



University of Ottawa

GNG 1103[B]: Group 19

Deliverable G – Prototype II and Customer Feedback

Group Members & Student Numbers:

Yale Botly (300229756)

Ali Gohar (300126709)

Gautam Mehta (300241579)

Haonan Zhou (300264669)

Abstract

In this deliverable we discuss our prototype II and the analysis of how prototype testing has gone. After the deliverable analysis is completed a bill of materials must be made and prototype III test plan is made.

1. Key Concepts

1.1. Microcontrollers

Microcontrollers are small computers that store codes and executes those codes using outside hardware. They are key components to any complex circuit. The main microcontrollers used are the UNO R3 style controller.

2. Prototype II Components & Analysis

To preface this section, due to access to materials portions of our prototype II test plan has have been omitted. Arguably the most crucial portion of our prototype II is the circuit. This portion of our prototype has a heavy focus on functionality, and this is demonstrated clearly in our physical circuit and code applications. Firstly, we have images detailing our serial screen and the two situations where there is a driver present and a child in the vehicle. The Serial Window clearly shows that the driver is present with the 1 and the child is present with the 1.

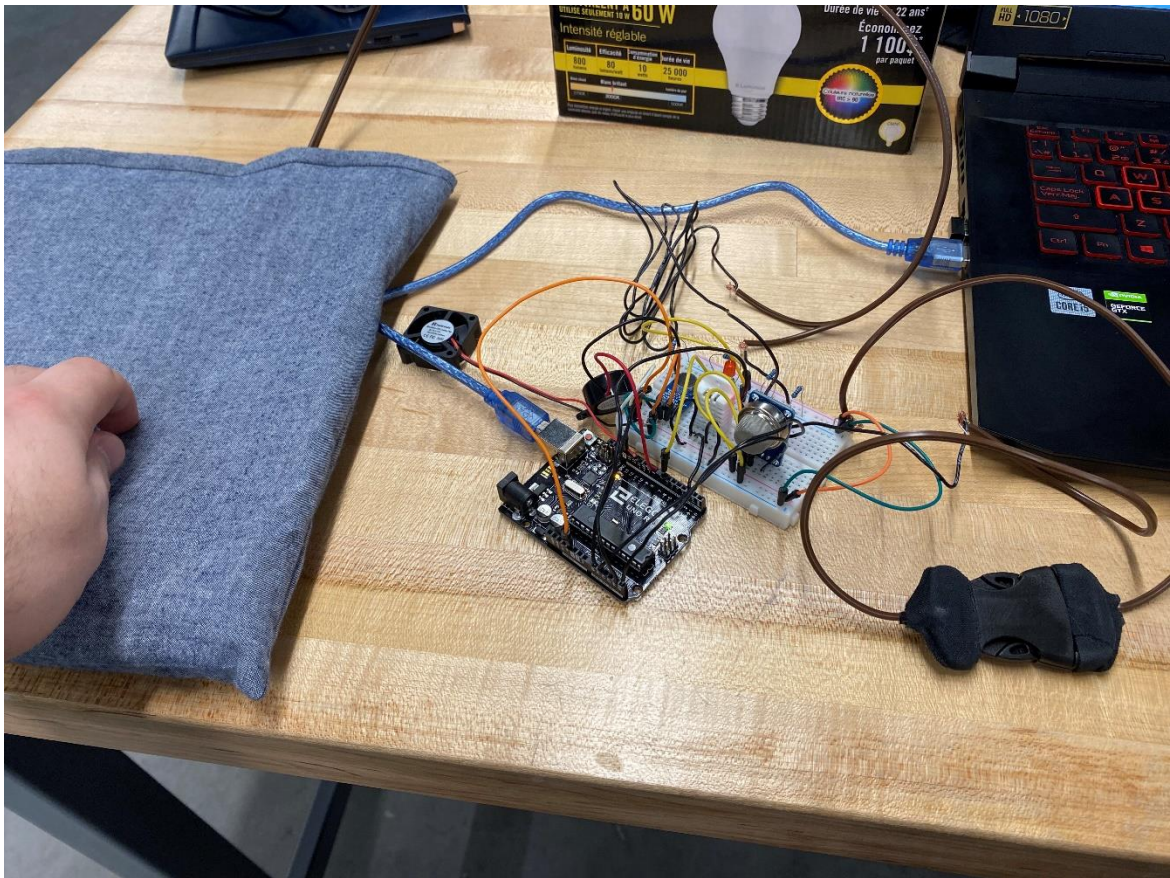


Figure 1: Kid and Driver

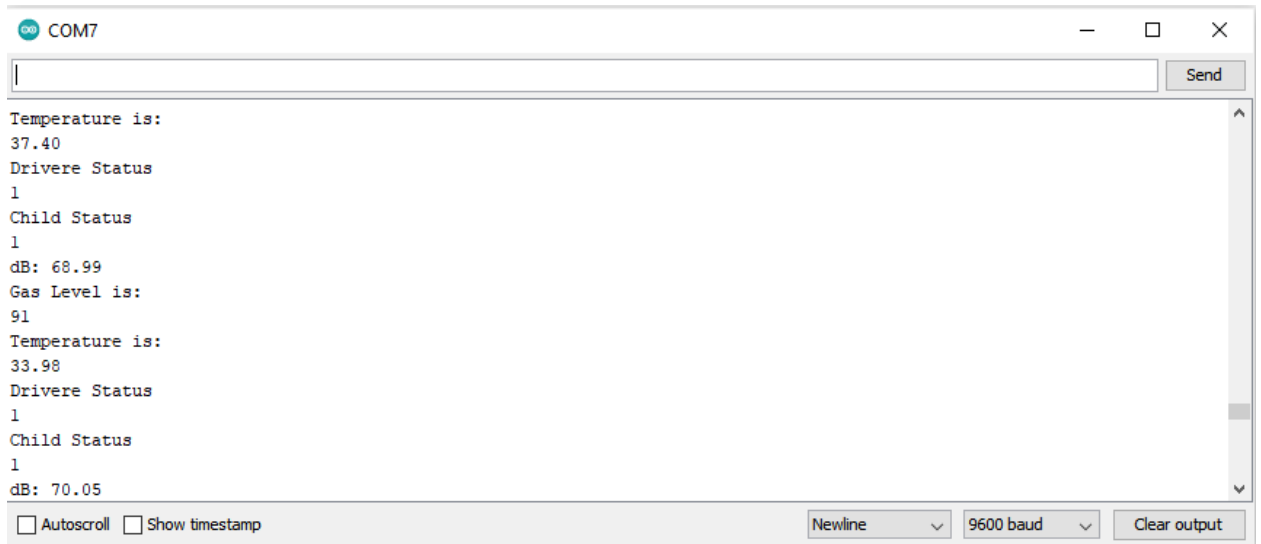


Figure 2: Case 1 Window

The next situation is where there is a child present and no guardian. This case is shown clearly in the Driver system reading 0 and the Child system having a reading of 1. In this situation the guardian is notified that there is a child in the vehicle with a flashing light and buzzer, as well as a notification via phone.

