SLEEP DETECTION AND ALERTING SYSTEM

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Yours sincerely,

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Asrith kadiyam

Shiva sai veldandi

Gowri sankar erubandi

Akhil krishna

Uday Bhaskar

Sai siddharta

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Bade manasa vamsi

Summary

Nowadays, the road accidents due to drowsiness took a great toll of death on humanity. While experiencing drowsiness people might doze off without even realizing it. For many decades, drowsiness detection system for vehicles was not among the major concerns though it turns out as one of imperative features that could have avoid the mishappens caused due to drowsiness and thus should be implemented in all vehicles in order to ensure safety of drivers and other vehicles on the road. Enforcing driving restrictions on such cases are yet to be implemented. The absence of such system in the current transportation systems expose drivers to a great danger especially at night because accidents are highly likely to happen at night due to drowsy and fatigue drivers. Therefore, this project proposes a real-time drowsiness detection system for vehicles, featuring sms.

Contents

1.0 Introduction

Accidents involving vehicles on road are becoming unpreventable nowadays. World Health Organization (WHO) once revealed that a death toll of over 3400 people took place due to the drowsiness of the drivers and billions of people are suffering non-fatal injuries and disabilities as a result of such mishappens. Traffic Safety Foundation study found that 37% of drivers have fallen asleep behind wheels. Driver fatigue affects the senses and ability of drivers. It impairs their coordination and dulls their senses. It deprives of his reaction time which is crucial aspect while driving which in turn causes lack of judgment therefore causing a death threat. The number of accidents due to such cases are increasing on a large scale these days. Recent statistics estimate that annually a toll of 76,000 injuries and 1200 deaths are attributed due to these cases.

2.0 Objective

Our objective of the project is to ensure a safety system. A system which can monitor the driver's state and alert before it's too late. In order to meet such criteria, we require a system which monitors the driver's state of consciousness. Detection in real-time is the major challenge in the field of accident prevention system. The project revolves around the following major aspects:

- To develop a system that automatically detects and executes appropriate reaction based on the driver's state of consciousness.
- To develop a drowsiness detection system with SMS notification.

