A
PROJECT DESIGN REPORT
ON

"Zona Del Silencio"

For the subject **Lab1 Project Phase 1**
Submitted in partial fulfillment of the requirement for the award of
Bachelor of Engineering
In
Computer Science and Engineering
Punyashlok Ahilyadevi Holkar Solapur University
By

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Under Guidance Of
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
WALCHAND INSTITUE OF TECHNOLOGY
SOLAPUR - 413006

(2019-2020)

CERTIFICATE

This is to certify that the Project entitled

“Zona Del Silencio”

is

Submitted by

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as a part of Project Design Report.

Studying in BE CSE for the subject **Lab1 Project Phase 1**

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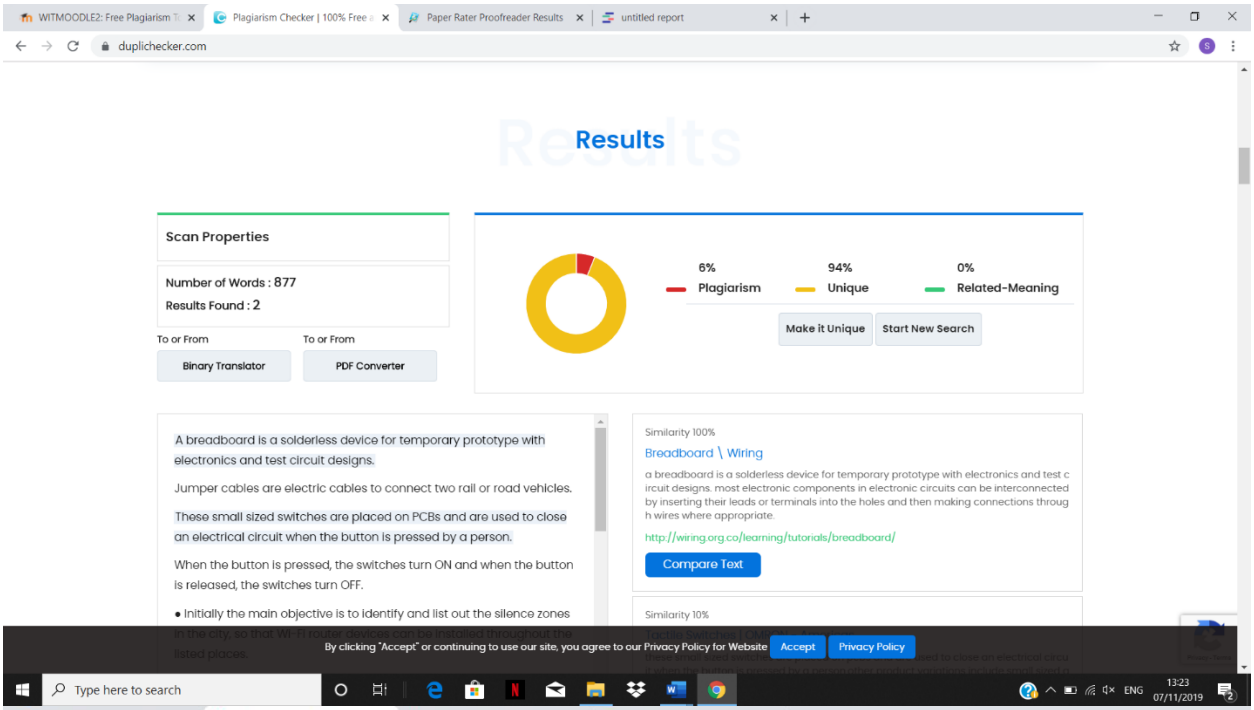
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These small sized switches are placed on PCBs and are used to close an electrical circuit when the button is pressed by a person.
When the button is pressed, the switches turn ON and when the button is released, the switches turn OFF.
• Initially the main objective is to identify and list out the silence zones
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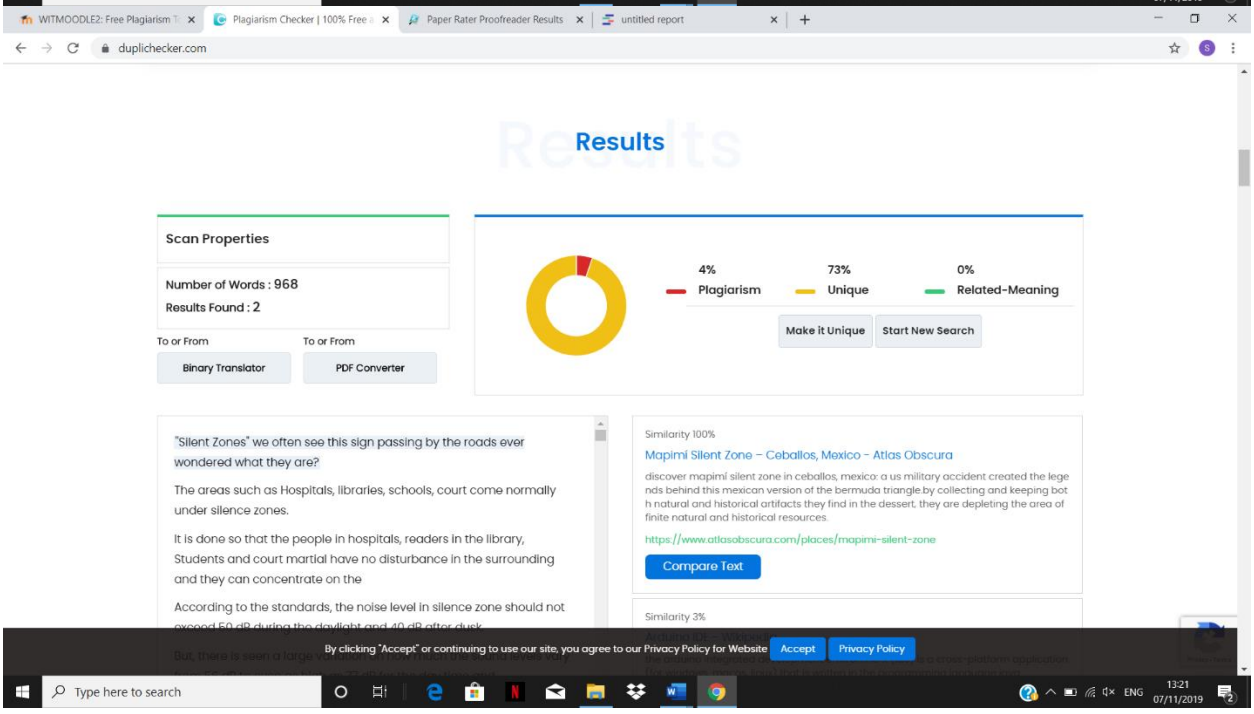
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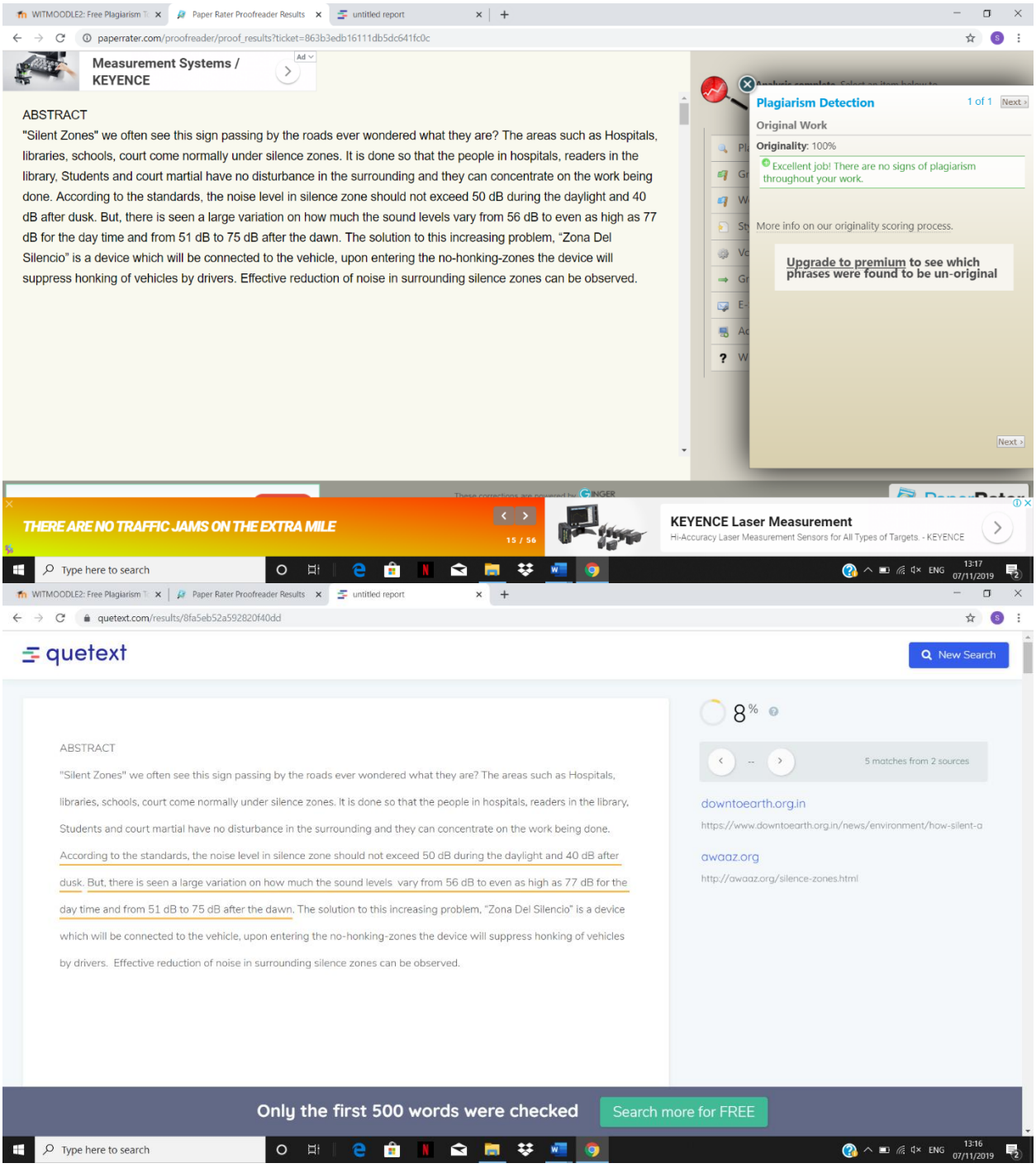
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1. INTRODUCTION

