PROJECT REPORT

ON

SMART SIGNS FOR IMPROVED ROAD SAFETY

Submitted to

KIIT Deemed to be University

BACHELOR'S DEGREE IN ELECTRONICS &
TELECOMMUNICATION ENGINEERING

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UNDER THE GUIDANCE OF

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JUNE 2020

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CERTIFICATE

This is to certify that the project entitled

"SMART SIGNS FOR IMPROVED ROAD SAFETY"

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is a record of Bonafide work carried out by them, in the partial fulfillment of the requirement for the award of Degree of Bachelor of Engineering (Electronics & Telecommunication Engineering) at KIIT Deemed to be university, Bhubaneswar. This work is done during year 2019-2020, under our guidance.

Date: 10/ 06 / 2020

Prof. Mamata Panigrahy

Project Guide

<u>ACKNOWLEDGEMENT</u>

We are profoundly grateful to Prof. MAMATA PANIGRAHY for her expert guidance and encouragement throughout to see that this project rights its target, since its commencement to its completion. The work is a team effort minus which the completion of this project was not possible.

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<u>ABSTRACT</u>

The project is to help the vehicle owners as well as a pedestrian to be aware of the current road situation through dynamic signs along with the existing static signs.

We are using sensors to detect the motion of the vehicle that will help in the analysis of traffic congestion. It will help drivers to choose the best possible route.

Ultimately , this will help to avoid accidents as well as help people save their time. The project aims to serve people by analyzing current road conditions and using the data to display dynamic signs so that people can make better decisions and save time.

CONTENTS

<u>INTRODUCTION</u>

In the present roadways system, the road signs and speed limits are static. For efficient control, traffic personnel is also deployed, whenever needed. But still, there are a variety of cases where static signs & personnel can't control the traffic in the most efficient way possible.

For instance, let us take the example of an accident. Whenever an accident takes place on the road,everyone ,ranging from a passerby who wants to cross the road to a trucker who is stuck in the traffic behind all the debris from the accident,has to waste much of their valuable time.
It affects people more when they have important and urgent work to tend to.

Various attempts like the odd-even formula applied in New Delhi and new and updated signs on roads have been made to tackle this predicament . But these attempts have yet to show any significant effects to cancel out the threats posed by traffic .

<u>MOTIVATION</u>

India being a developing country is growing at a very fast pace. The county's population is increasing along with the increase in resource demand. To fulfill it the country is using modern as well as traditional ways.

But , the inefficiency of static signs not only leads to wastage of time of people but also compromises with their safety as well.

In this fast moving era, the wheels on road is also increasing to deal with different situations at same momentum. With all this, the country is facing rise in road accident cases. Road accidents are considered to be a major source of deaths, injuries and property damage every year. Rash driving accounted for 64.4% of the persons killed. About 1,51,417 lives and 4,69,418 injuries caused leading to a sum of 4,67,044 road accidents are claimed by the country's states and union territories.

Addressing the above mentioned problem is advantageous for everybody as it will then greatly optimize travelling time for people , at the same time , will minimize the threat of freak road accidents .

OBJECTIVE

Our project deals with modern ways to help reduce traffic collisions. The project is based on Internet of Things(IOT). The shortcomings of static signs have direct consequences on public traversal. It will take much time for people to make a nearby journey and as, in general, static signs are not very eye-catching and are ignored by the people, it increases the chances of accidents.

The project have different dynamic signs which can be used in conformity with the static signs. Different sensors are used to give more accurate road condition. The sensors are used to detect the motion that will help in analysis of traffic congestion which can help drivers to chose their best route. This can help to avoid accidents as well as help people save their time. The purpose to design this project is to facilitate drivers a safe journey.

REQUIRED HARDWARE

NodeMCU :

NodeMCU is a low-cost open source IoT platform. It initially included firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which was based on the ESP-12 module. Later, support for the ESP32 32-bit MCU was added.

NodeMCU is an open source firmware for which open source prototyping board designs are available.The name "NodeMCU" combines "node" and "MCU" (Micro Controller Unit).

