# The Amazing Box

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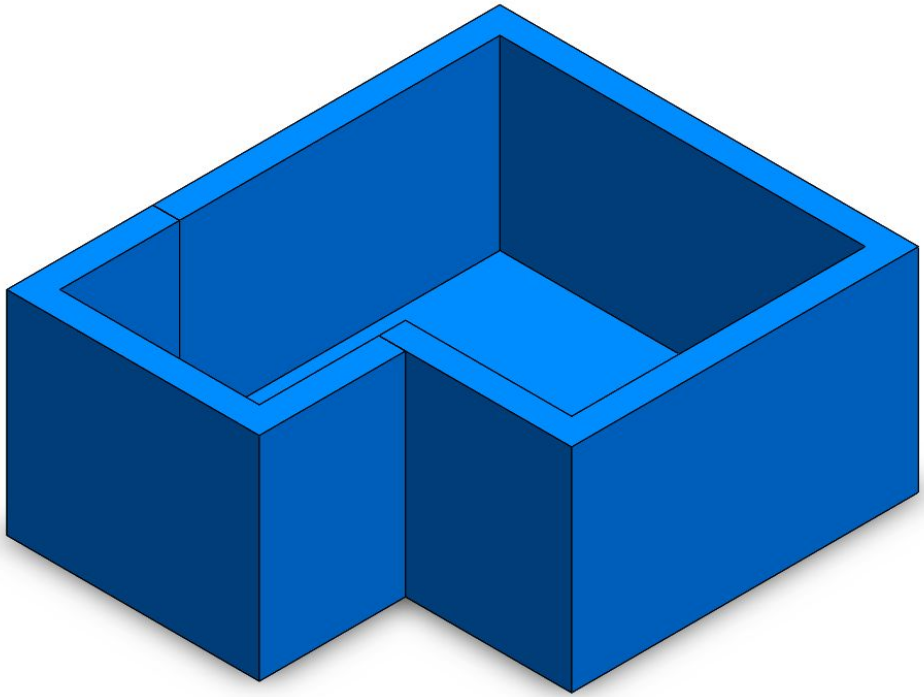
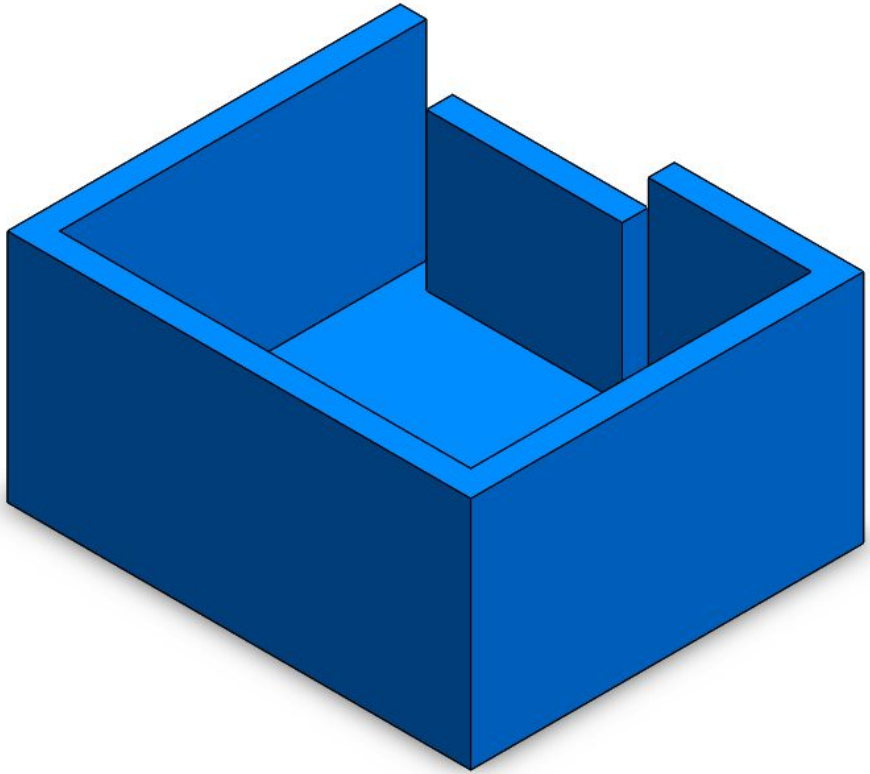
# The Project

