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Research Paper

Internet of Things based Accident Prevention and Detection System

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Abstract

Recent growth in technology makes our life faster and easier. This development in technologies leads to enhance the traffic hazards. In this paper, Internet of Things based accident prevention and detection system is proposed to deduce accidents and save human life. The vehicle performance has been continuously monitored for safety purposes. This technique is annoying to maintain speed balance to avoid accident and provide safety to the driver. Hence, a novel approach is proposed to avoid accidents and save the victims while accidents occur. Sensors are exploited to give alarm 'ON' when distance between two vehicles is too short. If accident happens, then the camera is automatically turned on and captures the images around 180 degree angles. This emergency alert information including the location is transferred to nearest police station, ambulance service and relatives through GSM modem. The major component of the project includes a Arduino, motion sensor, touch sensors, relay and GSM modem.

1. Introduction

In this current scenario, the usage of automobile increase with corresponding raise in population. Accordingly, the accident happens have also be increased due to distinct reasons. Among that, human mistakes while driving has become a crucial factor. There has been an increase of 32.4% in the total number of death rate caused by road accidents during the year 2016-2017. In addition, 20-50 million people were injured and disabled. This percentage has made an attention of many researchers to curb the accident growing rate [1,2]. It is found that, 90% of the times the accident happen is due to the fault of the driver. In this paper, a new method of obstacle detection system based on Ultra sonic sensor and Bump sensor is proposed. These sensors can detect nearby obstacles and give alert information to driver to reduce the speed of the vehicle if the obstacles are present mere closer.

2. Proposed work

This paper proposed a new device to avoid vehicles clash [3,4]. This device can monitor the vehicle in all directions and the information regarding the distance between the vehicles is given to driver for every second through LCD interface which is placed besides the steering of vehicle. This mechanism gives an alert to the driver, to invoke an automatic brake. When two vehicle come closer, then alarm in car is started sound and LCD display shows distance between vehicles. Alarm helps to alert driver without sleeping and calculation of distance help to predict probability of clashing.

If any accident happens, then touch sensor is activated which generate and send a message to nearest location Ambulance, Police station, Relatives, Blood bank with location. During accident time, external camera is also activated automatically which takes images around 3600 which will be helpful to identify the vehicle that makes an accident.

The proposed system consists of the main components such as Arduino, LCD interface, Camera, GPRS, Ultra Sonic sensor (US), Bump sensor (BS) and Buzzer. Fig.1 represents the proposed plan of the work and Fig.2 depicts the connections between the conponents.

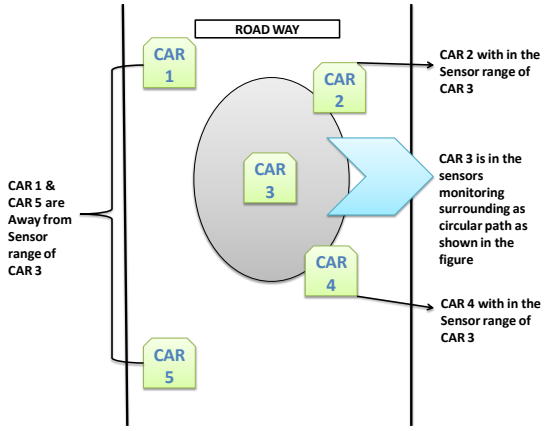


Fig.1 Proposed Architecture

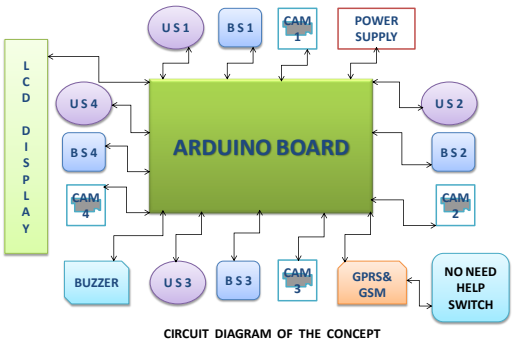


Fig.2 Circuit diagram of the proposed Approach

Module Descrpiton

Components are connected to Arduino board as per the circuit diagram [5,6]. The external devices such as mobile, GSM modules are connected to the board. Coding is executed in Arduino board with Embeded C.

Hard ware implementaion:

ARDUINO:

Arduino is open source computer hardware. This plays a vital role in design and manufactures of single board microcontrollers. This device can sense interactive objects that can sense and control objects in the physical world.

