Lumi Monitor

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INTRODUCTION

Goal: Make parenting easier

Our project, the Lumi Monitor is intended to ease the life of parents by keeping track of the living conditions of their infants and ensuring the safety and comfort of their baby through installation of an integrated hardware in the baby's room. In this project we used three sensors namely: Tsl2591(Light sensor) along with a Neopixel ring, DHT22 (Temperature & Humidity Sensor), SPH0645LM4H (Microphone Sensor). This project is unique since it allows parents to use a variety of functionalities through an Android app with a friendly User interface. The main hardware board that we are using to implement the project is the Broadcom Development platform, the raspberry pi 3B+.

Parts & Facilities

Lumi Monitor Project
Budget Plan

Parts	Description	Quantity	Ratings/Value	Supplier	Unit Price(CAD)	Shipping(CAD)	GST/HST(taxes)	Grand Total(CAD)
RPI	Raspberry Pi 3 Kit	1	Pi B+	ABOX	99.99	0	13	112.99
DHT22	Temperature/Humidity Sensor	1	3.0-5.5V	Adafruit	12.99	5.5	1.69	20.18
TSL2591	Luminosity Sensor	1	3.0-5.5V	Adafruit	11.99	7.4	1.56	20.95
WS2811/2812	Neopixel LED Strip	1	5.0V	Adafruit	3.05	5	0.39	8.44
SPH0645	Microphone Sensor	1	1.6-3.6V	Adafruit	6.95	0	1.75	8.7
Parts Kit	Essential tools for project	1		Humber College	130	0	0	130
PCB	Printed Circuit Board	1		Humber College	"			
Enclosure	3D Printed Enclosure	1		Humber College	"			
Total Expenses								301.26

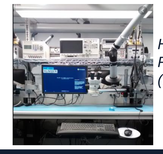
TSL2591 Luminosity Sensor

SPH0645 Microphone Sensor

Broadcom Development Platform (RPI 3B+)

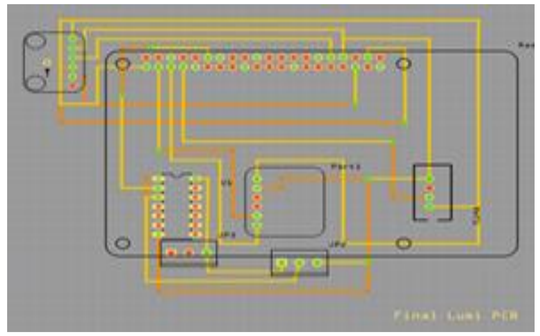
DHT22 Temperature & Humidity Sensor

Neopixel LED Strip

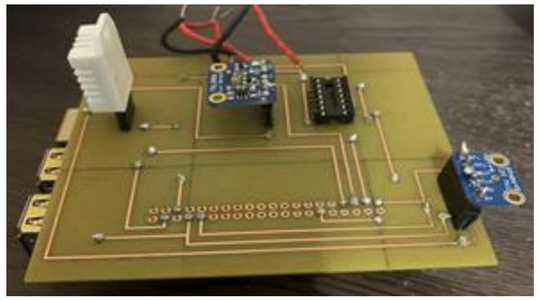


Humber College Facilities (Prototype Lab)

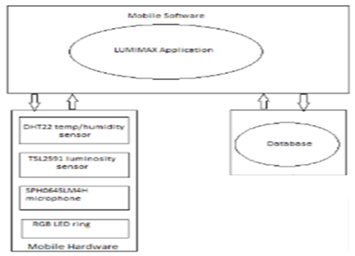
METHOD



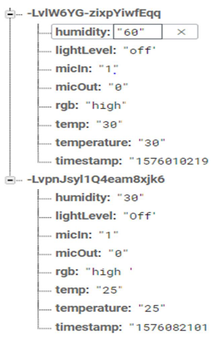
PCB Design using Fritzing Software



Final PCB with sensors attached and mounted on top of RPI



Block Diagram of how system works with all of its components.

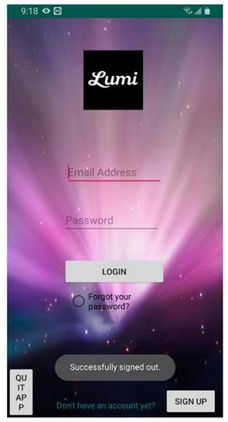


Firebase Database Design to accommodate data.

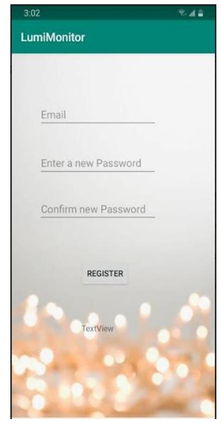
During the development of this project, we have made use of various software to be able to complete our objective. Some of most crucial software were: Fritzing(For circuitry), Firebase(Database purposes, Ganttproject(Scheduling), Cura (3D Printing).

RESULTS

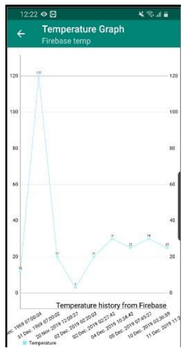
Below are some images of how the final app works and interacts with our database.

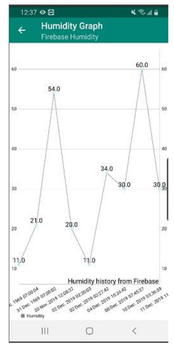


Login Screen



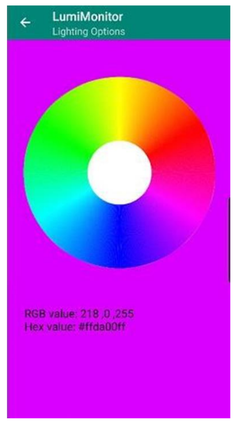
Registration Screen





Graphical representation of Temperature & Humidity from Firebase data

Temperature & Humidity Data retrieval



Color Wheel for adjusting color of Neopixel LED Strip

Final Prototype

Our prototype is complete and as mentioned before, the PCB is working as expected except for the Neopixel LED Strip issue which we were unable to solve before campus closure. At the moment, the prototype does not have an enclosure as a result of campus closure. However, we still sent the files before the closure but unfortunately, we were unable to pick up the final 3D printed product from the prototype lab as it closed due to the repercussions of COVID-19. From what we sent to the lab, this is what the product should have looked like:

Tentative Final Design of the Lumi Monitor Enclosure

CONCLUSIONS

Achieved:

- Temperature & Humidity Monitoring
- 2-way communication channel
- Light & Sound Detection
- Signal Processing Circuit
- Android Mobile Remote Access
- RGB light controlled by color wheel

Future Considerations:

- Add Camera for visual interaction
- Add fan a Servo motor to act upon temperature & humidity readings

REFERENCES

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https://www.adafruit.com/product/3421
https://firebase.google.com/docs/database/android/start

ACKNOWLEDGEMENT

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