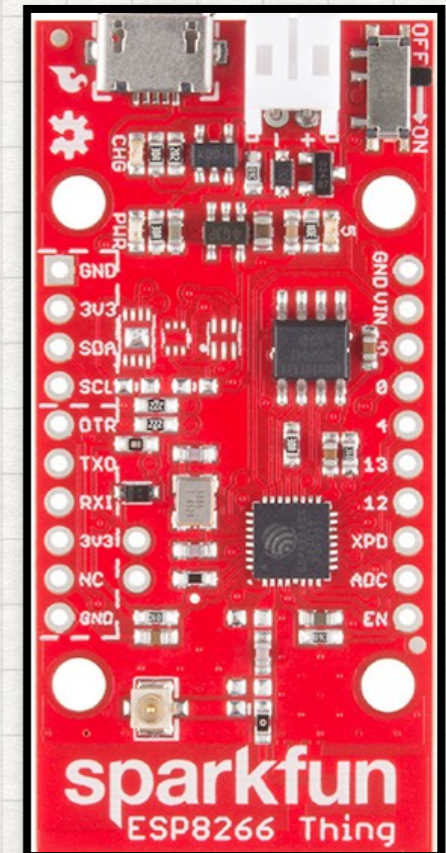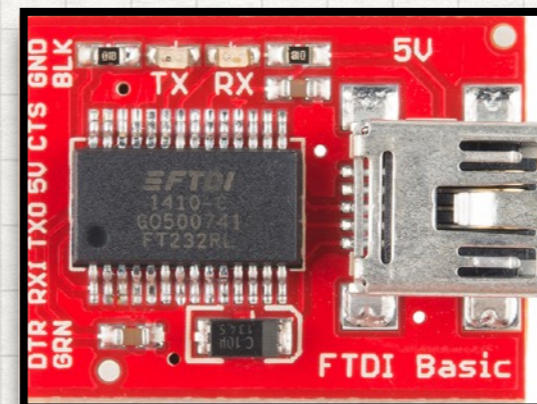- Fixed to a computer

- More favorable for indoor usage

# Monitoring System: Expansion
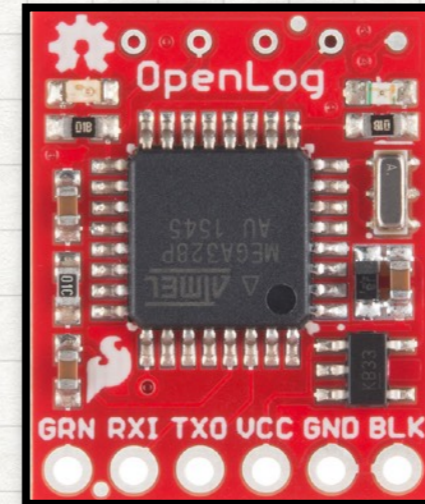
- Fix errors associated with the data logger

- Implement Sparkfun Thing

- Automatic uploading and plotting of sensor data

- Battery powered/drop and go sensor