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IOT Based Smart Black Box 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. This paper provides the features of data recording by using the datasheet of PLX-DAQ module. The data can be stored and also used to intimate to the accident location to the nearby action zone. The data which can be recorded is used to share its location to the traffic control, ambulance or nearby hospitals and it hosts several accidents zone at the time. This black box also provides automatic accident notification to intimate to the nearest hospital and the traffic authority by providing not only the coordinates of the accident but also provides the exact physical address for immediate medical attention which can save numerous lives every day. The black box also hosts several other features which include the systematic advanced web tracking anytime and from anywhere. By using this concept, we have implemented this technique along with IOT for investigation purpose and also for hospitals verifications.

KEYWORDS: Sensors, Zigbee, Arduino, IOT module, PLX-DAQ, LCD Display, GSM, PC.

I. INTRODUCTION

In these days, the usage of vehicles in urban areas becomes higher. So there was a lot of reason for the accidents to be met at crowded place. The accidents in crowded place have some sources like manual support, mobile, etc to intimate to the hospitals or some other safest sectors. But in un-crowded place like hill stations, there won't be any support to intimate about the accident zone. So this paper provides the main concept to develop a module to intimate the accident location to the traffic control departments and hospitals.

This module can be accessed by using the Black Box concept. Generally, a Black Box is used to store the data regarding details and status of the Passengers who travelled in the aircraft. Black Box can be initially used in aviation sectors.

To analyze the major reason for accidents in un-crowded areas this Black Box concept is used in vehicles. We proposed this system to record the data by using sensors which can be used for investigation purpose. This system also used to intimate the message of accident zone to the nearby safest sectors. In transmitter side, the black box module in the vehicles records the data and also used to send the message to the receiver side. This intimation can be received by the receiver where the PC can be connected to the Zigbee which provides direct intimation to the nearby hospitals.

In this paper, we are going to discuss on various section as follows. Section 2 describes about the Literature Survey, section 3 Proposed System, section 4 comprises of the references used.

II. LITERATURE SURVEY

Now-a-days the traffic congestion is increased in urban areas in-order to reduce it the communication unit between the vehicles can be made by using some systems like GSM. This system aims at monitoring the vehicles within the surrounded areas (i.e., using the latitude and longitude) to indicate their proximity. When these vehicles are very close in this limited proximity range the drivers are alerted with the help of a message indication. The main problems faced in this system are inaccuracies in the calculation of speed, distance measurement, and slow response time, etc.



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To overcome this problem, the Black Box Optimization can be proposed as an improved variant of the differential grouping algorithm, which has a better efficiency and grouping accuracy. The algorithm of DG2 is used to find a reliable threshold value by estimating the magnitude of round off errors. But it is only used to find the interactions between the two vehicles.

A new black-box arc model uses the test with short-line fault interruption of high-voltage circuit breakers. During the interruption process, the black-box arc models are widely used to simulate current and voltage waveforms. In this study, the parameters of this arc model are derived from an optimization approach in a defined time interval, to minimize the difference between the measured and simulated arc voltages. These arc parameters are applied to a Simplified circuit for short-line fault simulation, and the model accuracy of the interruption prediction and waveform fitting are quantitatively scored. So it is not possible in all cases of accidents in un-crowded area. In-order to avoid these problems, the following cases is added in our proposed system.

III. PROPOSED SYSTEM

The proposed system proposes a prototype of an automobile black Box system that can be installed into vehicles. The system also involves the improvement of the security by preventing the damage of the black box data. The PLXDAQ (Parallex Data Acquisition) module is used to hold data of the movement parameter of a vehicle mainly used for accident analyses purposes and for safety measures. These modules are connected to the sensors integrated with the car's engine and system. IOT module is used to update the location of the vehicle in the cloud. It shows the correct location, latitude, and longitude of the vehicles.

The black box provides the data of information for the cause of accident in the un-crowded place or hill station, etc. It also helps in informing the recorded data of the accidental location to the nearby hospitals, traffic control, or ambulance. The PLXDAQ is act as a data recorder to store all about the domestic vehicles and the persons inside in it. All sensors are functionally connected to the crash sensors to trigger all the sensed data to the data recorder of PLXDAQ.

In this transmitter side, the GSM is used to send the relevant alert message to the nearby safety sources. Some sensors are used in this prototype for safety purposes. The LCD display is used to display the data to be stored.

In receiver side, the Zig-bee is placed to receive the transmitted data from the accidental zone. The received data can be displayed on the PC in the hospitals. The black box with the basic features of the data recorder which could be very useful for domestic vehicles and at the same time it also host several additional features that could assist in mitigating the number of accidents and also will serve as an analysis tool to prevent future accidents by analyzing the previous accidents. The black box also host several other features of advanced web tracking anytime and from anywhere.

