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Road Monitoring System for Accident Detection

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ABSTRACT: The main purpose of the project is to detect the accidents along the highways by the use of sensors placed at frequent intervals. The sensors such as **radar for (long range)** and **ultrasonic sensors** are used for the purpose. In order to provide immediate first aid and safety to the accident prone area, the **GPS** is used to track the exact location of the occurrence and send information through cloud to the controller unit and thus get immediately first-aid. The confirmation of accident can be done through monitoring the cameras that are placed in those areas, which then transmits the IP address via **WIFI module**.

KEYWORDS: Arduino, Accident detection, Sensors, Controller.

I. INTRODUCTION

Road accident in general can be a global tragedy with the ever increasing trend. Almost every day, we come across of the accident news on the television, radio and internet. Most people continue with their endeavours and ignore the danger involved in their careless driving and thus accidents happen. To begin with, carelessness plays a major role in road accident. Carelessness in the sense, people using mobile phones while driving, that breaks the traffic rules and entering from the side road into the path of the vehicle. In addition, when inexperienced, untrained drivers and those with blur eyesight drive at night, these are the most common cases for the accident rate to increase in our nation. Drink and drive is yet another key reason for road accidents. Everyday around the world a large percentage of people dies from road accident. An effective approach is made to solve the problem by using smart accident safety system. The working of this safety system is very simple, Ultrasonic sensor will detect the accident status of the driver and transfer the information to the controller. Smart accident detection system is used to identify in case of accident by using IOT technology.

II. MODULES AND METHODS

Viplove Rohilla Monica Bazzad [1], conveys a new and improvised model of Vehicle Accidents detection by placing accelerometer and alert sent via GSM and GPS module in vehicle. Accident detection and the messaging system is all placed inside a vehicle which intimates in case of an accident to the Ambulance & Police. The GPS and GSM modules are used for the detection of the accident. GPS is used to track the exact location of the accident and sends the police and ambulance a notification in the form of SMS. The entire process is controlled with the help of the Arduino board and an LCD is used to display that the accident has been detected.

Ashwini Ashok [2], has designed an Alert system that uses the GSM GPS module in vehicle and which is used to prevent accident with Alcohol and Temperature Sensor. The sensor node that is used here has a controller along with the sensors. Sensors here are used for accident detection, by Alcohol detection and also uses GPS module. The sensor

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node consists of a wireless device that connects the sensor node to the base node. The Controller uses the Arduino Uno board (microcontroller based board) incorporated with ATmega328. The Network device that has been used is simply a Wi-Fi Module. The GPS module tracks the location in longitude and latitude and the sensor nodes will be connected to the base station via a wireless device. The Base station collects all the necessary data's from the sensors. The sensor nodes used here are designed to communicate with each other.

III. PROPOSED METHODOLOGY AND DISCUSSION

Internet of Things conceptualizes the idea of monitoring the road with the Cloud controlled system with Ultra Sonic sensor that is used and will be more accurate than the Infrared sensor used in existing system. GPS is used to track the exact location of the accident and send it the controller unit via Wi-Fi module. The controller unit can monitor the accident through the IP cam whose IP address is also sent to the controller. The system is also enabled to provide a notification when the accidents occur. Thus the controller can send the ambulance and Rescue team to provide immediate first-aid

1. MODULE DESCRIPTION

A. Module1-Monitoring

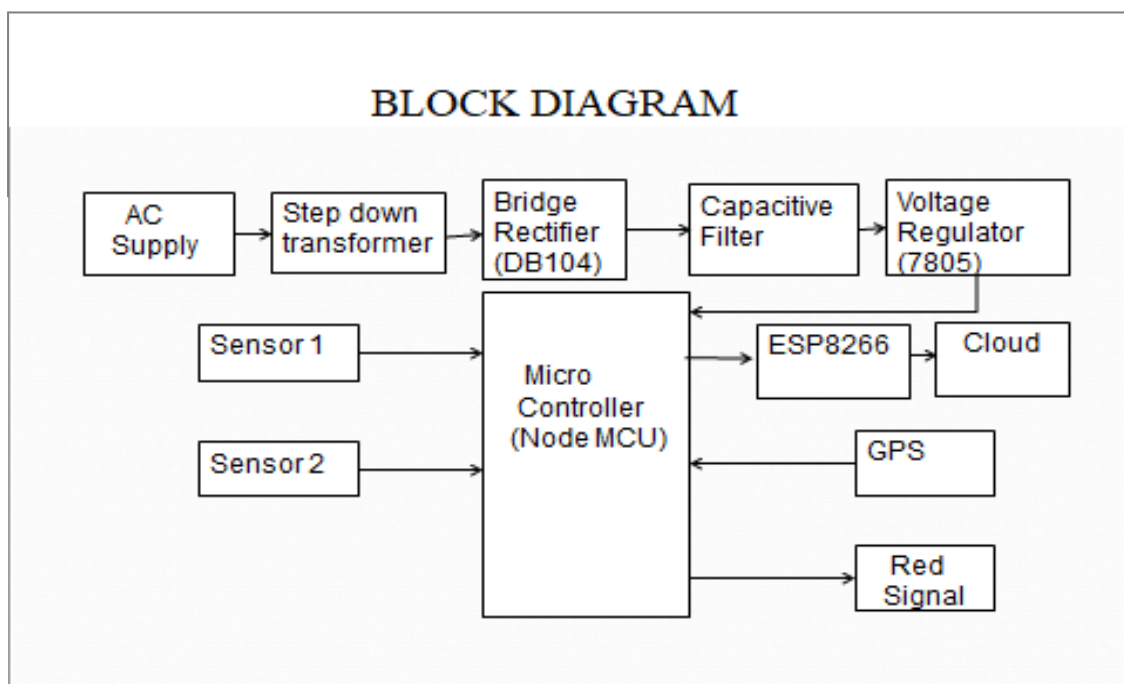
The ultrasonic sensors are used to monitor and in case of an accident intimation is given to the controller with Wi-Fi module.