- Our goal is to collect data from varying environments to compare
- This was achieved by utilizing the following:
  - A WeMos D1 Board
  - Arduino IDE
  - NI LabVIEW
  - Stevens MQTT Broker



Bottom of Enclosure



Top of Enclosure

# The 3-D Printing

Box base: 3hr 41min, 18.89 meters

Box lid: 3hr 58min,  20.74 meters

5+(vcm*0.057)+printimehrs*0.3=

5 + ( 188.1 * 0.1 * 0.057 ) + 3.68 * 0.3 = 7.18

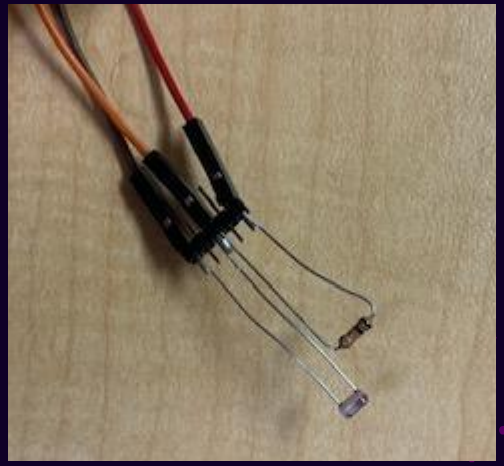
5 + ( 207.4 * 0.1 * 0.057 ) + 3.96 * 0.3 =  7.37

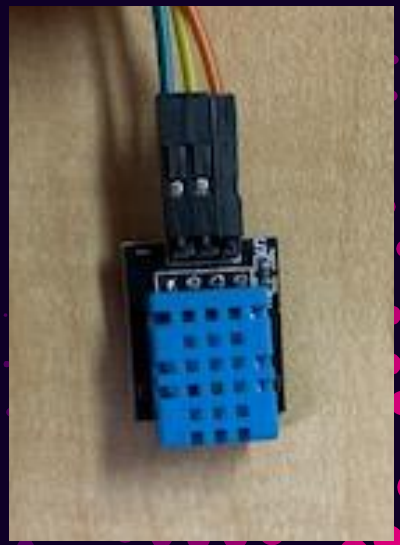
7.18 + 7.37 = 14.55

Estimated cost is $14.55

# Sensors

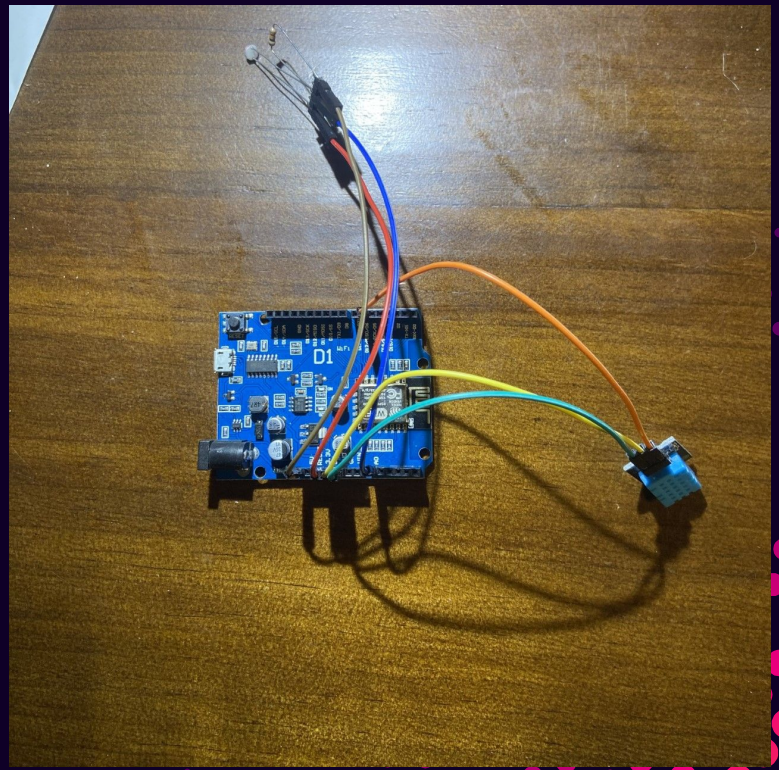
- The board has three sensors:
  - PhotoResistor
  - Temperature
  - Humidity