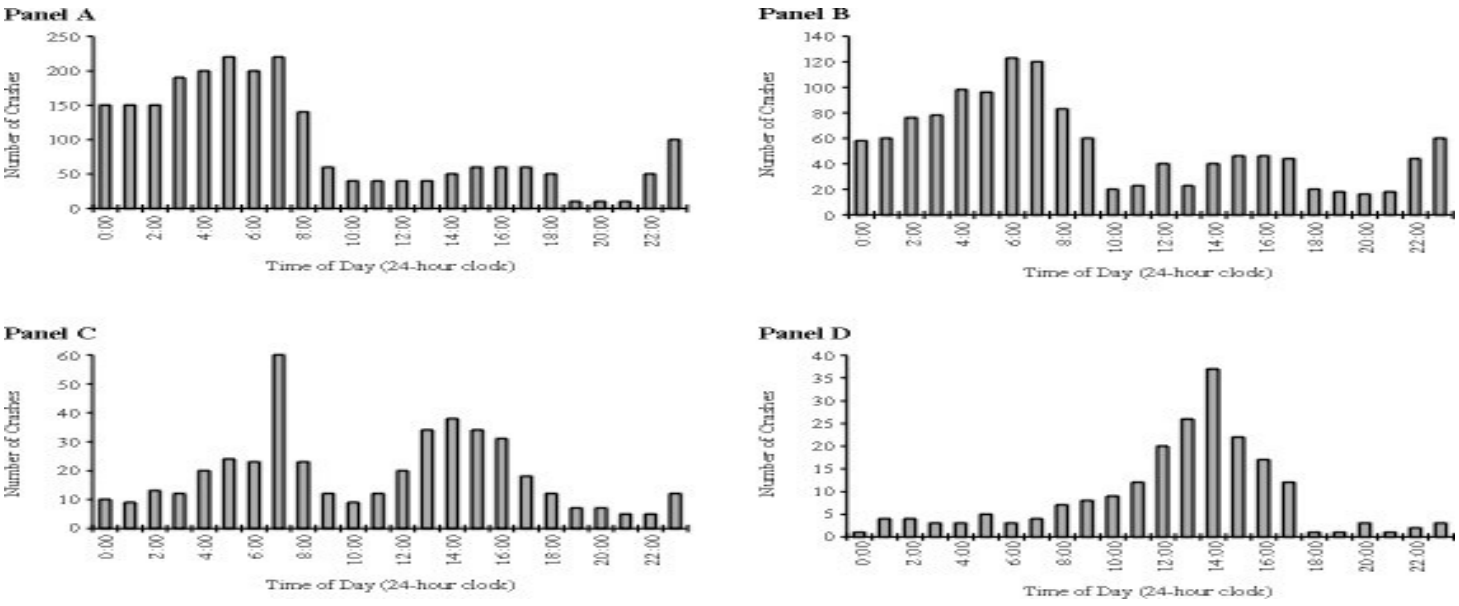
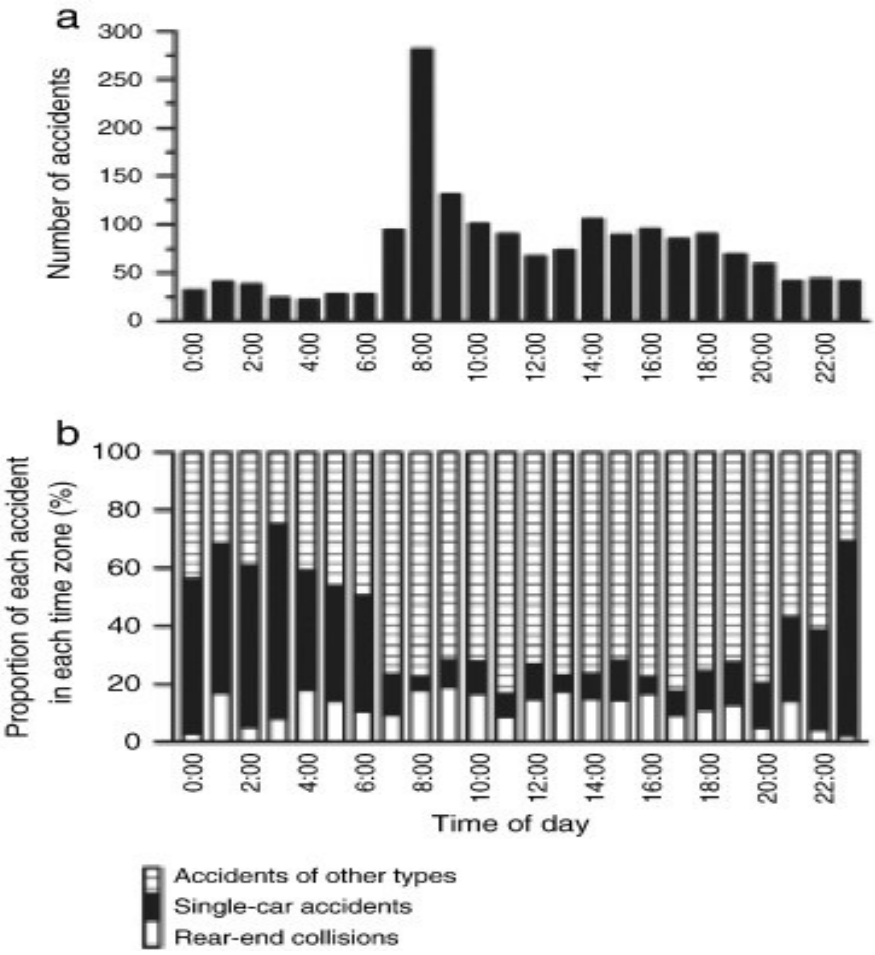
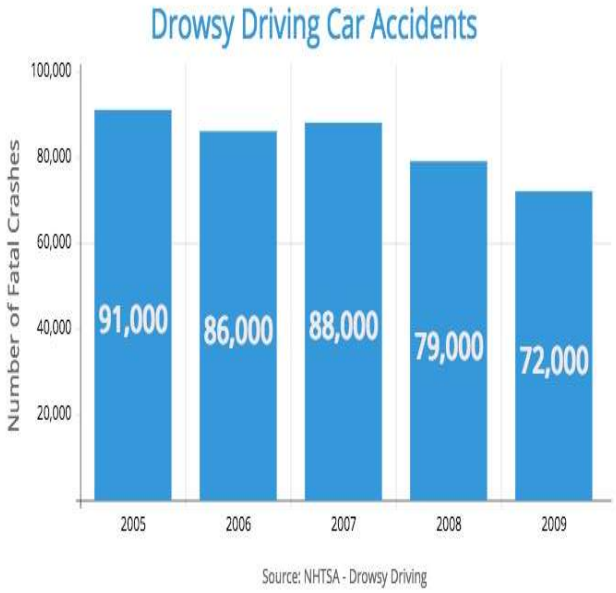


Figure 1. Time of occurrence of crashes in drivers of different ages in which the crashes were attributed by the police to the driver being asleep but in which alcohol was not judged to be involved. The four panels show plots for drivers of the following ages: (A) drivers 25 years of age or younger; (B) drivers between 26 and 45 years of age, inclusive; (C) drivers between 46 and 65 years of age, inclusive; and (D) drivers older than 65 years. In each panel, the X axis is the time of day and the Y axis is the number of crashes. However, the scale of the Y axis is different for each panel. The data are for the years 1990 to 1992, inclusive.





Each year, nearly 100,000 traffic crashes can be attributed to drowsy driving, including more than 1,500 deaths and over 70,000 injuries, according to the U.S. National Highway Traffic Safety Administration.

