Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 4, 2021, Pages. 9698 - 9704

Received 05 March 2021; Accepted 01 April 2021.

Design of a Road Side Safety Management Unit via Iot

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ABSTRACT
The amount of traffic in big cities has skyrocketed. Because of the increased population and the increased use of cars, it has become very difficult for emergency services such as ambulances to get through in emergency situations. The sensor is used to identify an accident and verify the crossing of a traffic line. Then, to monitor the ambulance, we suggested using a WIFI module. Traffic signals are modified and monitored for the ambulance to travel through traffic using these modules, which are accessible through the ESP8266 MCU.

Keywords: Arduino UNO, Vibration Sensor, Ultrasonic Sensor, RFID Module, IOT Module, Buzzer.

1. INTRODUCTION

In today's area, traffic is a big concern [1, 3, 7]. Owing to traffic congestion in the area, ambulances must sometimes come to a stop [2, 4]. Furthermore, since the traffic ahead of it is delayed, the traffic signal prohibits the ambulance from entering. This is a huge problem for the Ambulance Service because every second matters when itcomes to the patient's well-being [5, 6]. The ambulance can be monitored in real time because it is automatic [9]. We suggest a roadside device that tracks traffic collisions automatically by using several detection mechanisms. If an accident or incident occurs, the planned roadside unit is modeled to monitor traffic signals in order to stop traffic jams [8, 11, 12]. Increased traffic makes it difficult for rescue services to evacuate people in emergency situations. Traffic management in cities has been a major problem as a result of rapid urbanization and population growth. The proposed solution would enable drivers in emergency situations to drive across traffic junctions without stopping, allowing them to arrive at their destination on time[13, 15]. This poses a serious threat to the ambulance because any second is critical to the patient's life. Turning the light green is one of the most efficient methods to clear the traffic ahead of the ambulance [17].

2. EXISTING SYSTEM

They are using a traffic system that is incapable of controlling traffic, despite the fact that traffic is a major problem in our country, especially in urban areas.

- The product of this traffic chaos is a slew of issues.
- They are using programmes that do not understand ambulance vehicles.
- Because of highway congestion, emergency vehicles such as ambulances, fire trucks, and patrol officers
  have difficult time reaching their destinations, resulting in the loss of human lives.

3. METHODOLOGY

Ambulance Identification at First:
The tag that is put in the ambulance sends a signal to the reader, who then sends a signal to the traffic controller.The colour
of the signal will be changed from red to green.
To determine where the accident occurred:
If there is a sudden tragedy, there will be a traffic jam, and the call, along with the location, will be transmitted to the closest traffic dispatcher where the accident happened to monitor it.
Identifying traffic line crossings:
As a traffic line passes, the ultrasonic sensor activates the buzzer and displays the information on the LCD.
In addition, if no one is present during the traffic congestion, a note with the position can be sent to the traffic

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controller.

3.1. Block Diagram

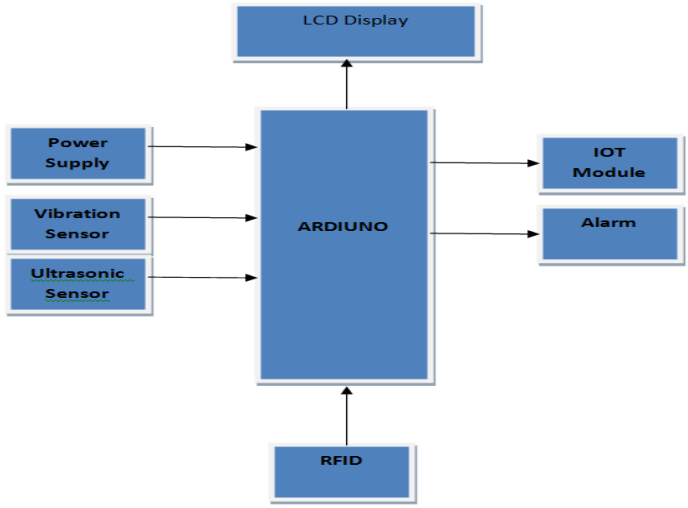

Fig.1 Block Diagram

4. HARDWARE PARTS FOR THE PROPOSED FRAMEWORK

- Arduino UNO
- Vibration sensor
- Ultrasonic sensor
- Wifi module
- Buzzer
- RFID Reader

4.1. ARDUINO UNO

The Arduino Uno is an8-bit microcontroller. It includes a crystal oscillator, serial connectivity, a voltage regulator, and so on, in addition to the ATmega328P.

