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IOT based Vehicle Surveillance

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Abstract: ***According to the WHO global report on the road safety, India accounts about eleven percent of accident deaths in the world. Hence, travel safety has become major concern in the world while travelling because many of people have lost their lives. The accidents are caused due to rider negligence, over speed and vehicle condition such as engine problem, tire pressure, speed or generation of poisonous gas etc. This problem can brought up to an end by continuous surveillance of vehicle condition with help of sensors and comparing sensor values with threshold value or limit set by government. Then triggers the alert message to the driver or owner through Wi-Fi and Node MCU when values exceed the preset value and respective precaution will be taken by owner to safeguard their lives.***

Keywords: Travel Safety, Node MCU, Wi-Fi.

I. INTRODUCTION

In modern days almost every family will have at least one vehicle and need to complete their work as soon as possible therefore they risk their life and drive the vehicle too fast which may lead to deadly accidents. Nowadays it is an excitement to drive fast risking their life which may even lead to death. In some cases the motor temperature may rise due to loss of coolant or rise in temperature of environment. These are major issues for temperature rise in the engine. Many people don't change engine oil at regular interval of time thus damaging the engine when it starts and large amount of CO2 and other gases are produced which may lead to failure of engine and mainly effects the atmosphere by emitting large amount of CO2 and therefore the CO2 sensor is required to monitor the pollutant.

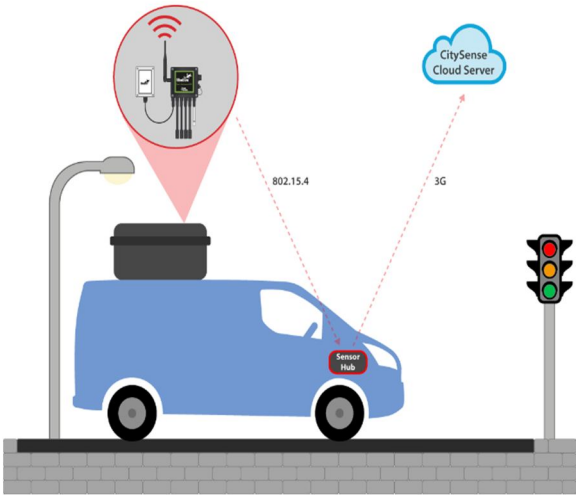

Figure 1: Vehicle Surveillance

Major accidents are due to not maintaining the minimum distances therefore we have to take care of vehicle controlling and also accidents occur because of variation in pressure of tires. If pressure is more than the specified amount it may lead to wheel alignment issues, balance issues and suspension issues thus the tire may explode and vehicle cannot be controlled thus causing accidents hence pressure sensors may be used to detect the pressure. By considering all these problem in recent era a smart vehicle surveillance can be implemented for detecting and classifying different problems arise in vehicle with help of sensors and those data base are stored in cloud with help of IoT, where Node MCU controllers receives data from sensor and compares it with preset value .if value exceeds the preset value it relay or triggers the alert message to the user android application with help of cloud storage , hence owner can take respective solution to safeguard their lives.

IoT (internet of things) is communicating between the devices by making use of internet where all the information is stored and can be accessed easily. The data from sensors are transmitted which is stored in cloud and can be analyzed by the platforms such as Blynk, Thinger and Thingspeak.

II. LITERATURE REVIEW

This section discuss about existing system. Vehicle monitoring and tracking were discussed using different sensors like IR sensor, temperature sensor etc. and GPS was used to track location. The blynk application used as communication platform to relay the information to the user with help of Raspberry pi. The advantage of this paper is, the data can be visualized in both blynk application and mail [1]. Vehicle theft monitoring and tracking were represented using IoT and RFID unique tag ID which gives information about vehicle theft to the owner through mail including the picture of vehicle from the information box i.e. cloud [2]. Monitoring of vehicle emission was discussed, how to reduce emission created by vehicle using different Pollution based sensor like carbon dioxide sensor, nitrogen oxides sensor and sends alert message to user through A IoT with help of node MCU [3]. Monitoring of vehicle by using the different sensor and those values were displayed on LCD and PIC microcontroller is used to send and store the data from different sensor also stores same values in computer, then sends alert message to the user [4]. Discussed about vehicle emission monitoring using different emission sensor and readings were display on LCD and relays information to the traffic unit to control the emission level of vehicle, which in turns helps to control pollution [5].