PIN Diagram of NodeMCU:
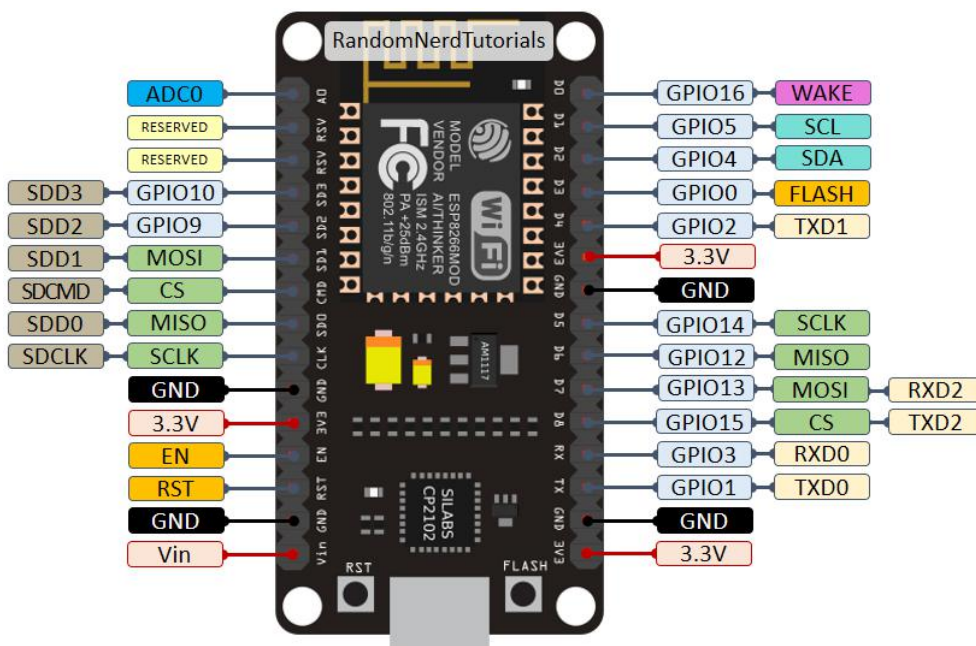
PIR SENSOR :

A passive infrared sensor is an electronic sensor that measures infrared light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. PIR sensors are commonly used in security alarms and automatic lighting applications.

