Portable Local Lightning & Weather Detection Apparatus (PLLAWDA)

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Introduction

Many people who venture out to places that have no cell service for a long duration of time may find that it can be difficult to know when dangerous weather is nearby and when it is best to seek shelter. To help with this issue, the Portable Local Lightning and Weather Detection Apparatus (PLLAWDA) was created. PLLAWDA is a device that collects data on the local weather conditions and displays that information on a screen for easy viewing. This device's purpose is to serve as a tool to prevent weather-associated dangers such as nearby lightning for users out there for a safer outdoor experience.

Methodology

1. At the beginning of this project, an Arduino Due was used as well as an AS3935 lightning sensor, BME280 sensor and openLog. The data the sensors collected was displayed on an LCD screen. During the start-up, I included a diagnostic point to let me know if the sensors were working properly. The hardware resided in a drop & waterproof container.

2. Once all the components were properly integrated. The device was tested during the summer on the accuracy, power duration, and handiness of the apparatus.
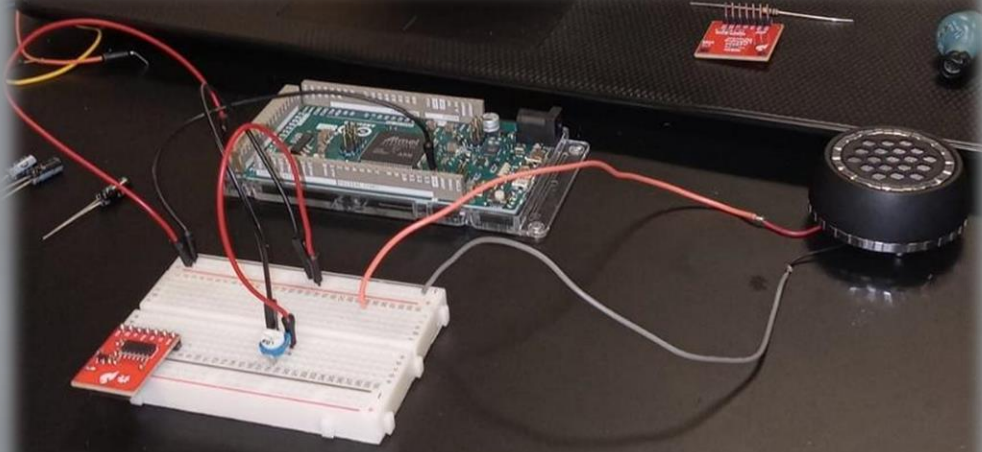