B. Module 2-GPS

The exact location of the accident (latitude and longitude) is continuously transmitted along with the IP address of the camera to be monitored by the control unit.

C. Module3-Database and Alert message

The cloud storage is continuously updated with those values and the alert message is sent to the main controller.



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2. EXPERIMENTAL SETUP

A. Power Supply

Supply of 230V, 50Hz ac signal from main supply board is given to a step down transformer. In this system it is used to step down 230V AC to 12V AC supply and provides isolation between power grids and circuit. A rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which flows in only one direction. The output from the rectifier is pulsating D.C. These pulsations are due to the presence of A.C. component in the rectifier output. The filter circuit removes the A.C. component so that steady D.C. voltage is obtained across the load. A regulated power supply consists of an ordinary power supply and voltage regulating device. The output of ordinary power supply is fed to the voltage regulator which produces the final output.

B. IOT Module

Node MCU is an open source IOT platform. It includes firmware which runs on the ESP8266 Wi-Fi SOC from Espressio Systems, and hardware which is based on the ESP-12 module.



Fig: IOT module

PIN CONFIGURATION

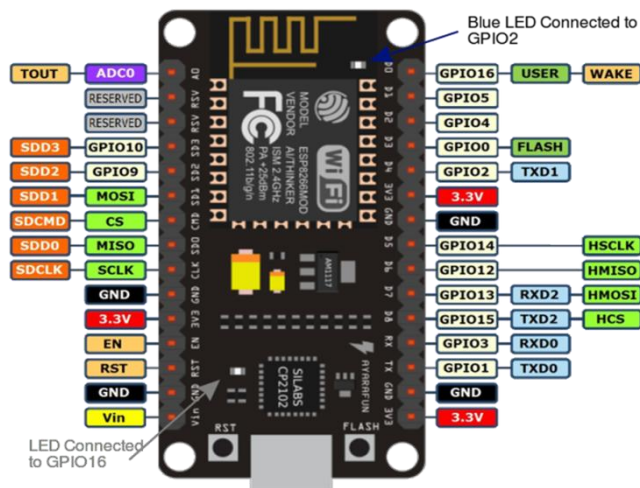


Fig: Node MCU Pin Configuration

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C. Ultrasonic Sensor

The ultrasonic sensor works on the principle of SONAR and RADAR system which is used to determine the distance to an object. An ultrasonic sensor generates the high-frequency sound (ultrasound) waves. When this ultrasound hits the object, it reflects as echo which is sensed by the receiver. By measuring the time required for the echo to reach to the receiver, we can calculate the distance. This is the basic working principle of Ultrasonic module to measure distance.

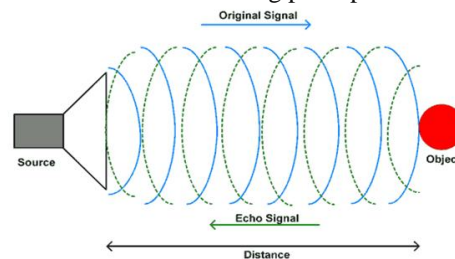


Fig: Ultrasonic Output

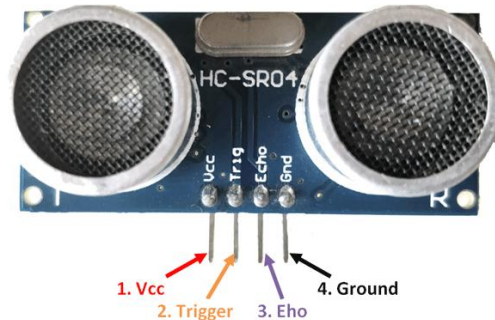


Fig: Ultrasonic Sensor Pin Configuration.

D. GPS

GPS receivers are generally used in smartphones, fleet management system, military etc. for tracking or finding location. Global Positioning System (GPS) is a satellite-based system that uses satellites and ground stations to measure and compute its position on Earth. GPS is also known as Navigation System with Time and Ranging (NAVSTAR) GPS.



