

D2 Progress Report.md

Pi Weather Station - D2 Progress Report

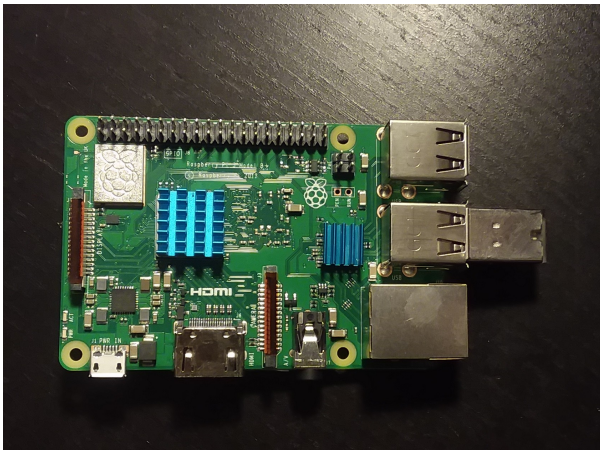
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Status

At this stage we have acquired our hardware and started planning the network structure of our weather station system and its final form as an end product. The stand alone sensor array will carry its own power source and communicate via wifi to the Raspberry Pi, which will act as a hub to receive the data and project it to the web. Additionally the Pi will be located in a sheltered area with access to a wired power source. Since we realize that this requirement may cause the Pi to be considerable distance from the sensor array in some settings (or otherwise separated by walls, etc), we felt that a WiFi connection would provide the most stable connection. Our next step is to program the Pi and ESP8266 in a way that facilitates communication and data extraction. For this project we will be evaluating power consumption, resolution and accuracy, and cost and marketability.

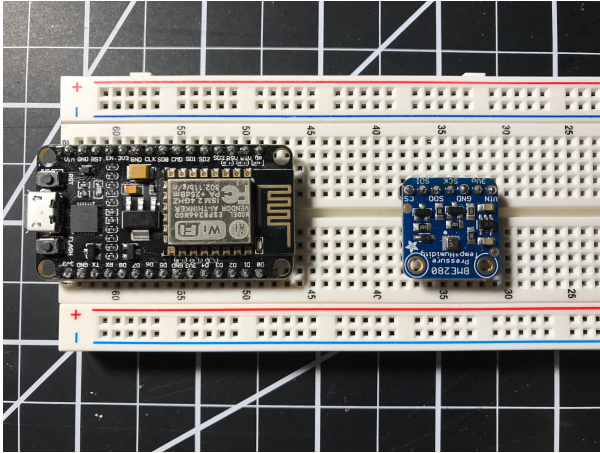
Boards and Additional Hardware

Raspberry Pi Model 3 B+



- Will act as access point for communication with ESP8266
- 5V DC power consumption (from wall outlet or vehicle)

ESP8266 - WiFi Development Board



- Used to interface with the BME280.
- Will communicate with the Pi over WiFi using built in WiFi chip.
- Will be powered using a 450mAh Lithium Polymer Battery
- Estimated Power Consumption of the Device:
 - Measured Power On Current Draw (with BME 280 plugged in): 92mA
 - This gives an estimated battery life of: 4.9hrs
 - In order to increase the battery life we will only sample data every 10 minutes, and we will put the ESP8266 into deep sleep mode when not sampling.
 - This results in a measured current draw of: 9mA
 - Increasing the battery life to (assuming the non sleep time is negligible): 50hrs
 - If we want to increase the battery life further we can use lower power communication such as Bluetooth instead of WiFi.

BME280 - Temperature, Pressure and Humidity Sensor

- Sensor communicates with the ESP8266 using the I2C protocol
- Resolution and Accuracy of the Sensor:
 - $\pm 1^{\circ}\text{C} = 1.8^{\circ}\text{F}$
 - More than adequate for a weather station
 - $\pm 3\%$ Humidity
 - $\pm 100\text{ Pa}$
 - Standard atmospheric pressure is 101,325 Pa
 - This gives accuracies around $\pm 0.1\%$ at the values we expect to measure