The term "passive" refers to the fact that PIR devices do not radiate energy for detection purposes. They work entirely by detecting infrared radiation emitted by or reflected from objects.
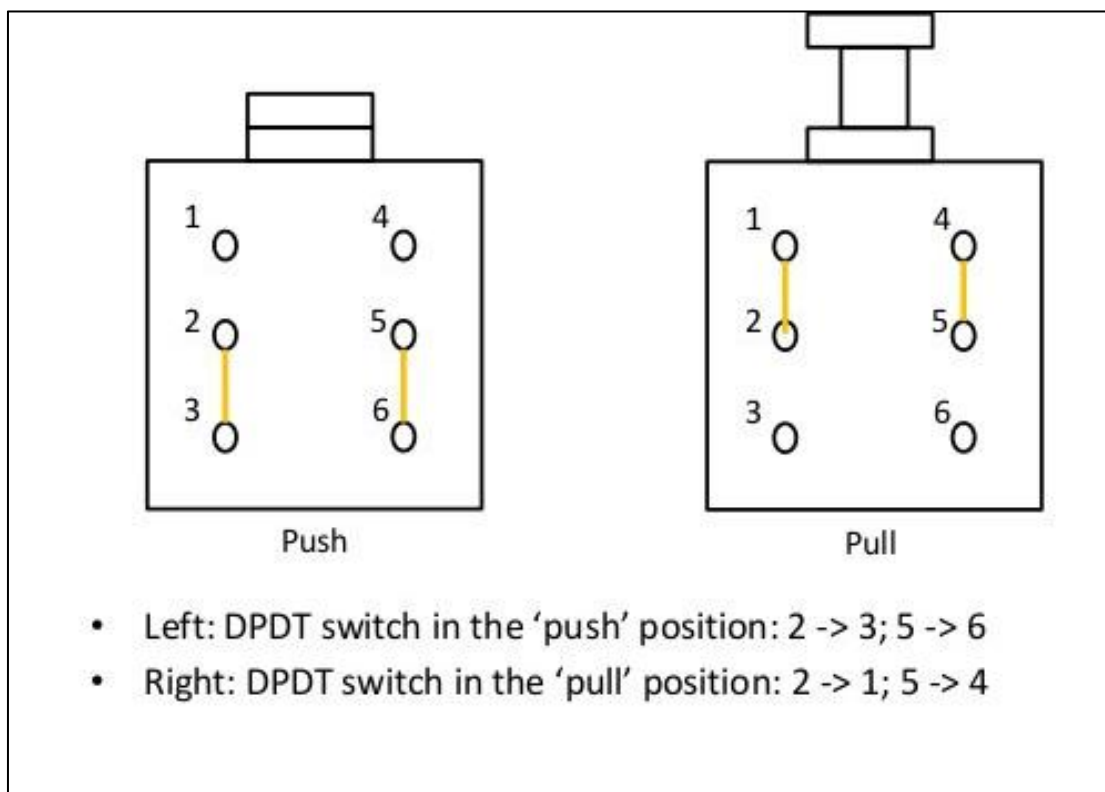
PIN Diagram of PIR Sensor :
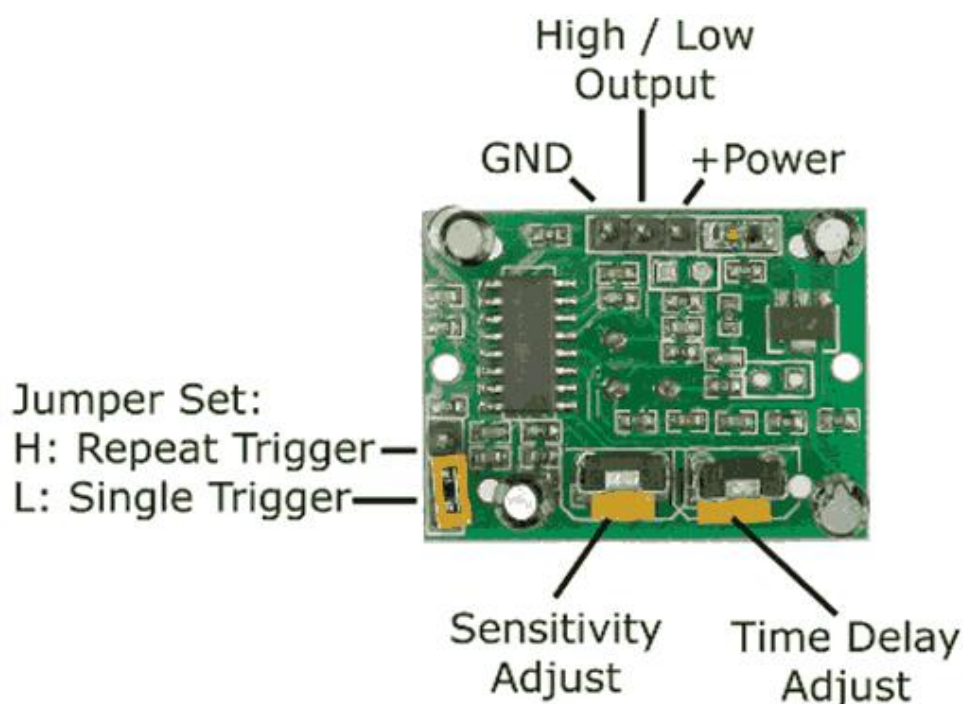
PUSH BUTTON :

A push-button or simply button is a simple switch mechanism to control some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal. The surface is usually flat or shaped to accommodate the human finger or hand, so as to be easily depressed or pushed.

PIN Diagram of Push button :

Push   Pull

- Left: DPDT switch in the 'push' position: 2 -> 3; 5 -> 6
- Right: DPDT switch in the 'pull' position: 2 -> 1; 5 -> 4

OLED SCREEN :

The OLED displays are one of the most attractive displays available for a microcontroller. It has a good view angle and pixel density which makes it reliable for displaying small level graphics. Interfacing this IC with MCU can either be done using IIC or using SPI hence helps to save some pins as well.

