

Real-time Vehicle Monitoring and Accident Alert System

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Abstract— During accident many people lose their life because medical services and family member not getting accidental information on time. Initially the Global Positioning System (GPS) continuously takes input data from the satellite and stores the latitude and longitude values in Arduino's buffer. If we have to track the vehicle, we need to send a message to GSM device, by which it gets activated. It also gets activated by detecting accident on the shock sensor connected to vehicle. Parallely deactivates GPS with the help of relay. Once GSM gets activated it takes the last received latitude and longitude positions values from the buffer and sends a message to the particular number or laptop which is predefined in the program. Once message has been sent to the predefined device the GSM gets deactivated and GPS gets activated. Any kind of accident detected is automatically sent as an alert to the required destination. Accident detection device installed in a vehicles when meets with an accident will send SMS/ messages to the pre-install numbers of the drivers family members, police station, ambulance and nearest hospital. This embedded system is useful for tracking and retrieving the exact position of any vehicle, which has met with an accident by using GPS. This system can monitor the vehicle as well as get auto location when accident occur.

Keywords— Global Positioning System (GPS), GSM, arduino

I. INTRODUCTION

The major death rates in the world are due to the road accidents. India faces the highest death rate in the world. Reasons for the accident are speed driving, lacking sufficient sleep, drink and drive. Automatic accident detection helps to recognize the location of the accident and to find the location of the accident. For an ambulance vehicle, every second is important. If there is a delay in the arrival of ambulance, there will be a loss of life. Delay is caused mainly because of the traffic signals. Therefore, time factor is an important task.

Radio Frequency module is used to control the traffic signals automatically. Therefore, the ambulance vehicle will reach the hospital in exact time to save the human. In addition, the main goals for the automatic accident detection techniques are to detect the accident and to send the message automatically to the emergency contacts along with the location. Emergency contacts include family members, friends, hospitals, police station etc. The incidents of accidental deaths have shown increasing trend during the year 2000-2015 with an increase of 50 percent in the year 2010 as compared to the year 2000. According to Planning Commission of India, the total annual economic loss is 2.5% of India's GDP due to rising number of road fatalities. Another important reason can be improper medical help. Survey shows that each minute that an injured crash victim does not receive emergency medical care can cause into fatality. Most victims lose their lives due to such reasons. Therefore, this idea of saving lives by curing the problem comes into existence.

Real-time position of the vehicles is informed by the system using the pre-install smart sensing accelerometer equipment. This data is recorded and all the information can be observed by remote location to provide the required services to the victims. Tracking of the vehicle can be done in all-weather condition. GPS and GSM technologies are used in this system to provide all the data to the remote server which is then processed and the extracted information is used to provide the services to the individual at the time of emergency.

The rest of the paper is organized as follows: Section 2 represents the background and motivation, In Section 3 we present our approach, In Section 4 we present our simulated results, and Section 5 concludes the paper.

II. BACKGROUND AND MOTIVATION

Due to higher accident rates vehicle tracking is very important now days. This can be done easily by the use of the GPS technology. Various other applications can also be used to do so [1]. These applications are also used in fleet management, anti-theft vehicle systems and accident recovery [2].

Vehicle Tracking: The vehicle tracking technology uses the GPS systems via many applications. These applications are very helpful as the track the vehicles and their partner web applications also monitor the vehicles continuously. There are various ways to track a vehicle. Larger organizations use web services to tract large number of vehicles whereas small scale industries can use various mobile apps. To find exact location, distance and estimating time to reach particular destination an android app is developed [3].Theoretical it is easy to say we can get the exact location of a vehicle, but practically sometimes it is next to impossible.

Even though we have advanced technology it is very difficult to actually obtain the geographical coordinates correct all the time. Use Kalman filter can be done, to get an exact longitude and latitude position. Location Identifier and immediate recovery of accident: As we already know there are numerous ways to track the location of a vehicle which has already met with an accident. When accidents happen, it becomes very difficult to send help to the victims as no notification the accident has the reached the hospitals, police or the family members of the victim, thus resulting in a huge loss of life. To avoid such situations, we can send an automated SMS to the predefined numbers in the system.

Bluetooth Technology is used as a medium to activate the GPS by the sensors. It is an intermediate between the sensors and the GPS. But now not only Bluetooth technology can be used but also MESA technology can be used to activate GPS and send the location coordinates to the predefined numbers.