Arduino was developed at the Ivrea Interaction Design Institute as a basic platform for quick prototyping targeted at students with little previous experience with electronics or programming.

Fig.2 Arduino UNO

4.2. VIBRATION SENSOR

In the idle state, the vibration sensor has two electrical contacts that do not touch each other. The contacts of the sensor close and touch each other when movement or vibration occurs. The sensor's contacts return to their original locations, away from each other, when the movement or vibration ceases. The circuit connected to it is triggered by the closed contacts during vibration.

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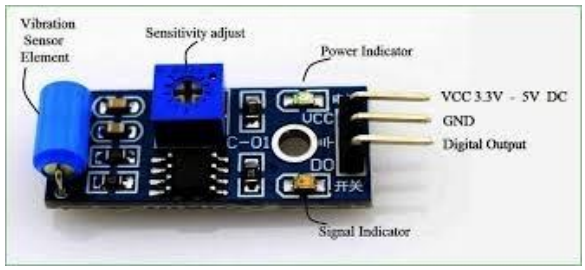

Fig.3 Vibration Sensor

4.3. ULTRASONIC SENSOR

The ultrasonic transmitter produced an ultrasonic wave in one direction and started timing when it was launched. When it came into contact with an obstacle, ultrasonic scattered into the air and returned rapidly. The ultrasonic detector can eventually stop timing as it receives the reflected signal. The distance between the sensor and the target object is calculated.

Fig.4 Ultrasonic Sensor

4.4. WIFI MODULE

Since the ESP8266 modem is a SoC with an integrated TCP/IP way of life stack, receiving internet records via ESP8266 modem when interfaced with a microcontroller or PC is much less difficult than using a separate Ethernet module. AT firmware comes with an easy-to-use bearing package that allows it to be orchestrated or laboured at a number of Baud Rates (Supported 9600, 115200 or 57600). Simple text can also be sent via modem by interfacing just three warning signs of the modem's subsequent interface with the microcontroller (TxD, RxD and GND). The RTS and CTS symptoms of the ESP Modem's successive port interfaces are linked in this configuration. The transmit banner of a microcontroller's successive port is connected to the ESP Modem's sequential interface get sign (RxD), while the get banner of a microcontroller's successive port is linked to the ESP Modem's successive interface transmit hail (TxD).

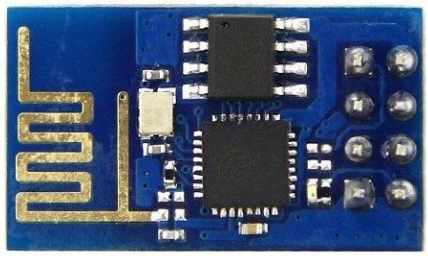

Fig.5 Wi-fi Module

4.5. BUZZER

A buzzer is an audio signaling device that can be mechanical, electromechanical, electrical, electromagnetic, electro-acoustic, or piezoelectric. An oscillating electronic circuit or another audio signal source may power a Piezo electric buzzer. A button being pressed can be indicated by a key, beep, or ring. A buzzer receives an input and responds by emitting a signal. They can make the sound with a variety of methods, including metal clappers and electromechanical devices.

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Fig.6 Buzzer

4.6. RFID READER

A scanning antenna, an RFID reader, and an RFID tag that includes traffic signal information make up the RFID device. Electromagnetic (EM) energy activates the tag in the traffic signal to transmit data through radio waves as it comes within range of a scanning antenna. The antenna in the RFID reader picks up the radio waves generated by the tags and sends them to the reader, which decrypts the waves into details that the microprocessor in the device can understand. As long as the RFID reader can read the RFID tag, the ambulance is believed to be close to the signal [10, 14]. The ambulance moves away from the RFID range after crossing the signal and gradually loses the radio waves emitted by the tag. If the RFID connection is lost, the ambulance is believed to have crossed the signal, and the signal status is reset to normal from emergency [16, 18, 19].