Most drowsy driving accidents occur between midnight and 6 a.m. among drivers who are alone in their vehicle Driving while being tired may seem like an innocent activity but it is proven to be quite deadly. From 2005-2009, drowsy driving accounted for approximately 1.4% of all car accidents. But don't let the small percentage number fool you. That 1.4% represents 5,895,000 car accidents during those 5 years. This means an average of 83,000 car accidents occurred every year due to drowsy driving. In 2014, 846 people were killed in drowsy driver related car accidents. This accounted for 2.6% of all car accident fatalities in 2014. Research has shown these figures to be consistent throughout the years. From 2005-2009 an average of 1,004 people died every year (2.5% of all fatalities) from drowsy driver related car accidents.

3.0 Apparatus

1. Node MCU 1.0v (ESP8266)
2. TCRT5000L (IR sensor)
3. Arduino Nano
4. Buzzer
5. Resistors
6. Batteries
7. Breadboard
8. Jumper wires
9. Led

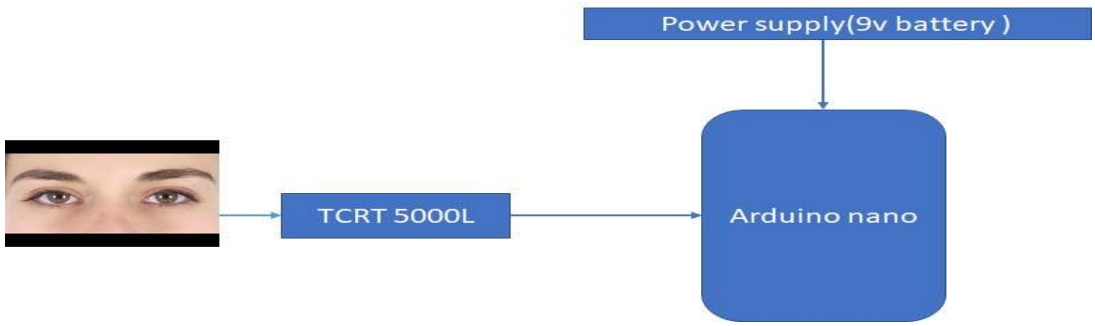
4.0 Illustration

The project is themed on three illustrations which on combined make it whole. The first being the receiving and analyzing the analog signals of TCRT5000L (IR sensor) followed by the second where the arduino nano analyzes the analog signals and provides a stimulus to the Node MCU which triggers the buzzer to set off if the IR sensor is triggered and the final one where the notifications are pushed through Node MCU upon the trigger of the sensor

4.1 Blink Detection

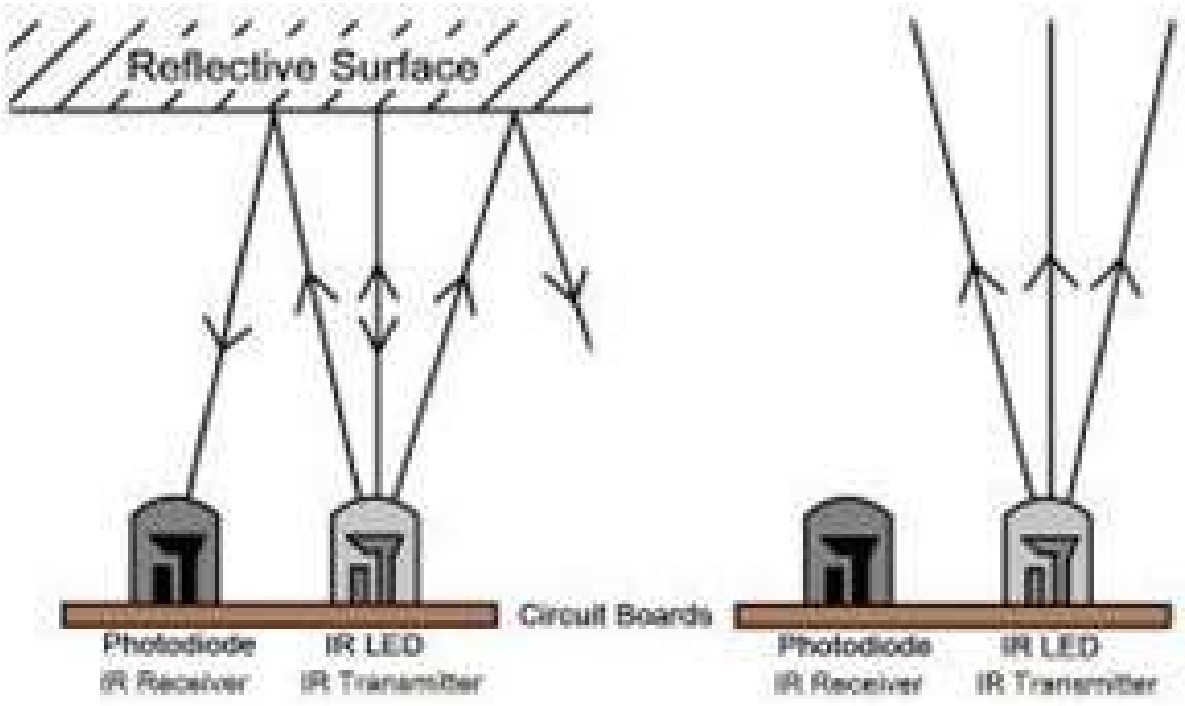
How we detect the eye blink?