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a. BLOCK DIAGRAM OF PROPOSED SYSTEM:

The general block diagram of the proposed system consist of two sections:

1. TRANSMITTER SECTION (Vehicles):

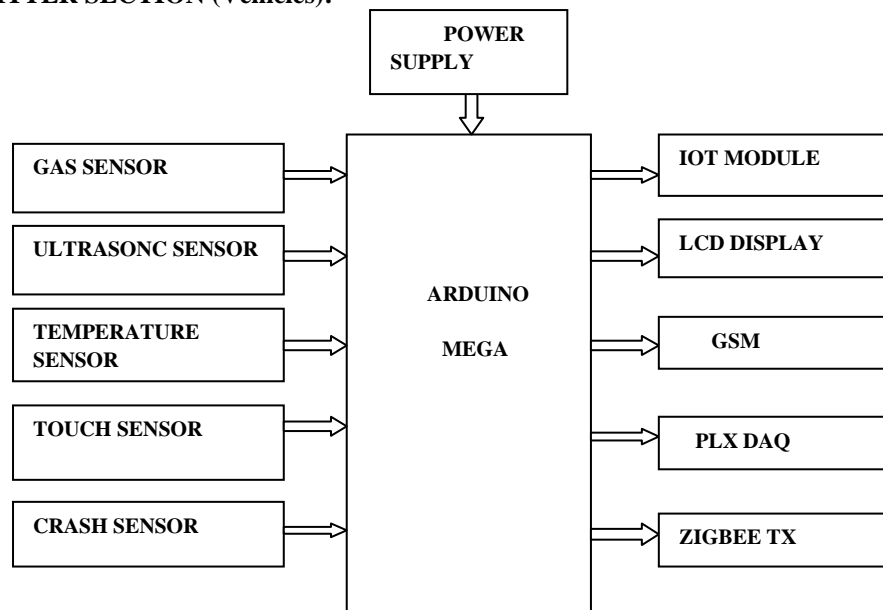


Fig. Block Diagram of Transmitter Section

2. RECEIVER SECTION (HOSPITAL):

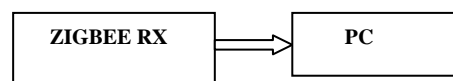


Fig. Block Diagram of Receiver Section

b. 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. The data keep on reading from the vehicle using the sensors mentioned above and only the detection of crash sensor triggers to store all the data read by sensor store to PLX DAQ. The GSM module we use here to inform respective person and public service organization. ZIGBEE is used to share the information of the accident vehicle to the nearby hospitals. All the data are updated to cloud so that the system operation is either controlled or monitored using IOT.

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c. STEPS FOR DESIGNING THE EMBEDDED SYSTEM:

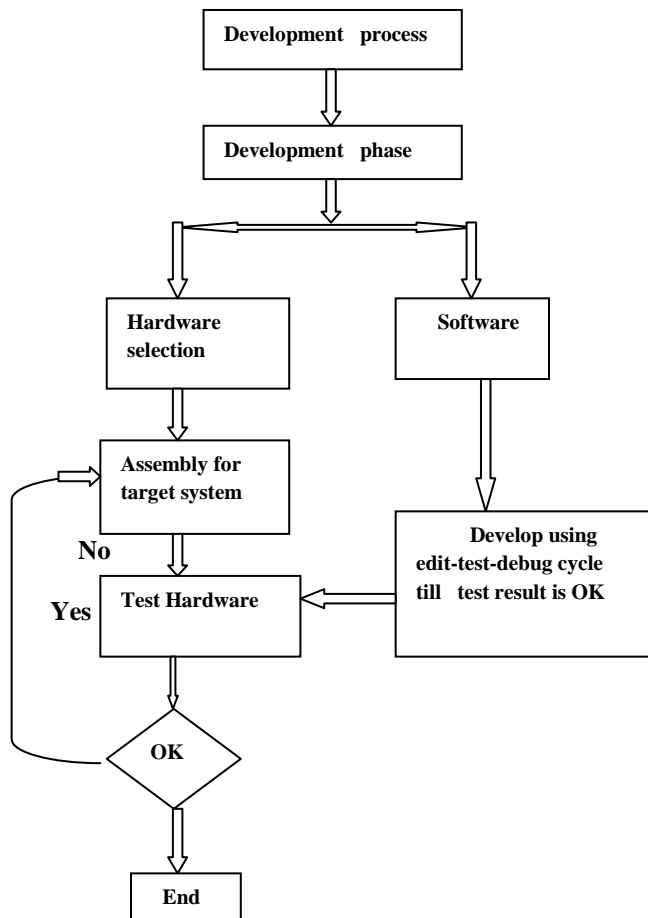


Fig. Flow diagram to assemble the target

Embedded System is a system composed of hardware, application software and real time operating system. It can be small independent system or large combinational system. Our Embedded System tutorial includes all topics of Embedded System such as characteristics, designing, processors, microcontrollers, tools, addressing modes, assembly language, interrupts, embedded c programming, led blinking, serial communication, lcd programming, keyboard programming, project implementation etc.

IV. CONCLUSION

In recent days, because of increased population the usage of automobiles became higher. So the accidents in the roadways lead to ultimate disaster to the public as well as the government. This black box system provides the message to intimate to the nearby traffic control, ambulance, etc. In crowd area it is possible to intimate or call the ambulance. But in un-crowded area it is not easy to pass the accident location. This paper provides the automatic message intimation to proper location. Also provides the investigation data of accidents in the zone by using the data recorder of PLXDAQ module. The proposed system provides a smart solution to the accidental zone, where it happens in the un-crowded area and also useful for the investigation purpose.



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