IOT BASED LOW COST VEHICLE MONITORING AND ALERT SYSTEM

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ABSTRACT - Automotive electronics plays a significant role in the automobile industry and provides luxurious features and more importantly addresses the safety and security concerns. The work presented in this paper aims at providing a cost effective solution to the design and development of an event data recorder which has been basically adopted from the aviation sector considering the need and the correlated benefits. The paper presents an integrated design of the data recorder which could be very useful for domestic vehicles and at the same time it also hosts several additional features that could assist in mitigating the number of accidents, or at bare minimum, will serve as an analysis tool to prevent future accidents by analyzing the previous accidents. It provides automatic accident notification system which helps in informing the nearest hospital and the traffic authority by providing not only the coordinates of the accident but also the exact physical address for immediate medical attention which can save numerous lives every day. It also hosts several other features advanced web tracking anytime and from anywhere. Thus the overall cost is highly optimized by integrating such multiple features

KeyWords: Data recorder, Iot, Sensor, notification system

1. INTRODUCTION

In recent years, traffic accidents have become increasingly common. In 2015, the global status report on road safety from the World Health Organization (WHO) [1] noted that approximately 1.25 million people die each year from traffic accidents worldwide. Furthermore, accidents indirectly cause nonlethal injuries for 20 million to 50 million people, and 90% of road traffic accidents occur in low- to moderate-income countries. Due to the low levels of emergency services and medical standards in many low- and moderate-income countries, the mortality rate from accidents in such countries is significantly higher than that in developed countries, and the economic losses caused by traffic accidents are extensive.

Recently, many studies have confirmed that rapid emergency rescue responses to crashes result in higher survival rates. For example, in China, approximately two-thirds of traffic accident victims died in 2016 because they did not receive timely and effective assistance. Moreover, most of the injured patients died either at the accident scene or while in-transit to a hospital; these trips averaged approximately 30 minutes. The statistics indicated that when an accident is detected immediately, the response time required for emergency services can be greatly reduced, and the survival rate of traffic accident victims increases. Additionally, most individuals involved in traffic accidents receive appropriate assistance from drivers, passengers, or other people. However, when a traffic accident occurs in the suburbs or the driver is the only person in the vehicle and the crash results in loss of consciousness, no one is available to notify the proper authorities within the "golden window period" for medical treatment, and this delay reduces the survival rate. Considering these issues, an system is needed for collision detection, analysis, and notification. To meet the above mentioned needs, in this paper, an Iot based low cost vehicle monitoring and alert system is proposed to detect single-vehicle accidents and provide an emergency alert mechanism.

1.1 MOTIVATION OF THE PROJECT

The main aim of the project is to minimize the road accidents and to prevent the incident. More than four lakhs road accident were recorded in the previous year and many accidents were unsolved. In order to analyse the reason for the accident and also to inform the nearest hospital, data recorder is implemented. The data recorder also provides automatic accident notification system which helps in informing the traffic authority and to the nearest hospital.

1.2 WORKING PRINCIPLE

In this system, we use ARDUINO MEGA (ATmega2560) microcontroller which acts as brain of the system, because the entire system program instruction stored in it. Here we have used ultrasonic sensor, gas sensor and temperature sensor to know the status of vehicle and driver like level of fuel, detection of alcohol and temperature inside the vehicle respectively. Touch sensor we use here to know the number of person are occupied in vehicle. The crash sensor which we use here to stop the data read from the vehicle using sensors mentioned above and store to SD card as if the data keep on read and store in SD card. The GSM module we use here to inform respective person and public service organization. If accident occurred, the location is shared to the police by using ZIGBEE with the help of GPS. All the data are updated to cloud so that the system operation is either controlled or monitored using IOT.
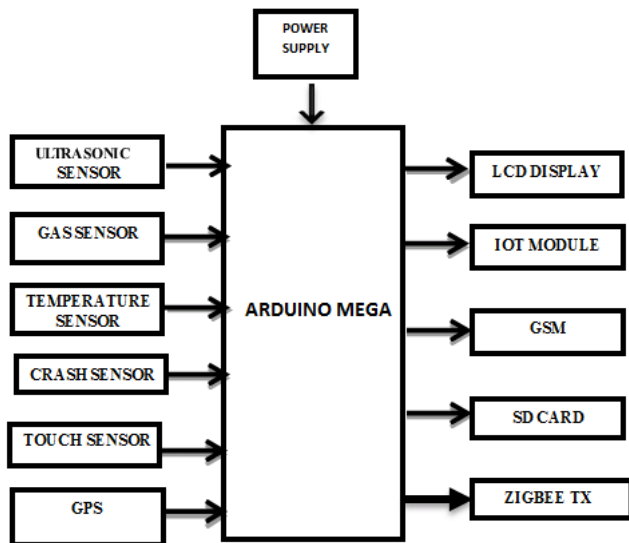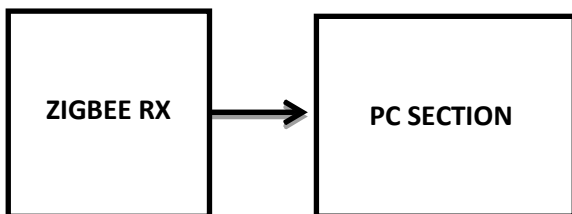
2. BLOCK DIAGRAM (TRANSMITTER SECTION):

Figure 2 Block Diagram

RECEIVER SECTION

3. HARDWARE DESCRIPTION:

3.1 ARDUINO MEGA:

Open source hardware, boot loader, flash memory. The

54 DIO,16 analog inputs, 4 UARTs ,16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.RS- 232 logic levels and transistor – transistor logic(TTL) level signals. Universal serial bus(USB), implemented using USB-to-serial adapter chips such as the FTDI FT232.

