ALERTING SYSTEM IN GHATS SECTION

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Abstract : In the developing countries accident is the major cause of death. "Speed Kills", but still people don't care enough to act safe while driving on road. Road traffic accidents and deaths caused by them are most critical issues now days. It is also impacting the country's economy. According to Million Death Study (MDS) about 2.3 million people die in India per year. In that 137 thousand is because of road accidents. That is about 377 people per day. In that 3.7% because of failed to look the road. We can see that all of them are curve roads and cross junctions in railway tracks. In the mountain roads there will be tight curves and the roads will be narrow. In these kinds of situations the driver of a vehicle cannot see vehicles and animals coming from opposite side on the roads and tracks. Thousands of people and animals lose their lives each year because of this problem. Since we are talking about mountain roads here other side might lead to a cliff and heavy cross junction in railway tracks. The solution for this problem is alerting the driver about the vehicles and animals coming from opposite side IN Ghats sections. This is done by keeping an ULTRASONIC SENSOR on one side of the road before the curve and keeping a LED light after the curve, so that if a vehicle comes from one end of the curve, sensor senses and LED light glows at the opposite side. By looking at the LED light on/off criteria driver can be alert and can slow down the speed of the vehicle.

IndexTerms **- Alerting system, Ultrasonic Sensor, Internet of things, LED, Buzzer.**

I. INTRODUCTION

The present technology Internet of things (IoT) has brought fine changes into every portion of our life by making it smart. There are many situations in which technologies can be used to avoid accidents in roads which opens a wide window for the requirement of Smart Road System. With the dynamic changes in the models of the vehicles the roads need to have same ability to face them. Today's roads have become stagnant paths which have no ability for assistance. Evolving towards the future, the road needs to build with advanced sensors and antenna systems to provide a pace with the new era. The design involves the road side units as part of sensor system involving IoT.

Ghats's roads

Ghats Roads are access routes into the mountainous with number of hairpin bends; which is very risky as compare to normal routes. So chances of accidents in Ghats section is more because of narrow road width, sharp bends, improper camber, and valley side etc

Road Accident in Ghats section

While driving on roads at Ghats section many drivers faces accident which results them into serious injuries or even death the main reason behind this accident is curves and bends of roads while turning in Ghats. It becomes difficult to see vehicles coming from other lane and turning drivers usually have to assume a way for turning at such critical section this creates a great risk of life other reason for accident in Ghats section is that only one vehicle can turn at turnings at a time. If two vehicles come face to face while turning it creates a chance of accidents and it becomes difficult to handle.

II. EXISTING METHODOLOGY

Currently, the following methods are being incorporated to negotiate a hairpin bend on a Hilly track, Ghats or any other kind of zero visibility turns.

A. Vehicle Horn

This is one of the traditional ways to negotiate a hairpin bend. The drivers on both sides judge the distance of one another based on the intensities of sound from their respective horns and also in the rainy seasons horn will not be heard. Some people will not use horn itself. This method although being the simplest poses to be highly inefficient also causing a lot of confusion between the drivers.

B. Headlights

Flashing headlights during the night works similar to the vehicle horn making it yet another inefficient method. Also this method is completely ineffective in day light conditions.

C. Convex Mirrors

This setup is most widely used nowadays to give a glimpse of any vehicle approaching the hairpin bend from the opposite end. But, these have their shortcomings such as the mirror needs to be kept clean at all times which is difficult in hilly areas as its always cold and misty, thereby reducing its visibility. Also the time taken for the driver to view the mirror and react is high resulting in a poor judgment in return resulting in a mishap and this method has many side effects such as reflection of sun rays which can distract the driver's attention. At night due to insufficient light it does not create an image in the mirror of the opposite road. It also becomes more complicated to set the mirror at a given angle so that the vehicles at the opposite side of the road will be reflected and image can be seen in the mirror. Setting the mirror at a given angle also has a demerit, such as the headlight of the vehicle at opposite side of the road will fall on the mirror and will be reflected towards the vehicle on the either side. Also during the rainy season due to the presence of water and moist in the mirror it doesn't allows the observer to see the reflected image of the vehicles in that mirror.

D. C.C.T.V and L.C.D screen("Advance Road Safety For Ghats Road's At Hairpin Bend")

The technique consists of two CCTV cameras and two LCD screen which displays the live scene captured from the CCTV. The initial cost price camera is high moreover the installations of CCTV camera may also increase the initial expenditure depending

upon the complexity of the CCTV camera system .The CCTV camera system is that they can only monitor limited area and CCTV camera might not catch all activity due its positions.