OLEDs are used to create digital displays in devices such as TV screens , computer monitors , portable systems such as smartphones and PDAs.

PIN Diagram of Oled screen :
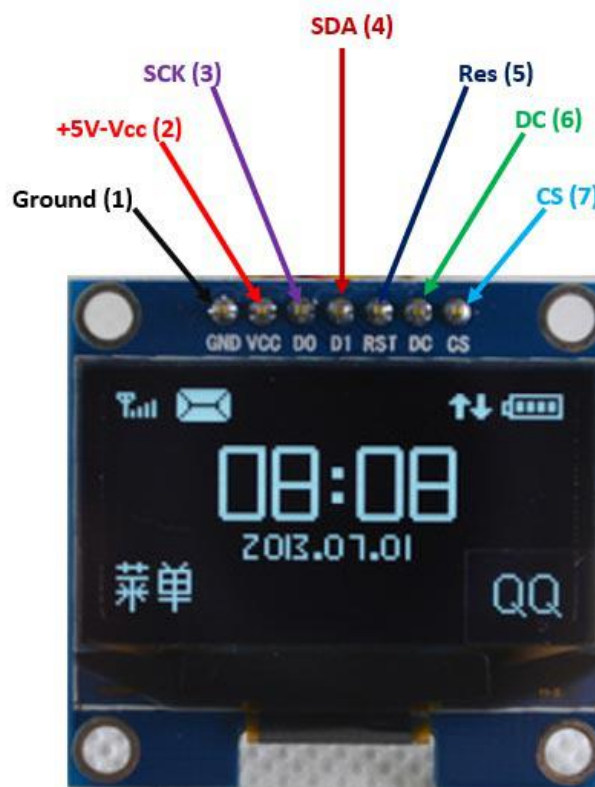
HUMIDITY SENSOR :

A humidity sensor (or hygrometer) senses, measures and reports both moisture and air temperature. The ratio of moisture in the air to the highest amount of moisture at a particular air temperature is called relative humidity. Relative humidity becomes an important factor when looking for comfort.

These sensors can also provide accurate measurements of dew point and and absolute humidity by combining relative humidity and temperature measurements .
PIN Diagram of humidity sensor :
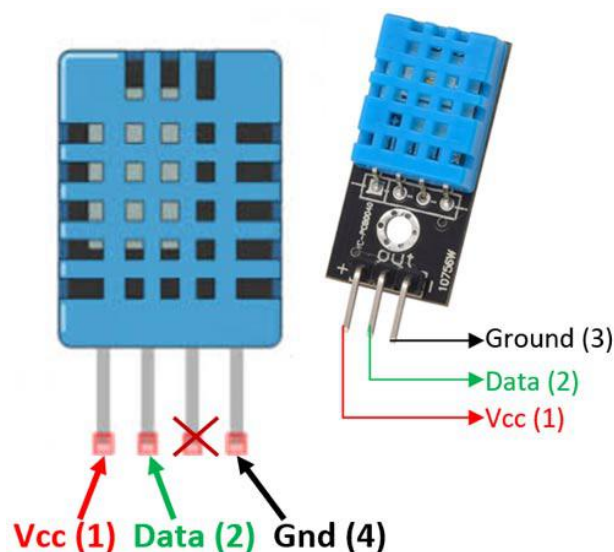
REQUIRED SOFTWARE

ARDUINO IDE :

The Arduino Integrated Development Environment (IDE)
Is a cross platform application that is written in functions
from C and C++. It's used to write and upload programs
to Arduino compatible boards.

IBM CLOUD :

IBM Cloud Computing is a set of cloud computing services
for business offered by the IT company, IBM.

