Avoiding Accidents on Ghat Roads and U-Turns Using Internet of Things

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Abstract—The most critical issues now a days are road traffic accidents and deaths. Research in this paper includes, important issues like causes of the accident, their impacts, prevention and control using IOT. It is unsafe to cross the ghat roads especially having long journeys. Most of the accidents in ghat roads is increasing day to day. Most of these accidents are irreparable. Nearly 1.2 million deaths are road traffic accidents are responsible worldwide each year. So it is necessary to control this situation and have some safety measures in ghat roads or ghat places.So, the simple accident prevention system on turnings project is very useful in mountain areas and U turns. From the knowledge of this paper, we can alert the driver through LED signals to know that the vehicle is arriving the blind spot or U-turn. It reduces the accidents and save the life of humans for a safe and happy journey.

Index Terms-Arduino, Internet of Things (IOT), LED, Ultrasonic Sensor.

1. INTRODUCTION

The world is facing lot of problems the major problem is accident. On Indian Roads the accidents are quite common. According to the Union Ministry of Road Transport and Highways information provided, there are 3.9 lakh accidents in 2000 where 78 thousand were killed and 3.99 lakh wereseverelyinjured. The rapid urbanization taking place in India has seen an unrivalled growth of motor vehicles. Recently, statistics showing that vehicle accidents is now 9[th]rankin order and soon to be ranked by 3[rd]by the year 2020. [1]

The prevention steps taken are
- Preventive measure
- Engineering measures
- Enforcement of regulation.
- Educators of public in traffic.

It is necessary to provide education related to knowledge the road user traffic laws regarding the necessary safety precaution taken while using the road. Safety studies have found that a majority of accidents occur either due to the negligence of safety norms and driver's error. The statistics show that most of road accidents take place at blind road corners. Vehicles taking a turn assuming no other vehicle is at the opposite end cause major road accidents and results in more number.Safety studies have found that a majority of accidents occur either due to the negligence of safety norms and driver's error. The statistics show that most of road accidents takes place at blind road corners. Vehicles taking a turn assuming no other vehicle is at the opposite end cause major road accidents and results in more number. Vehicles taking a turn assuming no other vehicle is at the opposite end cause major road accidents and results in maximum.

The outline of this paper is as follows: Section II discusses about the Internet of things (IOT), Section III discusses about the Components used and its brief description, Section IV discusses about the block diagram, hardware design and its working and Section V concludes the paper and discusses about the future scope.

2. INTERNET OF THINGS

The latest advance technology in IT sector now a days is Internet of things (IOT). It provides internetworking for number of devices such as PLCs, sensors, actuators, and other electronic smart devices. IOT controls and provides the systems network configuration and connects to which enables communication between the numerous devices for information exchanging.In the year 1995, ―thing to thing‖ was coined by Bill Gates sai that―IOT interconnects the, thing to thing, human to thing and human to human. The IOT brings out a huge network by connecting different types devices. IOT targets three aspects Cost saving in a system, Communication andAutomation. It allows people to carry out their daily and routine activities using internet and saves time and making them more fertile [2].Recent advancements are the vision of the cyber-physical systems,Internet of Things (IOT), the cloud computing model which provides support for themanagement and transmission of huge amounts of data regarding the observed in environmental parameters.

Nowadays, IOT is the most advanced, cost less technological solution and efficient, which encompasses the hardware and software resources, and allows remotely connected sensing devices to sense the with more capabilities, provides efficiency. And can be monitored and controlled through deployed of existing systems, resulting the physical World integration with computer controllers.

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3. COMPONENTS AND ITS DESCRIPTION

A. Arduino

Arduino is an electronicopen-source platform which is based on ease to use hardware as well as software. Arduino boards as shown in Fig.1 are able to read inputs when it is programmed well, gives lighting ON asensor, or a Twitter message and turn it into an output - activating required motor, turning ON a LED and publishing something online. By sending a set of instructionsthrough the Arduino Software named as ARDUINO IDE, to the microcontroller on the board. You can instructArduino board which is required .