Proposed system:

We plan to overcome this problem by placing a sensor on the side of the roads and alerting the driver about the obstacle or vehicle in Ghats section. At that time light will glow at the other side of the curve. In the absence of the vehicle or object the signal will not be received by the sensor and the light will not glow. As soon as the light glows driver can slow down his vehicle and he could even stop it if it's necessary.

III. LITERATURE SURVEY

1. The paper titled "Sensor based accident prevention system and diminishing road accidents on sharp curves using Arduino (Ranga Sreedhar Galla, et.al., November 2017)" is proposed a system to decrease the number of accidents in curve roads. This was done by alerting the driver by means of LED light which glows when vehicle comes from the other side of the curve. The vehicle is detected by the help of Ultrasonic sensor which was interfaced to the microcontroller Arduino UNO. However sensor based light system is implemented using wire which is difficult to maintain. In this paper they used Arduino and wired technology.
2. The paper titled "advance road safety for Ghats road's at hairpin bend(Harshada Targe et.al., Jan-2018)" is proposed a technique consisting of two CCTV cameras and two LCD screens which displays the live scene captured from the CCTV. But this system is the initial cost price of camera is high moreover the installations of CCTV camera may also increase the initial expenditure depending upon the complexity of the CCTV camera system. The CCTV camera system can only monitor a limited area and CCTV camera might not catch all activity due its positions. In this paper they used Arduino with CCTV and LCD technology.
3. The paper titled "Collision Avoidance algorithm (Chitransh Srivastava, et. al., 2016)" is proposed a system for the implementation of collision avoidance system for hairpin bends in Ghats using proximity sensors consisting of a microcontroller, IR sensors, warning LEDs. The systems has performed accurately under various conditions prioritizing the vehicles negotiating a hairpin bend on a Hilly track, Ghats etc. This simple yet effective methodology will enable the driver to have a better sense of terrain and drastically reduce road accidents in hairpin bends or other kinds of zero visibility turns. Even though this paper is that Infrared sensors can't work in dark environments and inability to use them in sunlight due to interference. Infrared sensor values normally fluctuate in variant light conditions. In this paper they used Arduino and wired technology.

IV. BLOCK DIAGRAM

In this proposed system, we are using ultrasonic sensor is used to sense the obstacle present are not. Here we are implement the ultrasonic sensor on the side of the roads and detect the obstacle is present on the road. The Arduino Mega will receive the data from ultrasonic sensor. if the obstacle is present on the road, Siren and LEDs will alert the drivers coming on from the other side. Here we are using 3 LEDs , red is used to stop the vehicle ,yellow is used to go slow and green is used to decrease the speed of the vehicle.

4.1 Modules & Description:

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560.It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega is compatible with most shields designed for the Arduino Duemilanove or Diecimila.

4.2 Power:

The Arduino Mega2560 can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the Gnd and Vin pin headers of the POWER connector.

The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

The Mega2560 differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter.

The power pins are as follows:

VIN. The input voltage to the Arduino board, when it's using an external power source. (as opposed to 5 volts from the USB connection or other regulated power source).

5V. The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply.

3V3. A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.

GND. Ground pins.

