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Vehicle Rash Driving Monitoring and Alert System using IoT Technology and IFTTT Protocol

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Abstract: Using NodeMCU, create a decisive and complete traffic accident and aggressive driving detection and alarm system. It features completely working and autonomous circuitry, unlike other projects on the internet. It effectively integrates the functionalities of Intenseness' MEMS Sensor, GPS module, and NodeMCU. MEMS Sensor is a combination of an accelerometer and a gyroscope, both modules assisting each other with data to overcome inadequacies. The accelerometer measures acceleration along three axes, whereas the gyroscope measures rotational velocity along one axis. The GPS module records the data in NMEA format, which may be utilized to pinpoint the precise position of the mishap. In addition, a letter is sent to the registered email address through an API call integrated with the Google link. IFTTT, a tool that links many services, assists us in sending the email. The email communicates the notification and also provides the user the location of the accident to the authority people.

Keywords: Vehicle Tracking System, Rash Driving System, IoT, NodeMCU, IFTTT.

INTRODUCTION

The overall number of cars on the road has expanded significantly over the last several decades, resulting in increasing automobile traffic. The immediate result of this condition is a significant increase in road traffic deaths, which is a severe problem in most nations [1]. Drivers are not usually the only cause of automobile accidents. The abrupt halting of traffic, particularly on busy routes and highways with restricted sight, is one of the leading causes of car accidents. Other factors such as work-in-progress roads, traffic volumes, and so on might be to blame [2]. Driver sight can be compromised by a variety of factors, including tight curves, fog, and limited light tunnels.

Every year, millions of individuals lose their lives as a consequence of traffic accidents. According to World Health Organization (WHO) road safety statistics, 1.35 million people die each year as a result of road traffic collision injuries throughout the world [3]. It is estimated that 74% of road fatalities occur in middle-income nations. Road safety improvements, as well as the creation of effective policies and procedures, are critical, particularly in developing nations [4].

Cars are equipped with a variety of safety features to safeguard drivers and passengers in the event of an accident. Every automobile has airbags that are employed for travel safety and security. The airbag device has been in use since 1968 [5]. The Tire Pressure Monitoring System (TPMS) is a device that monitors and controls the pressure on the tyres of cars and trucks. It provides various driving conditions, such as requiring less tyre pressure to increase traction, manoeuvre through difficult terrain, drag a massive load out of a steep slope at low speeds, and crawl out of soft sand. The pressure ranges from 15 to 45 PSI.

One of the leading causes of automobile accidents is careless driving. A protective system is created for people's safety in [8], automatically identifying and notifying irresponsible driving. This protective system makes use of a cloud server and machine learning techniques. Driving driver tiredness is another cause of vehicle accidents, and many gadgets are available to detect drowsiness and notify the driver in order to avert road accidents.

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LITERATURE REVIEW

This article describes a smart and dependable IoT system solution that promptly alerts the PSO headquarters when an accident occurs and pinpoints its geographic coordinates on a map. A shock sensor detects an accident when it occurs. The sensor signal is then processed by an algorithm, which sends the geographic position, along with other ancillary information, to the PSO headquarters, signaling the occurrence of an accident. This is a promising device that is supposed to help in the time-consuming rescue procedure by notifying the site of an accident, the passengers hurt, and blood types in a matter of seconds, cutting fatality rates [6].

This work suggests detecting an accident from a vehicle's map-matched position using GPS speed data and a map matching algorithm, and then sending the accident location to an Alert Service Center. Every 0.1 second, the GPS transmits speed and location. The map matching algorithm will utilize the position data to find the car on the route. A Microcontroller Unit will compare the current speed to the previous speed every 0.1 second. The technology will produce an accident situation whenever the speed falls below the safe determined threshold speed [7].

We created an Android application that detects an accident and sends an emergency alert message to the nearest police station and health care facility [8]. This application is integrated with an exterior pressure sensor to extract the car body's outward force. It uses GPS and accelerometer sensors on an Android phone to monitor speed and tilt angle change [9]. This application can reduce the rate of false alarms by checking circumstances [10].

This research [11] presents an accident detection and localization system based on accelerometer deceleration and data fusion from GPS and accelerometers. Integrating using a Kalman filter overcomes the bias, drift, and noise issues of accelerometers, as well as the GPS outage constraint. The test result demonstrates the proper deceleration for accident detection and location. The suggested method will be capable of circumventing GPS constraints and saving priceless human lives.This paper [12] describes an IoT-based automobile monitoring tools and categorization (ADC) system that exploits the fusion of built-in and networked sensors on smartphones to not only detect but also report the kind of accident. In our proposed system we use IFTTT for email alert to the authority user [13].

