



VEHICLE MONITORING SYSTEM FOR SMART CITY

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Abstract

An advanced vehicle monitoring and tracking system is proposed and designed in order to provide safety and security. The proposed method puts together superior exercise of contemporary technologies like Embedded Systems and IoT. The proposed model prevents vehicular difficulties like tax evasion, drunk & drive driving and ensures theft protection, Obstacle detection & Pollution Control. The evasion from due payment of automobile loan, vehicle insurance is an ordinary affair. To prevent this, a vehicle locking system in the real time environment based on the loan / Insurance details is designed. The microcontroller and the embedded in the vehicle with an interfacing to Engine Control Unit (ECU) through the Microcontroller and IoT. The ECU will allow starting the vehicle only after receiving the fair signals from the controller. If the user attempts to remove the controller unit, the fair signal won't get received by the ECU and thereby the engine will not ignite. In this proposed work, Real time data will automatically lock the vehicle on the every 30th day of the month. The engine are often unbolted solely by the banker/underwriter by causing the due clearance of the confirmation message. It makes the approach for the prompt payment of the dues by the client. The Global Positioning System (GPS) is used for vehicle tracking and monitoring purpose. The GPS provides present site of the vehicle; GPRS sends the tracking information to the server and thus an alert message generated is transmitted to the owner of the vehicle. The proposed system

take care of the traveler's safety by using Alcohol sensor to find the status of the driver, Accelerometer and Ultrasonic sensor to prevent traffic hazards there by preventing from the disaster. The proposed model also inculcates pollution control by measuring the values using gas sensor and comparing the values predetermined.

Index Terms: Embedded Systems, IoT, Vehicle monitoring, Tax evasion, Pollution Control

1. INTRODUCTION

The previous few decades, the country has progressed such a vast rate that several firms have powerful established themselves. These firms bring a large quantity of hands with them. Arranging transportation to such a large mass could be a cumbersome task involving several intricacies. Generally, this vehicle transport is organized through the native transport vendors on a yearly contract basis, recently happen mishaps such as burglary, rape cases etc. The development of communication technology is straightly to spot the vehicle locations. Vehicle monitoring systems have brought this technology to the day-to-day life of the common person. Today GPS utilized in cars, ambulances, fleets and police vehicles are common sights on the roads of developed countries. The GPS/GSM primarily based on the System is one amongst the foremost vital systems, which integrate both GSM and GPS technologies. It is necessary due to the many of applications of GPS systems and the wide usage of them by millions of people throughout the world. The real time monitoring information collected from is location, speed and expected arrival time of the user is moving vehicles in a concise and easy-to-read format.

Currently GPS vehicle monitoring ensures their safety as travelling. Vehicle owner or Police follow the signal emitted by the monitoring system to locate a robbed vehicle in parallel the stolen vehicle engine speed going to decreased and pushed to off. After switch off the engine unit, motor cannot restart without permission of the owner password. This system installed for the four wheelers. Vehicle monitoring usually used in navy operators for navy management functions, routing, send off, on board information technology and motor vehicle security.

The applications include watching driving performance of a parent with an adolescent driver. Vehicle pursuit systems accepted in client vehicles as a stealing interference and retrieval device. With the increase of number of automobiles especially in some metropolis, it is really difficult to solve the problems related to automobile accidents and hazards. In these cities accidents have crossed the level above the expectations and is causing hazards and human loss.

To prevent this predicament, driving safety systems have been customized as per the requirements and encouraged in a lot of developed countries for many years. Similarly the accidents occurred due to the consumption of alcohol is prevented using Alcohol Detection Sensor which senses the alcohol consumption from breath bringing the vehicle to halt and at the same time giving and by displaying a message on already mounted LCD monitor. The safety standard is especially easier said than done in real-life.

Even though of late the protection measures and standards allotted by the Governments from time-to time area unit testing and examining, the accidents became inescapable because of native standards of the vehicles. As a result, a new system is proposed to deal with the thorny issues. Along with continually updated wireless communication and signal acquisition technologies through the concept of IoT, an effectively wireless inspection and notification system has been developed. In today's urban life transportation is common and many mishaps are occurring on the roads daily.

