

IOT Based Smart Driving System

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ABSTRACT

(IoT) Internet of Things is referred as the world-wide network system which connects all the smart objects together. It is the way in which all objects are enabled to be in touch with each other. Whenever those connected smart objects over internet are controlled to only vehicles, then it is referred as Internet of Vehicles (IoV). Vehicle ownership has been increased by continuously increasing population and rapidly increasing cities. Hence, traffic management has become a great problem in our daily life. This research paper provides IoV based traffic management solution to overcome the problems like accidents, over speed, pollution in our daily life. The user interface designs has been planned in Php, arduino technologies and the application data storage in sql server.

Keywords: Internet of things, Internet of vehicles.

1. INTRODUCTION

Today drunk driving is a big trouble in every part of the nation. Many accidents take place due to the negligence on the part of the driver. Many drivers drink and drive and it is a criminal offence. Every vehicle will have emission of pollution gas. But the problem is due to the improper vehicle maintenance. This pollution emission from the vehicles cannot be completely avoided but it can be restricted. Due to the high speeds of vehicles even in the sharp turnings and junctions most of these road accidents are occurred. Reduction of number of such accidents is the major step needed to be taken.

In the research work titled as "IoT based smart driving system" initially checks whether the person has drunk or not with the alcohol sensor. The system is designed in such a way that when the alcohol concentration is detected then the related information should send to the nearby motor vehicle department. Also, the amount of air pollution can be reduced through this IoT based smart driving system. Pollutants are detected using the

CO sensor. The presence of the pollutants is detected when a particular level is reached and the related information will send to the nearest motor vehicle department. This system also informs the violations to the motor vehicle department when the over speeded cars on highways are detected. In case of accidents the IOT device will send an alert message along with the corresponding location data from the GPS module to the rescue centers like hospital and the ambulances using network. This is an effective solution to the poor rescue response in case of accidents. Therefore, Smart Driving system can make vehicle management more efficient. This system also provides the notification messages to the vehicle users regarding the traffic rule violations like over speed, alcohol detection etc and automatically deducts the penalty from them.

1.1. PROBLEM STATEMENT

The "IoT based smart driving system" provides traffic management solution to overcome the problem that is prevailing in our daily life like monitoring vehicle without using camera, over speed detection, accident detection, misuse of vehicles etc.

1.2 METHODOLOGY

1.2.1 Liquid Crystal Display (LCD)

The most common LCDs connected to the micro controllers are 16x2 and 20x2 displays. This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively. This is used to display visuals. LCD consumes less amount of power.



Figure 1.2.1 LCD

1.2.2 Alcohol Sensor

This module is made using Alcohol Gas Sensor MQ3. It is a low cost semiconductor sensor which detects the presence of alcohol gases at concentrations from 0.05 mg/L to 10 mg/L. MQ3 alcohol sensor module can be easily interfaced with Microcontrollers, Arduino Boards, and Raspberry Pi etc.



Figure 1.2.2 Alcohol Sensor

1.2.3 WI-FI Module

The ESP8266 Wi-Fi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware. The ESP8266 module is an extremely cost effective board[1].

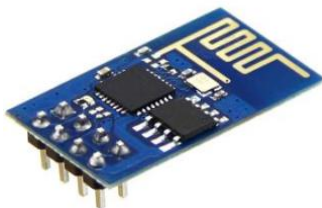


Figure 1.2.3 Wi-Fi Module

1.2.4 Arduino Mega board

The **Arduino Mega 2560** is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started [2].



Figure 1.2.4 Arduino Mega

1.2.5 Vibration sensor

The vibration sensor is used to detect the vibrations in a given area. This can help to provide alert to someone when trouble occurred, and today, you will even find these types of sensors in use with security systems.



Figure 1.2.5 Vibration Sensor

1.2.6 GPS Module

Global Positioning System (GPS) is a satellite-based system that uses satellites and ground stations to measure and computes its position on Earth. GPS is also known as Navigation System with Time and Ranging (NAVSTAR) GPS. GPS receiver needs to receive data from at least 4 satellites for accuracy purpose. GPS receiver does not transmit any information to the satellites.