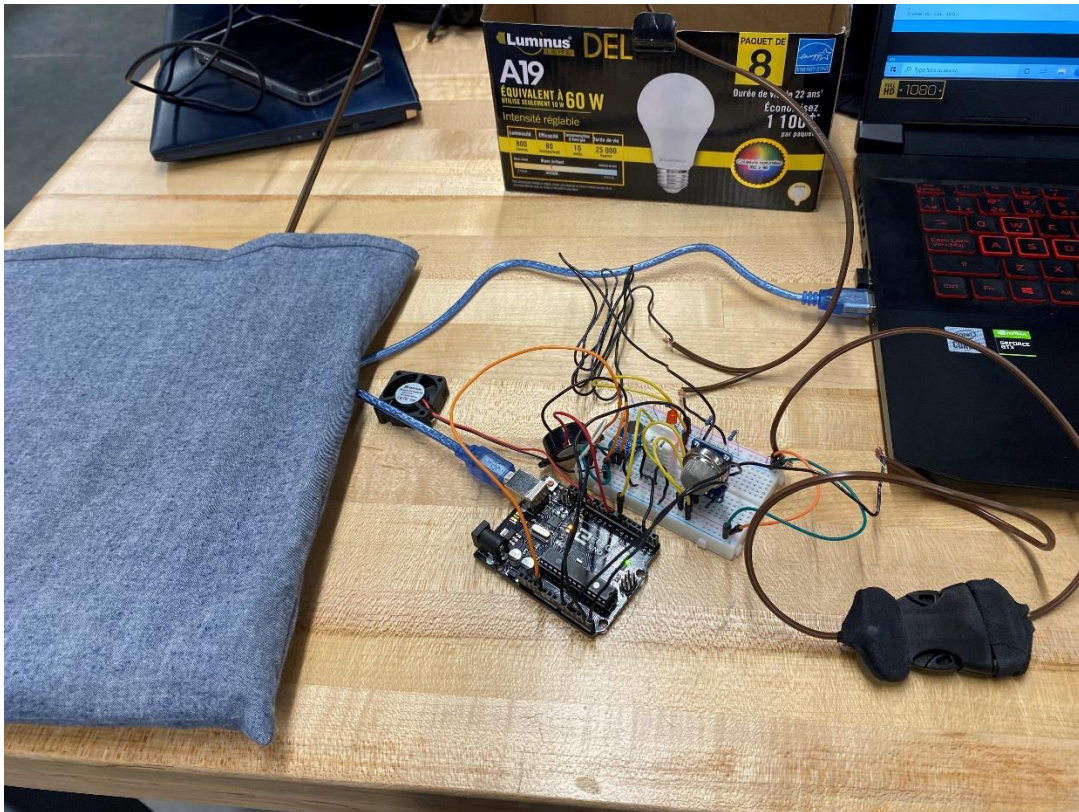


Figure 3: No driver and Kid

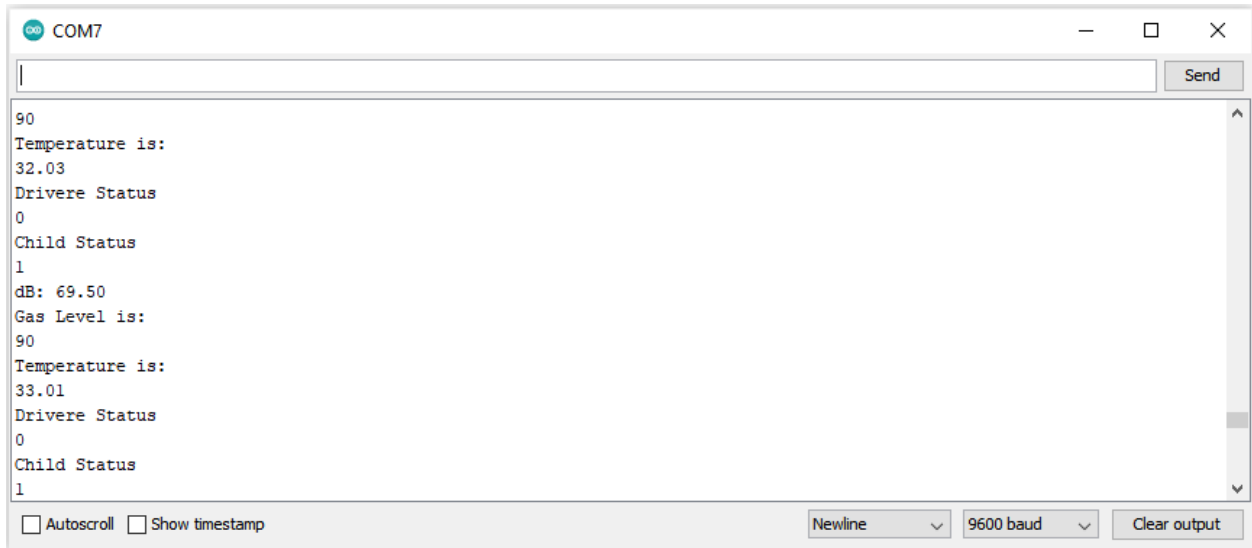


Figure 4: Case 2 Window

The next scenario that is present in our prototype is when the temperature is at an unsafe level. This scenario trips when there is no driver and a child is present. This scenario also causes the buzzer to trip and beep, alerting bystanders. Along with the buzzer there is also our LED strip which will be flashing (represented by the LED on our breadboard) as well as our fan, which will supply fresh and cool air to the child. The guardian will also receive an alert via our phone application.