To do so, it is required to use the Arduino programming language based on line wiring, and the Arduino Software based on processing. Over the long time Arduino boards has been the brain of thousands of innovative projects.
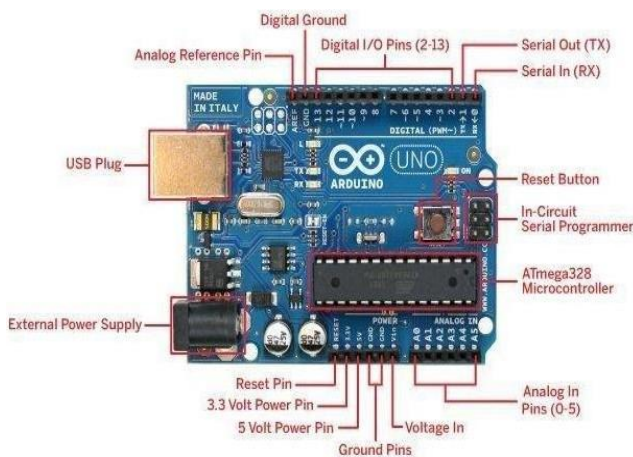

Fig. 1. Arduino UNO

Arduino is used because it is simple and accessible user experience. Now a days this is using in various thousands of projects and applications. The Arduino software is very easytouse for the beginners and for advanced users. It runs a Windows, Mac and Linux. students and Teachers use it to low cost scientific instruments. It simplifies the process of working with the microcontrollers.

These are mostly preferred because.

• It is inexpensive than other microcontroller platforms.

• This software runs on various operating systems.

• Its programming is simple and easy-to-use and easily understandable.

B. Ultrasonic Sensor

Ultrasonic sensors will help us to measuresthe distance of an object in centimeters by using ultrasonic waves. The ultrasonic sensor head emits an ultrasonic wave which receives the wave reflected back from the object. It also measures the distance to the object (target) by measuring the time (in seconds) between the transmitter (emission) and receiver (reception). When an electrical high voltage pulse is

applied to the ultrasonic sensor, it will vibrate across a spectrum of frequencies and generates sound waves. Whenever any object or obstacle comes infront or ahead of the sensor, the sound waves will reflect back through the receiver. It also calculates the time taken between sending and receiving sound waves.

Ultrasonic sensor module consists of one transmitter and one receiver. It also emits low frequency and high-frequency sound pulses at regular intervals. Ultrasonic sensor has four pins. They are V_{cc}, Trigger, Echo and Ground pin.

Fig.2. Ultrasonic Sensor

C. Light Emitting Diode (Led)

LED converts the electrical energy in to light energy. First production started in 1968. It undergoes the process named electroluminescence in which electrons and holes are recombine together to produce light energy. Oldendays, LEDs are used in inductor lamps but recently they are mostly using in handling different tasks and environmental.

Fig.3.
LED

A Light Emitting Diode (LED) is a two terminal semi-conductor light device. It is nothing but aP-N junction diode which emits light when it is activated. When a suitable voltage is applied to the terminals or leads, then the electrons are able to recombine with holes inside the device and releases energy in the form of photons. This effect is called as electroluminescence.Thecolor of light is determined by the energy band gap of semiconductor.

Infrared Light Emitting Diodes are mostly used as transmitting elements. The first visible LED is also of low luminous intensity, and is limited to color of red. In modern days, LEDs are available across the visible, infrared wavelengths and ultraviolet with high brightness.

Light Emitting diodes (LEDs) aremostly used now in applicationsas aviation lighting, traffic signals,flashes used in cameras, automotive headlamps, advertising purposes, general human lighting etc.

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4. BLOCK DIAGRAM AND ITS WORKING PRINCIPLE

Using Arduino software, the program which is given in the appendix need to be dumped in Arduino UNO board. The block diagram of the entire design is shown in the Fig.4, the Arduino should be connected to LEDs, and Ultrasonic Sensors. Thisultrasonicsensors will detect the objects entering into the zone of ultrasonic sensor.
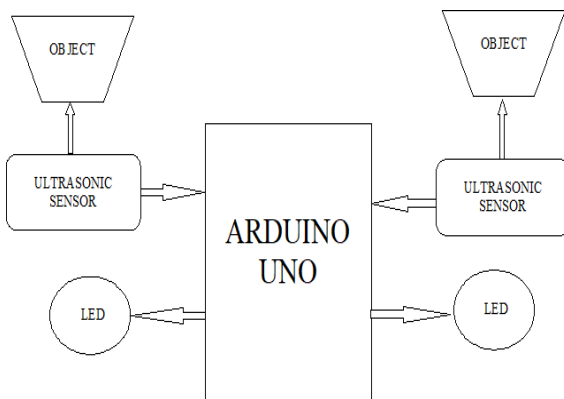

Fig. 4. Block Diagram of Hardware Implementation

Consider an example here with one U-turn in a mountain area. There are two RED POSTS1 and 2 (LEDs) fixed at the end points of U-turn area. If it lightens then it indicates the vehicles to stop or slow down the speed of vehicle.There are also two ultrasonic sensors (say two sensors, Sensor-1 and Sensor-2) placed at both sides of the U-turn.