Figure 1.2.6 GPS Module

1.2.7 CO sensor

A carbon monoxide detector or CO detector is a device that detects the presence of the carbon monoxide (CO) gas in order to prevent carbon monoxide poisoning. CO is a colorless, tasteless and odorless compound and is referred as “silent killer” because it is virtually undetectable by humans without using the detection technologies.



Figure 1.2.7 CO sensor

1.2.8 Bluetooth Module

BluetoothHC-05 module is designed for transparent wireless serial connection setup. The HC-05 Bluetooth module can be used as a great solution for the wireless communication. It exchanges data between fixed and mobile devices over short distances.



Figure 1.2.8 Bluetooth Module

1.2.9 Motor Driver Module

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC.[3]

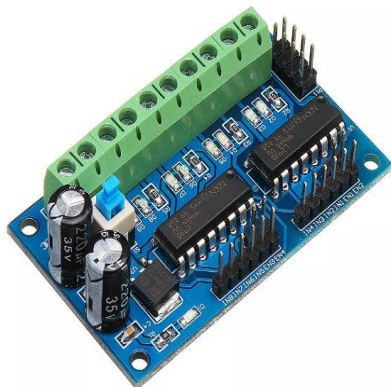


Figure 1.2.9 Motor Driver Module

2. BACKGROUND

2.1 TECHNOLOGIES USED

2.1.1 Php

The PHP Hypertext Preprocessor (PHP) is a programming language which allows the web developers to create dynamic contents that interacts with the databases. PHP is basically used to develop the web based software applications. RasmusLerdorf released the first version of PHP in 1994. PHP is a server side scripting language which is embedded in HTML. It is faster than the other scripting languages e.g. asp and jsp. It is integrated with a number of Popular databases like MySQL, Oracle etc.

2.1.2 Arduino

A program written in Arduino is known as sketch. Sketches are saved on the computer as text files with the file extension .ino. A minimal Arduino C/C++ sketch, has mainly two functions: one is setup: this setup function is called once when the sketch starts after reset. It is used for variable initialization, input - output pin modes, and other libraries required in the sketch. Second function is loop: after setup has been called, loop is executed repeatedly in main program. It controls the board until the board is reset or is powered off.

2.1.3 JavaScript

JavaScript is a scripting language. This is very easy and fast to learn. A scripting language is interpreted in run-time. JavaScript is a client side language which runs on a client browser. However JavaScript can also be used on the server side. JavaScript can be used on all most known browsers. It interacts with HTML elements easily. This validates text fields, disable buttons, validate forms, or background color changes of the page.

2.1.4 Html

HTML stands for Hyper Text Markup Language, which is used to develop the web pages. HTML was created by Berners-Lee. HTML was developed with the intent of defining the document structures like headings, paragraphs, lists etc.

2.1.5 CSS

CSS is referred as "Cascading Style Sheet". It is used to control the style of a web document. CSS handles

the look and feel of a web page part. We can write the CSS once and then reuse the same in multiple html pages. CSS handles the text color, font styles, spacing between paragraphs, columns, background images etc.

2.1.6 MySQL

MySQL uses the standard form of the SQL data language. It works very quickly and works well with large data sets. It is very friendly to PHP, the most appreciated language for web development. Speed, reliability, security, scalability and portability are some of the most compelling features of MySQL.

3. PROPOSED METHOD

3.1 Method of Alcohol Detection

The MQ3 alcohol sensor will detect the alcohol concentration when the power supply is given to the Microcontroller VCC pin, and it provides analog resistive outputs based on the alcohol level concentration. The microcontroller will convert the analog resistive output to the digital output in the form of "ALCOHOL DETECTED" LCD message. Once the alcohol is detected the system will notify the users through SMS regarding this traffic rule violation and deduct the penalty automatically. Further using the GSM modem this system also alerts the nearest motor vehicle department regarding the violation.

