IoT based Automated Vehicular System for Human Safety

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Abstract— **This paper presents automated vehicular system for human safety. With population growth, the demand for vehicles has increased tremendously, which has created an alarming situation in terms of traffic hazards and road accidents. The road accidents percentage is growing exponentially and so is the fatalities caused due to accidents. However, the primary cause of the increased rate of fatalities is, due to the delay in emergency services. Many lives could be saved with efficient rescue services. In this system, most of the accident scenarios can be avoided by detecting accidents on time and triggering immediate help from emergency services by using GSM (Global System for Mobile Communication) and GPS (Global Positioning System). The main aim of this project work to provide immediate emergency services on time and on exact location. The second aim is to prevent alcohol-impaired drivers from getting behind the wheel by detecting alcohol consumption of a driver using sensor which sense alcoholic gas content of the surrounding air. This system contains hardware ATMEGA 328 microcontroller, GPS, GSM, vibrator sensor, gas sensor, LCD and Relay. The system is implemented and working. This system will help to reduce road accidents.**

I. INTRODUCTION

In the last few decades, India has progressed at such an enormous rate that many companies have strongly established themselves here. These companies bring a huge amount of workforce with them. Arranging transportation to such a huge mass is a cumbersome task involving many intricacies. Generally, this transport is arranged through the local transport vendors on a yearly contract basis, recently happen mishaps such as burglary, rape cases etc.

The development of satellite communication technology is easy to identify the vehicle locations. Vehicle tracking systems have brought this technology to the day-to-day life of the common person. Today GPS used in cars, ambulances, fleets and police vehicles are common sights on the roads of developed countries. All the existing technologies support tracking the vehicle place and status. The GPS/GSM Based System is one of the most important systems, which integrate both GSM and GPS technologies. This system designed for users in land construction and transport business, provides real-time information such as location, speed and expected arrival time of the user is moving vehicles in a concise and easy-to-read format. This system may also useful for communication process among the two points.

A recent World Health Organization (WHO) report showed that every year 1.35 million people die and 50 million people get injured. Road accidents are ranked as the eighth leading cause of deaths (up from ninth in its previous report in 2015), with the Association for Safe International Road Travel (ASIRT) predicting that it may rise to the fifth leading cause of deaths in the near future, unless drastic changes occur. As well as the social harm caused by road traffic accidents, there is a significant cost. ASIRT estimates that between one and two percent of the annual budget of every country is spent on road accidents.

Recently, there has been a global increase in the annual number road traffic deaths, even in developed countries with good road safety measures. However, It remains the case that the greatest burden of road traffic fatalities and injuries lays in low- and middle-income countries.

Nowadays, the number of accidents has increased rapidly. About 17 accidents take place every hour. Bike accidents constitute a major chunk of all accidents; this is because two-wheelers do not have as many safety parameters which are included in four-wheelers. Reasons causing it can be due to not wearing a helmet, feeling drowsy while driving, alcohol consumption, two vehicles coming into closer proximity without both drivers' notice, breaking of traffic signals, driving without a valid or no driving license, careless driving, unintended triggering of the acceleration pedal, etc.

The road accident rate is increases because of that many fatalities caused. And many fatalities caused due to delay in emergency services. Many lives could be saved with efficient rescue services. The delay happens due to traffic congestion or unstable communication to the medical units. The implementation of automatic road accident detection systems to provide timely aid is crucial.

The high demand of automobiles has also increased the traffic hazards and road accidents. Life of the people is under high risk. The delay in reaching of the ambulance to the accident location and the traffic congestion in between accident location and hospital increases the chances of death of the victim. To overcome this problem our automatic ambulance rescue system comes to the rescue. This proposed IOT based accident detection system helps to reduce the loss of life due to accidents and also reduces the time taken by the ambulance to reach the hospital. To detect the accident there is accelerometer sensor present in this rescue system and the GSM module included sends messages about the location to the respective guardian and rescue team. With the help of accelerometer sensor signal, a severe accident due to an obstacle can be recognized. Microcontroller used, sends the alert message through the GSM module including the location to guardian or a rescue team. So, the emergency help team can immediately trace the location through the GPS module, after receiving the accident location information, action can be taken immediately. This accelerometer based accident detection system is powered by Atmega 328 microcontroller it consists of display, accelerometer sensor, GSM and GPS module and Wifi module, Vibration sensor, alcohol sensor.