The IR sensor constantly sends infrared waves which are reflected and detected by the receiver. With a blink in the eye, the output of the IR receiver escalates. This output is sent to the Aurdino nano. The Aurdino nano then stimulates the Node MCU which sends the signal to the buzzer to make the noise. In this way, a blink is detected. This system can be used to check if the driver is a bit sleepy on the drive. Excluding the detection of a normal blink ,the aurdino nano stimulates a command through the buzzer if the eyes of the driver are closed for more than 2-3 seconds (depending upon your preference) .



Working Principle of IR sensor

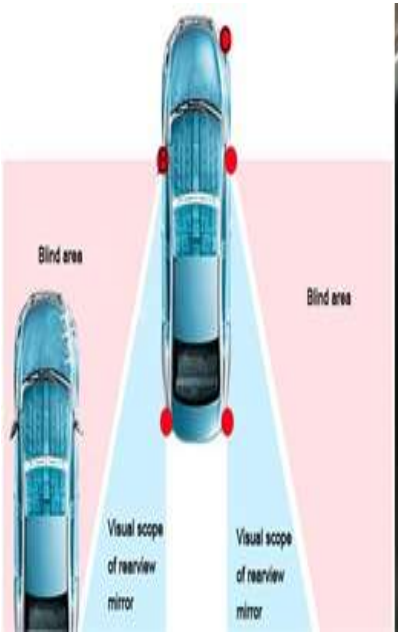
The IR sensor is an infrared sensor. It contains two parts. A transmitter and a receiver. The transmitter continuously emits infrared waves onto the eye. While the receiver continuously looks for variations in the reflected waves which indicates that the eye has blinked. If the eye is closed the output of IR receiver is high otherwise the output of IR receiver is low.



WORKING PRINCIPLE (figure1)

Comparative Analysis

This is the comparative Analysis between Camera view and IR Sensor. We can clearly see that IR Sensor detection method is much more beneficiary. So IR detection system can be used in-place of camera view for drowsiness detection.



IR visual

Camera visual

IR Sensor	Camera view
IR Sensors use a short wave-length to illuminate an area	In camera view Infra-red energy is reflected and interpreted to generate a image
IR Sensors are not affected by smoke oncoming headlights, haze etc.	Camera view are susceptible to be affected by headlights or haze
IR Sensors are cost efficient	Camera view is generally costlier
IR sensors are capable of measuring the heat being emitted by an object and detecting motion	Camera view is in which the camera is placed in-front of the driver and it monitors the driver drowsiness.
IR sensors are size compatible	Camera views are not size compatible.
This method is practically applicable	This method sometimes can cause trouble to the driver since it is in front of him/her
Helps in decreasing Road accidents	Even though this also helps in decreasing road accidents its much lower than IR Sensor
IR accuracy percentile is constant for both up-link as well as down-link eye movements	Its accuracy percentile varies from 80 percent to 55 percent for uplink and downlink movement.

ADVANTAGES :

