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Accident Detection and Emergency Rescue System

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ABSTRACT-*:* The rapid growth of technology and infrastructure has made our lives easier. The advent of technology has also increased the traffic hazards and the road accidents take place frequently which causes huge loss of life and property because of the poor emergency facilities.Our project will provide an optimum solution to this draw back. According to this project when a vehicle meets with an accident immediately Vibration sensor will detect the signal and sends it to Microcontroller. The microcontroller checks the accident condition if it is a majoraccident or minor accident using accelerometer sensor.Microcontroller finds the location coordinates of accident spot using GPS and sends the alert message including geographic allocation coordinates using IoT technology to ambulance/authorized unit. So, the rescue team in the ambulance/authority can immediately reach the location.Using the RFID reader and the RFID tags we could give an alert message to the driver regarding the accident-prone areas which could prevent the occurrence of accident.By using the alcohol sensor, we could detect the presence of ethanol in air.

KEYWORDS*:* NodeMCU, Accelorometer, Alcohol sensor, GPS, RFID Reader and tag.

I.INTRODUCTION

With the urbanization on the rise, the number of accidents that are happening every day is on the rise. According to the Global Status Report on Road Safety by WHO, about 1.24 million deaths occur annually and "Indian economy takes a 3% hit every year in its GDP due to road accidents", said the UN study. People in India consider road accidents to be the most often a thing to happen and call it an unfortunate event or destiny rather than reacting towards it. There are several causes associated with road accidents and a few of them include – over speeding, drunken driving, red light jumping, avoiding driving safety measures such as helmets and seat belts, using mobile phones, lack of traffic sense, etc. On the other hand, issues pertaining to the lack of infrastructural facilities are something that are not in the control of the person driving such as poor pedestrian space, undivided roads, potholes, narrow roads, sharp road curvatures, etc. Under such circumstances, security in travel becomes a primary concern for everyone. Due to the lack of the best emergency facilities available in our country, the lives of the people are under high risk.

II. LITERATURE REVIEW

[1] INTELLIGENT ACCIDENT DETECTION SYSTEM AND AMBULANCE RESCUE SYSTEM

by Bhandari Prachi, Dalvi Kasturi, Chopade Priyanka(INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH VOLUME 3, ISSUE 6, JUNE 2014 ISSN 2277-8616)

Description: To overcome the drawback of existing system this paperwill implement the new system in which there is an automatic detection of accident through sensors provided in the vehicle. A main server unit houses the database of all hospitals in the city. A GSM module in the concerned vehicle will send the location of the accident to the main server which will rush an ambulance from a nearest hospital to the accident spot. Along with this there would be control of traffic light signals in the path of the ambulance using RF communication. This will minimize the time of ambulance to reach the hospital. A patient monitoring system in the ambulance will send the vital parameters of the patient to the concerned hospital. This system is fully automated; thus, it finds the accident spot, controls the traffic lights, helping to reach the hospital in time.

[2]AUTOMATIC ACCIDENT DETECTION AND AMBULANCE RESCUE WITH INTELLIGENT TRAFFIC LIGHT SYSTEM

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Description: Traffic congestion and tidal flow are major facts that cause delay to ambulance. To bar loss of human life due to accidents we introduce a scheme called ITLS (Intelligent Traffic Light system). The main theme behind this scheme is to provide a smooth flow for the emergency vehicles like ambulance to reach the hospitals in time and thus minimizing the delay caused by traffic congestion. The idea behind this scheme is to implement ITLS which would control mechanically the traffic lights in the path of the ambulance. The ambulance is controlled by the control unit which furnishes adequate route to the ambulance and controls the traffic light according to the ambulance location and thus reaching the hospital in time.

III. PROBLEM STATEMENT

The main problem that we face every day is the accidents on the streets, the highways. The number of accidents is increasing due to population growth, the high speed of the new advanced cars and the use of mobile telephones while driving for calling or text. Many people have died in a disused highway because they have an accident, and no one is helping. Another scenario where the person who has the accident is unable to reach out for help or call the ambulance because he / she was injured, either he / she is not awake and helpless or the accident occurred on an inaccessible road or away from the neighbour hoods. However, if the incident occurs in the area, where there are plenty of cars in the street that can create crowding if the emergency services are late. We find the time to be a very important element in preserving the lives of others. Owing to lateness we could lose many lives. Consequently, the problem in this work has to do with reducing the significant number of deaths resulting from the traffic accidents and caused mainly due to the lack or latency of assisting the injured person.

IV. METHODOLOGY

In this project, Node Mcu is used for controlling whole the process with a GPS receiver and IoT technology. When an accident occurs sensors will sense the accident and through IoT sends the alert message along with the location coordinates to the authorized unit. Accelerometer namely ADXL335 is used for detecting accident or sudden change in any axis. And an optional 16x2 LCD is also used for displaying status messages or coordinate.When we are ready with our hardware after programming, we can install it in our vehicle and power it up. Now whenever there is an accident, the car gets tilt and accelerometer changes its axis values. These values read by microcontroller and checks if any change occurs in any axis.By using the RFID Reader the driver could be made conscious about the alleys, byroads which are the accident prone areas by giving an alert message.An alcohol sensor could be used to detect the presence of ethanol in air thereby to determine whether the accident has occurred because of drunk and drive.