II. LITERATURE SURVEY

Many solutions have been proposed in the literature for automatic accident detection. The techniques include crash prediction using smartphones, vehicular ad-hoc networks; GPS/GSM based systems, and various machine learning techniques. With such high rates of deaths associated with road accidents, road safety is the most critical sector that demands significant exploration. IOT based automatic vehicle accident detection and rescue system is rapid rise of technology and infrastructure has made our lives easier.

The proposed system [1] GPS/GSM based System has the two parts, first is a mobile unit and another is controlling station. The system processes, interfaces, connections, data transmission and reception of data among the mobile unit and control stations are working successfully. These results are compatible with GPS technologies.

A vehicle tracking system [2], is an electronic device, installed in a vehicle to enable the owner or a third party to track the vehicle's place. This report is proposed to design a vehicle tracking system that works using GPS and GSM technology. This system built based on embedded system, used for tracking and positioning of any vehicle by using Global Positioning System (GPS) and Global system for mobile communication (GSM). This design will continuously watch a moving Vehicle and report the status of the Vehicle on demand.

The system proposed [3], provides vehicle cabin safety, security based on embedded system by modifying the existing modules. This method monitors the level of the toxic gases such as CO, LPG and alcohol within the vehicle provided alert information as alarm during the dangerous situations. The SMS sends to the authorized person through the GSM. In this method, the IR Sensor used to detect the static obstacle in front of the vehicle and the vehicle is stopped if any obstacle is detected. This avoids accidents due to collision of vehicles with any static obstacles.

Kai-Tai Song and Chih-Chieh Yang [4] have a designed and built on a real-time visual tracking system for vehicle safety applications. In this report built a novel feature-based vehicle-tracking algorithm, automatically detect and track several moving objects, like cars and motorcycles, ahead of the tracking vehicle. Joint with the concept of focus of expansion (FOE) and view analysis, the built system can segment features of moving objects from moving background and offer a collision word of warning on real-time. The proposed algorithm using a CMOS image sensor and NMOS embedded processor architecture. The constructed stand-alone visual tracking system validated in real road tests. The results provided information of collision warning in urban artery with speed about 60 km/hour both at night and day times.

The remote monitoring system based on SMS and GSM was implemented [5]. Based on the total design of the system, the hardware and software designed. In

this report, the GSM network is a medium for transmitting the remote signal. This includes two parts that are the monitoring center and the remote monitoring station. The monitoring centers consist of a computer and communication module of GSM. The software-monitoring center and the remote monitoring station implemented by using VB. The result of this demonstration shows that the system can watch and control the remote communication between the monitoring center and the remote monitoring station.

In this report, the proposed tracking system based on cloud computing infrastructure [6]. The sensors are used to monitor the fuel level, driver conditions, and speed of the vehicle. All the data transferred to cloud server-using GSM enabled device. All the vehicles equipped with GPS antenna to locate the place.

To avoid the drunk and drive, the alcohol sensor installed to monitor the driver status [7]. The proposed technology significantly avoids the accident in highways.

III.PROPOSED SYSTEM

The proposed project work, automated vehicular system for human safety, involves hardware as well as software systems. The schematic block diagram of a proposed hardware is depicted in Fig. 1

The hardware component is explained below.
Microcontroller: Alcohol sensor, accelerometer, vibration sensor, GPS, GSM, wifi module, relay and LCD are interfaced with Microcontroller AT Mega 328.

Accelerometer: It is used to measure speed of vehicle.