III. PROPOSED APPROACH

In this Project it is proposed to design an embedded system which is used for tracking and positioning of any vehicle by using Global Positioning System (GPS) and Global system for mobile communication (GSM). In this project 8052 microcontroller is used for interfacing to various hardware peripherals. The current design is an embedded application, which will continuously monitor a moving Vehicle and report the status of the Vehicle on demand. For doing so an ARDUINO microcontroller is interfaced serially to a GSM Modem and GPS Receiver. A GSM modem is used to send the position (Latitude and Longitude) of the vehicle from a remote place. The GPS modem will continuously give the data i.e., the latitude and longitude indicating the position of the vehicle. The GPS modem gives many parameters as the output, but only the NMEA data coming out is read and displayed on to the LCD.

A. Global System for Mobile Communication

GSM abbreviates global system for mobile communication, this is a second generation (2G) mobile network. This is widely used in all over the world for mobile communication. This GSM device consists of sim slot in which a sim can be inserted which has a unique number, this unique number is used for contact. This GSM device consists of a unique number called IMEI number and this is different for each and every hardware kit. In our project the device is used for transmitting data. The data from GPS is transmitted to given mobile through this GSM itself.

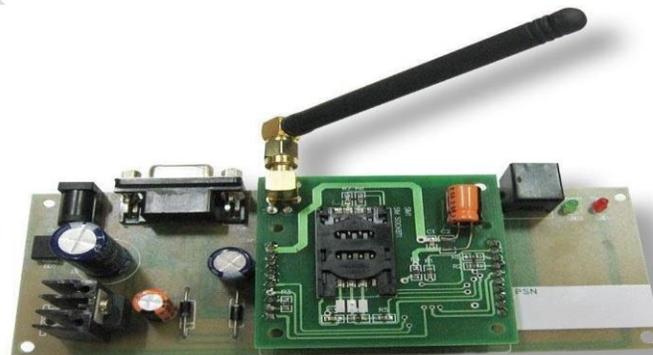


Fig.1 GSM board with slot for sim card.

B. Global Positioning System

GPS abbreviates global positioning system and this is used to detect the latitude and longitude of the particular position and it also shows the exact time. It detects these values anywhere on the earth. In our project it plays main role and it is the main source of the latitude and longitude of the vehicle to know the accident occurred location, or even for theft tracking of the vehicle. This gadget gets the coordinates from the satellite for each and every second. This device is the main component of vehicle tracking project.

C. Software Description

Express PCB: Breadboards are great for prototyping equipment as it allows great flexibility to modify a design when needed; however, the final product of a project, ideally should have a neat PCB, few cables, and survive a shake test. Not only is a proper PCB neater but it is also more durable as there are no cables which can yank loose. Express PCB is a software tool to design PCBs specifically for manufacture by the company Express PCB (no other PCB maker accepts Express PCB files). It is very easy to use, but it does have several limitations. It can be likened to more of a toy than a professional CAD program. It has a poor part library (which we can work around). It cannot import or export files in different formats. It cannot be used to make prepare boards for DIY production. Express PCB has been used to design many PCBs (some layered and with surface-mount parts). Print out PCB patterns and use the toner transfer method with an Etch Resistant Pen to make boards. However, Express PCB does not have a nice print layout. Here is the procedure to design in Express PCB and clean up the patterns so they print nicely.

Preparing Express PCB for First Use: Express PCB comes with a less than exciting list of parts. So, before any project is started head over to Audio logical and grab the additional parts by morsel, ppl, and tangent, and extract them into your Express PCB directory. At this point start the program and get ready to setup the workspace to suit your style. Click View and then Options. In this menu, setup the units for “mm” or “in” depending on how you think, and click “see through the top copper layer” at the bottom. The standard color scheme of red and green is generally used but it is not as pleasing as red and blue.

Arduino compiling: Download the arduino from the arduino website [4]. In the next step download the library files. As the arduino does not recognize the dictionary name, rename it. Launch arduino by double-click “arduino”. Select target board as “Arduino Uno”. Click Sketch and then Verify/Compile.

