International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 05 Issue: 09 | Sept - 2021 ISSN: 2582-3930

Arduino based Accident Prevention Device

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1) **Abstract - Mountain accidents are one of the world's major public health and injury prevention problems. According to WHO approximately 1.3 million people die each year as a result of road traffic crashes. the m**otivation behind this work is to make an Arduino-based embedded system that makes the passenger's journey safer and more secure. This paper handles the road discipline such as Warnings of the vehicle or any other thing on the other side of the U pin and serpentine bends. The features included in the paper are Vehicle alert systems in mountains and dangerous terrains.

Keywords- Road Safety, an Arduino Embedded System, Vehicle Detection.

Introduction

Mountain u-pin bends crashes are one of the world's largest public health and injury prevention problems. According to the World Health Organisation, more people die on roads in India than anywhere in the world. At least 13 people die every hour in road accidents in our country; the latest report of the National Crime Records Bureau reveals In 2007 1.14 lakh people in India lost their lives [2]. improper road infrastructure, failure to follow the speed limits, an increase in drinking and driving habits, Lack of Visibility, the tendency of not knowing about the vehicles coming from the other side of the road in mountains are among the major factors contributing to deaths from road crashes,

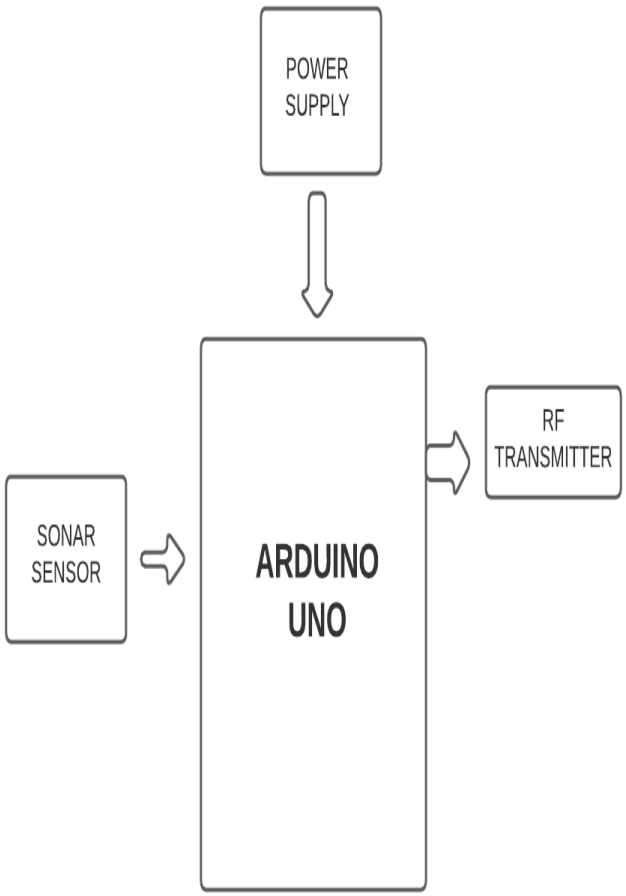
Currently, most of the u-pin bends in the mountainous regions of India do not have any safety system to alert the people about the vehicles coming from the other side of the turn. While some of the turns have cones mirrors installed but due to extreme weather conditions and lack of visibility in such scenarios they cannot be trusted with the life of the passengers.

The motivation behind the project is an attempt to make an embedded system to bring a positive difference in the field of road safety. The project tackles some major causes of the road accidents such as lack of visibility and the inability to identify the vehicles intern causing disastrous accidents.

This paper presents making riders alert about the vehicles ahead by a buzzer and flashing of the led light.

