

Group 8 Data Analysis

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Age of Ultron

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Water Flow in Loomis

Turbine Flow Sensor

Recap

We have this turbine flow sensor and plan to measure water flow using it (*Fig 1*)

Problem was the size of the sensor did not match the size of the water bottle dispensers

So we created this set up (*Fig. 2*)





Fig. 2

Data Analysis

- So far we have been able to calibrate the sensor

We had to pass a certain known amount of water through the sensor and measure how much water it detected had passed

- We measured the flow rate in the water fountain in the North West corner of the second floor and it was about 5.5l/min
- We plan to use the method to measure the flow rate in all of the fountains

Expected Results

The pressure and hence the flow rate should be the maximum in the maintenance room in the basement where water enters Loomis

We expect the flow rate to decrease linearly as we go to higher floors as flow rate is directly proportional to water pressure

We expect the flow rate to stay same in the same floor as we haven't thought of any reason for it to be different

Volume Flow Sensor

Recap

- Records time to fill known volume
- Sensors are covered to prevent bad readings from splashing
- Calibrated using a scale

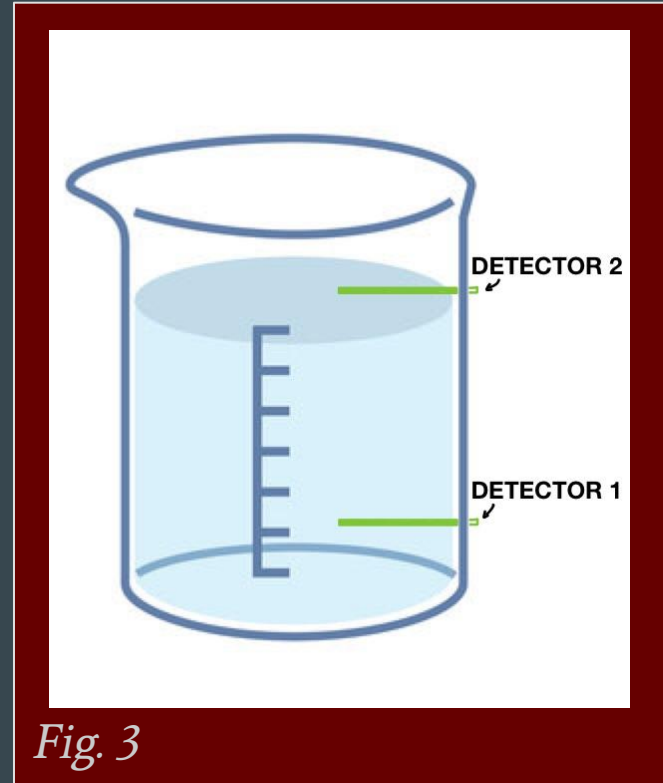


Fig. 3

Expected Results

- Similar flow on the same floor
- Good altitude readings for determining which floor a recording was taken on
- Linearly decreasing flow rate at higher floors

Actual Results (Altitude Correlation)

Agreement between floor and altitude readings on March 1st

Bad correlation on March 3rd

Conclusion:

Weather causes issues with BME altitude readings

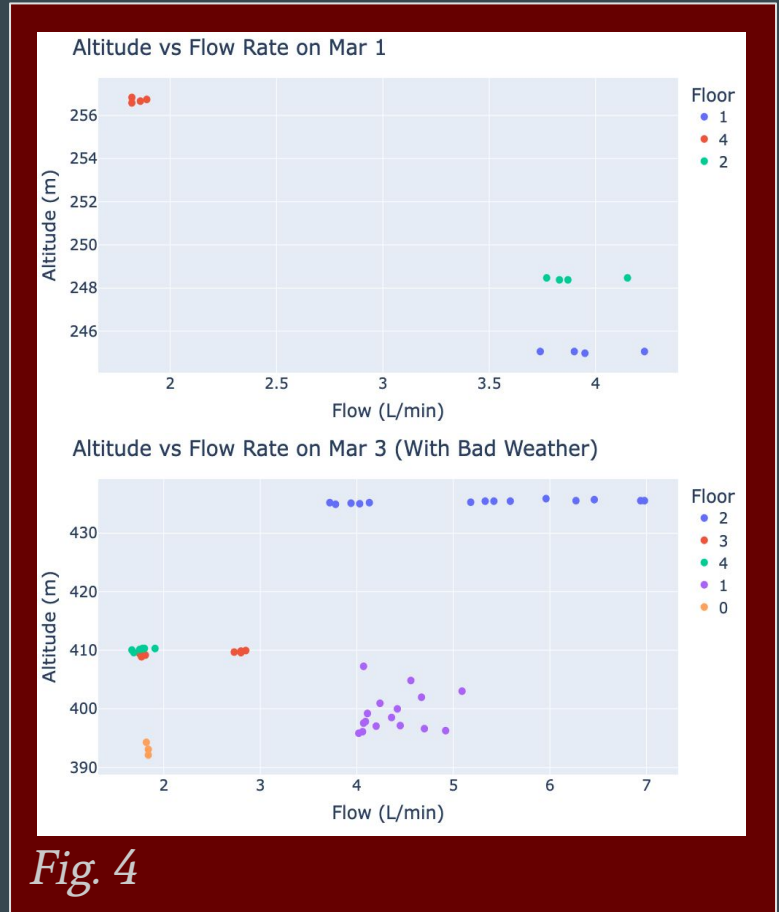


Fig. 4

Actual Results (Similar flow on same floor)

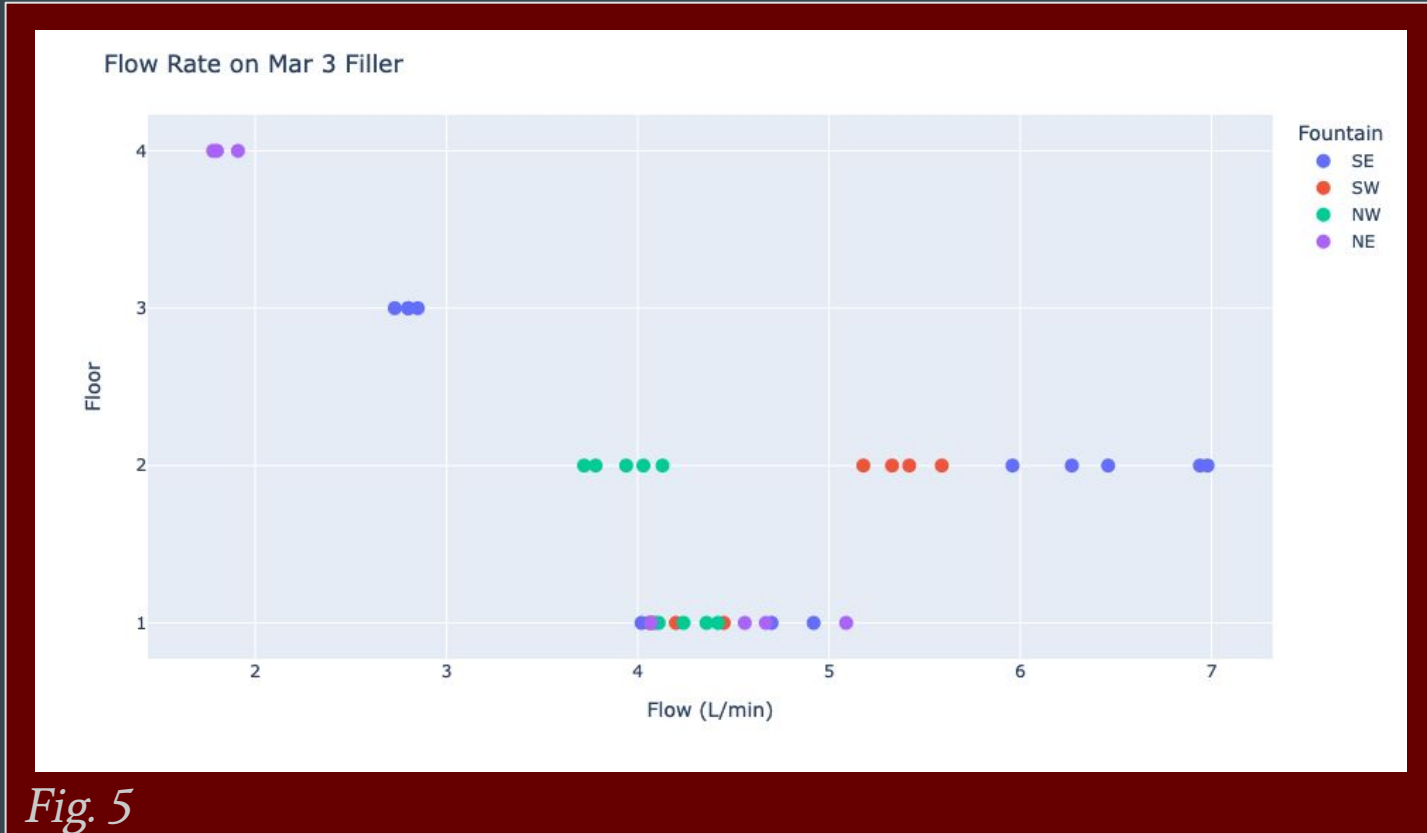


Fig. 5

Actual Results

Similar flow on the same floor - FALSE

Good altitude readings - VERY FALSE

Linearly decreasing flow rate at higher floors - SORT OF FALSE

Future

- Manual input floor and position
- Record more data
- Investigate why the second floor flow is higher than the 1st floor
- Correlate our results with the turbine sensor

