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Review on Vehicle Accident Prevention System for Hilly and Mountain Roads

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ABSTRACT: "Speed Kills", but still people don't care enough to act safely while driving on road. Road traffic accidents and deaths caused by them are the most critical issues nowadays. It is also impacting the country's economy. Research in this paper includes important issues and road accident and their impacts, causes of accidents, prevention and control that we can improve this situation. Also, it is not safe nowadays to cross hilly and hairpin bend roads while having a long journey. Road traffic accidents (RTA) are responsible for 1.2 million deaths worldwide each year. So it is first important to control this scenario and have some safety measures in hilly and mountain roads. This paper includes some solutions and ideas to improve safety in hilly and mountain roads.

KEYWORDS: Curved roads, accident prevention, IR sensors, mountain and hilly roads, alerting the driver.

I. INTRODUCTION

Population growth has led to growth in technology. People use the car on a large number and number of accidents taking place, is increasing day by day. Road accidents are undoubtedly the most frequent happening cases and overall, the cause of the most damage. In the developing countries accident is the major cause of death. The top 10 dangerous roads in the world are mountain roads and curve roads. 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 coming from the opposite side. Thousands of people lose their lives each year because of this problem. The mountain roads might lead to a cliff. The solution for this problem is alerting the driver about the vehicle coming from the opposite side in the hairpin bends. That can be performed by placing the infrared sensor (IR Sensor) on the road in one side before the road curve and then will keep the LED light after that curve, thus the vehicle which comes from the one end of the curve, the sensors which are present in that curve will sense and makes the LED light glows along with that buzzer sound and also vehicle speed is displayed at the opposite side. By looking at the LED light on the signal driver can become alert and can slow down the speed of the vehicle. Thus it saves more lives.

II. LITERATURE SURVEY

1. "SENSOR BASED ACCIDENT PREVENTION SYSTEM" Author: Aravinda B, Chaithra Lakshmi C, Deeksha, Ashutha K[1]

This paper is introducing a sensor-based accident prevention system:- That is we are keeping an ultrasonic sensor on one side of the road before the curve and keeping a LED light after the curve. The ultrasonic sensor which is also called an obstacle sensor sends a signal as a pulse from the trigger. If the vehicle is present signal will hit the vehicle and it is received by the sensor. At that time light will glow on the other side of the curve. In the absence of the vehicle, the light will not glow because the signal will not be received by the sensor. As the signal senses, the vehicle light will glow which is an indication to the driver that some vehicle is arriving from the front side. The driver gets noticed the signal and slow down or stop the vehicle if necessary. This type of sensor-based light system can be applied when the driver unable to see the vehicle coming from the other end of the road. Using this idea we can make all the mountain roads and curve roads safer from accidents and can save thousands of lives a year. The aim of this paper is to decrease the number of accidents on curve roads. This is done by alerting the driver using LED light which glows when the vehicle comes from the other side of the curve. The vehicle is detected with the help

of an Ultrasonic sensor which is interfaced to the microcontroller Arduino UNO. By this, we can save thousands of lives on the curve roads.[1]

2. “Diminishing Road Accidents On Sharp Curves Using Arduino”. RangaSreedharGalla [2]

has studied the main purpose of this paper is to reduce accidents on hilly and slippery roads. In curve roads, the other road end of the vehicle cannot be seen by the driver. At night many time accidents may happen by the huge intensity of headlight from the opposite side of vehicles. Also, the light intensity problem occurs on both curved roads and mountain roads at night because of this type of problem Thousands of people lose their lives. The solution for this problem is alerting the driver about the vehicle coming from the opposite side. 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 the vehicle comes from one end of the curve sensor senses and LED light glows at the opposite side.[2]

3. “Smart Road Safety and Vehicle Accident Prevention System For Mountain Roads” KartikVenkataMutya, SandeepRudra [3]

Has studied the road traffic accidents are being recognized as a major public health problem in several countries with alarmingly increasing fatalities in developing countries. Careless and rash driving as a result of excessive waiting and blind corners is attributed as one of the most important factors for all road accidents. An estimated 1.2 million people lose their lives in road traffic crashes every year, and another 20 to 50 million are injured. A docile, economical mechanism to prevent these road accidents is the need of the hour. It is hoped that the mechanism presented in this article would help in alleviating this concern especially in correspondence with large vehicle accidents on highways by being easily implemented in low-income countries and this mechanism can save thousands of lives.[3]

4. R.Saranya, R. Arun Kumar [4]

This paper concludes that Accidents may take place in various factors drunk and driving, texting while driving, Speeding, Distractions, Sleeping while driving. Among Drowsiness is a reason for most of the accidents. While driving at the speed of 100km/hr. driver falls sleepy within 4 seconds the buzzer will enable.[4]

1. HARDWARE REQUIREMENT

- Arduino Uno Board
- IR Sensors
- Cables and connectors
- Power Supply
- PCB
- Breadboards
- Buzzer
- Regulator
- LED

3.1. Arduino Uno Board

The Arduino Uno is a microcontroller board based on Atmel's ATmega328. It has 14 digital input-output pins of which 6 can be used as PWM outputs and 6 analog inputs. The Arduino Uno can be powered via a USB connection or with an external power supply. The Arduino Uno original contains everything needed to support the microcontroller, simply connect it to a computer with a USB cable.



