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GPS based Vehicle Monitoring and Accident Detection System

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ABSTRACT

In this fast life, everyone is in hurry to reach their destinations. People who rely on the public transport their major concern are to know the real time location of the vehicle for which they are waiting and the time it will take to reach their destination. This information helps people in making better travelling decisions. This paper is about a smart vehicle tracking system for easy transportation facility using IoT, GPS Module and Node MCU using ESP8266 microcontroller. Also a vibration sensor SW-420 is introduced to help in detection of any accident so that the location of our loved ones easily found. Vibration sensor basically functions by sensing a specific range or more than that range experienced by the vehicle. By knowing the location of the vehicle, lot of the time will be saved and by getting the information of any accident using vibration sensor we can take action soon. In this project, vehicle tracking and accident detection system are implemented using Blynk App platform that acts as a medium for data transfer and visualization. The developed system takes care of vehicles and s driver's safety.

Keyword: - GPS Module, Node MCU, ESP8266, SW-420, Blynk Application

1. INTRODUCTION

Vehicle tracking system and accident detection is technology used to determine the location of a vehicle using GPS. This technology has become very prominent. In order to implement a vehicle tracking system and accident detection which can display the location on Google map, the GPS, Wi-Fi modules controlled by Node MCU with a vibration sensor must be placed inside the vehicle. Also in case of vehicle met by an accident or any kind of casualty being faced by vehicle, the vehicle will produce the vibrations. These vibrations will be detected by the vibration sensor placed in the vehicle. This sensor will be connected with a device and immediately informed the loved ones about the accident with the location of the vehicle.

In this project a microcontroller NodeMCU with inbuilt Wifi 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 when demanded. The vehicle tracking and accident detection device designed here is an IoT device. It has ESP8266 interfaced with Neo-6M GPS module and SW-420 vibration sensor. As the device finds a data connection through Wi-Fi like Wi-Fi hotspot of a smart phone, it sends the current GPS location to the Blynk app. The webpage shows the location of the device with the help of Google Maps and also the range of vibration also displays on the screen.The Arduino Sketch manages the functionalities of the device like getting GPS location, displaying it, connecting to a Wi-Fi access point and sending the GPS data to a real time generated webpage. The Arduino sketch is written, compiled and loaded with the help of Arduino IDE. This simple vehicle tracking device is easy to design, implement and can be installed in any vehicle. It keeps track of the vehicle at which it is installed in real time.

This Paper is structured as follows. Section 2 presents the work done on vehicle tracking and accident monitoring in last few years. Block Diagram along with the circuit level diagram and its working is explained in section 3. Section 4 shows the results for the system developed. The results are using Blynk App. Section 5 defines the future improvement in the system and paper is concluded in section 6.

2. LITERATURE SURVEY

Mayuresh et al described a device that makes use of an open source platform and intended to display and tells about the area of an automobile, the framework additionally checks gasoline consumption, engine temperature and car speed, GPS/GPRS/GSM modules are used for communication. All the values are stored in the data base on the net server [1].

Das et al proposed a vehicle accident and location monitoring system. This machine presents a mechanism to reduce disasters by using tracking eye blinking of the driver, which shows drowsiness, obstacles positioned in the

street and the drunken country of the driver. Accident and the place of the vehicle are detected. By this machine primary care is received because the accident records are available [2].

Akshatha S.A in her paper gives an answer for tracking and monitoring the open transportation vehicles. In this strategy GPS innovation is utilized to get the location of the vehicle utilizing the space based route framework. Raspberry Pi handling board is utilized which forms the got qualities and gives the final output [3].

Sridevi.K et al. Framework gives the important data in regards to all the bus numbers going from clients' source and goal alongside the course subtleties, constant location. The system improves the transportation well-being and the nature of administrations to the school transports [4].

K.S.N.V Someswara Rao et al. in their paper presents the system which diminishes the waiting time of remote clients for the transport. The framework tracks the transport at any area, wherever it is. All the data is put in to the server and it is recovered to remote clients through Android portable application. The framework is easier to understand for client to get data outwardly appeared on Google map. Client can unreservedly get this Mobile application for constant following of the transport which give intuitive interface condition. So by utilizing this application remote client can simply pause or they may reschedule their excursion as per the accessibility of the transport [5].

June Myint Mo Khin & Dr. Nyein Nyein Oo in their paper presents an effective constant a vehicle following framework that is adaptable, adjustable and precise utilizing GPS and GPRS of GSM organize, appropriate for wide scope of utilizations everywhere throughout the world. The mix of the GPS and GPRS gives constant and continuous tracking. To show the situation on Google map Google map API is utilized [6].

Manuja M et al. structured a vehicle unit with sensor framework to distinguish mishap subtleties and send the alarm message to the Road side unit. In their work a road side unit is implemented that gets all alarm message's and sends that into the salvage group [7].

