

BEE AWARE

Maria AlQubtia High School

Hawalli Educational Area

Name of the group members:

Laila Khaled AlNajjar

Noora Mohammed AlSumait

Farah Farouq AlAsbah

Name of the project supervisor:

Maysaa Mousa AlAsbah

Civil id for the members:

Laila : 302051800976

Noora : 302033100343

Farah : no civil id

Maysaa : 284090400063

Phone numbers for the members :

Laila : +965 6033 7172

Noora : +965 5122 6189

Farah : +972 59-556-4926 (WhatsApp)

Maysaa : +972 59-761-7796 (WhatsApp)

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Abstract:

By researching the percentage of people that are being killed or severely injured by car collisions that are caused by phone distractions, we were motivated to do more research on all the inventions that aim to prevent those collisions. Unfortunately, we found nothing that caters to the majority of accidents which are caused by phone distractions.

In doing all this research, it resulted in us thinking of a project which focuses on preventing such tragedies from happening. So we invented our (BEE ~~IS~~ AWARE) project which is a sensor that is connected to multiple outlets (application, LED screen, gate) that are designed and programmed to prevent cars from colliding with students. Our project will definitely make a noticeable dent on the amount of collisions, by making distracted drivers aware of what is ahead of them and preventing students from crossing when a car is near.

The goals and objectives that we would like to achieve with this App:

- Decreasing crosswalk fatalities and injuries.
- Raising awareness of the bad effects of using phones while driving.
- Enforcing the importance of staying alert and focused while driving.
- Guaranteeing the safety of pedestrians.
- Making people feel safer and comfortable of their surroundings.

Acknowledgements and Dedications:

We would like to thank the people who helped us with this project:

- Maysaa Mousa AlAsbah (our supervisor for the project)
- Manal AlMutairi (our school principal)
- Muna AlKandari (our school's head of the physics department)
- The communication engineer Mohammad Badwi that helped us with tips on programming.

We would also like to dedicate our project to all the families of children and students that are in constant worry of careless drivers. And to the students that are sadly frequently exposed to all the dangers of roads and cars.

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Causes of car accidents

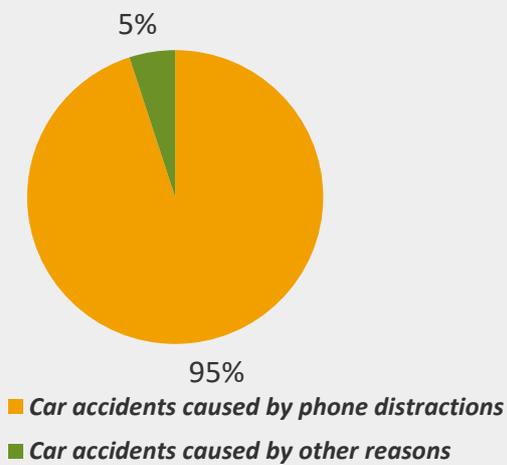


Chart 1

Causes of Car accidents

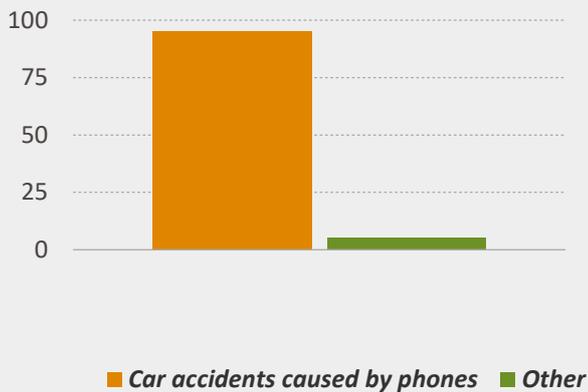
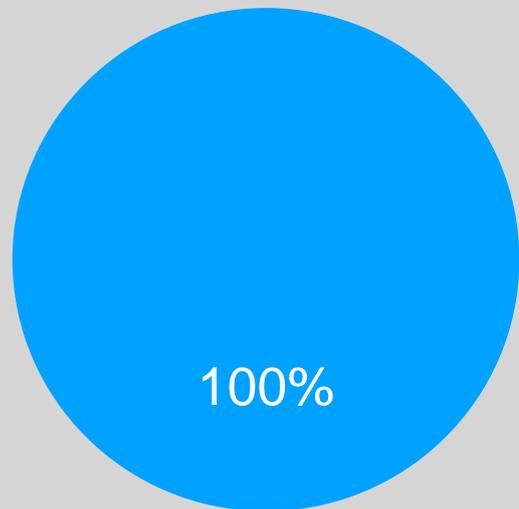