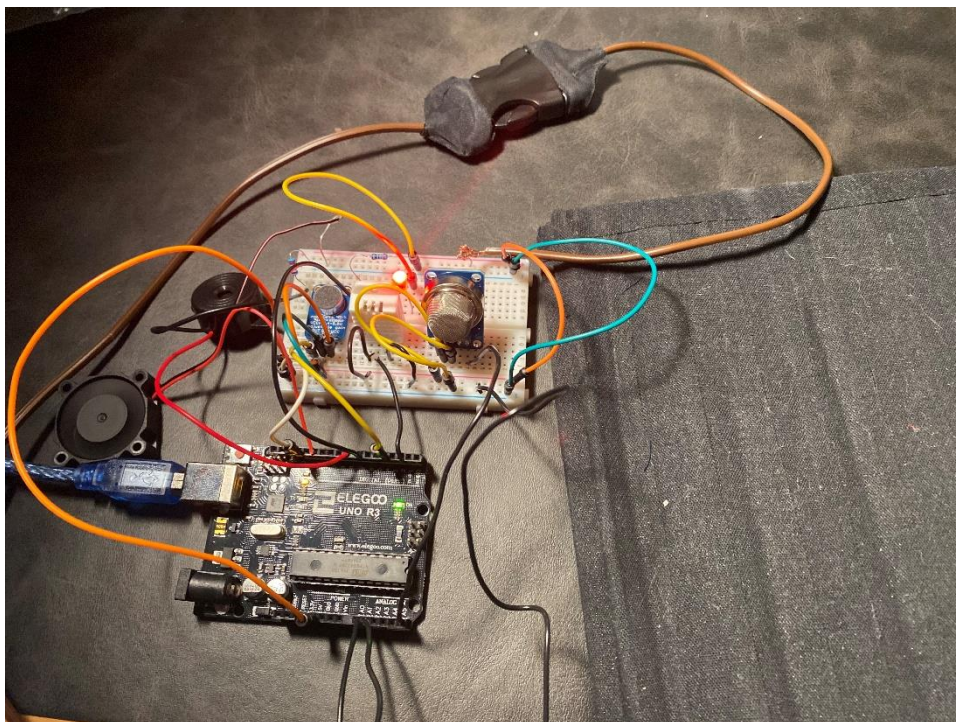


Figure 5: Poor temp

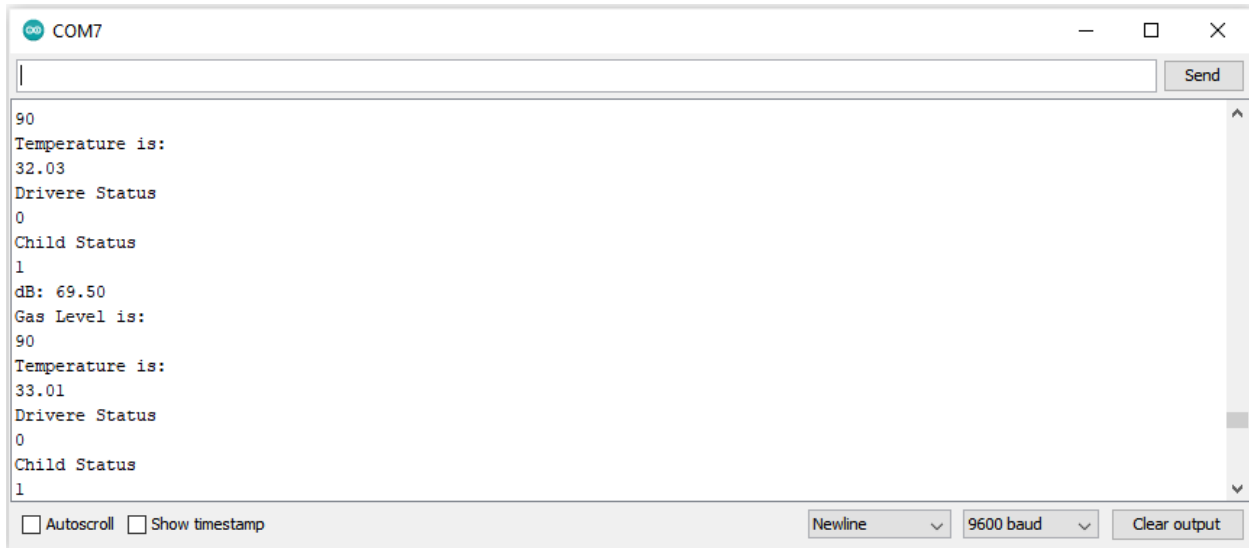


Figure 6: Case 3 Window

The next scenario that is present in our prototype is when the child is panicking profusely. This scenario trips when there is no driver and a child is present. This scenario will trip our LED strip which will be flashing (represented by the LED on our breadboard) as well as our fan, which will supply fresh and cool air to the child. The air will calm the child and the lights will alert the guardian to the current location of the vehicle. Along with the physical alerts it will also send a notification via our software.

(Please note that actual sound threshold will be around 110 db (below average child crying levels), however for testing it was lowered to 70 db)