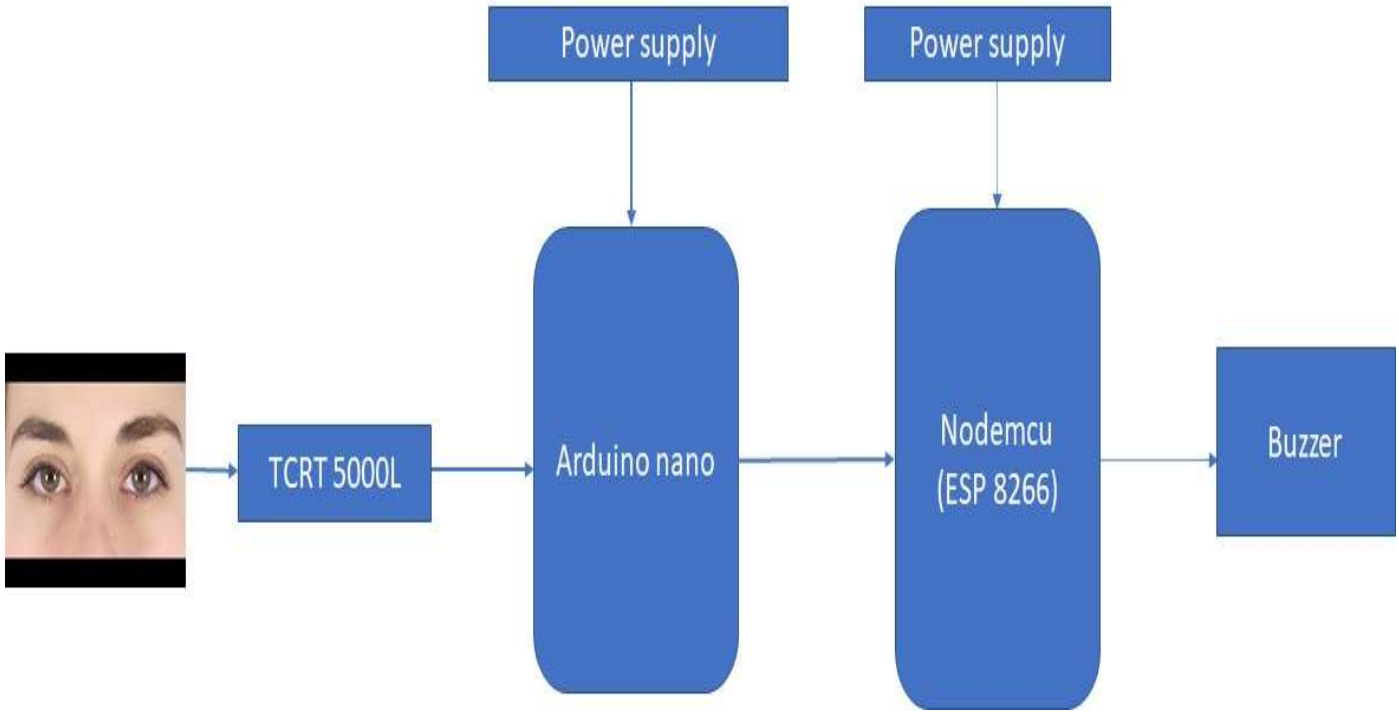
- Remote detection - no mechanical contact with eye.
- It is easy to implement. IR sensors are not affected by smoke , haze and oncoming headlight etcetera
- Our system does not require the restraint of the external eyelids.
- Excellent frequency characteristics (DC to more than 500 Hz).
- cost efficient (cost is lower than camera view detection).

DISADVANTAGES :

- Difficult to calibrate using common units of eye blink measurement. (e.g. mm of eyelid displacement)
- The signal is proportional to the exposed area of the eyeball. Independent measurements of the
- individual eyelids are not possible. And it works efficiently for only a short range distances.

4.2 Buzzer Response

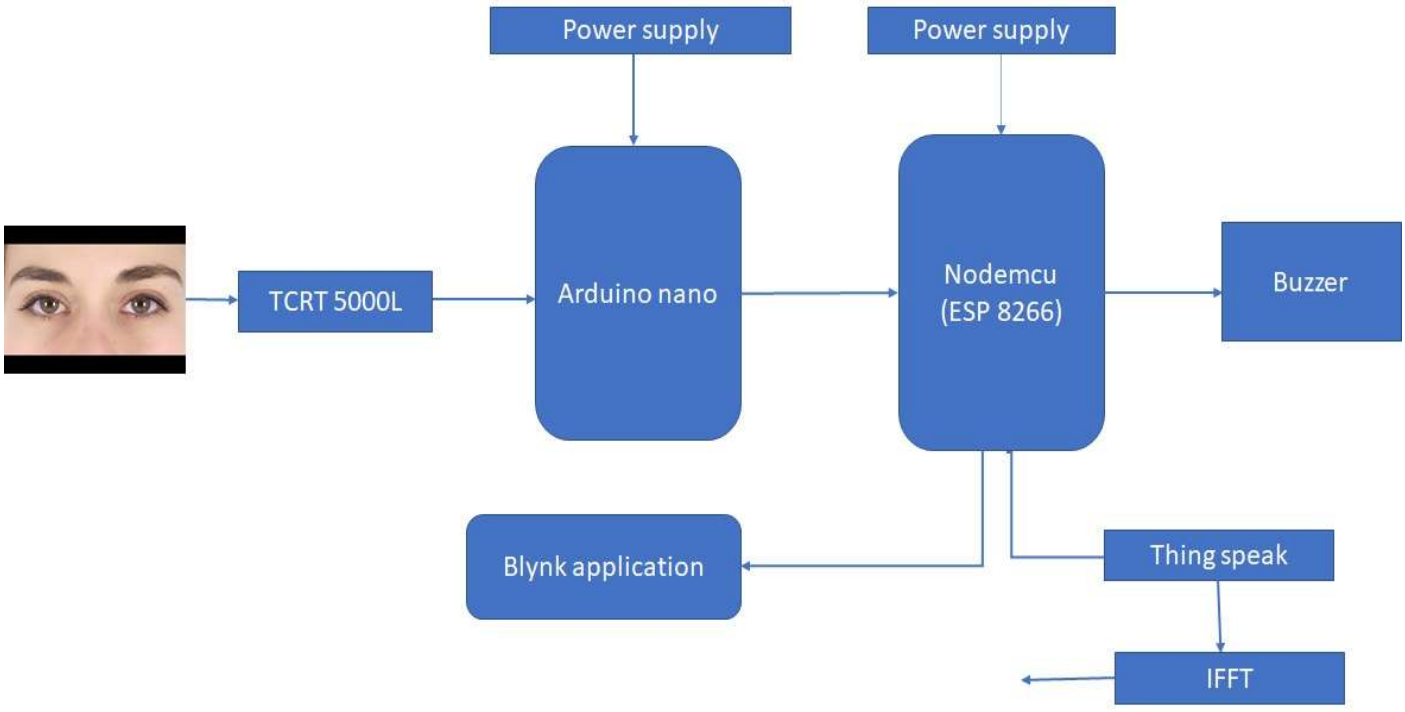
In this module the so obtained stimulus from the IR sensor is read and analyzed by arduino nano which sends the information to the Node MCU if the blink gap is more than the threshold value. Which in turns makes the Node MCU trigger the caution circuit containing the buzzer and led.