Boddapati et al implemented Vehicle monitoring and tracking frameworks which utilizes Blynk app giving the information about the movement of the vehicle. The framework is created to screen different driver assist parameters with preferring eye squinting, liquor utilization and vehicle parameters like motor temperature, the separation between the vehicles and following of the live area of the Vehicle [8].

3. PROPOSED SYSTEM

The main aim of the project is to track the vehicle and also to detect the accident.

3.1 Block Diagram

The block diagram consists of the six blocks satellite, GPS antenna, GPS module, NodeMCU, SW-420, Mobile, and Cloud.

NODEMCU: The Node Microcontroller Unit (NodeMCU) is utilized as a passage. It has inbuilt Wi-Fi module which is utilized to send the sensor information to cloud for capacity and examination. The primary explanation for choosing NodeMCU is that the sensors utilized in our task utilizes just advanced pins and one simple pins are required. Likewise, it is driven by low battery power (3.3v) and is of low cost when contrasted with other miniaturized scale controllers/processors like Arduino and Raspberry pi.

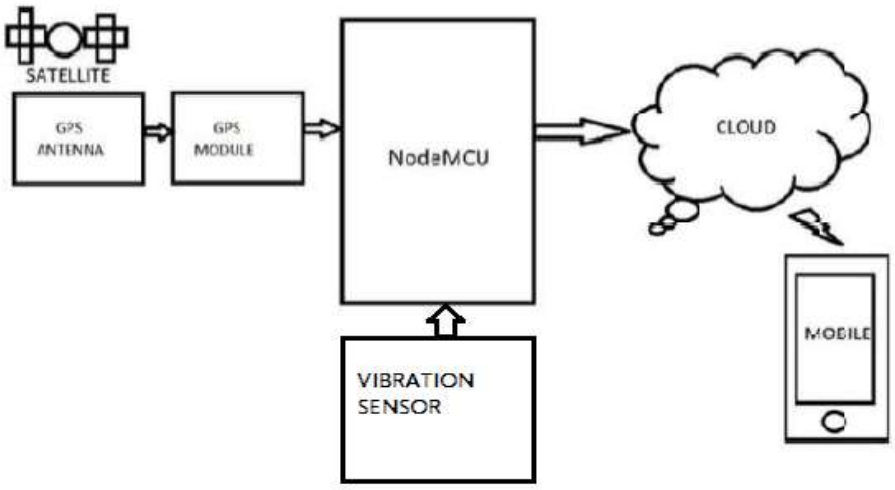

Fig 1. Block Diagram of GPS based Vehicle Tracking System

GPS MODULE: Global Positioning System (GPS) is a satellite-based framework that utilizes satellites and ground stations to gauge and figure its position on Earth. GPS is also called Navigation System with Time and Ranging GPS. GPS needs to get information from in any event 4 satellites for precision reason. GPS recipient utilizes a group of satellites and ground stations to figure exact area any place it is located. These GPS satellites transmit data signal over radio frequency (1.1 to 1.5 GHz) to the receiver. With the assistance of this received data, a ground station or GPS module can register its position and time. Here in this project we have NEO-6M GPS module.

BLYNK PLATFORM: Blynk can control equipment remotely. It can show sensor data, visualize. The three fundamental segments of Blynk are Blynk server, Blynk libraries, Blynk application. Utilizing Blynk application we can make various gadgets as indicated by the prerequisites.

VIBRATION SENSOR: The Grove - Vibration Sensor (SW-420) is a high affectability non-directional vibration sensor. At the point when the module is steady, the circuit is turned on and the yield is high output. At the point when the development or vibration happens, the circuit will be quickly detached and yield low output. We can likewise change the sensitivity as per our own needs.

3.2 Circuit Diagram

The Arduino based Vehicle Tracking System and accident detection designed here is an IoT device. It is designed by interfacing GPS module, SW-420 and ESP8266 Wi-Fi modem. Figure 2 shows the connection of NodeMCU with the GPS Module. The location information (latitude and longitude) is received by the GPS module through the GPS antenna. For better reception there should be a proper impedance matching between GPS antenna and GPS module which is typically 50Ω. Further the information is transmitted to cloud (Fire base) through NodeMCU. Further the information can be viewed in the android application which is Blynk App. The location information is updated for every 5 seconds.

