A Novel Method For Prevention Of Accidents At High Alert Zones

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ABSTRACT:

This project discusses about developing a novel safety system to prevent accidents especially in high alert zones like Schools, Colleges and Hospitals using Received Signal Strength Indicator(RSSI). Power level is measured using RSSI by making use of a RF client device as receiving from an access point or router. Most wireless devices have capability of measuring received signal strength .There is router fixed at school which has open Wi-Fi that emits RF signals. The project devices consist of an Arduino UNO module, LCD, APR voice and speaker and a Wi-Fi module which is attached to the vehicle being driven. Whenever a vehicle is driven nearer to high alert zones, the speaker attached in the vehicle indicates an alert to the user to reduce the speed of the driving vehicle in case if it is driven beyond the set speed. If the user does not reduce the speed, the module attached to the vehicle automatically controls the speed to the set speed thereby ensuring the safety of the driver and the people around. The vehicle can then be normally driven at any speed after crossing the area. Thereby the precious lives can be saved by controlling the speed automatically.

KEYWORDS: RSSI, RF, accidents, APR voice and speaker.

I. INTRODUCTION

Every year, around 1.5 lakh people are killed in five lakh accidents that take place across the country .Two wheelers account for 25% of total road crash deaths. 20 children under the age of 14 die every day due to road crashes in the country.India ranks 1st in the numberof road accident deaths across the 199 countries reported in the World Road Statistics. Engineering is the most successful injury prevention approach. It provides automatic protection by product or environment design changes.The major factor contributing to the increased number of road accidents is speeding. This has resulted in 41% of the total deaths. Some other factors are drunk driving, not following rules and regulations on the road, crossing the speed limit etc.There have been various technology developed over this issue to prevent the accident by predicting

the vehicle distance in the highways using GPSetc., but there was no control action over it. The proposed system is designed in such a way that it can monitor the vehicle speed and automatically controlled through wireless technology. Existing system deals with detection of accidents [1] using GPS module and GSM technology. The main drawback in this is that it can only provide an alert to the driver and the location of accident spot can be identified but it cannot give any other control measures in avoiding accidents. Similar existing system [2] implements a system to reduce traffic violations. It counts the violation made by the vehicle that leads to increase in penalty amount which effects in reduction of violations by the vehicle user. The drawback encountered in this system is that it can make the driver to be cautious of traffic violations but there is lack of control measure to reduce the speed of the vehicle when beyond the speed limit. But we can extract the use of Zigbee transmitter which helps to achieve wireless transmission in accident prevention system. In the system [3] there involves the use of radio frequency sensors to reduce the speed in two wheelers. The limitation encountered is the speed of the vehicle is limited by electrical circuits .If the circuit gets damaged, it cannot control the speed of the vehicle hence ensures there is a lack of reliability.

II. PROPOSED SET UP

The architecture of smart prevention system for accident can be represented with the help of a block diagram as shown in Fig.1.
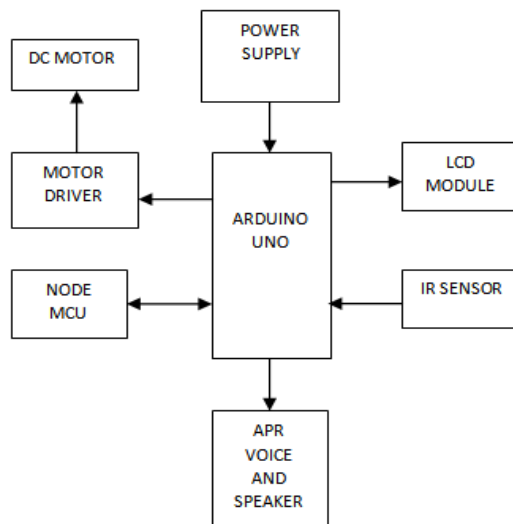

Fig 1. Block Diagram of the set up

Figure 1 illustrates the block diagram of the proposed set up. It consists of a arduino controller with node MCU. Depending upon the inputs obtained from the sensor from the high alert zones, the speed of the driving machine is controlled with the help of

driver associated with it. The specifications of hardware and software requirements are illustrated in the subsequent sections.

II.A HARDWARE SPECIFICATIONS

ARDUINO UNO:

Arduino Uno is a microcontroller board based on the ATmega328P. It is equipped with digital input/output pins ,6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. Arduino is an prototyping platform used for building electronics projects. It consists of both a physical programmable circuit board and a software, or IDE (Integrated Development Environment) that runs on computer, where one can write and upload the computer code to the physical board.
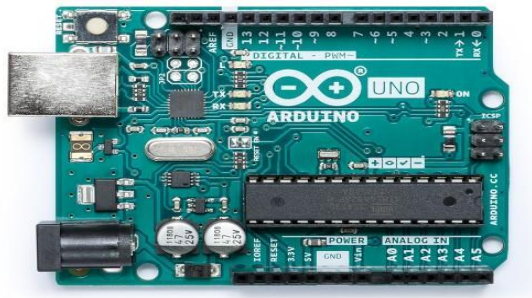

Fig 2. Picture of Arduini uno controller

LIQUID CRYSTAL DISPLAY:

An LCD is an electronic display module which uses liquid crystal to produce a visible image. In this LCD each character is displayed in a 5×7 pixel matrix. It is used to display the control action to be carried out and the vehicle speed.

Fig 3. Snapshot of LCD display

NODEMCU:

NodeMCU is an open-source firmware and development kit that helps you to prototype or build IoT product. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. It acts as a Wi-Fi module.