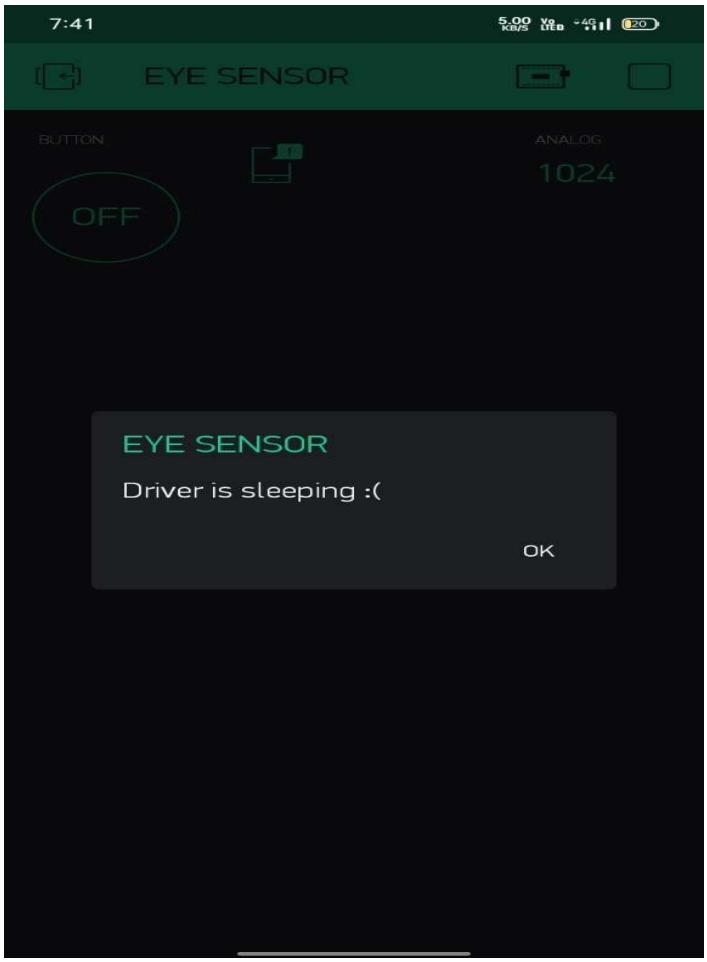
BLOCK DIAGRAM

4.3 Notifications through cloud services

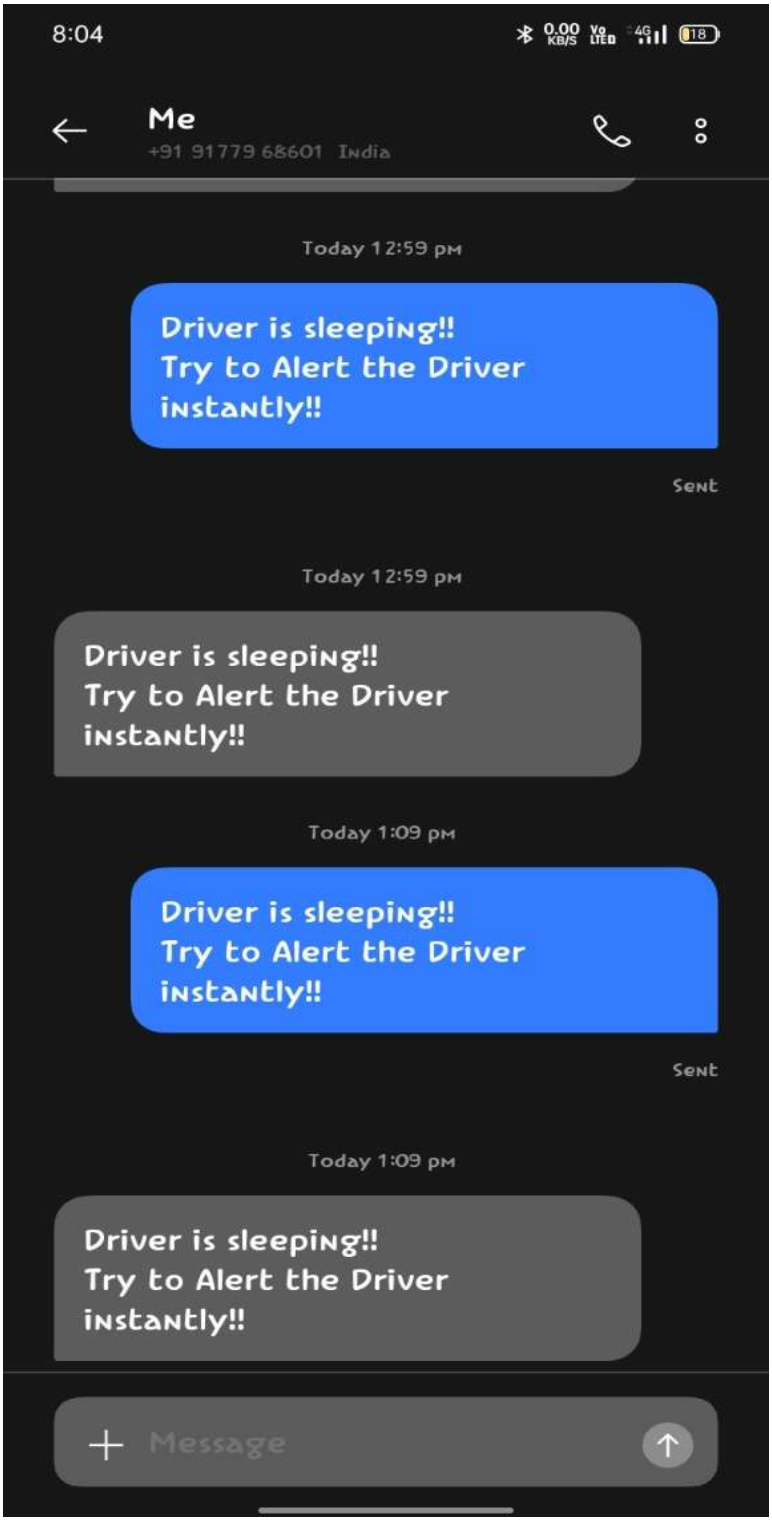
In this module the sensor information is collected by the Node MCU. If the driver is a bit drowsy, IR detects it and then arduino nano receives the information .Then Arduino nano sends the signal information to Node MCU then the buzzer will be activated and an alert message and mail is sent to corresponding passenger's number. The module has an inbuilt wi-fi module which transfers all the data to the cloud through wi-fi and the following is analyzed on the blynk platform through which notifications are sent according to the situation.