NODE-RED :

Node-Red is a flow based development tool for visual programming developed originally by IBM for wiring together hardware devices,APIs and online services as Part of the Internet of Things (IoT). Node-Red provides a Web Browser-based flow editor.
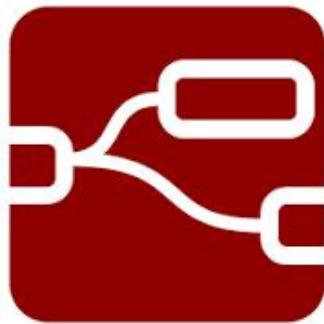
MIT APP INVENTOR :

MIT app inventor is an intuitive , visual programming environment that allows everyone to build fully functional apps for smart-phones and tablets .

<u>WORKING</u>

We first connected all the inputs I.e PIR sensor,Humidity sensor,Push button to the NodeMCU. PIR sensor has 3 pins: GND pin of the sensor is connected to the GND pin of the NodeMCU, The Operating Voltage of PIR Sensor is from 3.3v to 5v so the VCC is connected to the +3.3V pin of NodeMCU and lastly the output pin of PIR Sensor is connected to one of the input pins of NodeMCU.

Humidity sensor (TH11) has four pins out of which only pin number 1,2,4 are used. The Operating Voltage of th11 sensor is from 3.3V to 5.5v,so the pin 1 which is the input voltage of the sensor is connected to the +3.3V pin of NodeMCU.pin 4 is the GND pin so it is connected to the GND pin of the NodeMCU and lastly, pin 2 which is the output of the Th11 sensor is connected to one of the input pins of NodeMCU.

Push button also has a input voltage from 3.3V to 5.5V so one of the legs of the push button is connected to the +3.3V pin of NodeMCU. Other leg is connected to the GND pin of NodeMCU and lastly one leg is connected to one of the input pins of NodeMCU. For the output we are using a Oled display. Oled display has 4 pins. GND pin of the Oled display is connected to the GND pin of the NodeMCU, The Operating Voltage of Oled display is 5v so the VCC pin is connected to the Vin pin of NodeMCU.

The other two pins are SCL and SDA pins. SCL stands for Serial Clock and SDA stands for Serial Data. I2c pins of NodeMCU are pin D1 and D2. so SCL is connected to pin D1 and SDA is connected to pin D2. after which we will code the NodeMCU with the Arduino IDE to get all the digital signs based up on the readings from all the components . We will even code NodeMCU so that it can upload all the readings to IBM cloud with help of a unique Device ID.