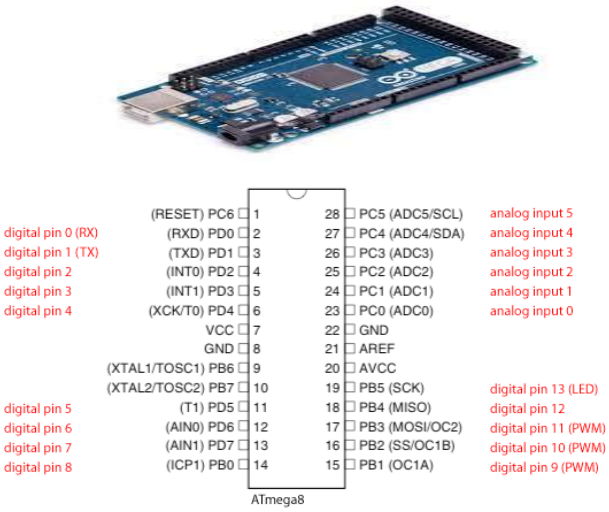
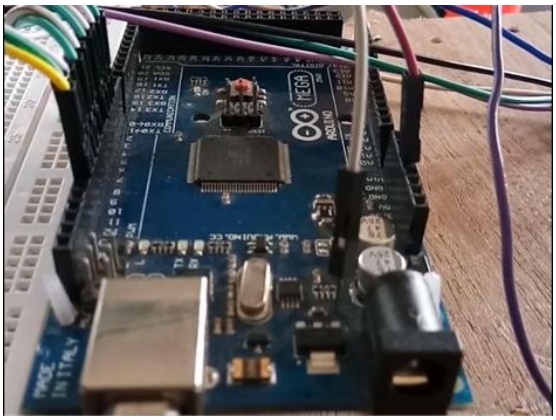


Fig.3. (a) Arduino board (b) Pin diagram

Circuit Diagram

Fig.4 represents the components such as bump sensor, ultrasonic sensor, connected to Arduino board.



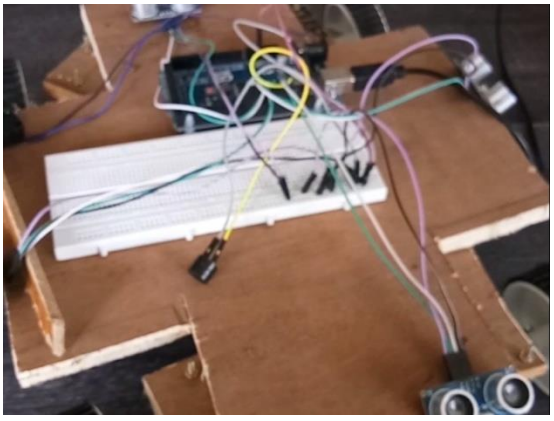


Fig.4 Circuit diagram of the proposed Technique

The program is executed in Embeded C language. Sample program module is given below.

```
// char array of the telephone number to send SMS
// change the number 1-212-555-1212 to a number
// you have access to
char remoteNumber[20] = "9000915617";

// char array of the message
char txtMsg[200] = "YOUR VECHILE MET WITH AN ACCIDENT";
LiquidCrystal lcd(1, 2, 4, 5, 6, 7); // Creates an LCD object. Parameters: (rs, enable, d4, d5, d6, d7)
To calculate distance
long distanceRightCm, distanceLeftCm, distanceFrontCm, distanceBackCm, RightSensor, BackSensor, FrontSensor, LeftSensor;
void setup() {
  Serial.begin (9600);
  pinMode(buzzer, OUTPUT);
  pinMode(trigPin1, OUTPUT);
  pinMode(echoPin1, INPUT);
…
}
```

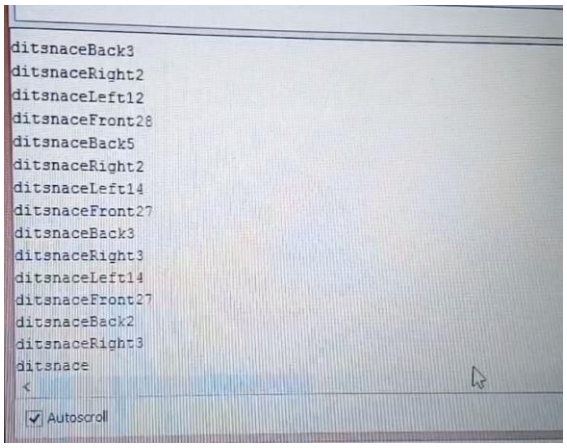


Fig.5 Screen shot represents distance between vehicles in cm

Advantages of Proposed technique :

- It reduce the maximum accident rate
- It help to find the location of accident
- It capture the images at the time of accident
- It help to convey the message to particular representatives
- It make our journey safe

3. Conclusion:

The intention of this proposed approach is to minimize the number of accidence happen per year. The aim of this project is to save human life. This methodology uses Ultrasonic sensor and Bump sensor to provide distance alert the driver to avoid accident and sending GPRS location and accident message these are the outcomes of the this project. It also used to monitor the over speed of a vehicle in restriction area.

Reference:

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