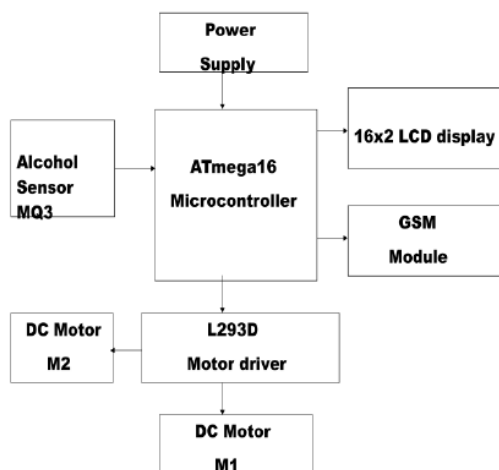


Figure 3.1 Block diagram of automatic drunken drive avoiding system

3.2 Method of Automatic Road Accident Detection

There are different methods for detecting the accidents automatically. These techniques include road accident detection using smart phones, mobile applications and GSM - GPS technologies. The exact incident location,

time and vehicle owner details can be identified using the GPS satellite. The abnormal behavior of vehicle detected using the vibration sensor. In case of an accident, the system finds the longitude and latitude of the position through the GPS module. Then it sends a message which contains the position of vehicle and the vehicle user details to the emergency departments like hospital and ambulance.

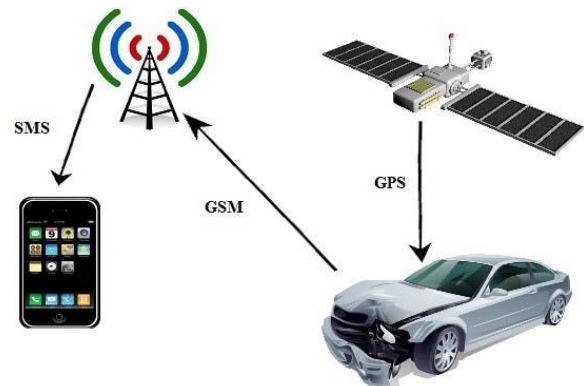


Figure 3.2 shows the procedure of accident detection through GPS technology

3.3 Method of Over Speed Detection

This system will be useful on the places where the rate of accidents due to over-speeding is comparatively high. The IOT based smart driving system has a speed sensing mechanism which automatically updates the database of motor vehicle department with the details of an over speeding vehicle using the GPS system. Once the details are updated, the driver is charged penalty for over speeding. Also the system notifies the user through SMS regarding the traffic violation and the fine will be deducted automatically from them. This makes use of the following units- Arduino MEGA, GPS unit, LCD display unit. The system has a device to detect rash driving and to alert the motor vehicle authorities in case of violations. Human concentration and lot of efforts required to detect the rash driving cases in early times and it is also difficult to implement. This paper is intended to design a system aimed at alerts related to rash driving.

3.4 Method of Pollution Detection

Every vehicle will have the pollution releases but the problem occurs due to the vehicle's improper maintenance. The pollution emission from the vehicles cannot be completely avoided but it can be restricted. When the pollution level shoots beyond the threshold level which has set, the message should be informed to the nearest motor vehicle departments. The method uses the CO sensor to detect the pollutants.

This sensor can be fitted at the mouth of the Silencer in the vehicles. When the sensor gets the pollution input it informs the vehicle owner details to the nearest motor vehicle departments after verifying the pollution threshold level according to the frequency. To maintain the transport law this system will be a great use for the government in order.