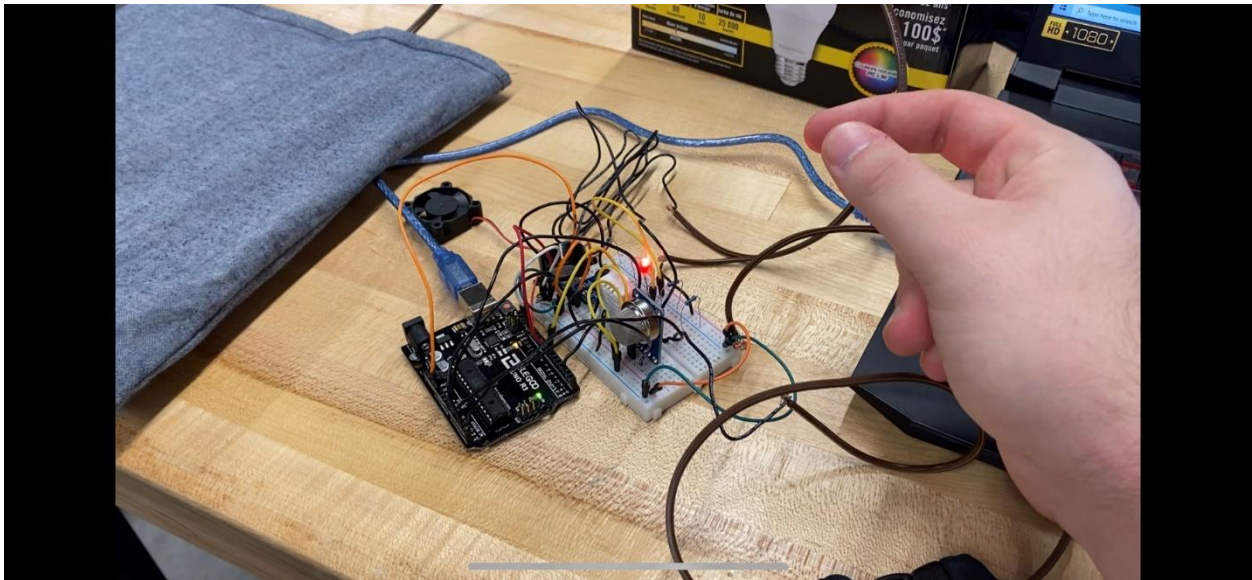


Figure 7: Sound Check

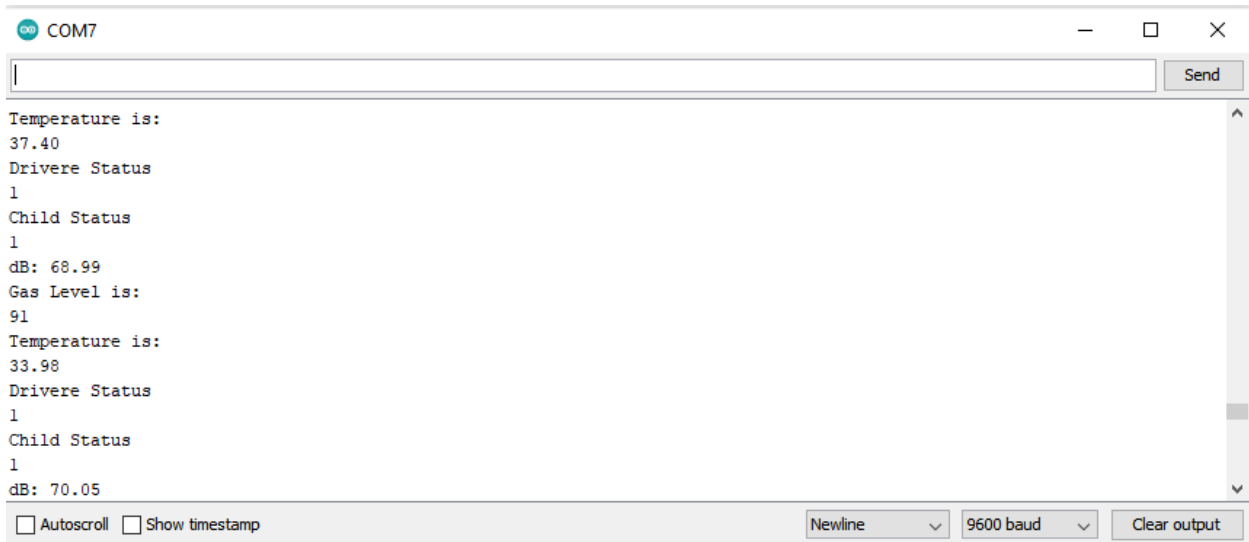


Figure 8: Case 4 Window

In order to complicate the whole notification application, the message reminder on mobile phones is indispensable. To build this reminder system we used three websites, they are “Thinkable website, One signal website and firebase. In Thinkable web we created the initial interface when people use it.

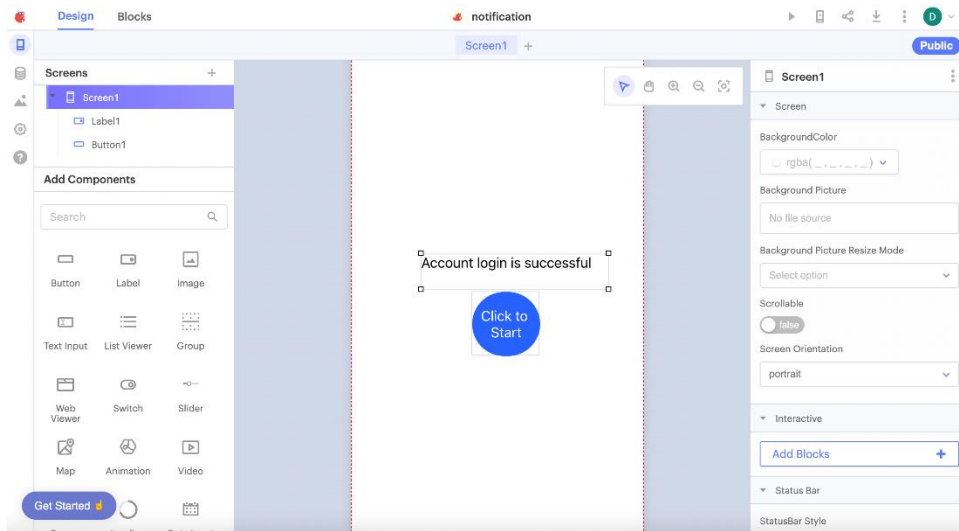


Figure 9: Login Webpage

Additionally, we got the application service key, and ID which is needed for “one signal ” website from the Firebase website.