Hence, a security and monitoring system is

design to overcome these problems. This system developed incorporating current technology is presented in this work. The main aim of this project is to design and develop a vehicle monitoring rig for smart city. This proposed work provides solution to the following vehicular difficulties like Tax evasion, Theft protection by vehicle monitoring and Tracking, Pollution control and Accident detection.

II. EXISTING METHOD

Indian automobile market has claimed global attention, being the largest two wheeler market, very largest in commercial vehicle market and eleventh largest passenger car market in the world, and poised to become the largest automobile market next only to the United States of America and China. Research says 75% of vehicles purchased in the last decade were financed through loans. The automobile finance offered by banks of insurance and more financial institutions at most affordable rates of interest has paved the way for the growth of the automobile sector in India. Various type of applications and features are available to consumers which can accommodate their every need, thus luring them into a financing option. Normally all the vehicle owners want to pay their regular loan/insurance for their vehicle. But many of the customers doesn't paid their loan/insurance amount properly, they are preparing duplicate copy of insurance and in case of vehicle loan, few of them are cheating the bank or any private office by submitting duplicate certificate.

Nowadays the Bankers & Insurers give the intimation about the loan insurance to the customer at every month to pay their loan due amount through SMS to their registered mobile number. If the customer delay to pay their due amount more than one month, immediately they will take the action to cease their vehicle. But it is very most difficult to find their owner address because few of them are submitting their improper nativity certificate and few of them will dismantle the vehicle after few due date gets over. So evasion of the loan amount of automobile loan, vehicle insurance is an ordinary affair. Currently there is invalid system to tracking the defaulters, which affects the

government exchequer hardly and also affects the prosperity of the individuals. Hence there is an urgent need to fill this vacuum by modernizing the existing technology in automobile industries. As a matter of initiation, an innovative IOT based control system exclusively for automobiles has been designed and implemented in this paper. Today modern automobiles already contain a multiplicity of controllers that are increasingly networked together by various embedded system with very different properties.

Automotive communication networks have access to several crucial components of the vehicle, like breaks and the engine control. The automation is use of the control systems to reduce the need for human work in the production of goods and services. This paper deals with the design and development of IOT with embedded system automatic vehicle locking system for an automobile, which is being used to follow the proper loan due / Insurance of a vehicle. It makes the way for the prompt payment of the dues on or before their payment date by the customer.

III. PROPOSED SYSTEM

The frame work the proposed system to make life more interesting by reducing unnecessary waste of man-power by employing controller with IoT. The frame work of the proposed system uses IoT to address the vehicular pollution in real-time applications. Two gas sensors cox, sox are used to monitor the pollutants continuously to maintain the quality of the air. The gas sensor will automatically sense the gas values. The observed continuous data is sent to the microcontroller for verification of the pollution level of the vehicle. The microcontroller has verifies the levels of the pollutants of the air produced by the vehicle. If the pollutants levels are beyond the threshold levels, then it sends the warning message to the vehicle owner, the threshold value will be compared with the predetermined value will stored in the webserver of the IoT and after a time the engine will be lock. Drunken driving is considered as one of the major reason of accidents in world wide. Drivers was influence

by the alcohol shows a clear failure of perception recognition and vehicle control. So, by this accident occurs. Alcohol detection in vehicle system is continuously growing over years which could resolve drunken driving accidents worldwide. If the driver influenced by the alcohol content, the engine will be locked automatically.