Chart 2

■ cars that were not able to stop beforehand
■ cars that were able to stop beforehand



Was the car able to stop correctly beforehand

	<i>Yes</i>	<i>No</i>
<i>1</i>		✓
<i>2</i>		✓
<i>3</i>		✓
<i>4</i>		✓

Table 1

<i>Was the car able to stop correctly beforehand</i>		
	<i>Yes</i>	<i>No</i>
1	✓	
2	✓	
3	✓	
4		✓
	<i>Table 2</i>	

■ cars that were not able to stop beforehand
■ cars that were able to stop beforehand

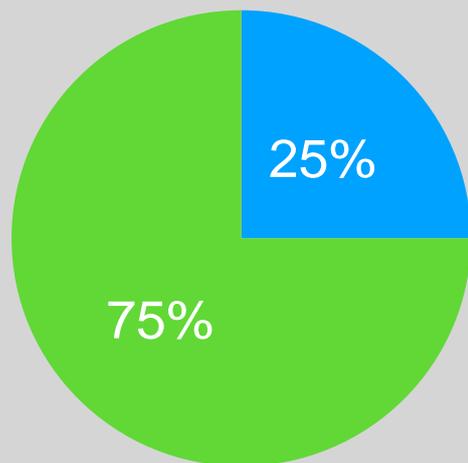


Chart 4

Nomenclature:

(*): This symbol means that there is a definition for the word under the paragraph.

Chapter 1: Introduction

The idea of making a pedestrians crosswalk sensor app came about to make sure that no more innocent lives are being endangered while they are crossing roads. We thought of programming a sensor that detects walking pedestrian who are near a crosswalk, and then a notification is sent via the app which alerts the driver to slow down beforehand.

The reason behind us choosing this idea for our project, is the large increase of deaths and fatalities of innocent people caused my cars colliding with walking pedestrians. This app will be designed to save thousands of lives by preventing possible car accidents.

This project covers a lot of missing pieces in the world of safety driving. Every person has been told not to use their phone while driving no matter what the reason is, but people unfortunately still use it without thinking off all the possible dangers that might face them. This app will enforce driving safety and tackle those who use their phones while driving, by warning them beforehand.

Our project does not cover car vs. car collisions.

Our project goes around the idea of warning and notifying the distracted driver that there is someone about to cross so the driver can slow down and focus.

We used a lot of references of past car accidents and the percentage of car accidents that are caused because of the driver being distracted by their mobile device. We did a lot of researched on how to decrease car accidents that are caused by this reason. We saw that there is not a specific invention that caters for school students, especially kids, that are trying to cross the road but are being put at risk of being hit and run over by distracted drivers.

Our mission in this project is to prevent as much car accidents as possible. As a result we had to organize this report carefully to make it as helpful, understandable and simple as possible.

Literature Review:

Other projects that were built for the safety of pedestrians:

- In the Netherlands, inventors have noticed an increase of car vs. pedestrians accidents mainly with phone addicts. So, they inserted LED lights into the pavement that copy the work of traffic lights. But this invention does not help with phone distracted drivers.
- Creators in London designed a smart cross walk that appears when pedestrians want to cross the road.
- In Quebec the company SAAQ have noticed that cars will not stop for pedestrians. So, they came up with an innovative solution. They created crossing lines that jump up when people want to cross the road.

Our project will add the ability for the drivers to be notified and alerted, so that he/she can stop in time and possibly prevent an accident. This will be an addition to what is already been done in this field of driving safety.

Chapter 2: Methodology (Analysis)

“Scientists at Massachusetts-based software company Cambridge Mobile Telematics based their research on drives that occurred while using CMT’s apps, looking at 1,000 verified real-world crashes, “tens of thousands” of near crashes, and “billions of miles” of driving with CMT’s apps. They found that phone-related distraction occurred during 52 percent of the trips that ended in a crash.” -2017 study by Cambridge Mobile Telematics.

In addition, a new study in Kuwait shows that 95% of car accidents are caused because of the lack of focus and concentration. This study was done by the Ministry of Interior.