3.5 Hardware Architecture

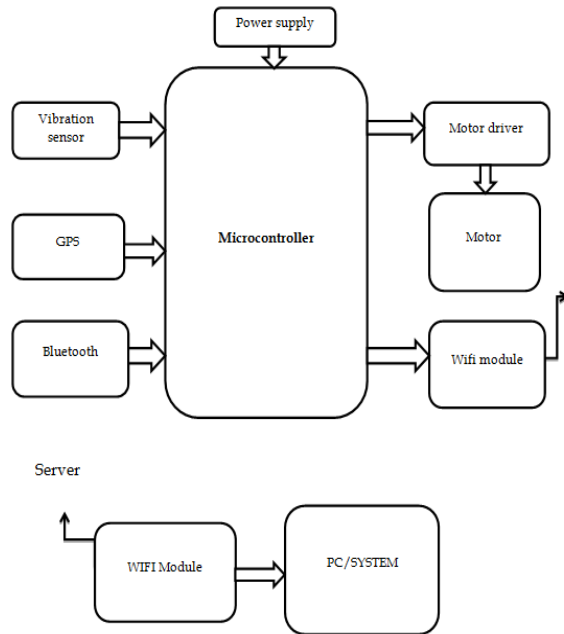


Figure 3.5 Block diagram of Hardware architecture Components

1. Power supply
2. Vibration sensor
3. GPS
4. Bluetooth
5. Motor Driver
6. Motor
7. Wi-Fi Module
8. Micro controller

Working Procedure:

1. Robotic car prototype contains 16*2 LCD Display, Arduino mega, Power Supply board, wifi module, Vibration sensor, GPS, Motor driver, motor, Co sensor and microcontroller.
2. Co sensors detect the vehicle pollutions, Alcohol sensors detect the alcoholic contents and the Vibration sensors detect the accidents.
3. When certain threshold level is reached, the level sensors will trigger the message to the concern authority.

4. ArduinoUno board provides a development environment for writing software for the board.
5. Here, when any of the mentioned traffic rules are violated then the nearest control rooms will get the details of the vehicles with the help of LCD display, GPS AND Wi-Fi module.
6. In case of accidents the in formations containing the location and vehicle owner details will send immediately to the nearest rescue centers like hospitals and ambulances.
7. In pc, there is a modem to receive the data coming from hardware and it directly gives to server.
8. The status of the vehicle violations are then sends to the concerned vehicle users as SMS and automatically deducts the penalty.
9. The motor vehicle department being the server can view all the vehicle details that are controlled by this system.

5. RESULTS

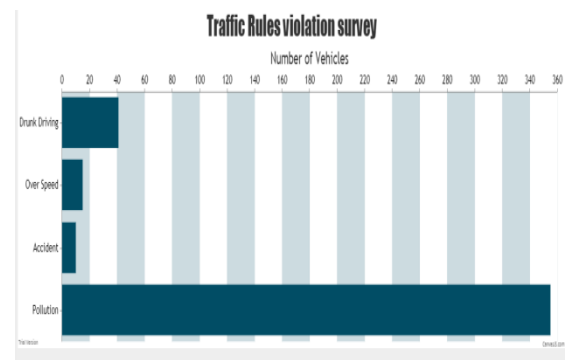


Figure 5.1- Analysis graph of traffic rule violations

The developed “robotic car prototype” and the portal “IOT based smart driving system” is working accurately. Motor vehicle departments are able to view the information regarding the traffic rule violations in their corresponding locations. Rescue teams are also able to view the accident related information in their corresponding locations. The vehicle users are also notified regarding their rule violations through sms and the penalty is deducted automatically from them.

6. CONCLUSION

Many accidents occur due to the lack of care of drivers. Many drivers drink and drive which is a criminal offence. Also we all know that one of the major causes for accidents is over speeding.



This project is for the solutions of vehicle management problems. This is developed to check the traffic rule violation efficiently. By implementing this project a safe car journey is possible by decreasing the accident rates due to traffic violations. Also through this project the air pollution amount can be reduced considerably. The system aims to timely inform the emergency services with the location of accidents and the vehicle owner details, to the nearest rescue centers in the process of saving precious lives. This is efficient advanced traffic rule violation detection and penalty deduction system which prevents the vehicle users from the traffic rule violations. This system will be useful to maintain the transport laws efficiently.

7. REFERENCES

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