Fig: Interfacing GPS module with NODE MCU

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E.SOFTWARE USEDARDUINO IDE

The Arduino IDE is a cross-platform application written in Java, and is derived from the IDE for the Processing programming language and the Wiring project, is designed to introduce programming to artists and other newcomers unfamiliar with software development. It includes a code editor with features such as syntax highlighting, brace matching, and automatic indentation, and is also capable of compiling and uploading programs to the board with a single click. There is typically no need to edit make files or run programs on a command-line interface. Although building on command-line is possible if required with some third-party tools such a setup. The Arduino IDE comes with a C/C++ library called "Wiring" (from the project of the same name), which makes many common input/output operations much easier. Arduino programs are written in C/C++.

PROTEUS 8

Proteus is a simulation and design software tool developed by Lab center Electronics for Electrical and Electronic circuit design.It also possess 2D CAD drawing feature. It deserves to bear the tagline “From concept to completion.

IV. RESULTS AND DISCUSSION

Thus the hardware output which is indicated is LED glow, the output is got when the vehicle is stationary for a few seconds.The software output is given by showing the latitude and longitude of the location of the accident along with the Google map.The alert message is sent as a notification to the control unit.

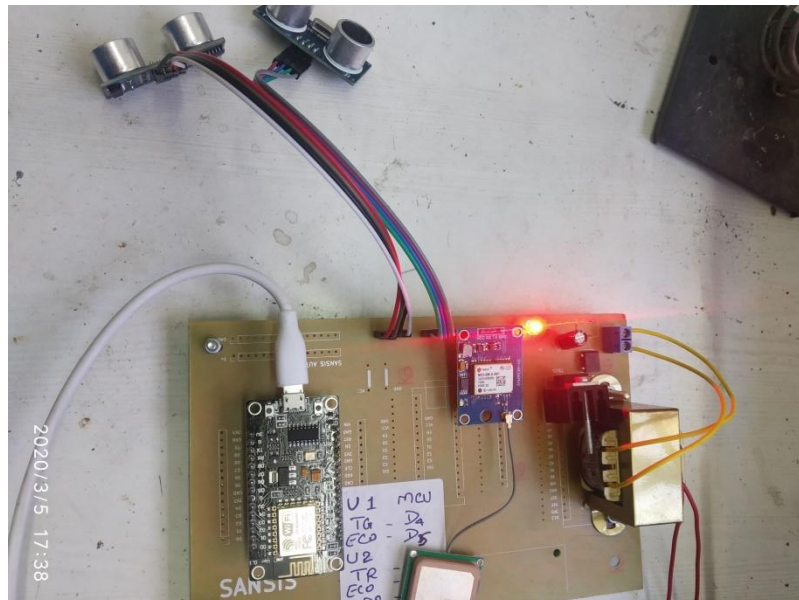


Fig 1: Hardware Output

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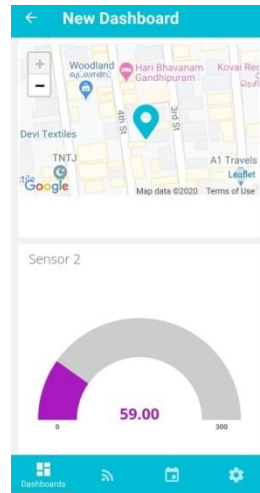


Fig 2:Ubidots Google Map Image

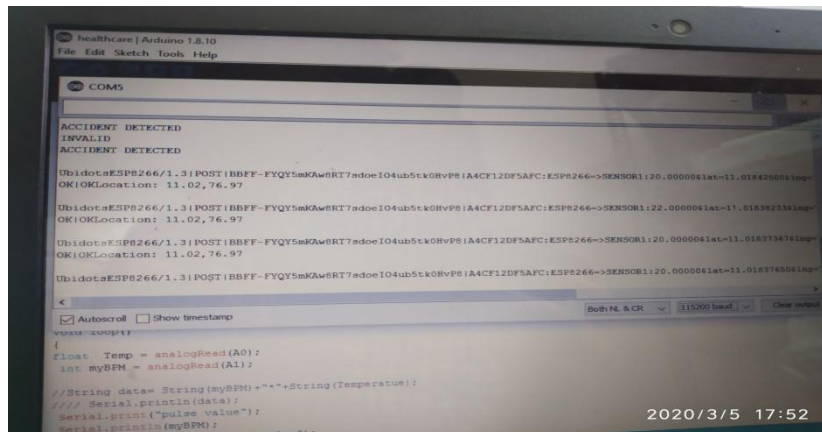


Fig 3: Serial Monitor Output

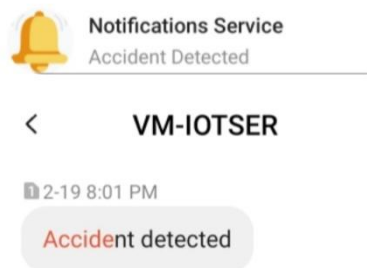


Fig 4: Notification Message.

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V. CONCLUSION

The design and implementation of this technique is directly targeted for accident detection and the information transferred to the cloud. Employing the new technique makes the results more accurate and thus be of good use to the society.

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