Causes of car accidents

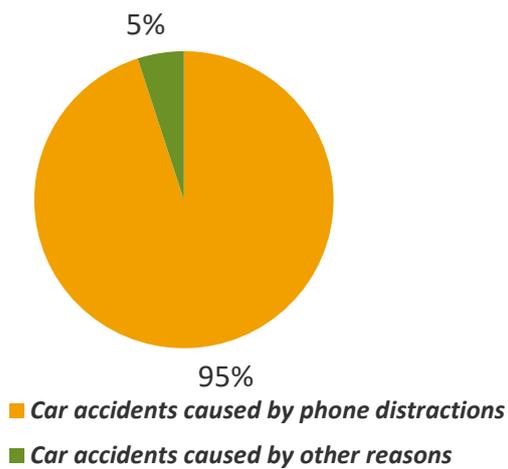


Chart 1

Causes of Car accidents

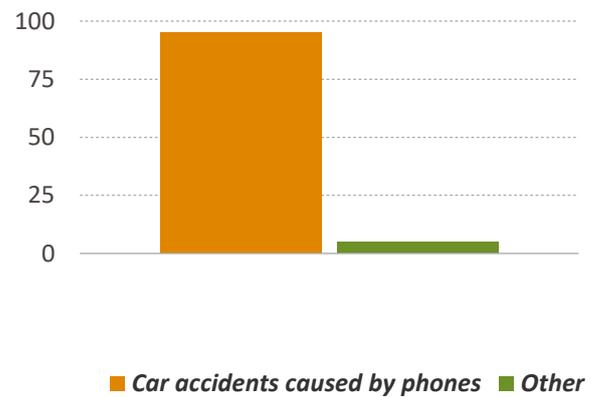


Chart 2

The theory behind our (BEE ~~IS~~ AWARE) project is to find an innovative solution to tackle stubborn drivers that are unable to put down their phones while being on the road. So we decided to take the negative and turn it into a positive. So we took the disadvantages of stubborn people and their phone obsessions and used it to our advantage, which is the idea of programming an application that sends a notification to the driver warning them of what is ahead.

Chapter 3: Experimental setup

Work steps:

1- We collected all of the equipment from recycling old school projects.

2-We programmed the electronics to do their job.

3-After that we tested everything to confirm that our programming is correct and the equipment all work in unison.

4-After testing and confirming that everything was correct, we built a miniature version of a school from unused foam boards. And then placed all the electronics and equipment's.

The device that we are building is a sensor that will be setup at a cross walk next to a school that will sense any car that is close to the crosswalk, so when cars pass through the sensors it will do the following:

- Activate the sign that will be put on the road that will have a warning.
- The gate that is also connected to the sensor will go down in-front of the kids that will prevent them from crossing the road.
- A notification will be sent to the phone of the driver to warn him/her that there is a crosswalk ahead of them.

The programming language that we will be using is C++. We choose this programming



Picture 1: Blynk (Programming Application)

language because it is easy and simple for us and it is user friendly. As for the application we will be using a program called blynk.

NodeMcu* Lua* Wi-Fi Internet of Things (IoT)*:

It is a development board based on ESP8266EX*. It is built with a microcontroller*, Wi-Fi receiver and a transmitter. This firmware uses the Lua* scripting language.



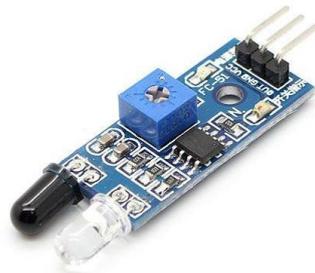
Picture 2: IOT

- ESP8266EX: Cheap Wi-Fi microchip which enables micro-controllers to connect to a Wi-Fi network and make straightforward TCP/IP connections via a specific command language (Hayes-style).
- Microcontroller: Single circuit that is developed to perform one task. It is usually implanted into a system to perform one single task in a device.
- Lua: Programming language that is mainly used for scripting use in applications.
- Internet of things (IoT): It is a system of linked computing devices that are added with a unique identifier (UID), either a number or alphabetical chain, that is related with an organism within a system. It is used for remote controlling and Motoring works anywhere in the world.

This piece will act as the brain of this project, and it is the device that will be coded. It will receive information (data) from the sensor, and begins to analyze (motion is detected) and execute orders. Commands will be sent to the server and then to the application, it can also receive commands from the application. The other feature is that when the sensor that will be placed on the gates senses a child crossing, it will send a notification to the drivers to warn them about it.