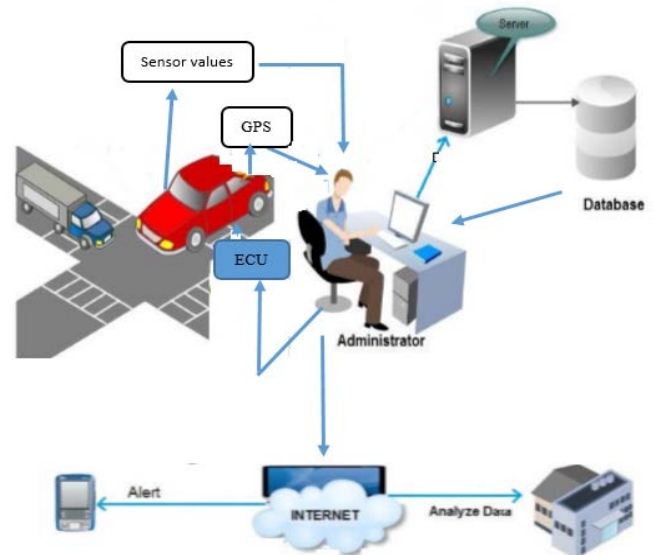


Fig.1 Proposed vehicle monitoring system using IoT

The aim of the system is to create a smart accident detection system using various sensors and locating the vehicle that can be viewed using Google maps which is much easier than location in terms of latitude and longitude. All other components like the ultrasonic sensor, accelerometer and GPS modules are connected via microcontroller. The code for the working model is developed using embedded c. Accelerometer is used to sense the crash or rollover of the vehicle and sends signals when an accident occurs to the vehicle. The ultrasonic sensor sense the presence of obstacle. GPS sensor is used for both tracking and navigation purpose. Tracking systems enable a base station to keep track of the vehicles as navigation system helps the driver to reach the destination. When an accident occurred in any place then GPS system tracking the position of the vehicle and sends the vehicle information to the particular owner through Wi-Fi by alerting the person through sms. As an additional option of the vehicle, the location detection of the vehicle can be done using google maps interface. The tax

evation proposed system will be entirely based on the progress of the loan/insurance data base. The proposed system anteing to make life more and more interesting by reducing unnecessary waste of man-power by employing Arduino micro controllers. The developed system here analysed, makes use of an IoT based Global Positioning System communication (GPS) technology. An interfacing GPS module is connected to the EPS 8266 Wi-Fi module with controller which is in turn, linked to the main controller Arduino. In this proposed work the load/insurance data will automatically lock the vehicle on the every 30th day of the month. Once the date exceeds 20th day, the LED in the vehicle glows continuously till 30th of the month. When the ESP6288 module reflects the date 30, the Controller sends the data '0'to the module using WiFi. The message stored in the module will be read by the controller whenever the car is turned on. If the stored data reflects '0', the car is locked immediately through ESP 8266 module. The above proposed and mentioned system is designed and installed in the vehicle. If the user paid the loan / Insurance amount due amount on time, the information is being used by the loan/Insurance officer for further processing. The message '1'which will be sent by the banker / insurer to the controller that reads the SMS and is stored in the module. Whenever the car is turned on, the main controller reads the SMS from the module that will be communicated to the Engine Control Unit (ECU) through WiFi, which leads to unlock the car immediately. Our research based on Arduino micro controller due to its low cost. If any vehicle exceeds the level in an area and the the load/insurance amount was not paid, then the proposed system send warning message to vehicular owner that contains level of the vehicle, afetr a time the ECU will locked using IoT application.

IV EXPERIMENTAL SETUP OF THE PROPOSED SYSTEM

The block diagram of the experimental setup of the proposed system for monitoring vehicle air pollution is shown in Figure 2.