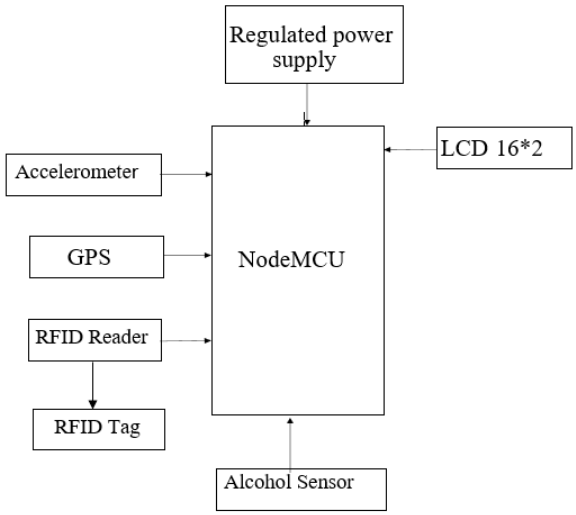

Fig.1 Block Diagram

V. FUNCTIONAL PARTITIONING

1. NodeMCu

The NodeMCU (Node MicroController Unit) is an open-source software and hardware development environment built around an inexpensive System-on-a-Chip (SoC) called the ESP8266. The ESP8266, designed and manufactured by

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Espressif Systems, contains the crucial elements of a computer: CPU, RAM, networking (WiFi), and even a modern operating system and SDK. That makes it an excellent choice for Internet of Things (IoT) projects of all kinds.

2.GPS

Global Positioning System was developed by the United States' Department of Defense. It uses between 24 and 32 Medium Earth Orbit satellites that transmit precise microwave signals. The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather, anywhere on or near the Earth, where there is an unobstructed line of sight to four or more GPS satellites. The GPS satellites are maintained by the United States' Air Force and is freely accessible to anyone with a GPS receiver.

The NEO-6 module series is a family of stand-alone GPS receivers featuring the high-performance u-blox 6 positioning engines. These flexible and cost-effective receivers offer numerous connectivity options in a miniature 16 x 12.2 x 2.4 mm package. Their compact architecture and power and memory options make NEO-6 modules ideal for battery operated mobile devices with very strict cost and space constraints. The 50-channel u-blox 6 positioning engine boasts a Time- To-First-Fix (TTFF) of under 1 second. The dedicated acquisition engine, with 2 million correlators, is capable of massive parallel time/frequency space searches, enabling it to find satellites instantly. Innovative design and technology suppress jamming sources and mitigates multipath effects, giving NEO-6 GPS receivers excellent navigation performance even in the most challenging environments. The Features includes GPS modules NEO-6M, 3V-5V power supply Universal. It is Module with ceramic destined antenna, super signal it has EEPROM power down to save the configuration parameters data and LED signal indicator. It comes with data backup battery. The default baud rate of module is 9600 and is applicable for Raspberry Pi and Arduino.

3. LCD

LCD (Liquid Crystal Display) 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. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A **16x2 LCD** means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

4.Accelorometer Module

An accelerometer is an electromechanical device that will measure acceleration force. It shows acceleration, only due to cause of gravity i.e. g force. It measures acceleration in g unit. On the earth, 1g means acceleration of 9.8 m/s2 is present. On moon, it is 1/6th of earth and on mars it is 1/3rd of earth. Accelerometer can be used for tilt-sensing applications as well as dynamic acceleration resulting from motion, shock, or vibration. The ADXL335 gives complete 3-axis acceleration measurement. This module measures acceleration within range ±3 g in the x, y and z axis. The output signals of this module are analog voltages that are proportional to the acceleration. It contains a polysilicon surface-micro machined sensor and signal conditioning circuitry.

5. Alcohol Sensor

Sensitive material of MQ-2 gas sensor is SnO_2, which with lower conductivity in clean air. When the target combustible gas exists, The sensor's conductivity is more higher along with the gas concentration rising. Please use simple electro circuit, Convert change of conductivity to correspond output signal of gas concentration.
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.

6. RFID Reader and Tag

Radio Frequency Identification (RFID) refers to a wireless system comprised of two components: tags and readers. The reader is a device that has one or more antennas that emit radio waves and receive signals back from the RFID tag. RFID uses radio waves produced by a reader to detect the presence of (then read the data stored on) an RFID tag. Tags are embedded in small items like cards, buttons, or tiny capsules. These readers also use radio waves in some systems to write new information to the tags.

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V. ADVANTAGES

- This system is an immediate aid system.
- It is an affordable system.
- This system can be used for social cause.
- Simple design and can be interfaced with other systems.
- Reliable system.

VI.CONCLUSION

This project describes the design and implementation of a real time vehicle rescuing system that provides information on any accidents. When the vehicle's sensor detect a collision the data is send to the receiver. The signal then transferred to the microcontroller after being decoded. All of the work of controlling and analyzing incoming signals, as well as executing essential actions is done by preprogrammed software in micro controller. Using GPS the location will be detected and through IoT technology the message will be transmitted to the pre-installed contact numbers. Early warning to the driver about the alleys and byroads using RFID Reader to avoid the risk of collision. Alcohol sensor senses the presence of ethanol in the air. The cost of putting this system in the place is quite minimal. The proposed accident alert system can be a rescuer of life for the individuals who are concerned in light of road crash. It can assume a fundamental part to lessen the passing rate in accidents. The system comprises of equipment and programming segments. The equipment unit includes accident identification sensors that are constrained by NodeMCU. It can use a GPS module to send the alert message along with location coordinates to the rescue team. Besides the detection system the vehicle occupant will be able to detect the presence of alcohol in air using an alcohol sensor and using RFID reader and tag accident prone areas could be detected and alert can be made. A rescue measure in time can save many lives. Thus the proposed system can serve the humanity by a great deal as human life is valuable.

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