3.2 ZIGBEE PROTOCOL:

NRF24L01:

Single chip 2.4GHz transceiver, embedded baseband protocol engine (Enhanced Shockburst), Worldwide ISM frequency band at 2.4-2.4835 GHZ. Internal FIFOs ensure a smooth data flow between the radio front end and the system's MCU. Enhanced Shock- Burst - high speed link layer operations.
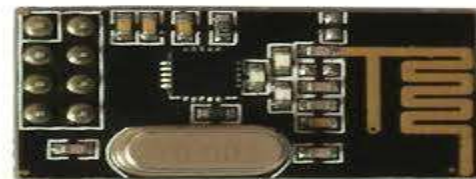

Figure 3.2 NRF24L01

3.3 GLOBAL POSITIONING SYSTEM (GPS):

GPS or Global Positioning System is a satellite navigation system that furnishes location and time information in all climate conditions to the user. GPS is used for navigation in planes, ships, cars and trucks also. The system gives critical abilities to military and civilian users around the globe. GPS provides continuous real time, 3-dimensional positioning, navigation and timing worldwide. The Global Positioning System (GPS) is a satellite-based navigation system made up of at least 24 satellites. GPS works in any weather conditions, anywhere in the world, 24 hours a day, with no subscription fees or setup charges.

3.4 GLOBAL SYSTEM FOR MOBILE COMMUNICATION:

GSM/GPRS Modem-RS232 is built with Dual Band GSM Engine - SIM900, works on frequencies 900 / 1800 MHz The Modem coming with RS232 interface which allows to connect PC as well as microcontroller with RS232 Chip(MAX232).It is suitable for SMS, Voice and data transfer application in M2M interface. Using this modem, we can make audio calls, SMS, Read SMS, attend the incoming calls and internet through simple AT commands.

3.5 TEMPERATURE SENSOR(LM35):

The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly proportional to the Centigrade temperature. It senses the temperature inside the vehicle.

3.6 GAS SENSOR (MQ-2):

MQ-2 gas sensor has high sensitivity to LPG, Propane and Hydrogen, also could be used to Methane and other combustible steam, it is with low cost and suitable for different application. Sensor is sensitive to flammable gas and smoke. It is used for detection of the alcohol.

FIGURE 3.6 GAS SENSOR(MQ-2)

3.7 ULTRASONIC SENSOR:

An ultrasonic sensor measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity. It is used to measure the distance within a wide range of 2cm to 400cm.It detects the level of the fuel by sound waves.
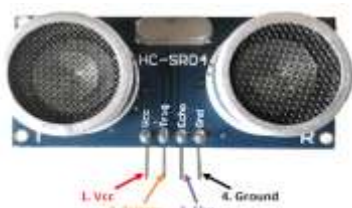

FIGURE 3.7 ULTRASONIC SENSOR(HC-SR04)

3.8 CRASH SENSOR:

A crash sensor is a small micro switch sensor designed for the Arduino. It could be directly connected to the IO Expansion shield. It integrates the pull-up resistor and the status indicator LED onboard. That makes it easier for testing. The crash sensor is used to stop the data read from the vehicle using sensors mentioned above and store to SD card as if the data keep on read and store in SD card.

FIGURE 3.8 CRASH SENSOR

3.9 LIQUID CRYSTAL DISPLAY:

LCD screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. The data which is stored are displayed in the LCD.

3.10 IOT:

Iot is the infrastructure of the information society, it allows objects to be sensed and controlled remotely across existing network infrastructure creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit. This IOT based vehicle monitoring and alert system enables us to collect and analyze the information about the accidents.

3.11 SD CARD:

The SD card module is especially useful for data logging. The Arduino can create a file in an SD card to write and save data using the SD library. The data collected from the sensors are stored in the SD card.

4. HARDWARE DESCRIPTION:

4.1 ARDUINO SOFTWARE (IDE):

The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them.

4.2 EMBEDDED C:

Embedded C is most popular programming language in software field for developing electronic gadgets. Each processor used in electronic system is associated with embedded software. Embedded C programming plays a key role in performing specific function by the processor. In day-to-day life we used many electronic devices such as mobile phone, washing machine, digital camera, etc. All device working is based on microcontroller that are programmed by embedded C.
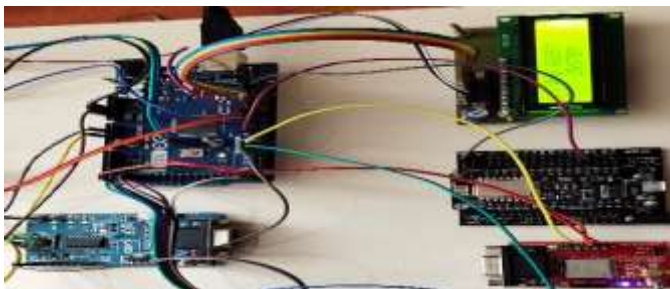
5. SOFTWARE RESULT:

6. HARDWARE RESULT :

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