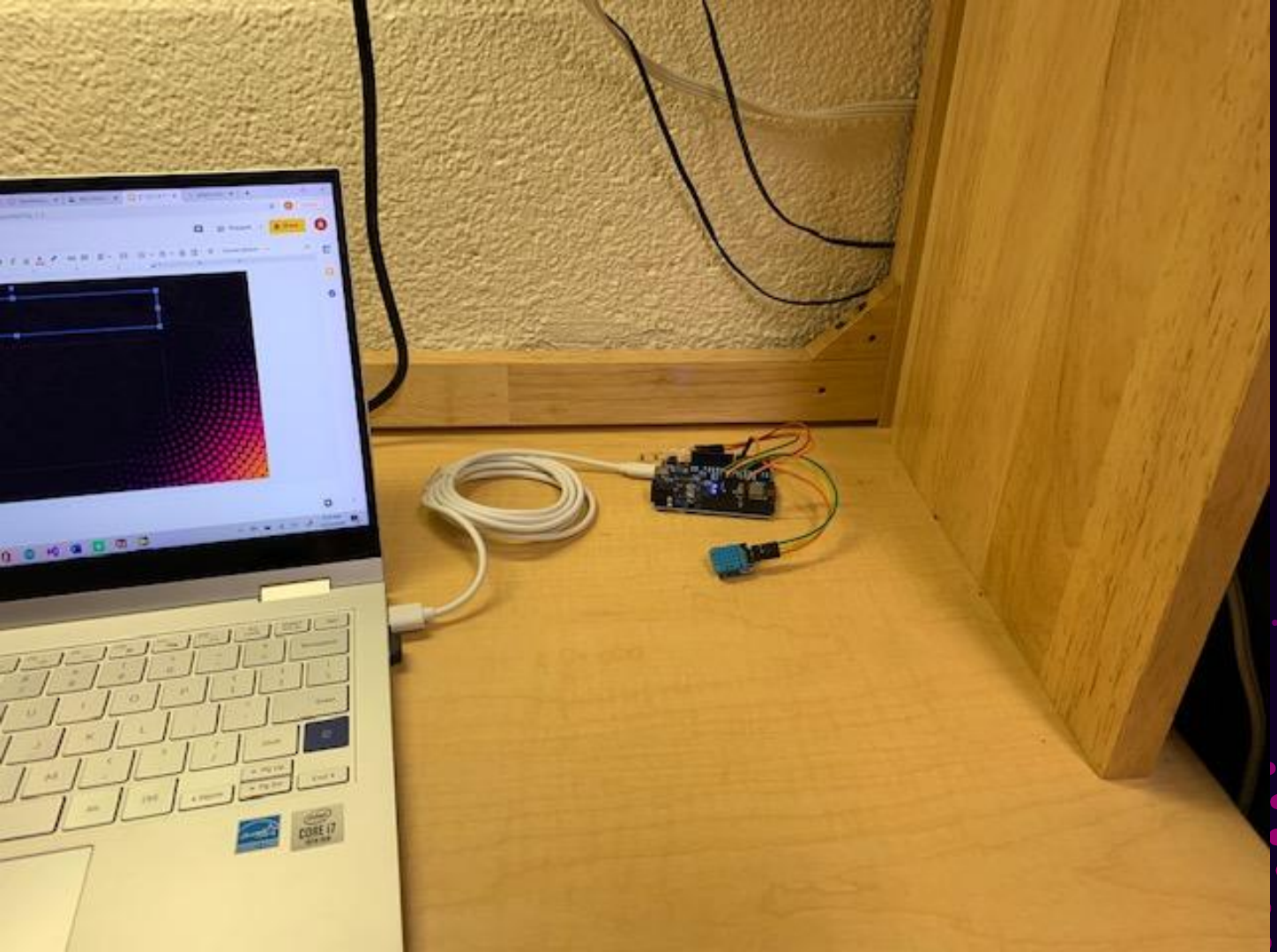




# Circuitry

- Red, blue, and brown wires on the photoresistor. Orange, yellow, and green are on the temperature and humidity sensor.