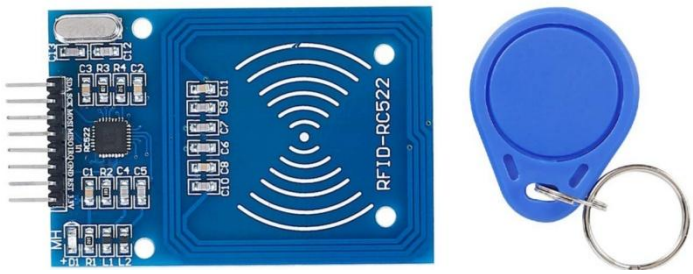

Fig.7 RFID

4.7. HARDWARE SETUP

The components in the hardware setup require DC Supply. Buzzer requires 12V DC supply whereas other components require only 5V DC Supply.

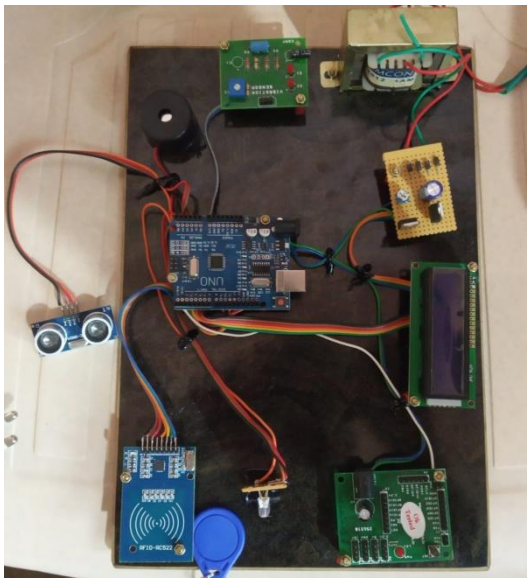

Fig.8 Hardware

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ADVANTAGES

- Cost-efficiency
- Ambulance tracking in real time.
- It helps in reducing number of certain types of traffic jams.
- Simple and reliable Design.

5. RESULTS AND DISCUSSION

By using vibration sensor we can be able to detect the accident and with the help of IoT. It can able to send a message to the concerned person along with the location and those values get uploaded in the web server.

Fig.9 Detection of an accident using IoT

By Using ultrasonic sensor we can be able to monitor the crossing of line in the traffic signal.The is done to create awareness not to cross the line in the traffic signal. With the help of IoT we can able to send a message to concerned person along with the location and those values get uploaded in the web server.

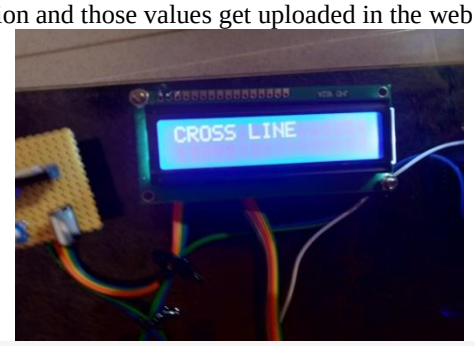

Fig. 10Detectingthe crossing the traffic signal

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With the help of RFID we can be able to able to change the traffic signal. The tag which is called as transmitter will be placed in the ambulance and the receiver will be there a few distances away from the traffic signal. The transmitter sends the signal to the receiver after the signal is received by receiver end and it initiates the Arduino to change the signal from red to green. A message with location will be received by the concerned person.

Fig. 11Changingthe traffic signal using RFID

The values of vibration and ultrasonic sensors get updated in the server and the details are given below.

Table 1. The values of vibration and ultrasonic sensors

Vibration sensor	Ultrasonic sensor
723	48
154	25
154	25
723	28

6. CONCLUSIONS

People should be mindful of their surroundings and take safety precautions because human life is highly valuable.In India's current traffic management scheme, traffic signals have fixed timers for switching traffic between directions, and there are no specific improvements in traffic signals for emergency vehicles.One of the most critical services that is often delayed due to traffic is ambulance service.The traffic lights in the ambulance's route are automatically changed by the system.This will save more lives because the ambulance will be able to arrive on time.This would make it easier for paramedics to save lives.In addition, we have created two other systems. In addition, we have created two other systems. The first is that if an accident occurs, a message will be sent to the concerned people via IOT and the second is that it will get notified if any person crosses the traffic signal line.

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