IR* Infrared Obstacle Arduino*:

It is a cheap sensor that mainly used in robots.



Avoidance Sensor Module

detects moving objects. It is

Picture 3: IR

- Infrared sensor (IR): It is a device that calculates and notices (detects) infrared radiations.
- Arduino: It is an open source development board used in communicate with objects in the world .

This piece will be placed on the motorway. When the car crosses in-front of it, it will send data to the microcontroller (Nudmcu). When the data is sent to the Nudmcu, it will analyze the data (a car is detected). After that the data will be sent to the server which will be sent

to our application, that will send a notification to the driver of the car.

LCD* Characters Display 16x02 Green And Blue Color And IIC/I2C/Interface Adaptor:



Picture 4: LCD Display

- LCD (Liquid Crystal Display): It is a display that uses liquid crystals to function.

This device will be placed on the street as a sign, that will also warn the drivers about the child that will be crossing among side the notification.

Mini Servo Motor:

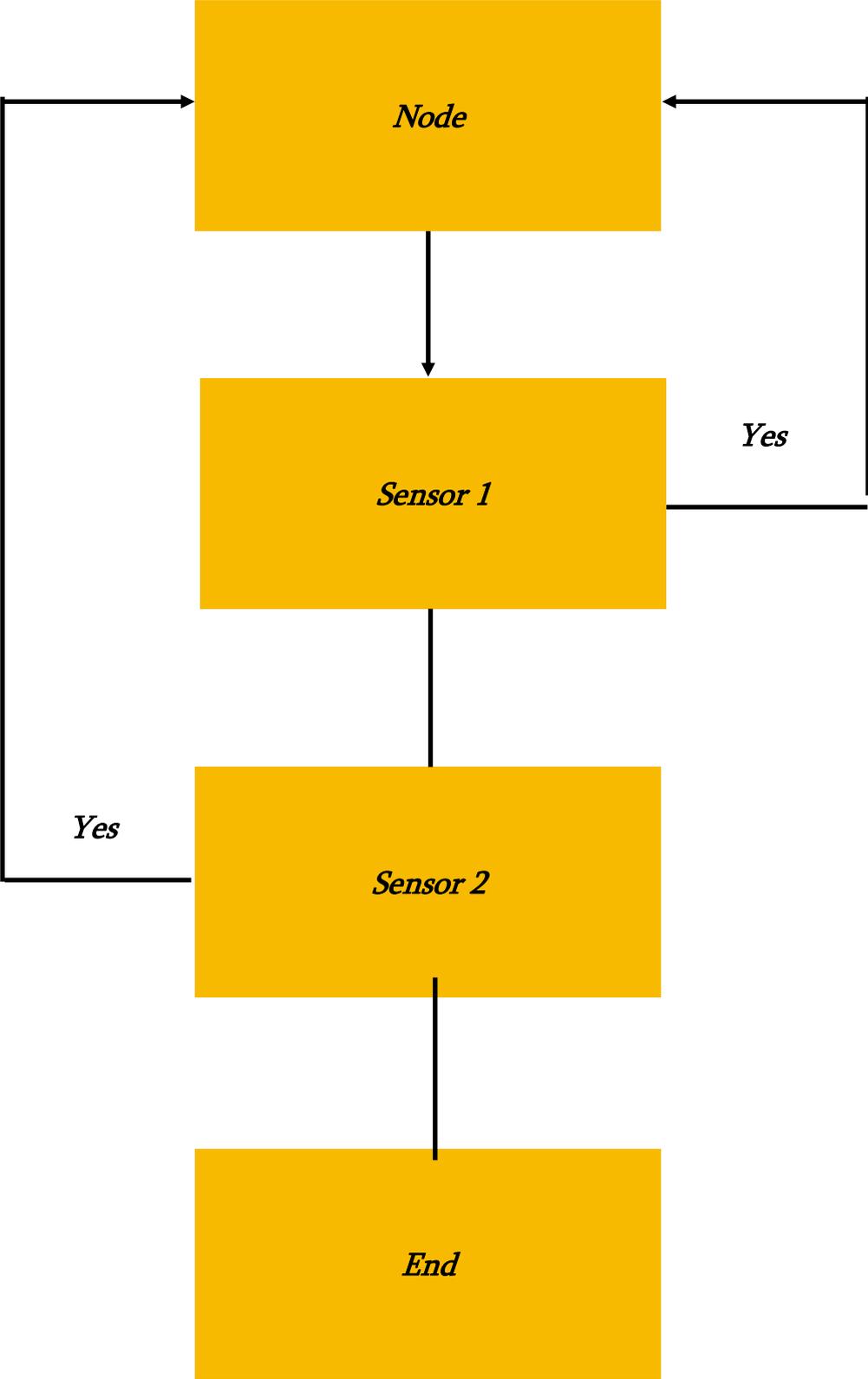


Picture 5: Mini Servo Motor