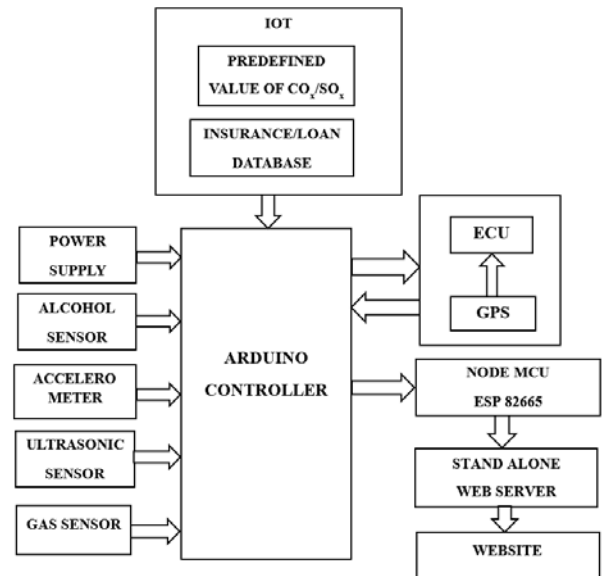


Fig.2 Block diagram of the vehicle monitoring system

A. Arduino board

It is a low power and high performance microcontroller used to read and control the data from sensors and GPS. It sends the data to server and LCD display for displaying the vehicular hazards, vehicle positioning and tax evasion performance. Arduino is one of the hardware source platform that can work with different communication technologies and sensor devices. Due to the most simplicity and number of hardware extensions more users and developers are used the Arduino. Arduino uno is microcontroller based where it processes the data from sensors and sends it to the output display unit. It comprised of several input and output units. It also has digital pins which is 14 in number of them only six can be used as the PWM outputs. Apart from these six analog pins which used for sensors which gives the output in the form of analog signals. It can be power supplied by USB cable and also through the power jack.



Fig.3 Arduino uno Board

B. GPS (global positioning system)

GPS is navigation System which provides the location and timing services. Initially these were used for defense academy and later on came into usage for everyone. In the project these are used for tracking the location of the vehicle. The main advantage of GPS is to track the location of anything which has these GPS device. It operates based on four or more satellites to get the location.



Fig.4 GPS Sensor

C. Gas sensors

The most common MQ-6 gas sensor is used to measure the carbonmono dioxide and sulpher oxides concentration in air. It is simple and low cost.



Fig.5 Gas sensor

D. Accelerometer

The Accelerometer device/sensor which measures the unevenness of the vehicles through which we can conclude whether a vehicle is met with the accident or not. It measures through all the three axis i.e. x, y, and z. the output signals generated by these system are the analog signals proportional to acceleration.

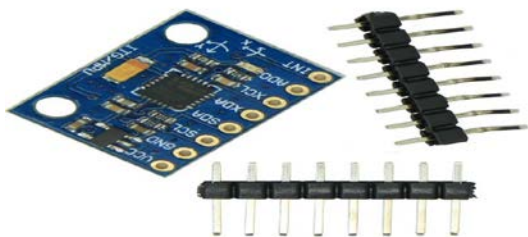


Fig.6 Accelerometer

E. Alcohol sensor

The analog alcohol sensor MQ3 is suitable for alcohol detecting, this sensor can be used in a breath analyzer. When the threshold value of the alcohol gas exist, the sensors conductivity is higher along with the gas concentration rising, use of simple electro circuit, convert change of conductivity to correspond output signal of gas concentration. MQ-3 alcohol sensor has highly sensitivity to Alcohol, and has good resistance to disturb of gasoline, smoke and vapor.

The Resistance value of MQ-3 alcohol sensor difference to different kinds and various concentration gases. So, when using these type of the components, highly sensitivity adjustment is very necessary.

It is recommended to calibrate the detector for 0.4mg/L (approximately 200ppm) of Alcohol concentration in air and use value of Load resistance that (RL) about 200 KΩ (100KΩ to 470 KΩ). When the measuring the value, proper intimation for the gas detector has to be determined after considering the temperature and humidity influence.



Fig.7 Alcohol sensor

F. Ultrasonic sensor

Ultrasonic sensor is one which used to obstacle detection one and it most commonly used in industrial applications to detect hidden tracks, discontinuities in metals, composites, plastics, ceramics, and for water level detection. For this purpose which are indicating the propagation of sound waves through solid materials have been used since ultrasonic sensors using sound instead of light for detection and used for the vehicle monitoring system.

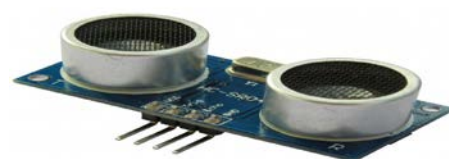


Fig.8 Ultrasonic sensor

G. Node MCU

Node MCU is a Wi-Fi SOC (system on a chip) produced by Express if Systems. It is based ESP8266 -12E Wi-Fi module. It is a very highly integrated semiconductor chip designed to provide full internet connectivity in a small package. It can be programmed directly for the Arduino board through USB cable port using c programming or Arduino IDE. It is used has Wi-Fi networking (can be used as access point and/or station, host a web server), connect to internet to fetch or upload data.