IFTTT is a free web-based application that allows users to create applets by utilizing basic conditional expressions. It normally allows the user to build the applet using the if statement (If this happens, then do an action) [14]. To start the event, an API request is frequently utilized [16]. The API key, hostname, port, event name, and values to be delivered are all included in the API call. For this project, the user must create an applet that can send an email with the GPS location connected to the vehicle's owner or authority [15].

PROPOSED METHODOLOGY

The proposed system as shown in Figure 1 consists of a Rash driving system using MEMS sensor, Node MCU, GPS module to track the exact location of the vehicle. Create a decisive and comprehensive traffic accident and aggressive driving detection and alarm system using NodeMCU. Unlike other initiatives on the internet, it has fully functional and independent circuitry [17]. It efficiently incorporates the MEMS Sensor, GPS module, and NodeMCU functionality of Intenseness. MEMS Sensor is a hybrid of an accelerometer and a gyroscope, with both modules sharing data to compensate for shortcomings. The accelerometer detects acceleration along three axes, whereas the gyroscope detects rotational velocity along one axis [18].

MPU 6050 uses buffers, is required to store the data from the ADC until it is ready to be processed. The data from the buffer is transferred to the processing unit through the I2C communication protocol. The processing unit performs various calculations on the data and sends the results back to the ADC through the I2C communication protocol. The ADC converts the data back into a digital format and transfers it to the microcontroller through the I2C communication protocol.

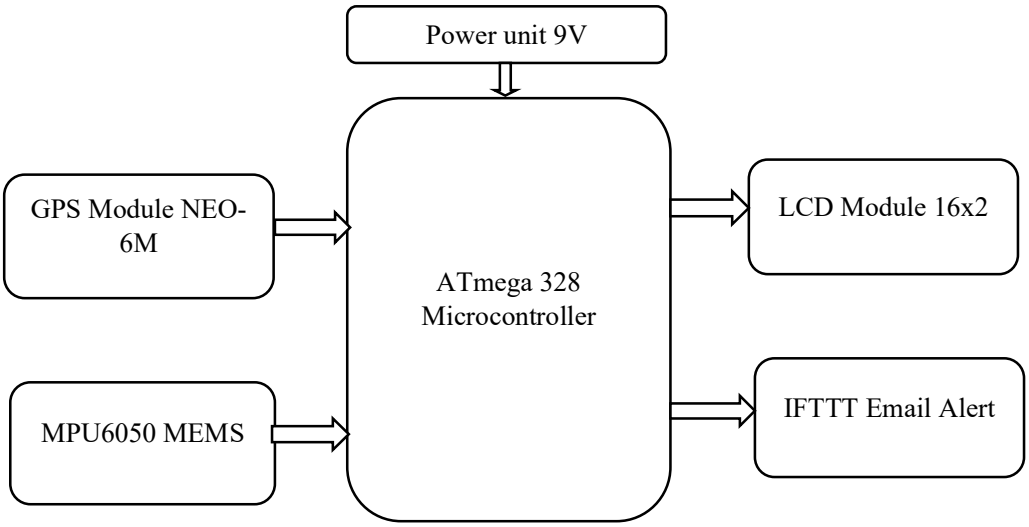

FIGURE 1. Proposed Model

Node MCU is programmed using the Arduino IDE and communicates using I2C protocol. It has about 10 GPIO pins, which can be configured as input and output. The PCB design is such that all the GPIOs are accessible through the pin headers. The NodeMCU firmware supports Arduino IDE for programming.

IFTTT is a free web-based tool that enables users to build applets using simple conditional expressions. It usually allows the user to construct the applet by utilizing if statement (If this happens, then do an action). An API call is often used to initiate the event. The API call includes the API key, the hostname, the port, the event name, and the values to be supplied. For this project, the user must construct an applet that can send an email to the vehicle's owner with the GPS location attached.

RESULTS AND DISCUSSION

To utilize IFTTT the user will be required to provide the API key, hostname, port, event name, and the value to be passed in the API call. The user will be required to provide the hostname, the port, and the event name to be used in the applet. The user will also be required to provide the API key and the event name to be used in the applet. The user will have to provide the values to be passed in the API call for the mail to be sent as shown in Figure 2.

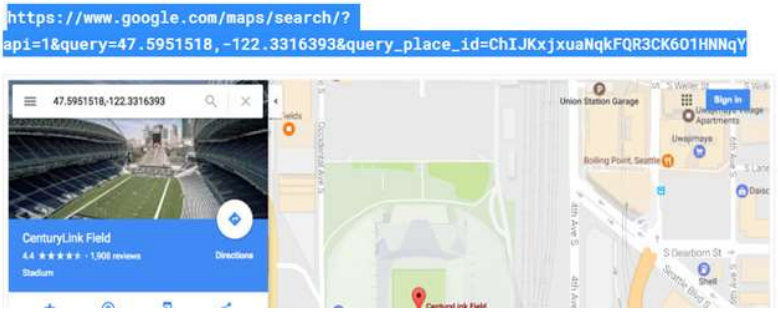

FIGURE 2. Google Map URL

When turbulence is low (normal driving conditions), an indicator on the LCD displays "Normal driving" along with the three-phase values as shown in Figure 3.