Vibration sensor: The Vibration Sensor Module Vibration Switch SW-420 is based on the vibration sensor SW-420 and Comparator LM393 to detect if there is any vibration that beyond the threshold. The threshold can be adjusted by the on-board potentiometer. When this no vibration, this module output logic LOW the signal indicate LED light, and vice versa.
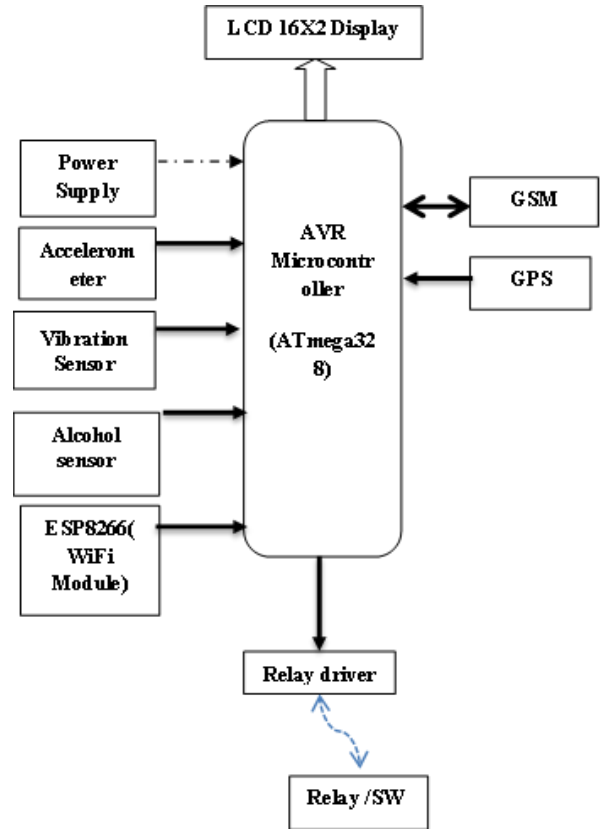

Fig. 1. The Block diagram of Vehicle tracking and locking system based on GSM and GPS

Alcohol Detection sensor: When a drunken person breathes near the alcohol sensor it detects the ethanol in his breathe and provides an output based on alcohol concentration.

ESP8266 (WiFi Module): ESP8266EX delivers highly integrated Wi-Fi SoC solution to meet users' continuous demands for efficient power usage, compact design and reliable performance in the Internet of Things industry. With the complete and self-contained Wi-Fi networking capabilities, ESP8266EX can perform either as a standalone application or as the slave to a host MCU. When ESP8266EX hosts the application, it promptly boots up from the flash. The integrated high speed cache helps to increase the system performance and optimize the system memory.

Relay: It is used to control operation of vehicle motors.

GPS Module: The GPS signal is applied to the antenna input of module, and a complete serial data message

with position, velocity and time information is presented at the serial interface.

The GSM/GPRS Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS, Voice as well as DATA transfer application in M2M interface. The onboard Regulated Power supply allows you to connect wide range unregulated power supply. This is used to send exact accident location via SMS.

LCD Display: when alcohol is detected system will display message on LCD to inform driver about not starting of vehicle.

IV. IMPLEMENTATION

The proposed system has been implemented and the hardware part of it is as shown in Fig. 2.
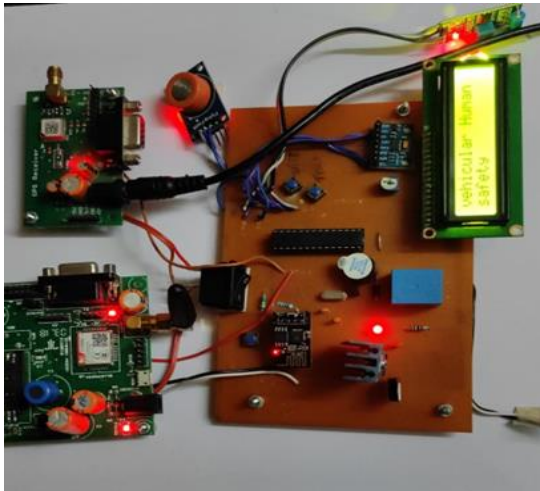

Fig. 2 Hardware part of proposed system

V. CONCLUSION

Automated vehicular system for human safety has been designed and implemented. This system helps in providing emergency services. The driver's health is being tracked by alcohol sensor which serves as the added advantage. This project will help to reduce the complexity and improve security, also much cheaper and 'smarter' than traditional ones. easily added to the system to upgrade and enhance it. This paper discussed the importance of IoT in automobiles and how IoT can be used to curb road accidents that are caused by drivers' health issues.

VI. FUTURE SCOPE

The System offers a widely communication bandwidth with the car control system to change data and information, and new functional modules can be This project also highlighted some effective and unique features based on interconnectivity of sensors in the car that will lead to a safer journey for passengers as well as driver.

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