III. PROPOSED SYSTEM

The smart vehicle surveillance show in figure 2 which consists of three major component

A. Sensors, i.e. pressure, co2, alcohol, ultrasonic, accelerometer and temperature
B. Node MCU
C. Android Application.

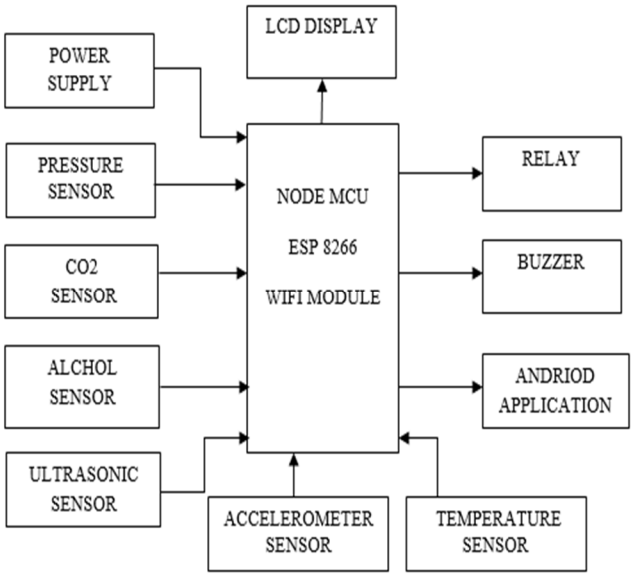

Figure 2: Block Diagram of Vehicle Surveillance

In front part of vehicle Ultrasonic sensor is placed to maintain the minimums distance between the nearest vehicles. If not able to maintain minimum distance then it relays the information to the user. The generation of spark can be sorted by placing temperature sensor in the engine part of the vehicle. If rider is recognized with higher alcohol content with help of alcohol sensor then intimates to user android application with help of IoT. If not changing the engine oil properly at the correct time it causes damage to vehicle and start to emit large amount of carbon dioxide and harmful gases while burning fuel and leads to engine failure, environmental pollution hence co2 sensor used to monitor the pollutants. The imbalance of tire is calculate by using pressure sensor because improper alignment of tire sometime leads to accident or breakdown of a vehicle and over speed indication is calculate by using accelerometer sensor. The value obtained from sensors is continuously monitored and updated to LCD and cloud. When obtained value reaches the preset value or threshold value, the controller will alert to user through LCD and database. IoT helps the system to update the sensor values to the cloud and node MCU connected to sensor helps to update the value obtained from sensor to cloud when Wi-Fi is connected to the internet. The value is continuously updated to vehicle owners cloud storage and indicates the message to owner when sensor value reaches or exceeds the preset value or threshold limit set by government and respective action will be taken by the owner to safe and save the passenger lives.

IV. HARDWARE DESCRIPTION

This section gives brief description about hardware components

A. *Power Supply*

A Power supply is an electrical device that supplies electric power to an electrical load. The function of a power supply is to convert electric current from a source to the correct voltage, current and frequency to power the load.

Figure 3: 12v Power Supply

B. *Sensors*

1) *Temperature Sensor:* Temperature sensor is an electronic device which collects the input data and converts to electronic form to analyze the temperature changes
2) *Accelerometer Sensor:* Accelerometer sensor is an electromechanical device measures the acceleration forces which may be static or dynamic forces.
3) *Ultrasonic Sensor:* Ultrasonic sensor is an instrument device measures the distance between two object by using ultrasonic sound waves
4) *CO2 Sensor:* CO2 sensor detects the gaseous present in object or environment by detecting the quantity of IR radiations
5) *Pressure Sensor:* Pressure sensor converts the pressure value into analog electrical signal which helps out to find the variations of pressure present in the system
6) *Alcohol Sensor:* Alcohol sensor detects the alcohol concentration on breath. It has high sensitivity and fast response