It is a small device that is built into a robot or any electric device, that can move or change the position of the device.

This device will be connected to a gate that goes down when the sensors sense cars to warn the pedestrians before crossing.

Algorithms:



Programming Code:

```
#define BLYNK_PRINT Serial
#include <SimpleTimer.h>
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
#include <Servo.h>
Servo servo1;
int ir1=D4;
int ir2=D5;
int val1;
int val2;
LiquidCrystal_I2C lcd(0x27,16,2);
char ssid[] = "other";
char pass[] = "12345678";
void timerEvent(){
  val1=digitalRead(ir1);// 0 when detect
  Serial.print(val1);
  Serial.println("value1");
  val2=digitalRead(ir2);// 0 when detect
  Serial.print(val2);
  Serial.println("value1");
  if(val1==LOW)
  {
    Blynk.notify("warning!");
    lcd.setCursor(0, 1); // Col, Row
    lcd.clear();
    lcd.print("BE CAREFUL");
    servo1.write(0);
    delay(1000);
  }
  if(val2==LOW)
  {
    Blynk.notify("studdent on road!");
    lcd.clear();
    lcd.setCursor(0, 1); // Col, Row
    lcd.print("stop please");
    servo1.write(90);
    delay(1000);
  }
}
```

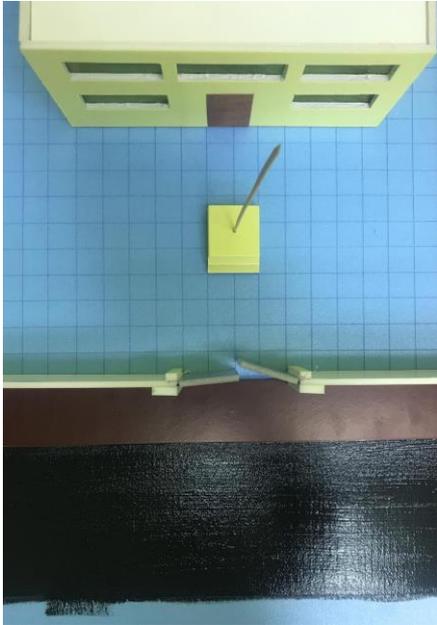
Pictures of our project:



Picture 6: Building Project 1



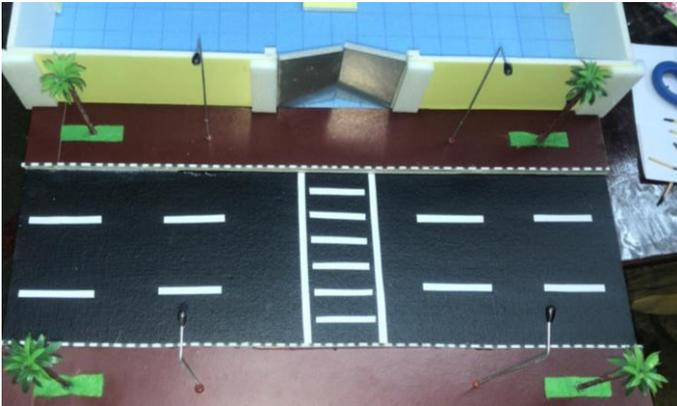
Picture 7: Building Project 2



Picture 8: Building Project 3



Picture 9: Building Project 4



Picture 10: Building Project 5



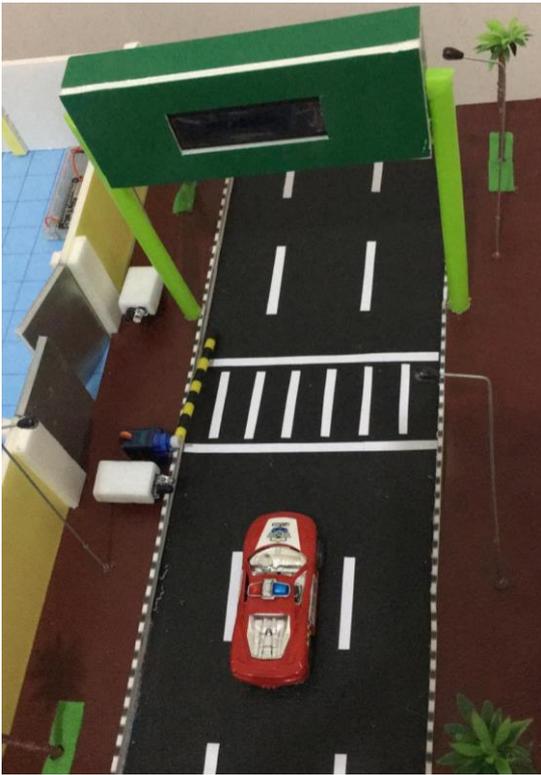
Picture 11: Building Project 6



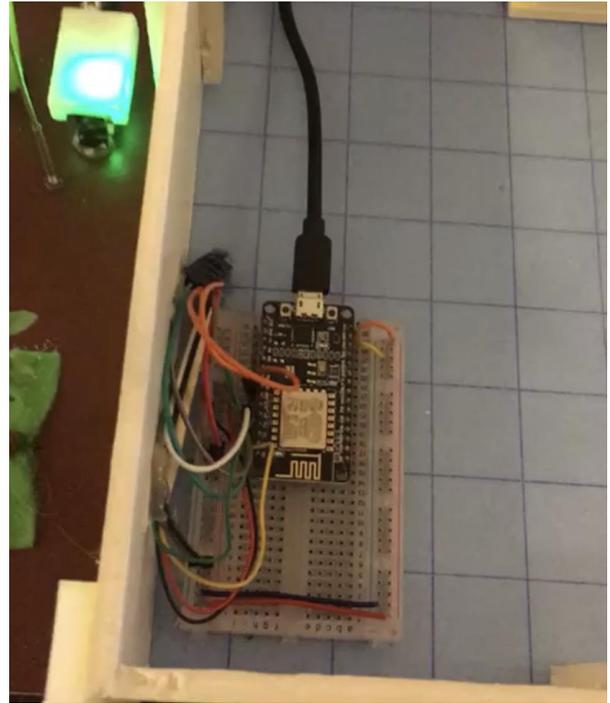
Picture 12: Building Project 7



Picture 13: Building Project 8



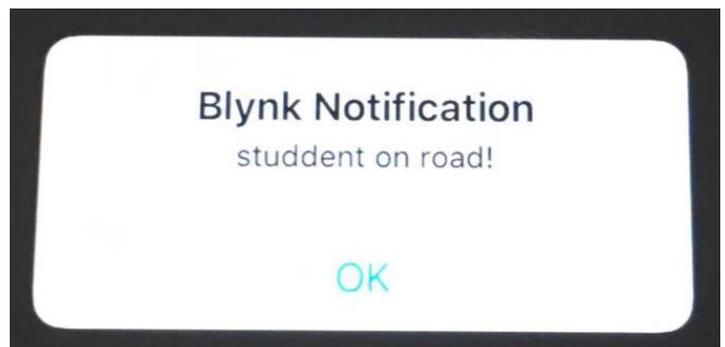
Picture 14: Building Project 9



Picture 15: Building Project 10



Picture 16: Building Project 11



Picture 17: Notification

Chapter 4: Results

Experiment 1:

<i>Was the car able to stop correctly beforehand</i>		
	<i>Yes</i>	<i>No</i>
1		✓
2		✓
3		✓
4		✓
	<i>Table 1</i>	

- cars that were not able to stop beforehand
- cars that were able to stop beforehand