Water Pressure Sensor

Installation of the Junctions

Since the last update, the junctions on the water fountain supply pipes have been installed, one on the fourth floor and one on the third. (*Fig. 6*)

This decision is due to

- Fountain type
- Ease of access
- Limiting the boards needed



Fig. 6

Data Collection

This preliminary data was a short test conducted by simply blowing into the sensor to check responsiveness. (*Fig 7*)

The data consists simply of pressure and timestamp.

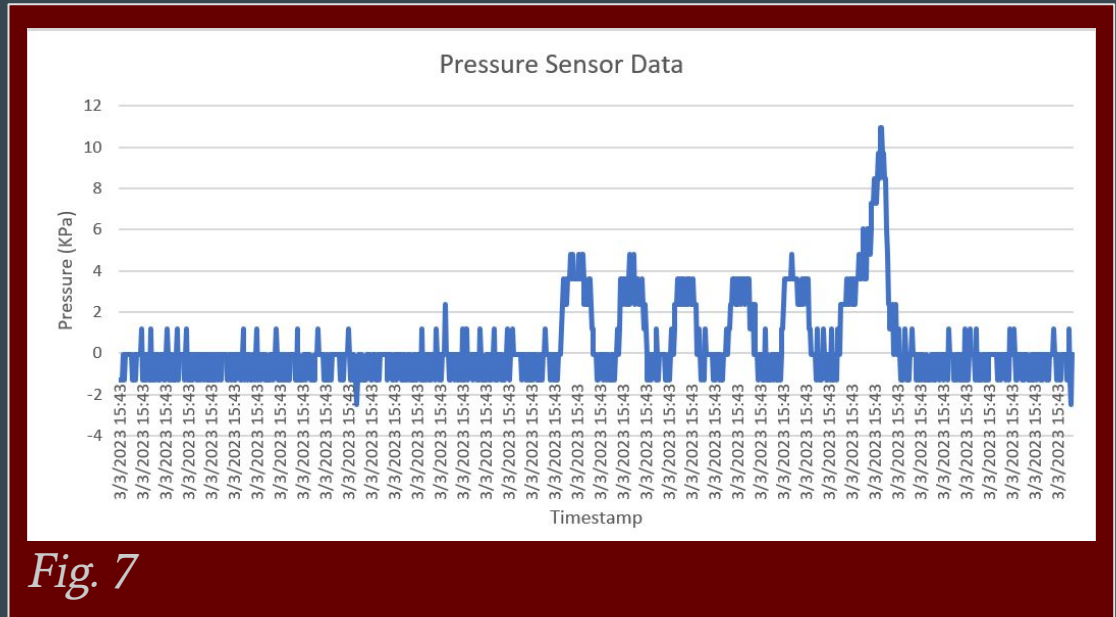


Fig. 7

Code

The code involved (*Fig. 8*) is a simple data logger, and reads once per millisecond (at present. That is likely to change).

```
72 V = analogRead(A0) * 5.00 / 1024; //Sensor output voltage
73 P = (V - OffSet) * 250; //Calculate water pressure
74
75 String dataString = ""; //Create empty datastring
76
77 dataString += (String(time.timestamp(DateTime::TIMESTAMP_DATE))+ " " + (time.timestamp(DateTime::TIMESTAMP_TIME))); //add timestamp to datastring
78
79 dataString += ",";
80
81 dataString += String(P); //add pressure to datastring
82
83 File dataFile = SD.open("datalog.csv", FILE_WRITE);
84
85 // if the file is available, write to it:
86 if (dataFile) {
87     dataFile.println(dataString);
88     dataFile.close();
89     // print to the serial port too:
90     Serial.println(dataString);
91 }
92 // if the file isn't open, pop up an error:
93 else {
94     Serial.println("error opening datalog.csv");
95 }
96 delay(1);
97 }
```

Fig. 8

Wrap Up

Next Steps / Goals

Big Goal

Try to correlate the data from the different sensors to understand pressure patterns

Next Steps

Install sensors and take lots of data so we can begin to have a coherent understanding of what we see

Dunzo