- “Silence Zones were identified by the MCGM after a Bombay High Court Order directed them to identify and place Silence Zone boards within a week in 2009. In its Order and Judgment of August 2016, the Bombay High Court ruled that Silence Zones do not require any specific Notification by the Government, so long as an area fulfils required definitions. After a failed challenge to the Supreme Court of India, the State is bound to implement Silence Zones in Maharashtra in accordance with Noise Rules and Bombay High Court Orders” - Awaaz Foundation

- The Silent Zones are facing a severe issue of noise pollution which is causing a humongous disturbance to the people. According to World Health Organization (WHO), the sound level of 60 dB can cause a person temporary deafness, while sound levels of 100 dB can lead to deafness permanently. In heavily urbanized cities it is becoming a serious issue.

- “Zona Del Silencio” is a device connected to the vehicle which will act as a noise barrier upon such areas, this device will suppress honking of vehicles by drivers. In case of an emergency, the driver will be provided with an emergency switch.

- The noise pollution levels will be decreased in the silence zones thus maintaining the integrity of the silence zone. A system to penalize the mischievous drivers would be obtained.

2. BACKGROUND

1. Library sound level meter [1]

The Library Noise Detector is a portable device that is used in detecting noise in the library with Short Information Provider. This device is used to control excessive noise inside the library. Fig 2.1.1

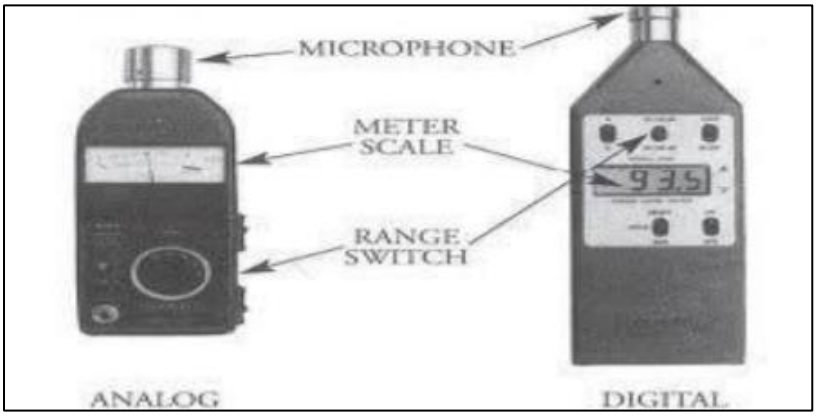

Figure 2.1.1 Sound level meter

2. Nirob a next generation green earth technology [2]

It is a device which detects overall sound level and displays it on the Digital Board using sound sensors. Thus creating an awareness among the public. Fig 2.2.1

Figure 2.2.1 Traffic noise digital display board

3. Assessment of honking impact on traffic noise in urban traffic environment of Nagpur, India [3]

Study Area

The noise assessment is done in Nagpur which comprises of three roads Wardha road, South Ambazari road and Neeri road. The above assessment was done by the authors in the year 2010. These roads were aliased as national highway, major and minor roads.