Fig 4. Snapshot of NodeMCU

APR VOICE AND SPEAKER MODULE:
Audio playback board using APR33A3 IC for 8 channels of recording. Features: Total 11 minutes of recording time each channel(M0 to M7) having 1.3 minutes of recording time. Single chip, high quality voice recording and playback solution.

Fig 5. Snapshot of Voice and speaker Module

MOTOR DRIVER IC:
Common DC gear head motors need current above 250mA. There are many integrated circuits like ATmega16 Microcontroller, 555 timers IC. But, IC 74 series cannot supply this amount of current. When the motor is directly connected to the o/p of the above ICs

then, they might damage. To overcome this problem, a motor control circuit is required, which can act as a bridge between the above motors and integrated circuits. There are various ways of making H-bridge motor control circuit such as using transistor, relays and using L293D/L298.
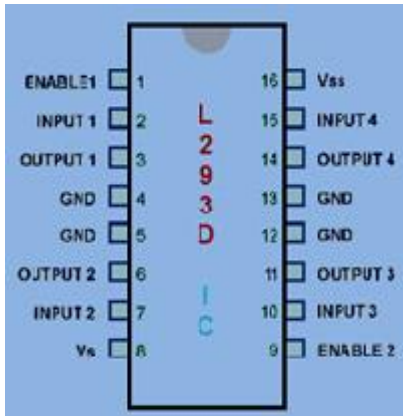

Fig 6 Snapshot of Motordriver IC

DC MOTOR:
A DC motor is an electric motor that runs on direct current power. In any electric motor, operation is dependent upon simple electromagnetism.

Fig 7 Snapshot of a DC motor

ARDUINO SOFTWARE (IDE):
It connects to the Arduino and hardware to upload programs and communicate with them. Embedded C program has been used to implement this system.

IR SENSOR:
The IR sensor module consists of IR Transmitter and Receiver in a single pair that can work as a Digital Tachometer for speed measurement of any rotating object.
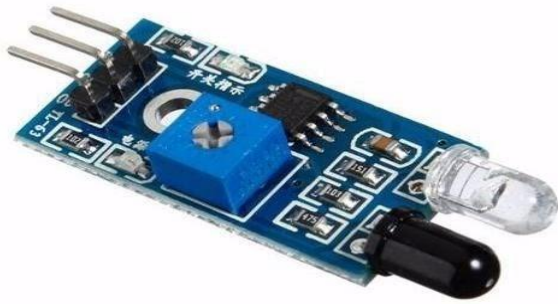
Fig 8 Snapshot of IR sensor

III.WORKING OF THE PROPOSED SYSTEM

In this system, the Arduino microcontroller acts as brain of our system, hence entire system program instructions are stored in it. In real time application, the working will be there is a router been fixed at a school that emits RF signals. A kit that is been fixed at vehicle contains Arduino, APR voice and speaker, Wi-Fi module and an IR sensor which acts as a receiver section .Whenever the vehicle is approaching the accident prone zones ,the frequency of the router gets paired with the receiver section connected with the vehicle then it automatically reduces the speed of vehicle .Instead of vehicle, the system uses the DC Motor and a driver circuit which controls the motor as this is a prototype of real time system. The speed of the vehicle reduced is shown in the IR sensor periodically.
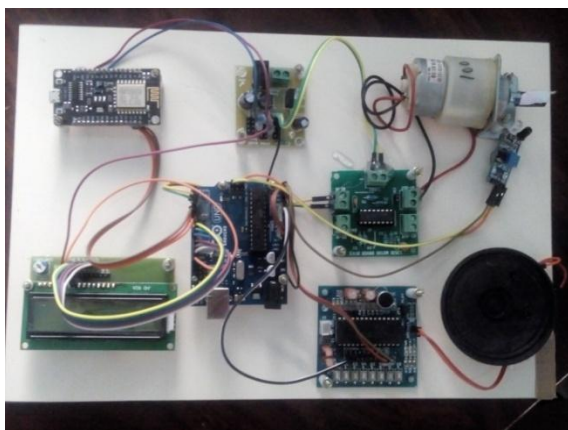

Fig 9. Hardware module

IV.RESULTS:

Whenever the vehicle enters into accident prone areas ,then the below proposed system will automatically controls the speed of vehicle and gives an alert through speaker and the status is shown in LCD periodically.
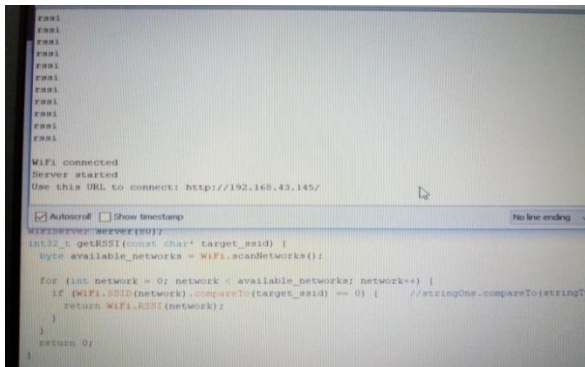
FIGURE 10: Connection of Wi-Fi

Fig 11: Indication of speed of DC motor when vehicle is far away from school zone

Fig 12: Indication of speed of DC motor when vehicle is closer to school zone

III.CONCLUSION:

Our RSSI based accident prevention system not only provides an alert to the person who drives the vehicle but also prevents them from accidents and save other human lives also. Automatic control of vehicle speeding is achieved by implementing this system in real time.

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