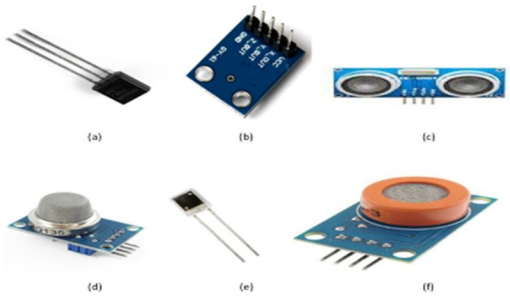

Figure 4: (a) Temperature, (b) Accelerometer, (c) Ultrasonic (d) CO2, (e) Pressure and (d) Alcohol Sensor

C. LCD Display

Liquid crystal display is a flat panel display which emits the information of incoming and outgoing signal with the preset value. The commonly used LCD is 16×2 LCD which display 16 character per line and has ability to display in two lines i.e. 16 columns and 2 rows, and also includes three control signals, one data bus, read and write pin, enable pin, register select pin.

Figure 5: LCD Display

D. Relay

Relay is a switch operated by magnetic force when current flows through a coil in relay. Relay has two circuits normally closed and normally open which operates based on flow of current. The relay has coil, when a voltage is applied piston is pushed and connects to another end, when a voltage is removed it comes back to a normally open position.

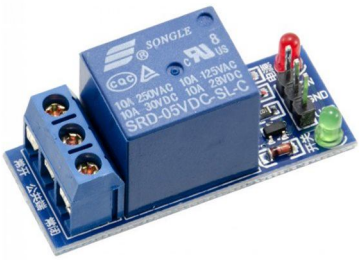

Figure 6: Relay

E. Node MCU ESP8266

Node MCU is a controller which has low cost Wi-Fi module suitable for adding Wi-Fi connectivity to a existing microcontroller via URAT serial connection. The main aim of Node MCU is to achieve low power consumption which has been designed for mobile, IoT and wearable electronics. The power saving architecture operates mainly in 3 modes: active mode, sleep mode and deep sleep mode.

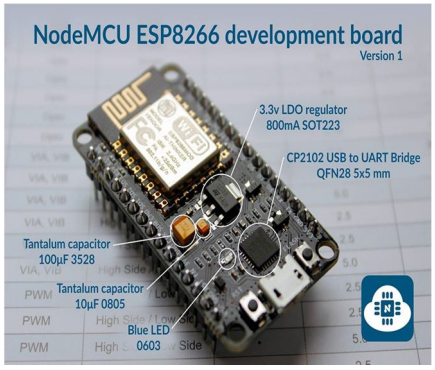

Figure 7: Node MCU

F. Wi-Fi Module

Wi-Fi module creates network connectivity by taking help of radio waves. It is wireless adapter to create a hotspot and also helps out to store data in cloud

Figure 8: Wi-Fi Module

V. SOFTWARE DESCRIPTION

This section gives brief description about software requirements

A. Arduino IDE

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them. It is also called as sketches. The sketches are written in text editor and saved with file extension .ino. The software also includes libraries, third party hardware and serial monitor.

Figure 9: Arduino Software

B. Adafruit MOTT

It is a protocol for device communication that Adafruit IO supports. Using a MQTT library or client you can publish and subscribe to a feed to send and receive feed data.

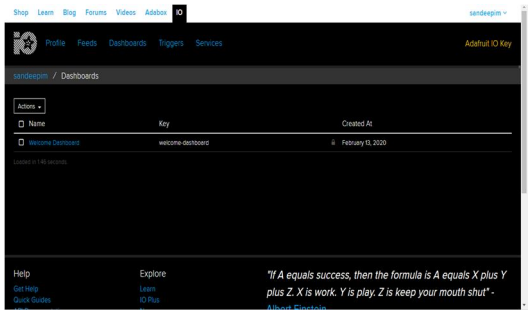

Figure 10: Adafruit MQTT Dashboard

VI. CONCLUSION

In this paper, the cost optimized device used for continuous monitoring of vehicle for detecting and classifying the different problems present in vehicle was achieved. Where tire pressure, distance, speed, poison gas, alcohol and temperature were detected with help of sensors by comparing the sensor values with preset value and stores those data in cloud ,then triggers the alert message to the user with help of cloud and Node MCU to user android application about fault when sensor value exceeds the preset value. From experimental result it can be concluded that the smart vehicle surveillance device is easier and highly reliable device to detect the problem in vehicle within short period to safe the passenger lives.