Fig 2.3

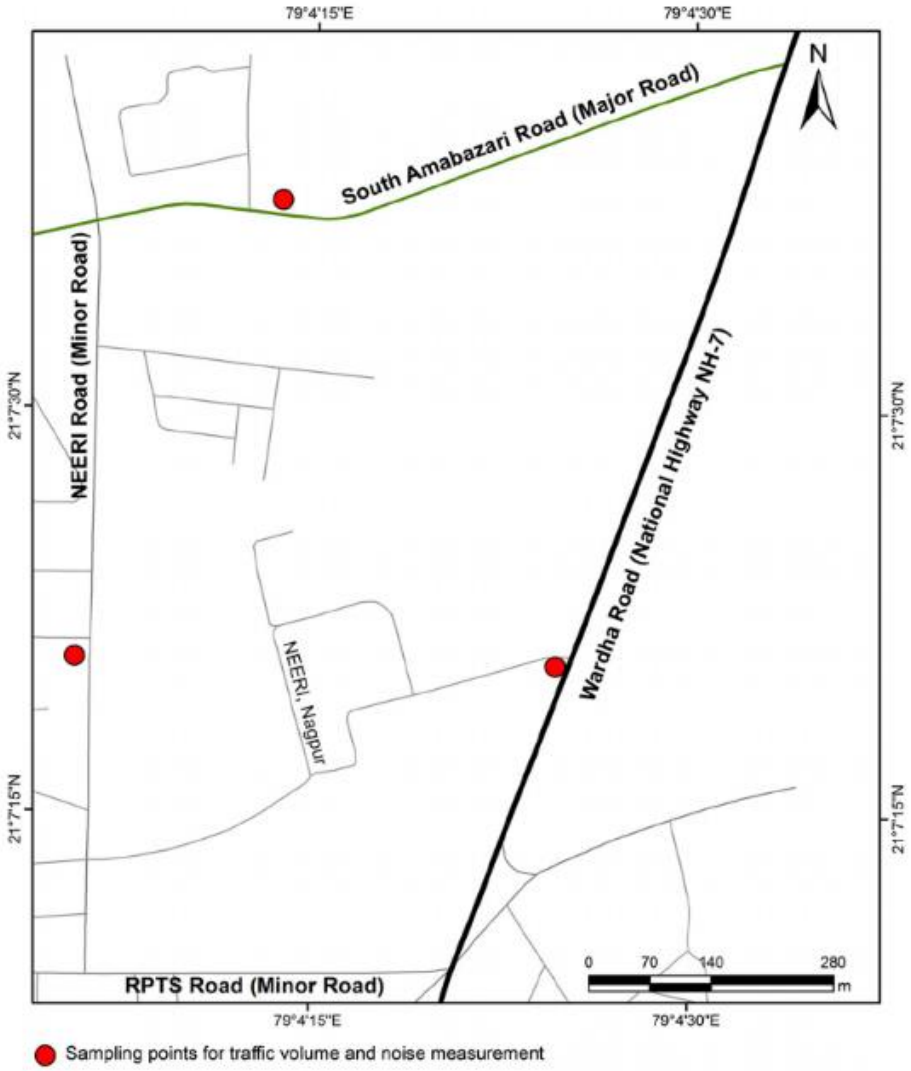

Figure 2.3.1 Study area of assesment[3]

Data Collection

The vehicles were categorised into three types namely heavy, medium and light vehicles. Heavy vehicles comprised of trucks, bull-dozers, dumpers,etc.Medium vehicles are car, jeep, auto-rickshaws,loading rickshaw.Light vehicles are motorcycles, scooter.