FIG 1: Arduino Uno Board

3.2. IR Sensors

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Herchel in 1800. There are two types of infrared sensors: active and passive. Active infrared sensors both emit and detect infrared radiation. Active IR sensors have two parts: a light-emitting diode (LED) and a receiver. When an object comes close to the sensor, the infrared light from the LED reflects off of the object and is detected by the receiver.



FIG 2: IR Sensor

3.3. PCB

It is a type of PCB that comes with a conductive copper layer on both sides of the board, unlike single-sided PCB which has a conductive layer on one side of the PCB. Double-sided PCB, also known as two-layer PCB is a type of PCB that has conductive copper layers on both sides of the board. Double-sided PCB comes with two-sided traces or paths i.e. top layer and bottom layer. It is extremely useful in many electronic applications because circuits on one side of the board can be connected on the other side of the board with the help of holes drilled on the board.

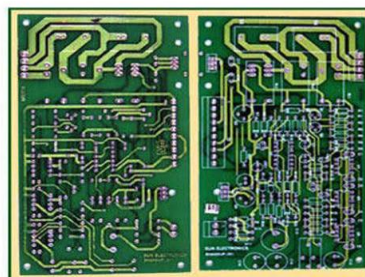


FIG 3: Double Sided PCB Board

3.4. Regulator(AMS1117)

The AMS1117 series of adjustable and fixed voltage regulators are designed to provide up to 1A output current and to operate down to 1V input-to-output differential. The dropout voltage of the device is guaranteed a maximum of 1.3V, decreasing at lower load currents. On-chip trimming adjusts the reference voltage to 1.5%. The current limit is set to minimize the stress under overload conditions on both the regulator and power source circuitry.



FIG 4: Regulator IC

2. Component Diagram

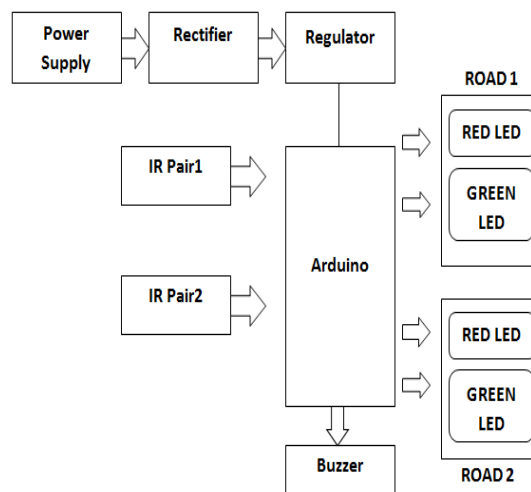


FIG 5: Component Diagram

The above figure shows components of the hardware system in which we have used a microcontroller(Arduino Atmega 328p), 5mm LED lights, IR sensors measures in infrared radiations and a +5v power supply with the regulator. IR sensor sends infrared radiations. When this radiation hit the object it will get reflected back to analog input pins and received by microcontroller Arduino Atmega 328. Microcontroller process data and sends digital signal pins of Arduino 328. LED will work according to input. Vcc is connected to a +5v power supply with a regulator for a constant +5v supply and the GND of the microcontroller is connected to GND.

III.WORKING

In this accident prevention system, there will be warning lights which are LED's installed on side of mountain roads specifically on blind spots. There will be IR sensors on both side of the roads that will track the oncoming vehicle from both sides, also the buzzer is there for giving a signal.The lights will change colours according to the vehicles coming and the distance between two vehicles. If the light is red that means there is a vehicle coming from the opposite side and it is very close. Similarly, if the light is green it would mean the vehicle coming from the opposite side has passed and it is safe to go ahead. LED decisions will be taken on software coding using the Arduino IDE tool which is open-source software.

When to cars pass from the opposite side of a mountain curve the IR sensor senses the car and the LED colour changes to red and raises the buzzer giving a signal of danger and then it is changing one LED colour into the green to allow one car to pass and then the other LED colour turns green. In this way, we can prevent the accidents of curve and mountain roads.

IV. PROPOSED SYSTEM

In this project, propose a vehicle accident prevention system that will alert the drivers on both sides of the blind spot on the mountain roads about the oncoming traffic from the other side. It would change colours and alert the drivers with the help of LEDs. Our paper proposes a system that would be installed on mountain roads and will use sensors to detect vehicles. It would also be a major safety booster for mountain roads and curved roads.

V. CONCLUSION

This vehicle accident prevention system is developed so that any person on the road can realize that someone is coming from the opposite side or not. So that it will decrease the number of accidents on curve roads. In our country, there is a massive need for a modern technological solution for safety measures on mountain roads especially the curves section of the road. This project will definitely ensure the safety of drivers on mountain and curve roads, hence we can save thousands of lives. This project can be installed at the junction of two or more roads even in plain areas, but we implemented it only in case of hilly curves which are even more dangerous than normal junctions, and are more prone to accidents. Hence, this project is easily implementable, unique and will ensure the safety of drivers and reliability.

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