Two vehicles (say two cars, 1&2), are approaching towards the U-turn. Both of them are not aware about crossing U- turn by each other. Since there is mountain in between them. So, the ultrasonic sensor on each side of the mountain will detect the passing of cars.

When the Car-1 passes over the sensor-1, it will detect the car passing and it will switch ON the LED of RED POST-2 for some time (with a specific delay given in program which is in seconds).So, the Car-2which is passing on other side will get the warning to slow down the vehicle by LED indication.

Now, when the Car-2 passes over the sensor-2, the LED of RED POST-1 will light up giving the warning message to Car-2.Soboth the vehicles need to be slow down and then carefully cross each other which avoids the U-turn accidents as shown in the hardware design in Fig.5.

The simple accident prevention system at ghat roads, this technique is very useful in mountain areas and U turns where there is prone to accidents. From this project we can alert the driver through LED signals to know that the vehicle is arriving the turn or the blind spot. It reduces the accidents occurring and this project save the life of humans for a safe and happy journey.
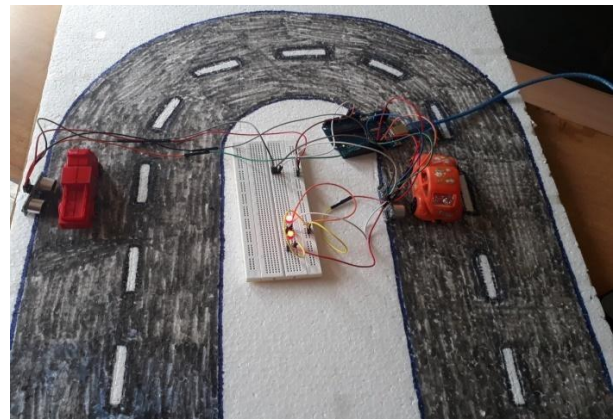

Fig.5. Hardware implementation of avoiding accidents in U-turns

5. CONCLUSION

In this paper, we get to know about the accident which occurs on the road at Ghat section. Understanding the causes and effects of accidents and then it is founded out a solution to introduce a new technique to avoid such accident. By using IOT latest technology, avoiding accidents is implemented and also tested which uses Arduino UNO, Ultrasonic sensors, LEDs. The advantages form this paper is:
•To Reduce the number of accidents
•It is also used for security alerts at u -turns
•It is also used for 24 hours surveillance
1.Investment capital and pay back:
•It is having less capital.so we can use more
2. Efficiency:
•It having better efficiency.
•It is easy to control.

6. FUTURE SCOPE

• Addition of GPS module uses to trace any vehicle on the U turn.
• Addition of camera can also be used for surveillance purpose.

APPENDIX – ARDUINO PROGRAM

```
#define echopin1 7
#define trigpin1 8
#define echopin2 9
#define trigpin2 10
#define alarm1 11
#define alarm2 12
long     duration1,distance1,     duration2,
distance2; void setup()
{
Serial.begin(9600);
pinMode(trigpin1,OUTPU
T);pinMode(echopin1,INP
UT);

pinMode(trigpin2,OUTPU
T);
pinMode(echopin2,INPUT)
;
```

```
pinMode(alarm1,OUTPUT)
;
pinMode(alarm2,OUTPUT)
;
}
void loop()
{
digitalWrite(trigpin1,LOW);
delayMicroseconds(2);
digitalWrite(trigpin1,HIGH);
delayMicroseconds(10);
digitalWrite(trigpin1,LOW);
duration1=pulseIn(echopin1,HIGH);
distance1=(duration1/58.138)*.39;
if(distance1<=5)
{
digitalWrite(alarm2,HIGH);
delay(2000);
}
else
{
digitalWrite(alarm2,LOW);
}
Serial.println("1 is arriving. 2 on alarm");
Serial.println(distance1);
Serial.println("cm");

digitalWrite(trigpin2,LOW);
delayMicroseconds(2);
digitalWrite(trigpin2,HIGH);
delayMicroseconds(10);
digitalWrite(trigpin2,LOW);
duration2=pulseIn(echopin2,HIGH);
distance2=(duration2/58.138)*.39;
if(distance2<=5)
{
digitalWrite(alarm1,HIGH);
delay(2000);
}
else
{
digitalWrite(alarm1,LOW);
}
Serial.println("2 is arriving. 1 on alarm");
Serial.println(distance2);
Serial.println("cm");
}
```

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