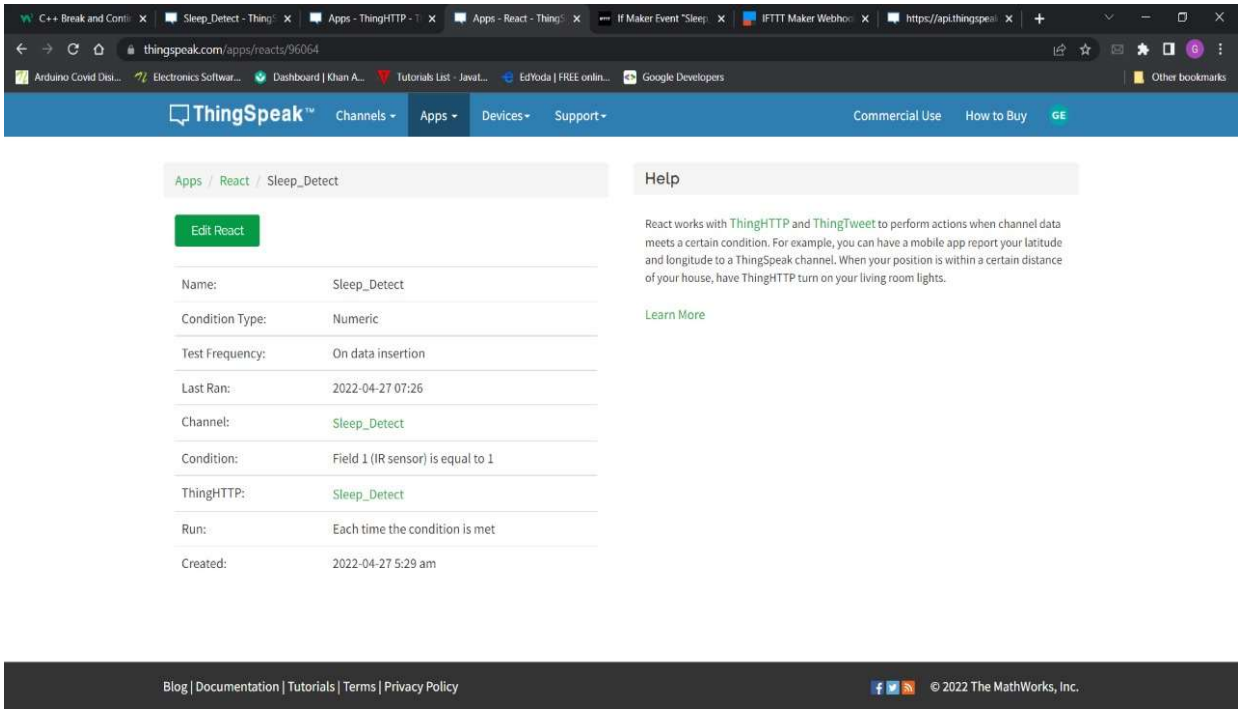
BLOCK DIAGRAM



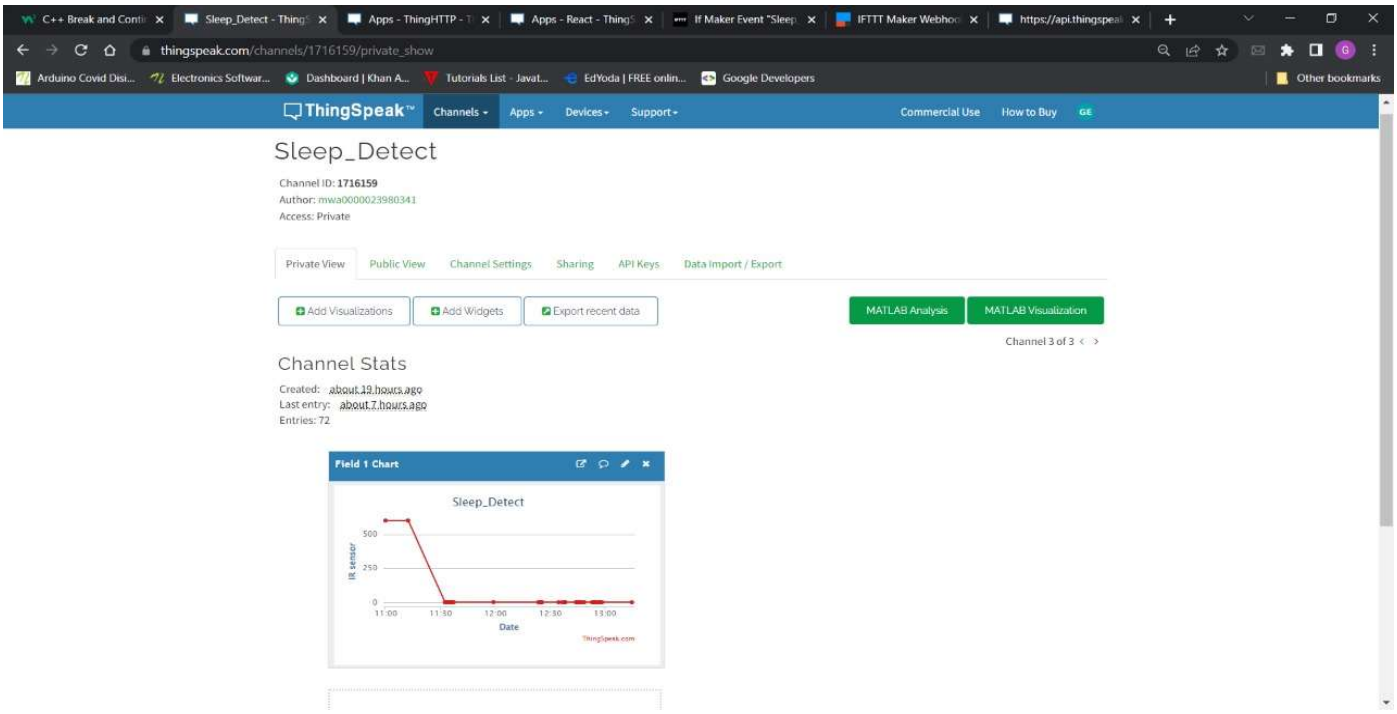
BLYNK NOTIFICATION



SMS



ThinkSpeak Platform



5.0 Conclusion

By developing this system, basic road security and safety against drowsy drivers can be established with low cost effective system. This project includes drowsiness detection, alert system for drivers (triggering alarm) and sending message with the detail location of driver. The real implementation of this project can indirectly reduce the number of accidents due to drowsiness or sleepiness of drivers.

6.0 References

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