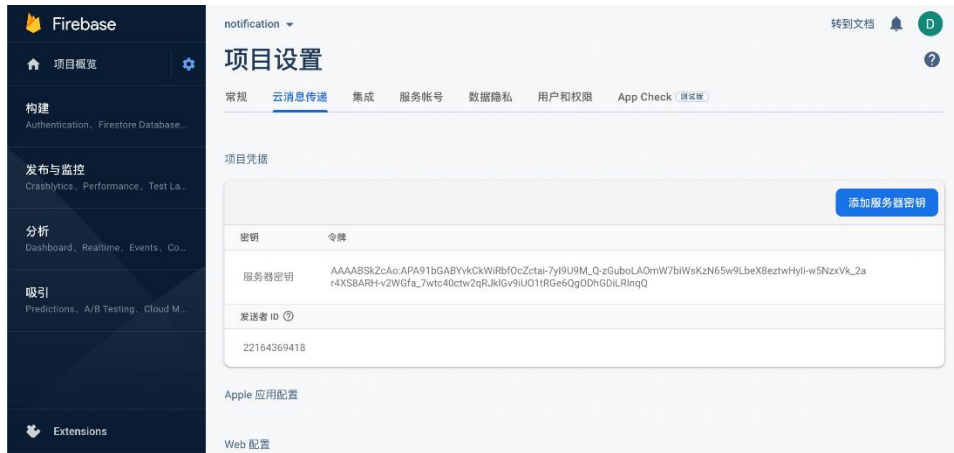


Figure 10: Application service key, and ID

Lastly, by using the application service key and ID from “firebase” website we can start to edit what we want to send to those people who have download this application.

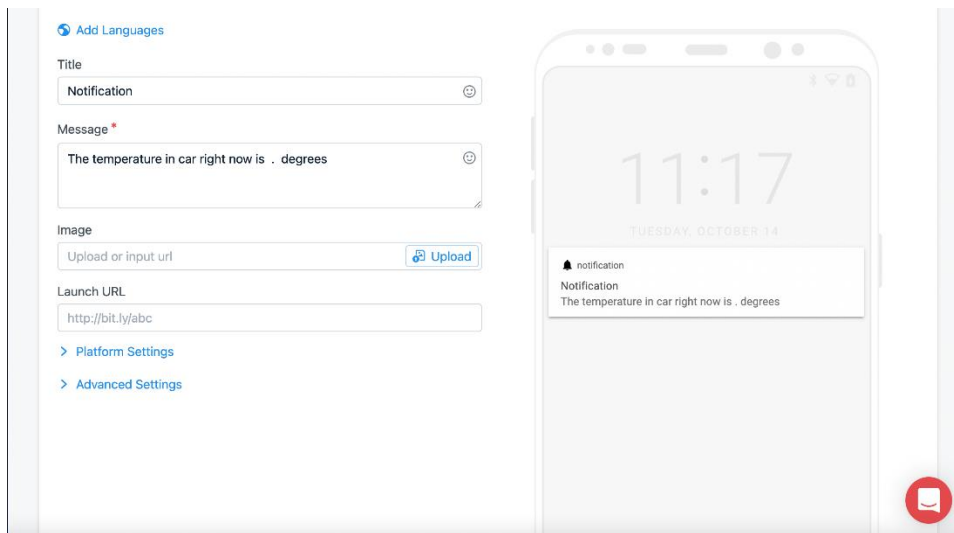


Figure 11: Message

Along with all other aspects of prototype II there was also a test run of our model for the fan casing, this performed well and has a solid build. We feel that it can be improved upon with a sleeker design.