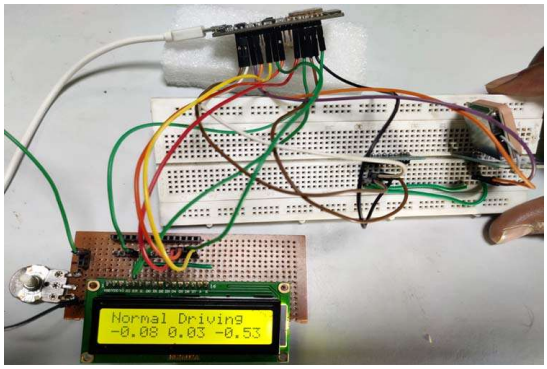

FIGURE 3. Normal Driving Mode

The driver is alerted to the simulated situation and is able to continue driving safely. When the 'High' is simulated as shown in Figure 4, the Mail server is activated to alert the situation. This helps in future analysis of the same traffic incident and can help in identifying the same driver's reactions in future similar situations. The driver is also able to continue driving safely and smoothly as the system is able to detect the road condition accurately.

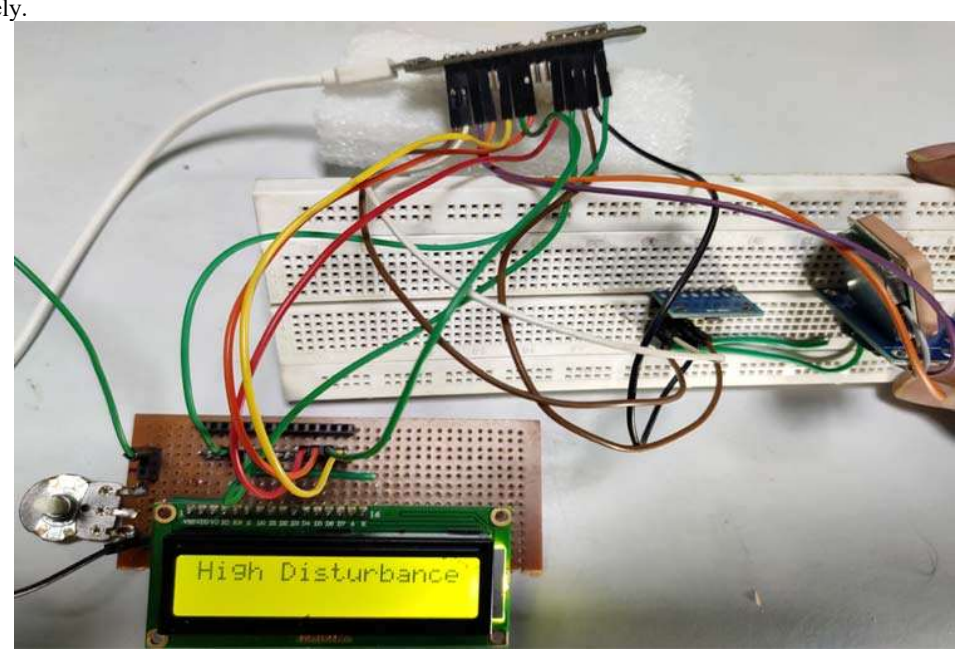

Figure 4. High Disturbance Mode

IFTTT is a free web-based application that allows users to create applets by utilizing basic conditional expressions. It normally allows the user to build the applet using the if statement (If this happens, then do an action). To start the event, an API request is frequently utilized. The API key, hostname, port, event name, and values to be delivered are all included in the API call. For this project, the user must create an applet that can send an email with the GPS location connected to the vehicle's owner.

CONCLUSION

The emergency communication system is being created and tested. The method provides an excellent answer to the problem of unanticipated mortality caused by traffic accidents. When an accident happens, the system uses the IFTTT Protocol to communicate with the users. This user may be the traffic management system to monitor the rash driving among the vehicle. The accelerometer measures acceleration alongside three axes, whereas the gyroscope measures rotational speed along one axis. The GPS module records the information in NMEA format, which may be utilized to pinpoint the appropriate role of the mishap. In addition, a mail is

dispatched to the registered email address through an API call integrated with the Google link. IFTTT, a device that hyperlinks many services, assists us in sending the email. The e-mail communicates the notification and additionally gives the person the region of the twist of fate. Our future work may include camera module to view the driver consciousness via raspberry pi controller.

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