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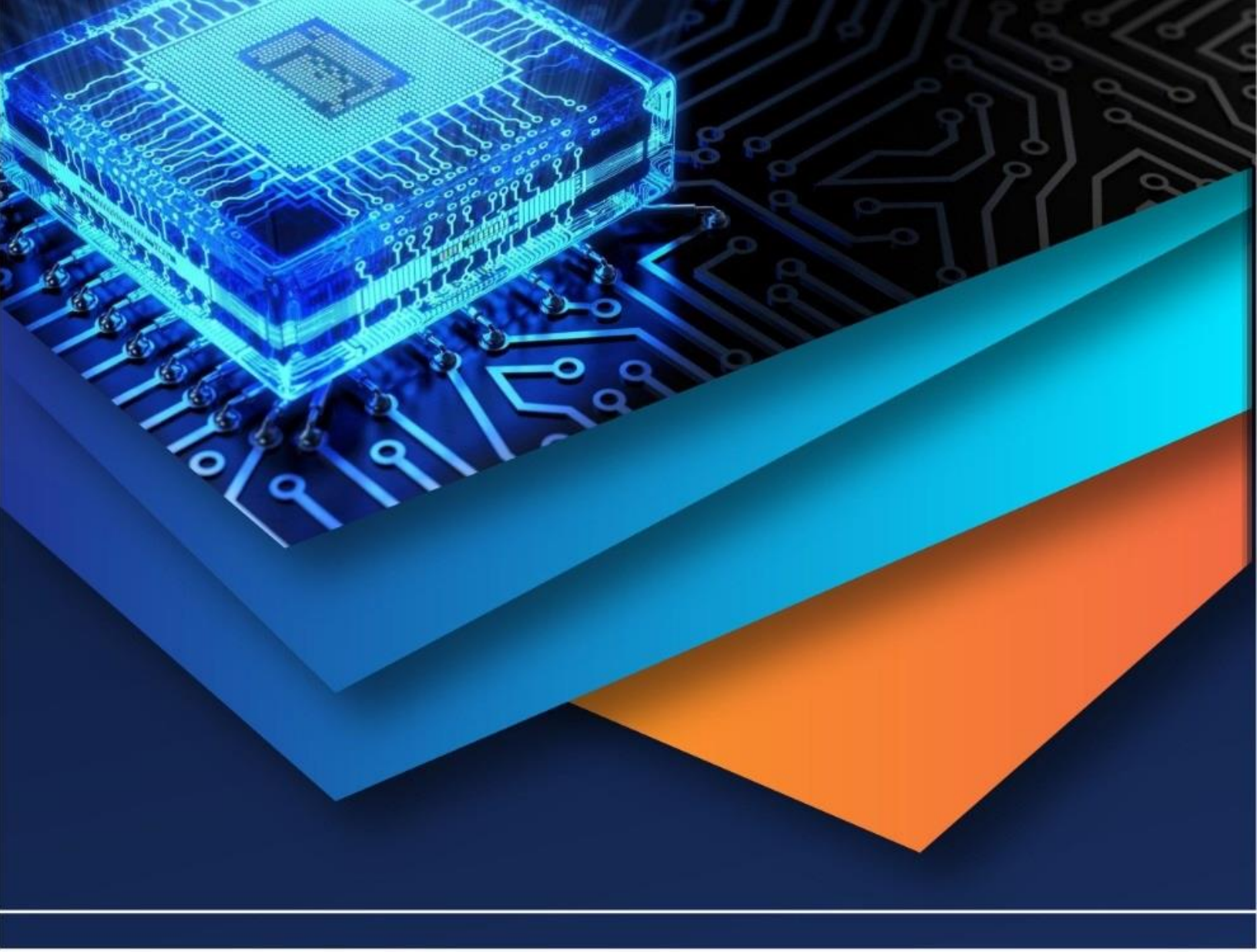

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