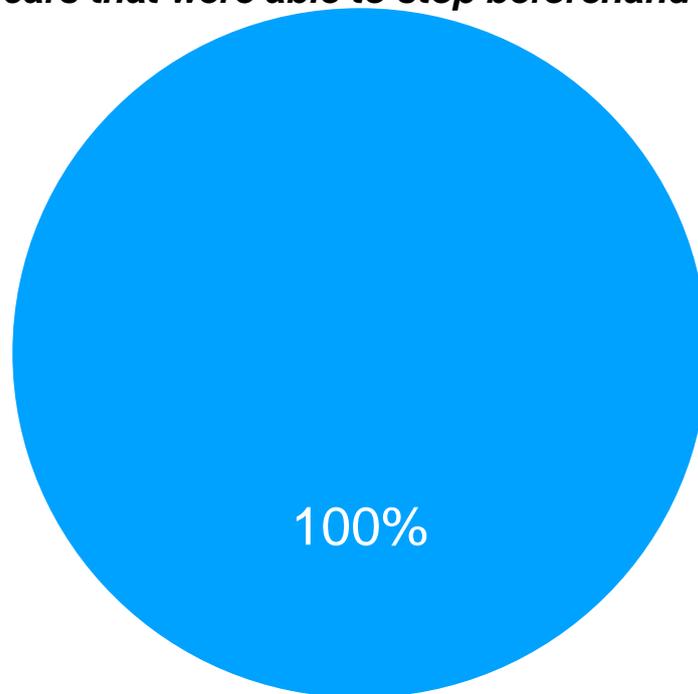
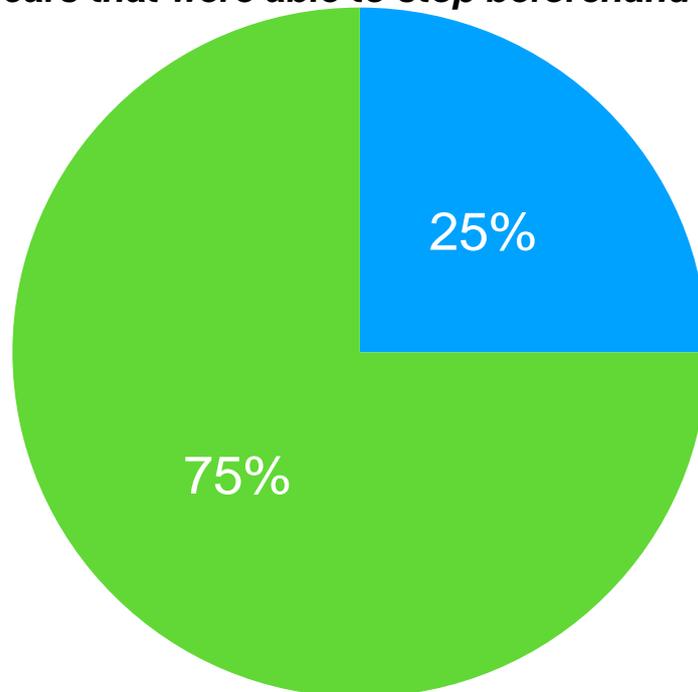


Diagram 2

<i>Was the car able to stop correctly beforehand</i>		
	<i>Yes</i>	<i>No</i>
1	✓	
2	✓	
3	✓	
4		✓
<i>Table 2</i>		

- *cars that were not able to stop beforehand*
- *cars that were able to stop beforehand*



Experiment 2:

Diagram 3

After doing our experiment in front of our school by testing four cars, we discovered a dramatic change with the results in positive way.

In the first experiment we had four cars with distracted drivers go through a school crosswalk. The results that we obtained from the experiment was that all four drivers were not able to stop in time or were not able to stop in a correct manner.

In the second experiment we had the same four distracted drivers but this time we used our project, and the results were positive, most of the drivers were able to stop in time and they were more aware of their surroundings.

although we had a mostly positive result with our experiment, we were not able to get 100% positive outcome. But with that we were able to reduce the car accidents to almost 75%.

We saw that our project had made a difference in the amount of road awareness.

Chapter 5: Conclusion and recommendation for future work:

In conclusion, our project reached all the points that we aimed for. We achieved our goal by ensuring safety for the pedestrians and children of the community, and guaranteeing parents the safety of their children.

To sum up our project, it is a device that senses the crossing pedestrians and warns the drivers beforehand which will decrease the amount of death and injuries of innocent people.

Our project is useful to raise awareness of careless driving and decreasing the percentages of car collisions outside of schools. We found that we did not require expensive and complicated equipment's and gadgets to build this project.

For this project we envision:

- It will be applied on all schools in Kuwait at nearby roads and crosswalks for students.
- It is also able to be updated in the future to suit other circumstances and needs.
- Manufacturers can also apply more complex appliances to make it more accurate.
- In the future, the government can link it to the police station to monitor cross walks.

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