3. After the summer testing, I analyzed the data and started planning the next steps for PLLAWDA. This included researching new additions to the device like a real-time clock and an audio lightning alert system. The following fall and spring semesters were dedicated to researching and adding these new additions to the second rendition of PLLAWDA.
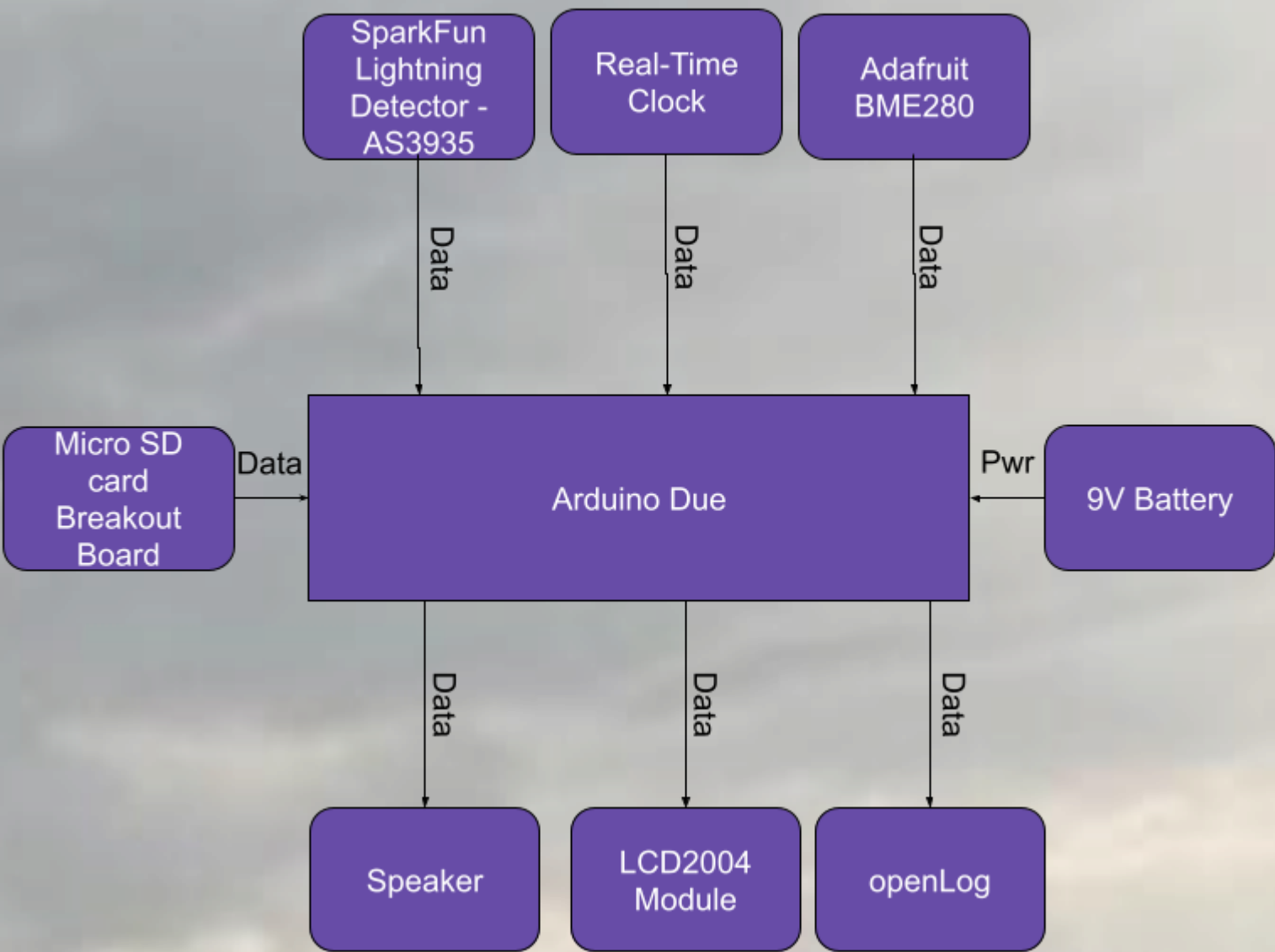
PLL&WDA Block Diagram

Results

Data Collected on June 6, 2022 6:10-6:20 pm	PLLAWDA (observed inside)	Actual Conditions (WeatherBug & Compass)	Timeanddate.com (At 6:50 pm)
Temperature (°F)	79.68	51	64
Humidity (%)	35.02	90	64
Pressure (millibar)	738.0	1021.33	1008.81
Altitude (Ft)	~8507	~8790	N/A

Data Collected on July 8, 2022 4-5 pm	PLLAWDA (observed outside)	Timeanddate.com (At 4:58 pm)
Temperature (°F)	80.56	83
Humidity (%)	44.27	44
Pressure (millibar)	745.9	1017.95
Altitude (Ft)	~8231	N/A

Conclusion

Overall, the prototype of PLLAWDA was generally successful. It sensed the temperature with about 2.9% error, humidity with about .6% error, pressure with about 27.1% error, and altitude with about 4.8% error. The lightning sensor failed to detect any lightning as well as any other electrical signals. The general durability of the actual hardware could be better, but the casing pulled through with minimal damage. Many fixes and several additions were made including a real-time clock and a lightning audio alert system. Moving forward, PLLAWDA will continue to be tested on its abilities and built upon for improvement.

Acknowledgements

References

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