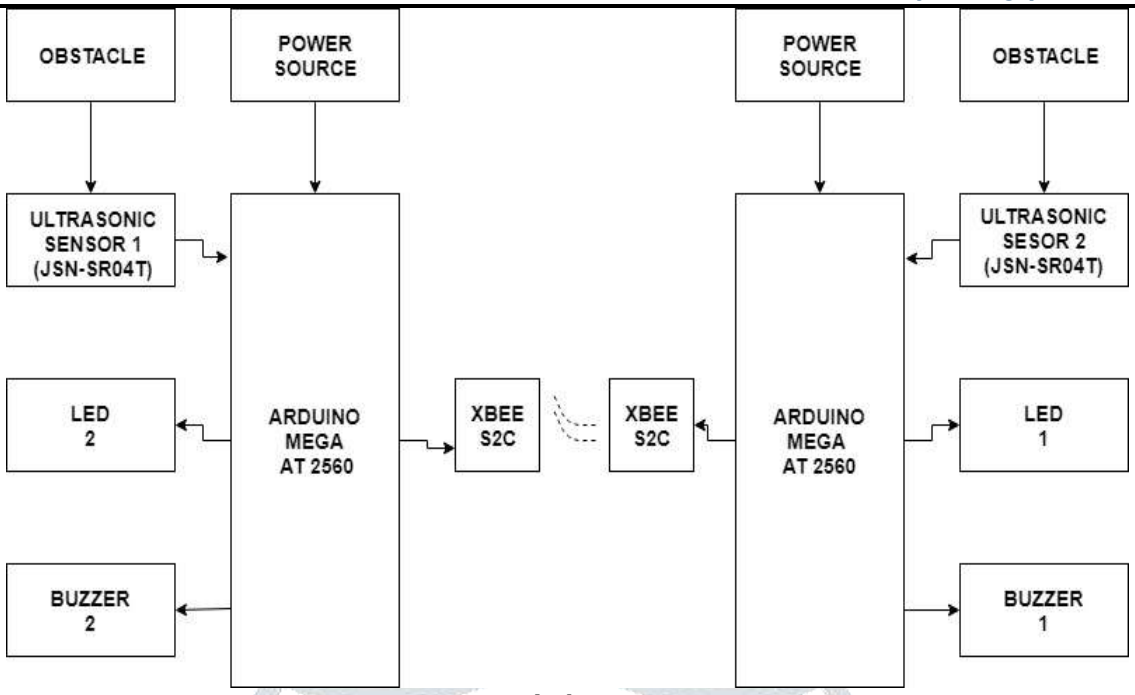

Fig.1 Block Diagram

4.3 Memory:

The ATmega2560 has 256 KB of flash memory for storing code (of which 8 KB is used for the boot loader), 8 KB of SRAM and 4 KB of EEPROM (which can be read and written with the EEPROM library).

input and output:

Each of the 54 digital pins on the Mega can be used as an input or output, using **pinMode(), digitalWrite(), and digitalRead()** functions. They operate at 5 volts. Each pin can provide or receive a maximum of 40 mA and has an internal pull-up resistor (disconnected by default) of 20-50 kOhms. In addition, some pins have specialized functions:

Serial: 0 (RX) and 1 (TX);
Serial 1: 19 (RX) and 18 (TX);
Serial 2: 17 (RX) and 16 (TX);
Serial 3: 15 (RX) and 14 (TX).

Used to receive (RX) and transmit (TX) TTL serial data. Pins 0 and 1 are also connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip

· **External Interrupts: 2 (interrupt 0), 3 (interrupt 1), 18 (interrupt 5), 19 (interrupt 4), 20 (interrupt 3), and 21 (interrupt 2).** These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value.

· **PWM: 0 to 13.** Provide 8-bit PWM output with the **analogWrite()** function.

· **SPI: 50 (MISO), 51 (MOSI), 52 (SCK), 53 (SS).** These pins support SPI communication, which, although provided by the underlying hardware, is not currently included in the Adriano language. The SPI pins are also broken out on the ICSP header, which is physically compatible with the Duemilanove and Diecimila.

· **LED: 13.** There is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

· **I2C: 20 (SDA) and 21 (SCL).** Support I2C (TWI) communication using the Wire library . Note that these pins are not in the same location as the I2C pins on the Duemilanove.

The Mega2560 has 16 analog inputs, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and analog Reference() function.

There are a couple of other pins on the board:

AREF. Reference voltage for the analog inputs. Used with **analogReference().**

Reset. Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

Communication:

The Arduino Mega2560 has a number of facilities for communicating with a computer, another Arduino, or other microcontrollers. The ATmega2560 provides four hardware UARTs for TTL (5V) serial communication. An ATmega8U2 on the board channels one of these over USB and provides a virtual com port to software on the computer (Windows machines will need a .in file, but OSX and Linux machines will recognize the board as a COM port automatically. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the board. The RX and TX LEDs on the board will flash when data is being transmitted via the ATmega8U2 chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A Software Serial library allows for serial communication on any of the Mega's digital pins.

The ATmega2560 also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus. To use the SPI communication, please see the ATmega2560 datasheet.

Programming:

The Arduino mega can be programmed with the (Arduino Software (IDE)). Select "Arduino/ Genuino Uno from the Tools > Board menu (according to the microcontroller on your board).

The Atmega2560 on the Arduino Mega comes preburned with a **bootloader** that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol and also bypasses the boot loader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header.