IV. SIMULATED RESULTS

Whenever a vehicle is met with an accident then owner can send an SMS to the vehicle to know the location or position of the vehicle. The SMS sent would pass through the GSM service provider and then reach the vehicle, which is travelling, because the vehicle has a GSM device with a SIM card. This GSM modem will receive the SMS and send to the microcontroller in the vehicle. The microcontroller will receive this SMS and compare the password and the command. If the information matches the already programmed one, then it will perform the request required by the owner. It will then send the required location; latitude, longitude and time to the registered number of the owner and the results will be display on the screen of the owner’s mobile phone. The owner can then send a message to stop the engine of the vehicle. Whenever accident or theft of the vehicle is occurred then the device sends message to given mobile device. Message for theft: “Vehicle alert latitude: 2400.0090, N longitude: 12100.0000, E time: 12:00”. Message for accident: “Accident alert latitude: 2400.0090, N longitude: 12100.0000, E time: 12:00”.

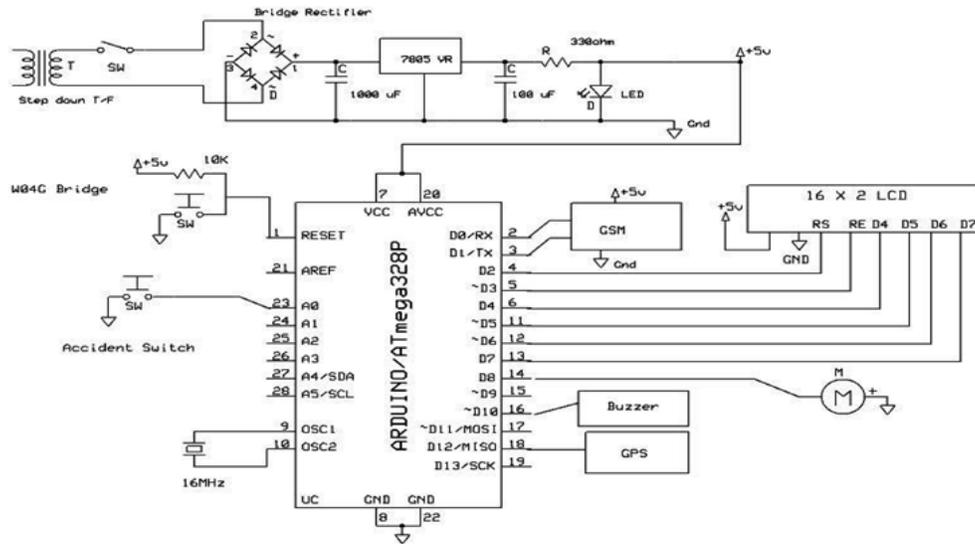


Fig. 2 Schematic diagram of Arduino based Vehicle Tracking.

The above is the schematic figure of the Arduino based vehicle tracking project. The project Arduino based Vehicle Tracking was designed is to mainly intended to applications to track the location of vehicle.

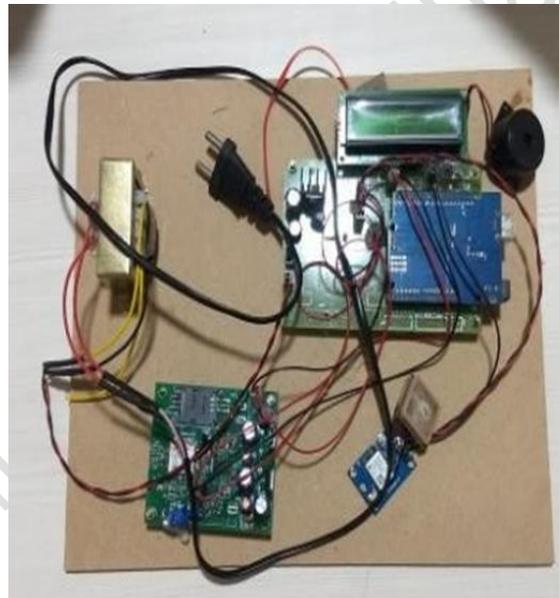


Fig. 3 Arduino based vehicle tracking kit

V. CONCLUSIONS

The vehicle tracking system works mainly by receiving messages from a mobile phone. There is a message command by which we can track the vehicle. And this command is to send an SMS; "TRACK VEHICLE" to the registered SIM card number in the GSM modem. This command initiates the GPS modem and receives the latitude and longitude position and this information will then be sent as SMS to the mobile device. Whenever theft occurs or on demand request of the vehicle's location, the device sends a message to the vehicle owner's mobile.

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Journal of Engineering Sciences