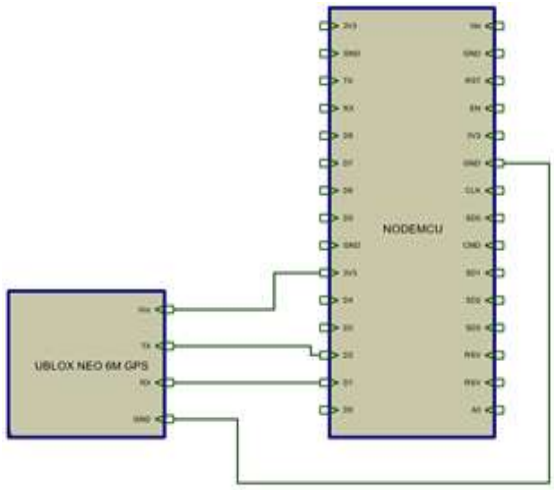

Fig.2 NodeMCU with GPS Module

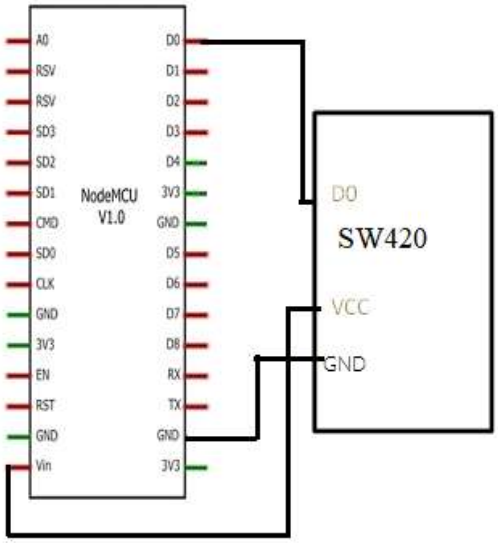

Fig.3 NodeMCU with Vibration Sensor sSW-420

Connection of vibration sensor with NodeMCU is shown in figure 3. Using vibration sensor vibration of the vehicle can be monitored in real-time, whenever the vibration exceeds a pre-defined value a notification message is sent even if the application is running in the background.

3.3 Working

When the IoT device is powered on, it starts reading the GPS data from the Neo6M module. At first the local server IP should be loaded in the web page. The GPS starts getting the geographic coordinates of the location, where the GPS module gets the location update every 5 seconds and update to the web server with help of the ESP Wi-Fi module. The device starts searching for a Wi-Fi Access Point. If a Wi-Fi access point is available, the Arduino obtains the IP address if required and connect with the Wi-Fi point. The name and password of the Wi-Fi access point are hard-coded in the Arduino sketch. The initialization of the Wi-Fi connection is done within the setup function of the Arduino Sketch which runs once the board is powered on. The ESP reads the latitude and longitude from the GPS module. The GPS and vibration sensor data is wrapped into proper formatted strings and stored in variables. It is sent to the remote server (local server in this case) when the Wi-Fi connection is available.

The data is updated in every 5 seconds and the current stored data to update to the local server as Wi-Fi connection is setup. The local server is a PC or laptop connected to the same Wi-Fi access point and running local host. A webpage is created by the Arduino Sketch and sent with the updated GPS data to the local server. At the web server the location of the vehicle moving and the vibration range can be viewed through Google Maps on the blynkl app. The device here connects to local host. In order to connect with a hosted website or webpage, port forwarding must be done on the ESP8266 modem.

4. RESULT

The proposed system is more user friendly than existing system. And it also gives greater performance. The proposed system is successfully designed, implemented and tested and the following conclusions are made. The system that tracks the vehicle at any location at any time. All the current information is stored to the server and it is retrieved to remote users via Android mobile application. The system is more user friendly for user to get information visually shown on Google map. User can freely get this Mobile application for real time tracking of the vehicle which provide interactive interface environment. So by using this application remote users can easily track the vehicle from any location. So this paper presents a system which provides high practical value in the modern fast era. The system has high practical value and cost efficient .Figure on left hand side shows the longitude and latitude of the vehicle and Figure on the right hand side shows the output of vibration range on the Blynk App.

5. FUTURE SCOPE

So far, it has been implemented that the system can collect data successfully and communicates with web server. In near future, the system can be improved by using more sensors to detect accident with more accuracy and more different way of accident detection. This system will try to communicate at least three nearest hospitals if any major accident occurs and show the shortest path to reach the accident spot. Moreover, the system will integrate with other system. For example, an insurance company can use the project database to inquiry about an accident and provide money to the owner in time. If people use this system, the system can collect traffic data and notify the driver about traffic and find out ways which have less traffic jam.

6. CONCLUSION

Unfortunately, it seems that crime and violence are going to be a horrible reality for this and future generations. Personal VTS systems are already being used to enhance the safety of children and vulnerable adults. As VTS systems continue to become more affordable, it's likely that they'll be used even more for this purpose. When it comes to offering transportation facility for school students what needs to be considered on a priority is the safety of the wards. By providing access to customizable GPS and accident detect ion vibration sensor enhanced school bus tracking system; parents, school authorities as well as the transport agencies keep updated with the route, location and schedules of buses

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