This was the setup in Ben's dorm room where the collection was taking place.

```
99
100 //MQTT Publish Topics
101 //XXXX will automatically be replaced by last 4 digits of MAC address, this helps insure
102 // that MQTT topic names are unique for each WeMos board
103 char* MQtopic1 = "E121/0F92/Temperature";
104 char* MQtopic2 = "E121/0F92/Humidity";
105 char* MQtopic3 = "E121/0F92/Light";
106 //Note that since this is a real Wemos board -- it runs forever as opposed to
107 // the fakemos -- http://www.dmi.stevens.edu/fakemos/
108
```

# Data Publishing and Subscription

- Data was collected using the Arduino software and WiMos boards.
- This data was then published to the server and then we subscribed to the data.
- This data came as an Excel sheet which was then put into LabView.

# Arduino Software (Publication)

- The WeMos board used the arduino software “WeMosBaselineV4Stevens"
- This software require the board to be connected to the Stevens Media WiFi t publish data to the server.
- This required registering the board's MAC address.

50Data_Processor_BlankTabs_Send.vi

File Edit View Project Operate Tools Window Help

Cloud Data | Temperature | Humidity | Light Intensity

**file path** (dialog if empty)

C:\Users\stoll\Downloads\Data_0F92 (1).csv

**all rows**

| | | | | | |
|---|---|---|---|---|---|
| 0 | 11/19/ | 19:02:22 | 0F92 | Temperatur | 71 |
| 0 | 11/19/ | 19:02:23 | 0F92 | Humidity | 29 |
| | 11/19/ | 19:02:23 | 0F92 | Light | 1 |
| | 11/19/ | 19:02:35 | 0F92 | Temperatur | 71 |
| | 11/19/ | 19:02:35 | 0F92 | Humidity | 29 |
| | 11/19/ | 19:02:35 | 0F92 | Light | 0 |
| | 11/19/ | 19:02:40 | 0F92 | Temperatur | 71 |
| | 11/19/ | 19:02:40 | 0F92 | Humidity | 29 |
| | 11/19/ | 19:02:40 | 0F92 | Light | 1 |
| | 11/19/ | 19:02:45 | 0F92 | Temperatur | 71 |
| | 11/19/ | 19:02:45 | 0F92 | Humidity | 29 |
| | 11/19/ | 19:02:45 | 0F92 | Light | 1 |
| | 11/19/ | 19:02:51 | 0F92 | Temperatur | 71 |
| | 11/19/ | 19:02:51 | 0F92 | Humidity | 29 |
| | 11/19/ | 19:02:51 | 0F92 | Light | 1 |
| | 11/19/ | 19:02:56 | 0F92 | Temperatur | 71 |
| | 11/19/ | 19:02:56 | 0F92 | Humidity | 29 |
| | 11/19/ | 19:02:56 | 0F92 | Light | 1 |

Data

| | |
|---|---|
| 0 | 71 |
| | 29 |
| | 1 |
| | 71 |
| | 29 |
| | 0 |
| | 71 |
| | 29 |
| | 1 |
| | 71 |
| | 29 |

labels

| | |
|---|---|
| 0 | Temperature |
| | Humidity |
| | Light |
| | Temperature |
| | Humidity |
| | Light |
| | Temperature |
| | Humidity |
| | Light |
| | Temperature |
| | Humidity |

scrubbed temp

| | |
|---|---|
| 0 | 71 |
| | 71 |
| | 71 |
| | 71 |
| | 71 |
| 0 | |
| | |
| | 1 |
| | |
| | |
| | 0 |
| | |
| | |
| | 1 |
| | |
| | |
| | 1 |