H. Server database

A database server is a server one which houses a database application that provides database services to other computer programs or to computers, as defined by the client server model. Some database rely exclusively on the client-server model for database access (while using the others e.g. SQLite are using as an embedded system database). Every users can access database server anytime either through a "front end" running on the user's computer – which displays requested data – or through the "back end", which runs on the server and handles tasks such as data analysis and storage. Most database applications respond to a query language. Each database understands its own query language and converts each submitted query to server-readable form and executes it to retrieve results. Examples of own proprietary database applications include Oracle, DB2, Informix, and Microsoft SQL Server. Every maintenance server uses its own type of query logic and structure.

IV. EXPERIMENTAL RESULTS

The above proposed system is used for the vehicle monitoring and it reduces vehicular difficulties of the different prospects. The results of the given system to make ensure that having the good protection and preventions of the accident. We have proposed a novel method of vehicle monitoring systems used to track the vehicle which has not paid insurance by using GPS technology. This proposed system will gives to the sleeping mode vehicle handled by the owner or authorized persons; otherwise goes to active mode.

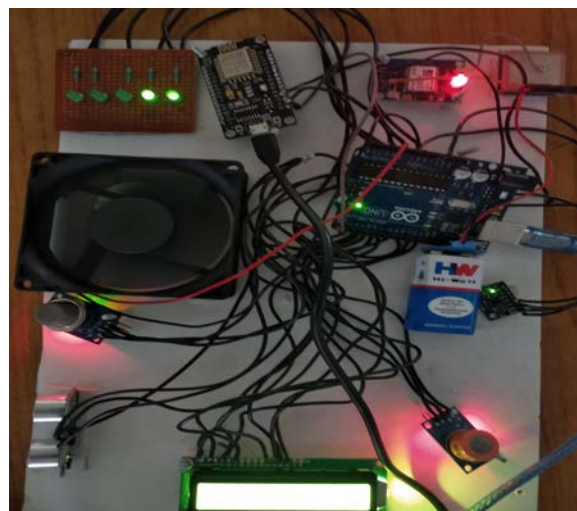


Fig.9 Experimental Setup

This proposed monitoring system will automatically lock the vehicle on the every 30th day of the month. The engine control unit would be remove the locked system only by the banker / insurer by sending the due clearance confirmation message. It makes the best way for the pay the payment of the load/insurance amount by the customer. The proposed system take care of the traveler's safety by using Alcohol sensor to find the status of the driver, Accelerometer and Ultrasonic sensor to prevent Theft protection and traffic hazards there by preventing from the disaster. The proposed model also inculcates pollution control by measuring the values using gas sensor and comparing the values predetermined.

V. CONCLUSION

The Vehicle monitoring system provides a vehicle information like velocity, position, through a GPS module and identity of a vehicle to a monitoring station and to a mobile phone according to a predetermined values was stored in a program or a query from a monitoring station. The monitoring station display these information on GPS also stored these information in database for further process according to a program. The system is useful in much application such as surveillance, security, tracking and tax evasion, which may be installed in cargo trucks, cars, motorcycle, and boat. The system can be used in many applications.

vi. FUTURE SCOPE

In this paper, we have proposed a novel method of vehicle tracking and locking systems using webserver and IoT. This system puts the vehicle into the idle mode or active mode by the control variables generated by processor. The inputs for the processor are received from the various sensors and pre-determined values stored in the web browser. It makes the way for the prompt payment of the dues by the customer and safe driving. Inculcating the hardware implementation, ensuring vehicle monitoring and security, user friendliness are some of the valuable features enlisted in this project. In future this can be extended with other vehicular safety conditions and other criteria of autonomous vehicle development.

vii. REFERENCES

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