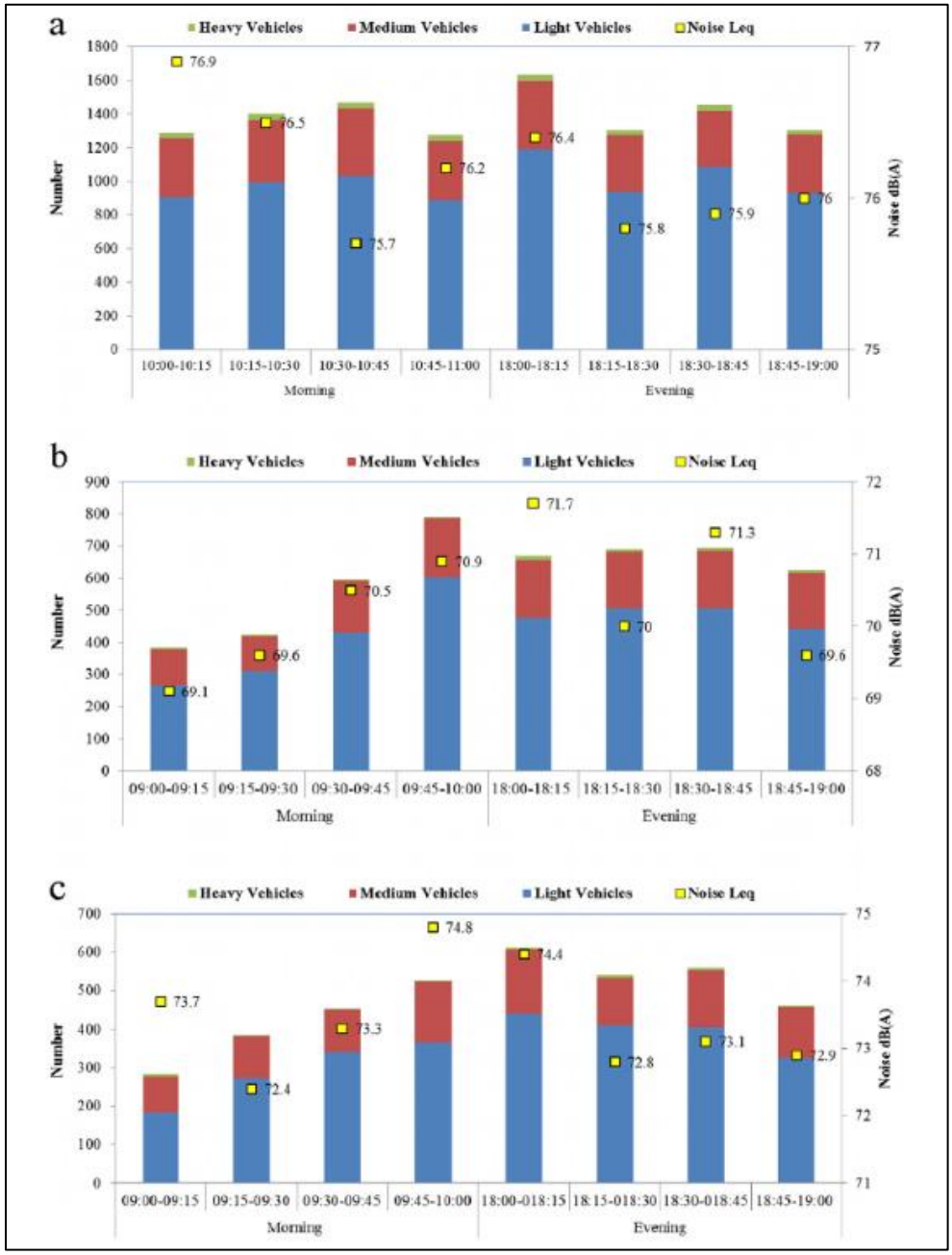

Figure 2.3.2 data set of data for traffic and noise during morning and evening[3]

Data Analysis

The roads were monitored for 24 hours so that the peak noise level can be recognized during morning and evening for each of the three roads. Based on the study following table was obtained in [3].

Type of road	Traffic noise L_{eq} dB(A)		Honking (no)		L_{eq} dB(A) without honking			
					Statistical		Frequency	
	Morn	Even	Morn	Even	Morn	Even	Morn	Even
National Highway	76.6	74.7	63	57	69.8	71.9	72.2	72.1
Major	72.4	71.4	50	37	68.0	69.0	68.1	68.2
Minor	73.6	71.2	57	38	66.3	67.3	69.4	68.9

Figure 2.3.3 Analysis of data [3]

3. TECHNOLOGIES REQUIRED

Node MCU Microcontroller

The Node MCU (Node Microcontroller Unit) is an open source software and hardware development environment. It is built on System-on-a-Chip (SoC) calls the ESP8266. It contains almost all crucial elements of the modern computer like CPU, RAM, networking (Wi-Fi), and modern operating system and SDK.

Arduino IDE (software)

The Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in the programming language Java. It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor development boards.

Wi-Fi Router

Wi-Fi router is an electronic device that sends data received from an Internet cable to other devices. It also acts as a wireless access point from which it shares data through the use of radio signals. The router converts the data stream delivered by your Internet connection into radio signals.

Buzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke. In this project it is used for emergency use only.

IR Sensor

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measure only infrared radiation, rather than emitting it that is called as a passive IR sensor.

Firebase DB

Firebase is a mobile and web application development platform developed by Firebase. Cloud Firestore is a NoSQL document database that lets you easily store, sync, and query data for your mobile and web apps at a global scale.

Battery

A battery is a device consisting of one or more electrochemical cell with external connections provided to power electrical devices

Miscellaneous components

1. Breadboard

A breadboard is a solderless device for temporary prototype with electronics and test circuit designs.

2. Jumper Cables

Jumper cables are electric cables to connect two rail or road vehicles.

3. Tactile Switches

These small sized switches are placed on PCBs and are used to close an electrical circuit when the button is pressed by a person. When the button is pressed, the switches turn ON and when the button is released, the switches turn OFF.

4. OBJECTIVES

- Initially the main objective is to identify and list out the silence zones in the city, so that Wi-Fi router devices can be installed throughout the listed places.

- Implement an IoT based prototype which will interact with the Wi-Fi routers installed in the silent zones and suppressing the honking of vehicle to maintain the integrity of the zones.

- Additionally, maintaining the records i.e the count for which the emergency switch has been used since there will be a limit for this switch in order to identify the mischievous drivers from the normal one.

- To ensure the rightful use of emergency switch, device will be integrated with sensors such as IR sensor to check the existence of vehicle which is in front of the honking vehicle.

5. PROPOSED WORK

Zona Del Silencio is an IoT based device that works solely on Node MCU which is integrated with ESP 8266 module. As the project idea describes that the horn is suppress once the vehicle enters the silent zone. The process is divided into seven parts:

1. Set up routers.
2. Installation.
3. The infinite loop.
4. Establish connection
5. Disable horn.
6. The emergency switch.
7. Records and penalty.