Now with the help of NodeRed we can extract all the readings and display it into a web-page. From the web-page we then take all the readings and then display our digital signs based on the readings on to our moblie application which was made using MIT app inventor. We can even give alert notification via text messages to the traffic police using the app. Consequently , the data flow takes place as follows :
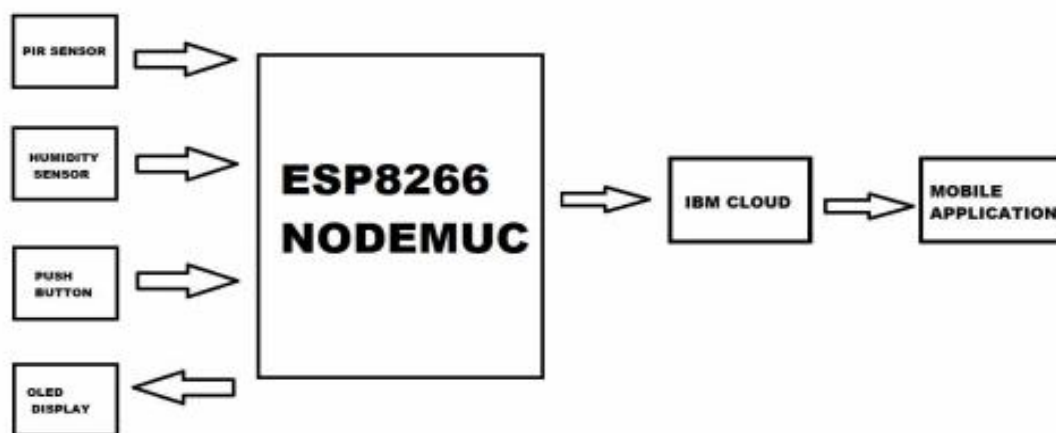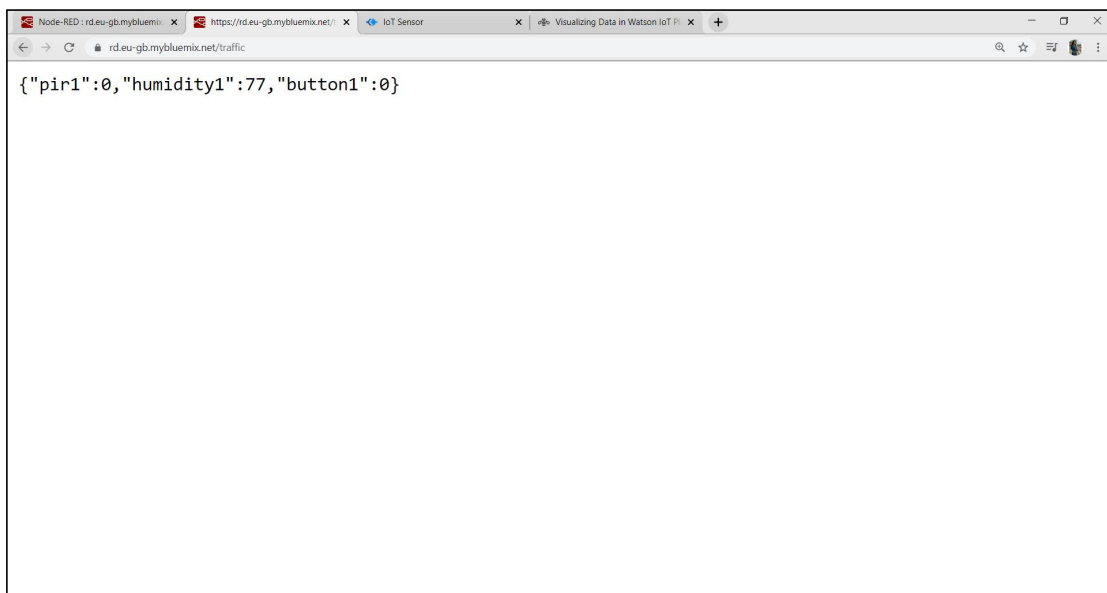
IMPLEMENTATION

The Node-Red flow , in this case is as follows :
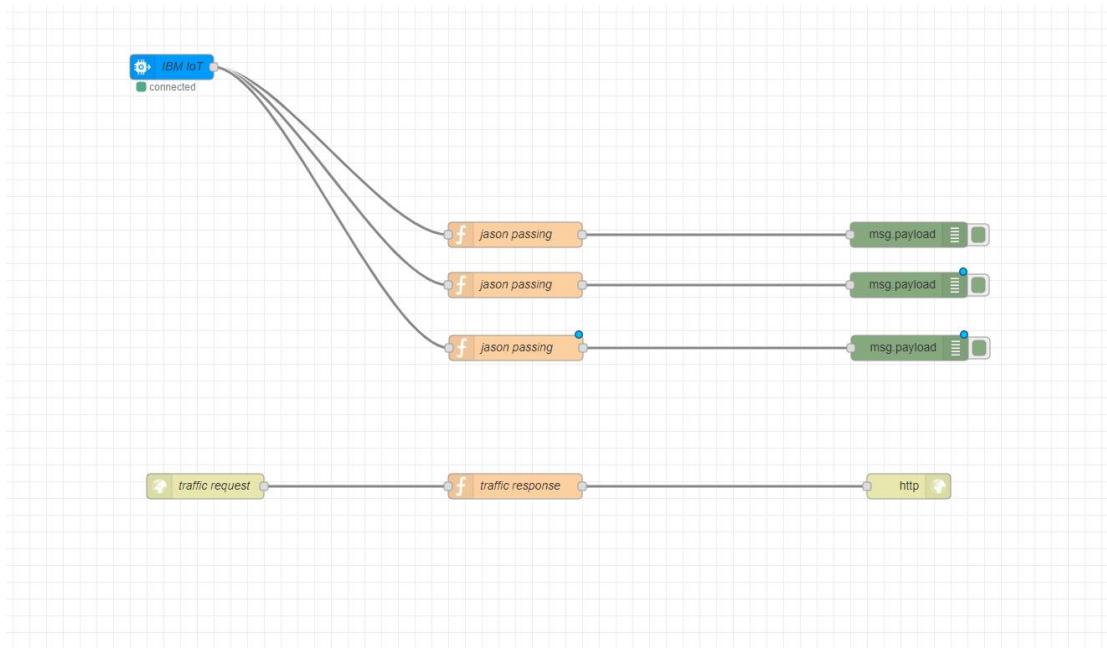
Now,since we know that Node-Red provides a Web browser interface for flow editing , so the extracted readings will be displayed on the web page.