scrubbed light

| | |
|---|---|
| 0 | 1 |
| | 0 |
| | 1 |
| | 1 |
| | 1 |
| 7 | |
| | |
| | 71 |
| | |
| | |
| | 71 |
| | |
| | |
| | 71 |
| | |
| | |
| | 71 |

scrubbed humidity

| | |
|---|---|
| 0 | 29 |
| | 29 |
| | 29 |
| | 29 |
| | 29 |
| 15 | |
| | 29 |
| | |
| | |
| | 29 |
| | |
| | |
| | 29 |
| | |
| | |
| | 29 |

Temperature 2

| | |
|---|---|
| 20 | 71 |
| | 71 |
| | 71 |
| | 71 |
| | 71 |
| | 71 |

Humidity 2

| | |
|---|---|
| 0 | 29 |
| | 29 |
| | 29 |
| | 29 |
| | 29 |
| | 29 |

Light Intensity

| | |
|---|---|
| 20 | 1 |
| | 1 |
| | 1 |
| | 0 |
| | 1 |
| | 1 |

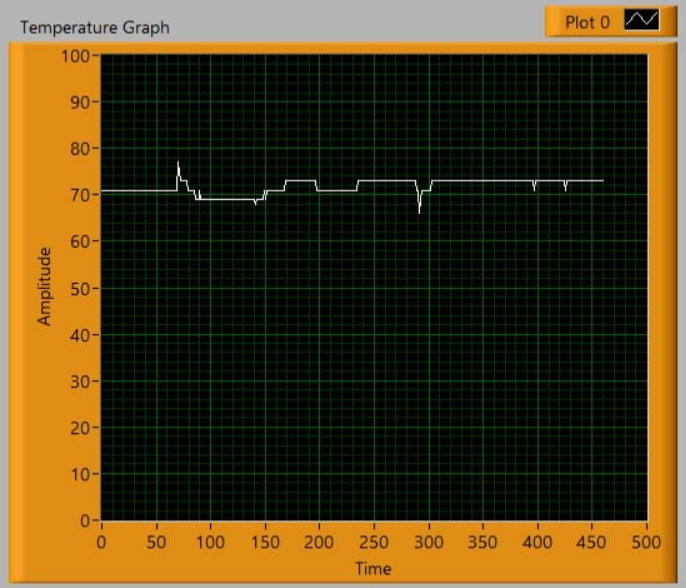


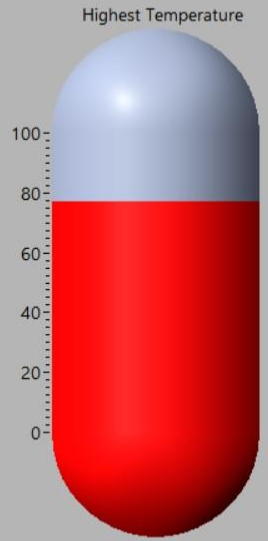
Evaluation

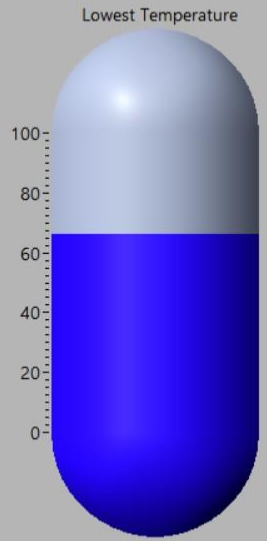
50Data_Processor_BlankTabs_Send.vi

File Edit View Project Operate Tools Window Help

Cloud Data | Temperature | Humidity | Light Intensity