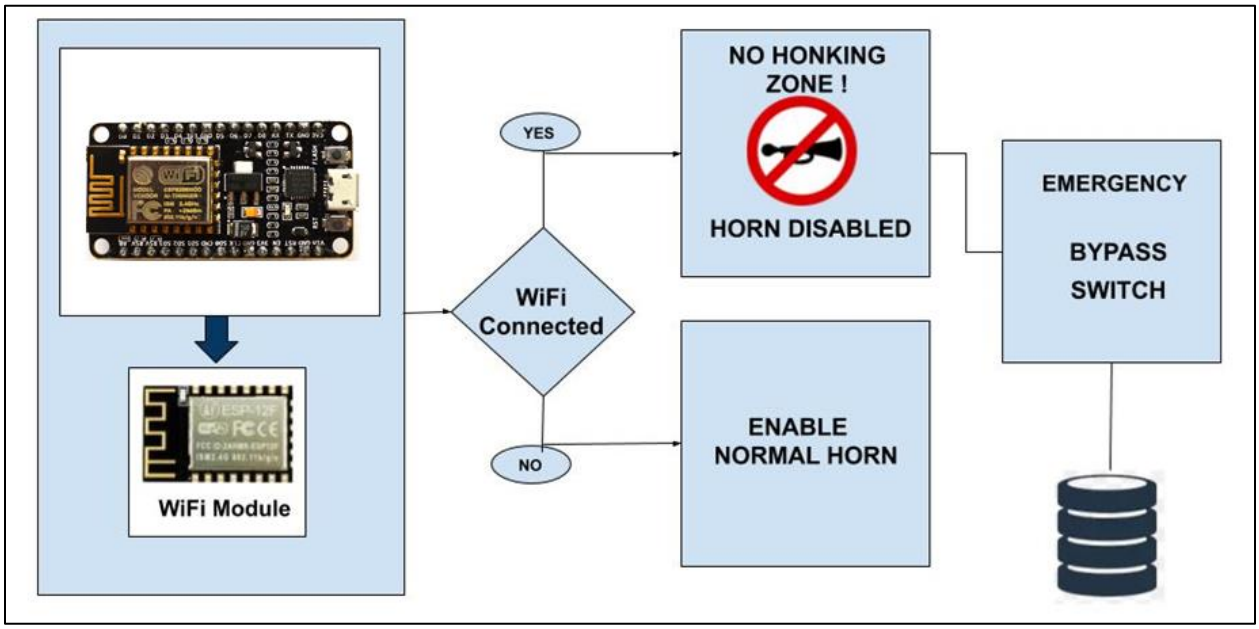

Figure 5.1 Architecture diagram

1. Set up routers.

   All the Wi-Fi routers are set with a common SSID and PASSWORD.

2. Installation.

   Device is installed in the vehicle. From the research done, it is found that light two-wheeler vehicles are ought to make more noise.

3. The infinite loop.

   Node MCU is programmed to establish a connection eternally with the common SSID and PASSWORD by continuously trying to connect to Wi-Fi.

4. Establish connection.

   Once vehicle comes in the WIFI zone the installed device connects to it and halts the eternal loop, which is turned back on exiting the WIFI zone

5. Disable horn.

   On a successful connection the microcontroller is programmed to suppress the horn of vehicle by turning low the digital pin for the buzzer.

6. The emergency switch.

   The driver is provided with an emergency switch to blow off the horn in case of an emergency scenario.

7. Records and penalty.

   Every time an emergency switch is used count is incremented of the vehicle which is identified by vehicle number. This count will be used to filter out the drivers using the emergency switch notoriously.