All the readings are then taken from the web page and then the digital signs are displayed based on these readings onto the mobile application.

A PIR sensor is placed on road to detect the motion of pedestrians. When the motion is detected then a message is displayed on o-led screen 'STOP FOR PEDESTRIAN', if no motion is detected then it displays 'HEAVY TRAFFIC' which allows vehicles to pass.

A push button is also used to customize the road crossing time for pedestrians by showing red light. This button is handled manually, after observing the live traffic condition. A humidity sensor is used to measure humidity in atmosphere; if high humidity is measured then it displays a message 'CHANCES OF RAIN' on o-led screen, and if normal humidity is measured then it displays a message 'DRIVE SAFE' on o-led screen.
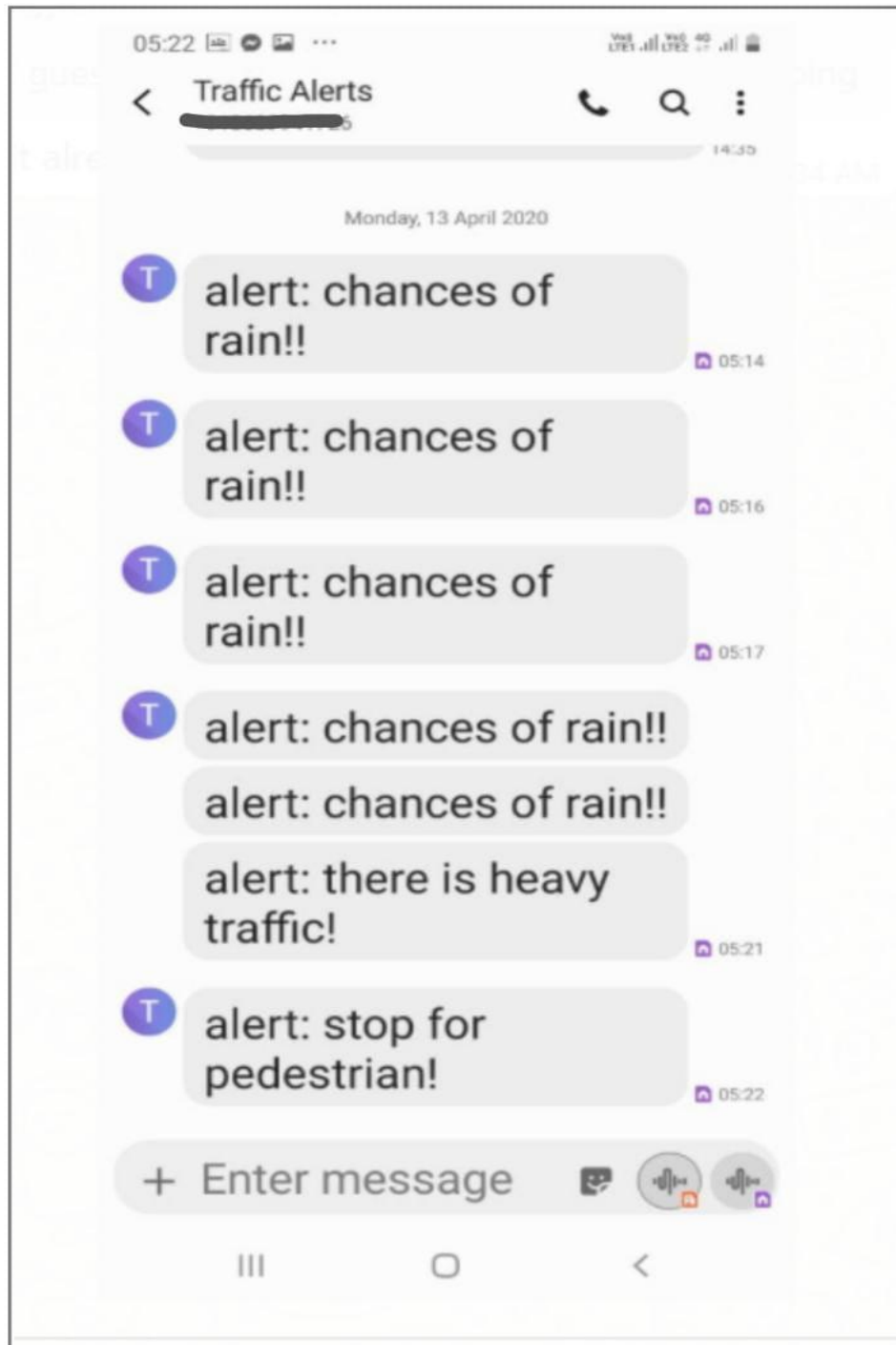
The mobile application receives the same messages displayed on the OLED screen. This can be a great help for drivers to decide the optimum course of journey.