Evaluation

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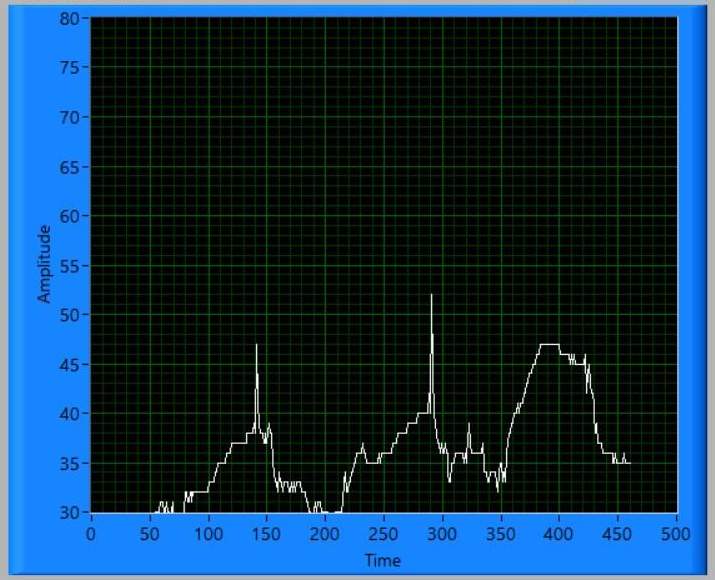
File Edit View Project Operate Tools Window Help

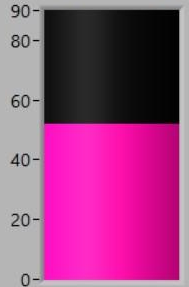
Cloud Data | Temperature | Humidity | Light Intensity

Humidity Graph

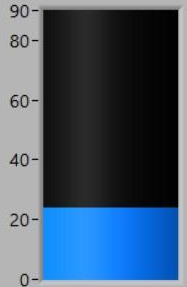
Plot 0




Highest Humidty Tank




Lowest Humidty Tank






Evaluation

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File Edit View Project Operate Tools Window Help

Cloud Data | Temperature | Humidity | Light Intensity

Light Intensity Graph

Plot 0

Amplitude

Time

Light Intensity Maximum

Light Intensity Minimum

Light Intensity (LUX) Graph

Plot 0

Amplitude

Time

NATIONAL INSTRUMENTS
LabVIEW Evaluation Software

Evaluation

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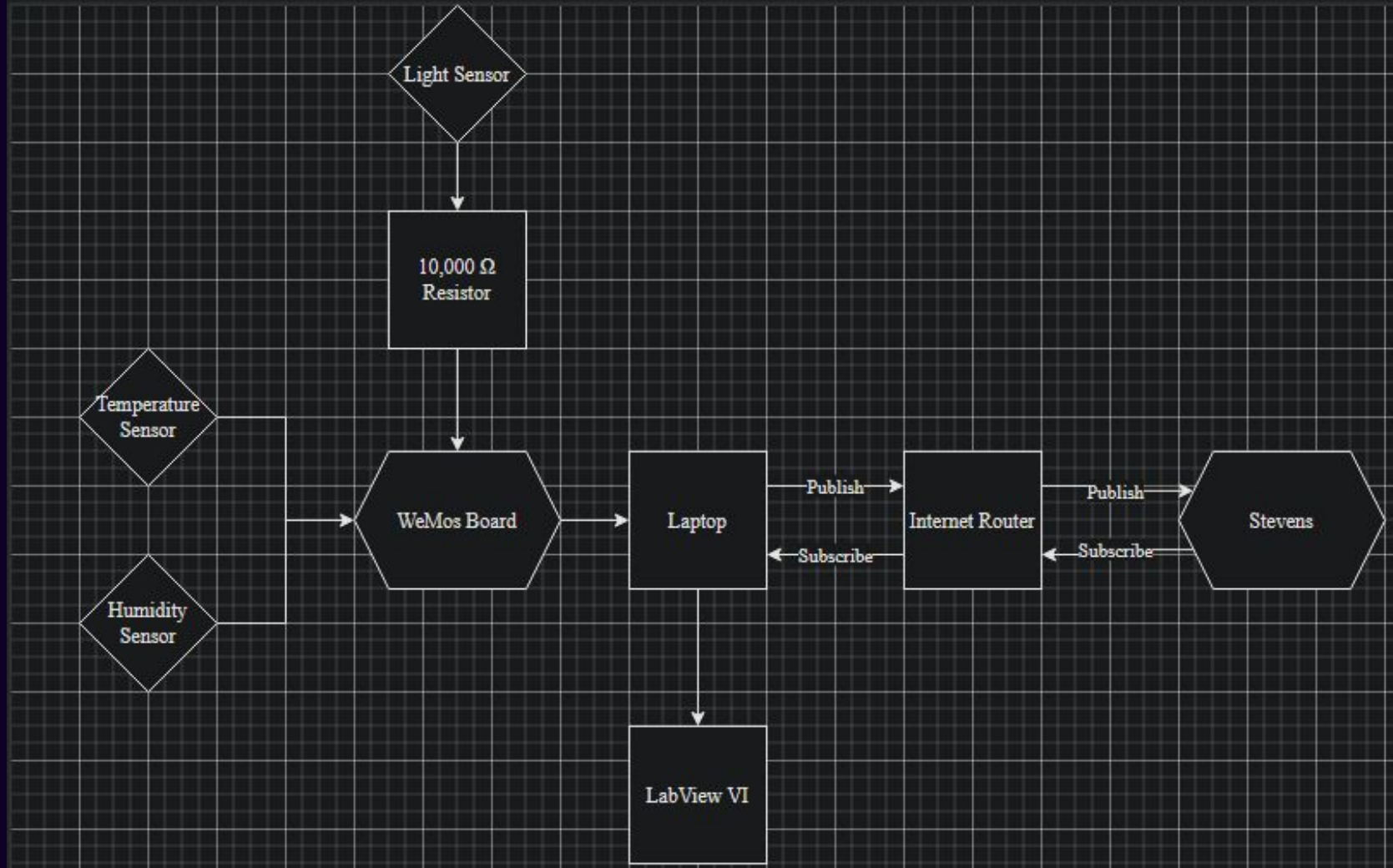
11/22/2020