6. UML diagrams

Level 0

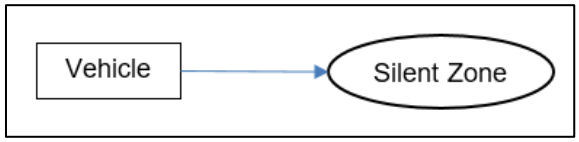

Figure 6.1 Vehicle interacting with silent zone

Level 1

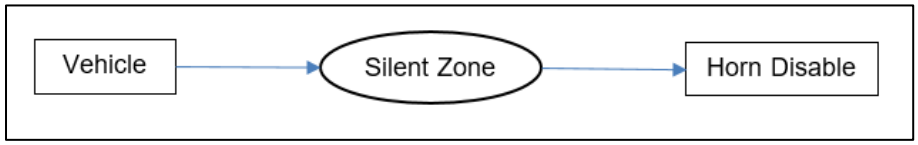

Figure 6.2 Horn disable on successful connection

Level 2

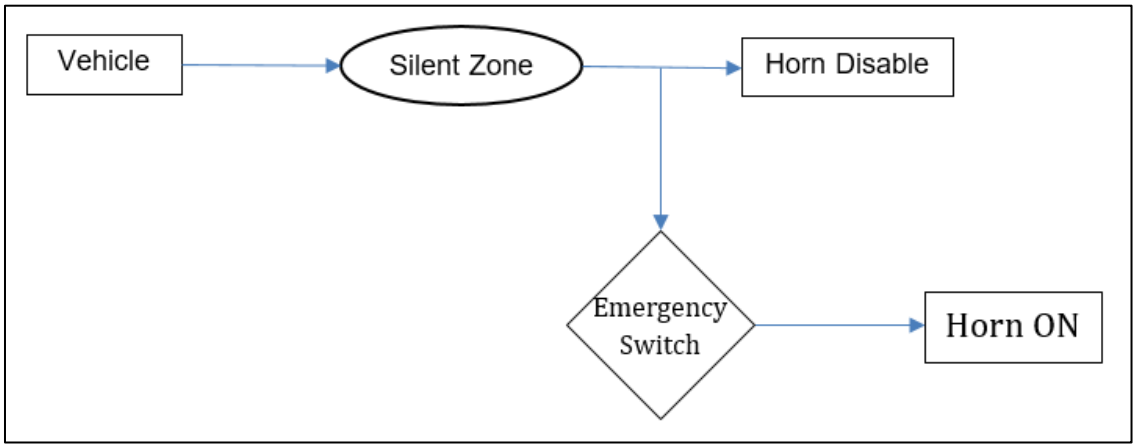

Figure 6.3 Emergency Switch

Data Flow Diagram

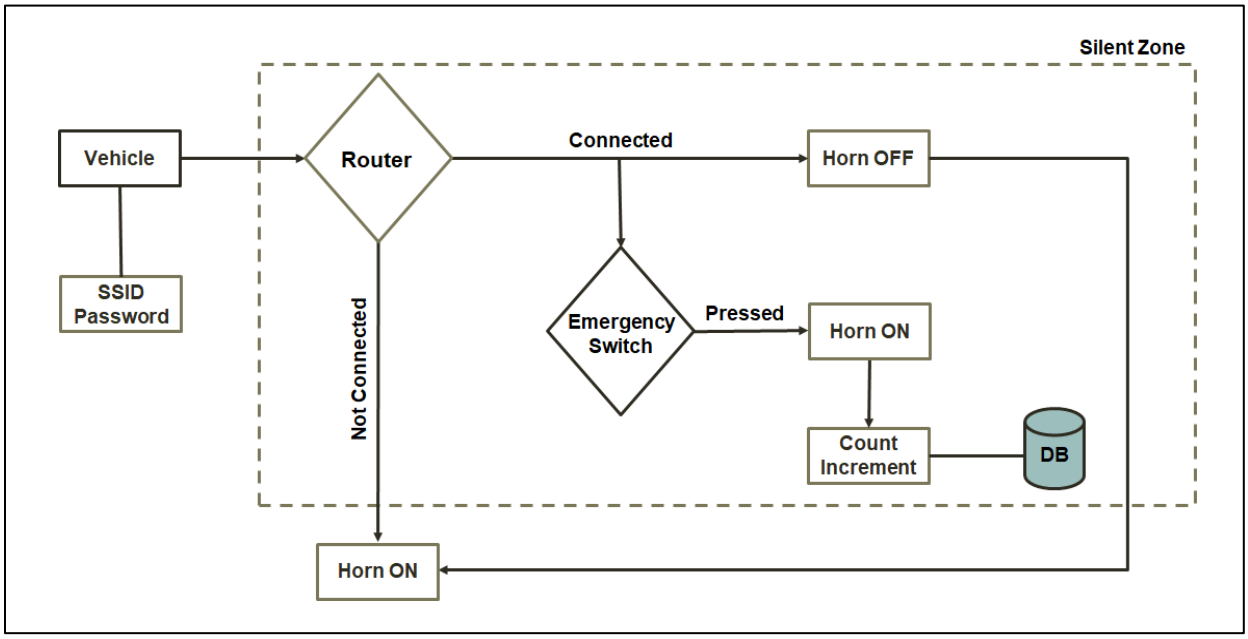

Figure 6.4 DFD

7. TASKS COMPLETED

The initial node MCU circuit developed on a breadboard with buzzer and horn figure 7.1

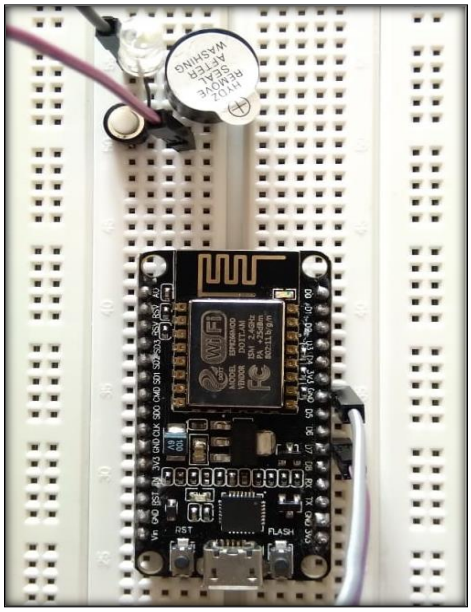

Figure 7.1 Initial prototype

For development purpose a LED light is replaced with the buzzer to demonstrate the working of the model in the figure 7.2, we can see the WIFI hotspot i.e. the WIFI router if “Off” means the model is out of the silent zone and on pressing the switch the light can be seen “on” demonstrating an active buzzer or horn.