MOBILE APPLICATION :
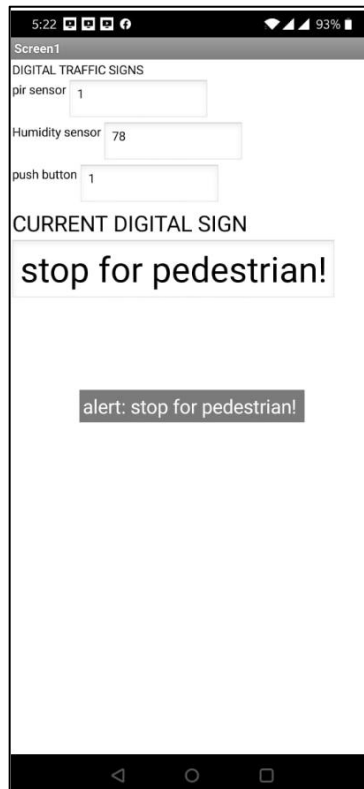
We can also receive alert notifications via text messages using the app.

<u>FUTURE SCOPE</u>

With continuous rise in number of vehicles on road leads to traffic congestion and creates a great challenge in transport management systems. In order to avoid different kind of losses caused due to traffic, it is mandatory to take effective steps to control traffic. One way to solve this is by predicting the high traffic density. Furthermore, the PIR sensor detects and informs the traffic control system about the traffic jam risk in order to guide them bypass critical zone.

The other way discussed in project is about using push button to customize the time for pedestrians to cross the road according to available traffic which   helps in saving their time. This is helpful in urban areas with huge population on foot. The dynamic messages are displayed on an o-led screen which can be see by a mass of people at a time.

Next is humidity sensor which senses the humidity in atmosphere and predicts whether there is chances of rain or not. This can be very helpful to drivers as a great number of road accidents take place due to bad weather conditions. This informs driver to vary speed accordingly or take a divergence.

The project identifies the mixed traffic conditions and encroachment resulting in reduction of capacity of roads and providing the information to drivers to choose alternative routes. These are some of the solutions which can work very efficiently to Indian traffic as the existing methods are not sufficient as Indian traffic conditions are heterogeneous in nature.

<u>CONCLUSION</u>

The project aims to serve people different current road conditions through dynamic as well as static signs to make their best decisions and save time. The project looks forward for more flexible, less invasive, and more precise, more robust, easier to maintain and produce richer information to manage traffic.

The project does not affect the integrity of the road and offer as an added bonus. Population growth and different traffic issues were among the parameters analyzed in the project to recommend suitable improvements for smoother traffic flows.

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