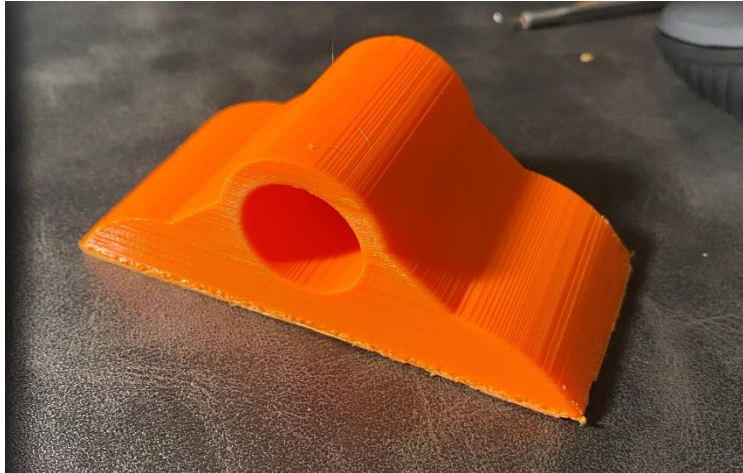


Figure 12: Auxiliary Fan

Lastly there is our code, This code is mainly the alert and central system code. All of our codes have been made into functions so that they can easily be shared and inputted the void loop area. It has been shared in link: [University of Ottawa – GroupB 19 – Prototype II Code.docx](#)

Considering the material access issues it is safe to say that the main components of our prototype II have performed adequately.

3. Customer Feedback

Due to the nature of our meeting (Pre recorded video) we have not gotten any feedback. For our final prototype we will be looking into a rechargeable battery source as per the customer’s general specifications.

4. Updated BOM

Owing to the limited budget, we need to spend money prudently and cautiously. Thus, we have listed a potential costs table below.

Part#	Part Name	Description	Cost (\$)
1	Humidity/Temperature sensor (DHT22)	Link	9.99\$
2	Gas Sensor (MQ-6)	Link	6.50\$
3	Microphone amplifier (3.7W ClassD)	Link	8.00\$
4	Buzzer (Active)	Link	2.00\$
5	Auxiliary Fan	Link	6.00\$
6	Elegoo - Micro control.	N/A	0.00\$
7	9V connection cord	Link	1.30\$
8	Velcro	Link	0.11\$
9	9V Battery	Link	0.00\$
10	LEDs x 4	Link	1.20\$
11	5V LED strips	Link	5.00\$
12	Thinkable	Link	0.00\$

13	Laser Cutting	N/A	0.00\$
14	3-D printing	N/A	0.00\$
15	Wiring x2	Link	5.00\$*
16	Double sided adhesive	N/A	0.00\$
18	Wood MDF	TBD	2.50\$
19	Filaments	N/A (Leftovers)	0.00\$
20	Zipties x4	Link	2.36\$
21	Resistors x7 (2x 220ohm)	Link	0.70\$
22	Protoboard	Link	0.50\$
23	GSM Module	Link	5.30\$
24	SIM 800I	Link	2.68\$
Total			59.58\$

4.1. Equipment List

Part	Description
Protoboard	Wiring block used to centralize circuits
Multimeter	Use to measure electronic components of the system
3-D printer	This machine will be used to make the case for the sensor and possibly other things
Laser Cutter	This is a machine that will be used to cut out the pieces for our cases to the Arduino
Soldering/solder	Used to connect wiring between sensors and
Jumperwires	Used to make non permanent connections during the prototyping stage
ThinkerCad	Used to virtually create circuits before physical production begins
DHT lib	Library for the DHT 22 sensor
MQ-6 lib	Library for the MQ-6 sensor
Class D lib	Library for Class D microphone Amplifier

5. Planning for Prototype III

5.1. Finalizing Product

5.1.1. Why

This is now our last iteration of the product and given time constraints it should now be completed by the end of our testing phase.

5.1.2. What

This round of testing will encompass/show the entirety of our product. Our product will consist of each separate module (Sensor Module, Driver Sensor, Auxiliary Fan, Arduino Housing, Buzzer Housing, Child Sensor, and Lighting Alerts)

5.1.3. When/How

Testing will be completed on the 23rd of November, 2021 and will consist of testing the system as a whole with a variety of situations. These testing's will simulate as many scenarios as possible.

7. Wrike URL

<https://www.wrike.com/workspace.htm?acc=4975842&wr=20#path=folder&id=758826352&vid=47240218>