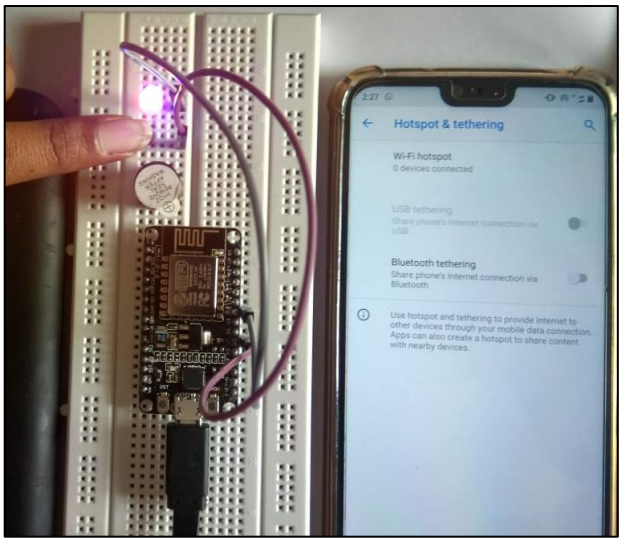

Figure 7.2 prototype out of silent zone

In the figure 7.3, we can see the WIFI hotspot i.e. the WIFI router if “ON” means the model is in contact of the silent zone and on pressing the switch the light can be seen “off” demonstrating a suppressed buzzer or horn.

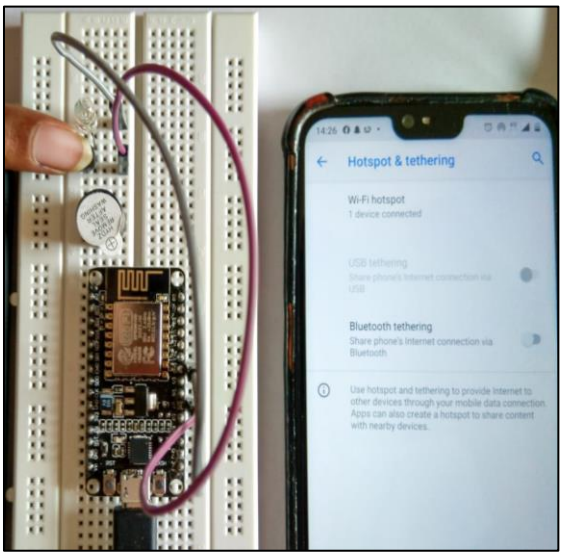

Figure 7.3 prototype in the silent zone

8. WORK PLANNED FOR NEXT SEMESTER

- Implementation of Emergency switch.

  The emergency switch will be provided to the driver to use in case of an emergency. Upon pressing this switch a count must be incremented in the database.

- Creating the database and storing the count.

  Firebase database will be used for storing the count for each vehicle.

- Integration of IR Sensor to check the improper use of emergency switch.

  IR sensor will be used to check if there is a vehicle in front or ahead of the user. In absence of such will be marked as a notorious honk.

- Online setup of portal with database for storing and processing the count record.

  A web application where user would be enrolled with his/ her vehicle number for the authorities to check at end of month and penalize the drivers.

9. CONCLUSION

“Zona Del Silencio” is an IoT based device which suppresses the unwanted honking of vehicles in the Silent Zones. The vehicle being installed with the device detects the silence zones by sensing the Wi-Fi routers present in the zones. The driver is given an emergency switch to use in such scenarios, each time this switch is used, it is recorded in the database to check any mischievous behavior. This way it can be easily made sure that notorious use of emergency switch is penalized.

Thus, achieving **The True Silent Zone!**

10. REFERENCES

[1] David, Nathan & V, Anyika & IfeyinwaN, Ejindu & AyodejiO, Abioye. (2013). LIBRARY SOUND LEVEL METER. Quest Journal of Electronics and Communication Engineering Research(JECER). 1. 20-29.

[2]Sojol, Jafrul & Shihab, Hashmi & Ahamed, Tanvir & Abu, Sayed & Siam, & Siddique, Shahnewaz. (2019). Nirob: A Next Generation Green Earth Technology Based Innovative System for Metropolitan Sound Pollution Management. 10.23919/ICACT.2019.8701955.

[3]Vijay, Ritesh & Sharma, Asheesh & Chakrabarti, Tapan & Gupta, Rajesh. (2015). Assessment of honking impact on traffic noise in urban traffic environment of Nagpur, India. Journal of Environmental Health Science and Engineering. 13. 10.1186/s40201-015-0164-4.