System Architecture

TRANSMITTER



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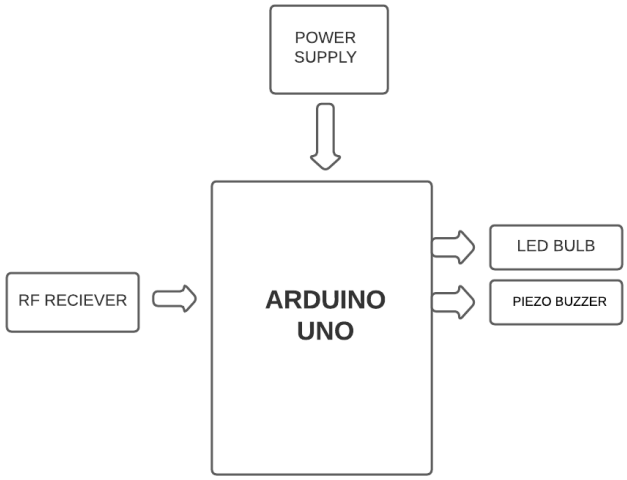
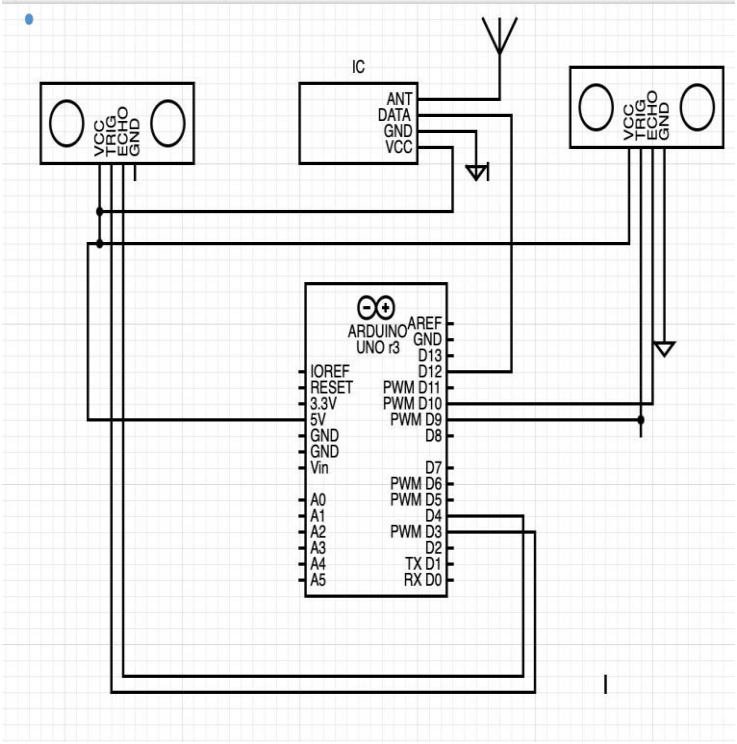


BLOCK DIAGRAM

In this work, the modules used are- Transmitter



module, Receiver module, Sonar ultrasonic sensor, Arduino Uno, 5v Buzzer, 3v Led light.

1 *RF TX/RX Module:* The transmitter/receiver (TX/RX) pair operates at a frequency of 433 MHz. The transmission occurs at the rate of 1Kbps - 10Kbps. The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter.

2. Ultrasonic sonar sensor HC-SR04 - The ultrasonic sensor works on the principle of SONAR and RADAR system which is used to determine the distance to an object. An ultrasonic sensor generates high-frequency sound (ultrasound) waves. When this ultrasound hits the object, it reflects as echo which is sensed by the receiver[3]

3. Piezo buzzer - A "piezo buzzer" is a tiny speaker that is connected directly to an Arduino."Piezoelectricity" is an effect where certain crystals will change shape when you apply electricity to them. By applying an electric signal at the right frequency, the crystal can make a sound.[4]

Design Details

This model consists of two modules - Transmitter and Receiver Section. The receiver module will be placed on the car and the Transmitter module can be fitted on a signboard on the U-Pin BEND. Following are the circuit diagram details:

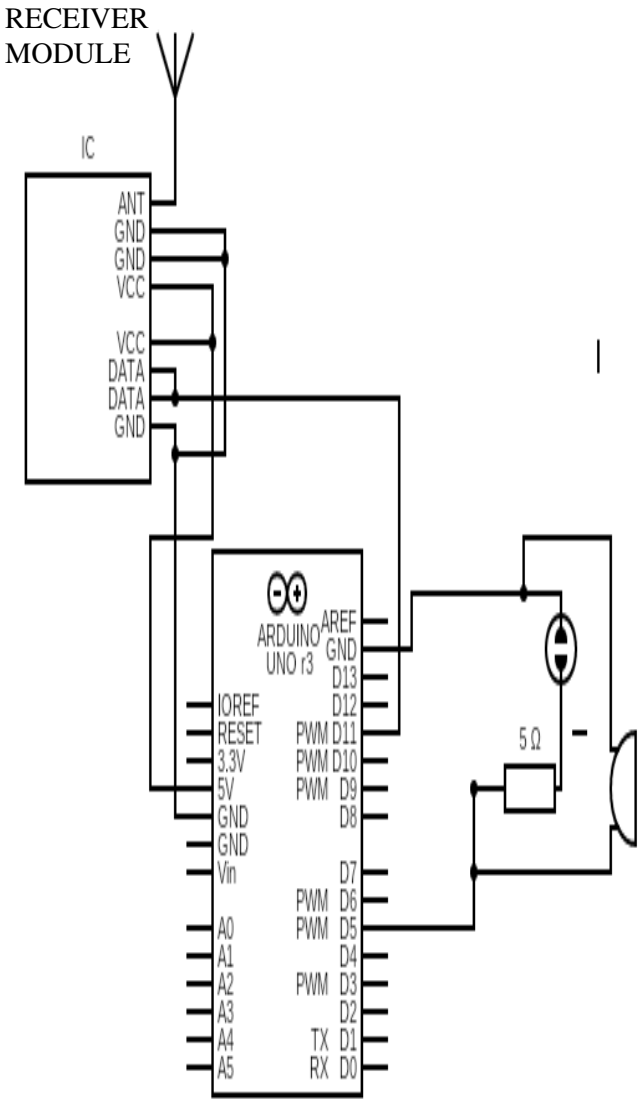
To transmit the information, RX TX module is needed.

In this circuit, 433 MegaHertz frequency transmitters are being used. Parameters: ASK modulation and transmission range is 100-300 square feet (10-15 feet). There are 4 pins:

1. Antenna: there is a built-in helical antenna.
2. Data Pin - to receive Data for transmission
3. Ground pin - Connected to the ground
4. VCC - 3 Volts Power Supply

Receiver Module :

The receiver has 32 KB (with 0.5 KB used for the boot loader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library). The Arduino Uno has several facilities for communicating with a computer, another Arduino, or other microcontrollers[10]. The receiver



provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). To receive the data from the roadside transmitter, RF Receiver is needed. RX will have 4 pins same as that of the Transmitter.

ARDUINO SOFTWARE

THE UNO board can be programmed with Arduino software.
which allows you to upload new code without the use of an external hardware programmer. The Arduino Software (IDE) uses this capability to allow you to upload code by simply pressing the upload button in the Arduino environment. In addition to
The library was used to program the ultrasonic sonar sensor for receiving the data

RESULTS

A. *Environment:* A case is used with the transmitter circuit placed in it and the transmitter with a range of 10 feet for implementing various features of the project.

B. Placement of Receiver - The receiver would be powered through the charging port in the car and in the area where the buzzer is audible to the driver

C. Highly cost-effective product made with a shoestring budget. This device doesn't add any extra dollars to the car cost.

CONSTRAINTS

A. Extreme weather conditions affect RF Reception:

Rain fade refers primarily to the absorption of a microwave radio frequency (RF) signal by atmospheric rain, snow, or ice, and losses which are especially prevalent at frequencies above 11 GHz. It also refers to the degradation of a signal caused by the electromagnetic interference of the leading edge of a storm front [5].

Rain fade usually does not last long. Once a heavy shower or squall has passed, normal communications return. However, during tropical storms or severe winter storms at northern latitudes, fadeouts can persist for hours at a time

B. Reliance on an ultrasonic sensor - As it cannot tell about the type of vehicle or thing approaching there are chances of false alarm

CONCLUSION

Since the vulnerability of the accidents in the mountains where the sole technique of detection of vehicle relies upon guesswork <Project name.>
Would bring a humongous change in the life of people as they are vulnerable to accidents that could cost them their lives. The price of each device is less than RS 500 which can be afforded by most people which makes <project name> more accessible.

FUTURE SCOPE

Using AI-based tracking of objects the vehicles can be specifically told about the thing approaching rather which would minimize the chances of false alarms

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[5]https://www.arduino.cc/en/Guide