4.4 ULTRASONIC SENSOR WATER PROOF SR04T:

Fig. 2. Ultrasonic Senor

Basic Working Principle:

(1) Using IO port TRIG trigger measuring distance, high level signal for at least 10uS. (2) Module automatically sends eight 40kHz square wave, automatically detects whether there is return signal. (3) When there is return signal, through IO port ECHO output a high level, the duration of the high level is the time of ultrasonic wave from sending to returning. Test distance = (high level time * sound velocity (340m/S))/2;

4.5 XBEE(S2C):

Fig. 3. XBEE

XBee S2C is a RF module designed for wireless communication or data exchange and it works on ZigBee mesh communication protocols that sit on top of IEEE 802.15.4 PHY. The module provides wireless connectivity to end-point devices in any ZigBee mesh networks including devices from other vendors. Please note that XBee is a module designed by 'DiGi' and ZigBee is the name of the protocol followed by XBee modules for establishing wireless communication. With a few of these modules the user can setup their own ZigBee network up-and-running in a matter of minutes.The XBee RF Module is compatible with other units that use ZigBee technology. These include other XBee modules, Connect Ports gateways, XBee and XBee-PRO Adapters, XBee Sensors and other products that are designated with "ZB"product name.

Xbee to Xbee communication is done from coordinator to router by connecting two xbee's with power supply and ground. The Xbee transmitter is connected to receiver of the arduino mega and Xbee receiver is connected to transmitter of arduino mega in each case, which initiates communication in serial monitor of serial ports from one Xbee to another Xbee.

V. RESULTS AND DISCUSSION

Fig. 4 & 5 shows, that the experiment started with Ultrasonic sensor, sensing distance with the help of duplex communication. In this project we are alert the driver by blinking LED and BUZZER. The Alerting system in Ghats's section system is able to transmit data which is sensed from other side of the road using ZigBee transceiver as a wireless transmission technology. The system is completely integrated and can give alert to the driver by using buzzer and led. This system helps to detect the vehicles by Using the Ultrasonic Sensor. This system provides the information about the vehicles coming from the opposite side of the vehicles in the Ghats section. This system is useful when the driver can't see the vehicle in the opposite side of the vehicle because of long curve roads in the Ghats section. Thus the system provides the safety and security to the driver.

Fig. 4 Kits with Outputs

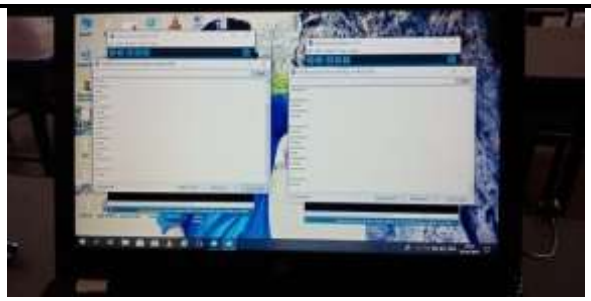

Fig. 5. XBEE transmitter and Receiver communications

FUTURE SCOPE

In this project we are using ultrasonic sensor to reduce the accidents in the Ghats section. We have not done anything to if they get an accident in the Ghats section. Hence we can add GSM module if driver met with an accidents in the Ghats section it will send messages directly police stations and hospitals.

REFERENCES

[1] Aravinda B, Chithralakshmi C. 2016. Sensor Based Accident Prevention System Students. IJIREEICE 4 (6).
[2] Ranga sreedhar galla. 2017. Diminishing road accidents on sharp curves using Arduino. Gokaraju Rangaraju Institute of Engineering and Technology, Department of Electrical and Electronics Engineering, Telangana, 1(5).
[3] Harshada Targe, Anushka Mahajan et.al. 2018. Advance Road Safety For Ghat Road's At Hairpin Bend. ICECE Maharashtra, India. 5(1).
[4] Chitransh Srivastava, Nikhil Acharya et.al. 2016. Implementation of collision avoidance system for hairpin bends in Ghats using proximity sensors. 3(11).
[5] Prof. Lakshmipraba Balaji, et. al.,2017. Smart highway systems for accident prevention using IoT. Management & Research, Akurdi, Pune, India. 5(5).
[6] Dasari Vishal, et. al.,. 2017. Smart highway systems for accident prevention using IoT. International Conference on Electrical, Electronics, Communication, Computer and Optimization Techniques (ICEECCOT).
[7] Zarin Zulkafli1, et. al., 2016. Android Based Car Alert System" PETRONAS Bandar Seri Iskandar, Perak, Malaysia.
[8] S.Baskaran, et. all. 2018. Safe Driving Using Voice Controller In Android With Embedded System. IJEDR. 6(1).
[9] Sumit Garethiya,et.al., 2016 Predictive vehicle collision avoidance system using Raspberry. ICEEOT.
[10] Uvaraja S. and Raghav Prashanth V. 2012. Advanced Pre-Warning System (Railways) IACSIT International Journal of Engineering and Technology, 4(2).