# Data

This is a screenshot sample of the data that was collected via Ben's board.

http://prooflab.stevens.edu/mqtt/getdata.php?macid=0F92

| | | | | | |
|---|---|---|---|---|---|
| 341 | ######## | 3:38:25 | 0F92 | Temperatu | 69 |
| 342 | ######## | 3:38:25 | 0F92 | Humidity | 35 |
| 343 | ######## | 3:38:25 | 0F92 | Light | 0 |
| 344 | ######## | 3:48:25 | 0F92 | Temperatu | 69 |
| 345 | ######## | 3:48:25 | 0F92 | Humidity | 35 |
| 346 | ######## | 3:48:25 | 0F92 | Light | 0 |
| 347 | ######## | 3:58:25 | 0F92 | Temperatu | 69 |
| 348 | ######## | 3:58:25 | 0F92 | Humidity | 36 |
| 349 | ######## | 3:58:25 | 0F92 | Light | 0 |
| 350 | ######## | 4:08:25 | 0F92 | Temperatu | 69 |
| 351 | ######## | 4:08:25 | 0F92 | Humidity | 36 |
| 352 | ######## | 4:08:25 | 0F92 | Light | 0 |
| 353 | ######## | 4:18:25 | 0F92 | Temperatu | 69 |
| 354 | ######## | 4:18:25 | 0F92 | Humidity | 36 |
| 355 | ######## | 4:18:25 | 0F92 | Light | 0 |
| 356 | ######## | 4:28:25 | 0F92 | Temperatu | 69 |
| 357 | ######## | 4:28:25 | 0F92 | Humidity | 36 |


Light Sensor
10,000 Ω Resistor
Temperature Sensor
Humidity Sensor
WeMos Board
Laptop
Publish
Subscribe
Internet Router
Publish
Subscribe
Stevens
LabView VI

# Conclusion

- Through this project we have learned that it is quite hard to get a project done when completely online.
- We will remember collecting data.
- We could have seperated the work a bit differently and more efficiently. We could have also been working a bit more diligently.

# Future Advice

- For the next class, we advise that you do not put off the collection of the data. We waited a little too long to collect data and nearly ran out of time to collect it before our LabView licenses ran out.