



Accident Prevention Using IR Sensors

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Abstract: Both the population and technological growth are accelerating daily. Recent research indicates that accidents are the leading killers in developing nations. Mountain roads, u-turn roads, tight curve roads, hairpin bend curves, and T-roads are the most hazardous and accident-prone places. Mountains have small, blind corners where drivers cannot see the cars or obstacles coming from the opposite side. This project's primary goal is to reduce the number of accidents that happen on u-turn and mountain roads. An Arduino Uno is used to power the system's sensors, which in this project comprise IR sensors, LED lights, and buzzers. As two automobiles pass one another on the road curve in the mountains. The LED colour turns to red when the IR sensor sees the vehicle, raising the buzzer to signify danger. This warns drivers to avoid collisions on roads with mountain curves.

Key words: Arduino Uno, IR Sensor, LED, Buzzer.

Introduction: On mountain roads, we are implementing an automatic accident prevention system based on sensors. Before the bend, two IR sensors are mounted on either side of the road, and a buzzer is installed after the curve. If a vehicle is present, the signal strikes the car before reaching the sensor. The buzzer begins to beep at this point, signalling that a vehicle is approaching from the opposite direction. In order for the driver to reduce the vehicle's

speed and, if required, to stop the vehicle when the buzzer beeps. When a driver cannot

see a car approaching from the opposite end of the road, this system may be used. All of the winding and mountainous routes may be made accident-free, saving lives in the process.

COMPONENTS REQUIRED:

The components required are as follows Arduino uno , IR Sensor , LED, Buzzer.

Arduino uno: A microcontroller board called Arduino Uno is based on the ATmega328P. It has a 16 MHz quartz crystal, 6 analogue inputs, 14 digital I/O pins, a USB port, a power jack, an ICSP header, and a reset button.

Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB
SRAM	2 KB
EEPROM	1 KB
Clock Speed	16 MHz



Figure. 1 Arduino Uno

IR Sensor: An electrical device that monitors and detects infrared radiation in its environment is called an infrared (IR) sensor. William Herchel, an astronomer, made the unintentional discovery of infrared radiation in 1800. He saw that the temperature was highest just beyond the red light as he measured the temperatures of each colour of light (separated by a prism). As IR has a longer wavelength than visible light, it is invisible to the human eye. Infrared radiation is produced by everything that radiates heat. Infrared sensors come in active and passive varieties. Infrared radiation is produced and detected by active infrared sensors. A light emitting diode (LED) and a receiver are the two components of an active IR sensor. The infrared light illuminates the thing when it approaches the sensor. the receiver picks up the light from the LED as it bounces off the object. Infrared is produced and detected by active sensors.

radiation. A light emitting diode (LED) and a receiver are the two components of an active IR sensor. The infrared light from the LED reflects off of objects as they get close to the sensor.



figure 2: IR Sensor

LED: A semiconductor light source with two leads is known as a light-emitting diode. It is a p-n junction diode that turns on to produce light. Electrons are able to reunite with electron holes inside the device when a proper voltage is given to the leads, releasing energy in the form of photons.

Electroluminescence is the name given to this phenomenon, and the semiconductor's energy band gap determines the hue of the light. LEDs are mostly used to illuminate items and even spaces. Due to its small size, low energy consumption, long lifespan, and versatility in terms of use in many applications, it is applied everywhere.

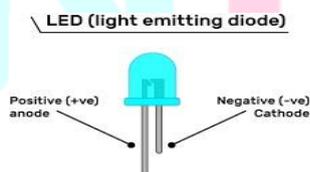


figure 3: LED

Buzzer: A beeper or buzzer, for example, could be electromechanical, piezoelectric, or mechanical in design. The signal is converted from audio to sound as its primary function. It is often powered by DC voltage and used in timers, alarm clocks, printers, computers, and other electronic devices. It can produce a variety of sounds, including alarm, music, bell, and siren, according on the varied designs.

object and is detected by the receiver. Active IR sensors act as proximity sensors, and they are commonly used in obstacle detection systems.



figure 4:Buzzer

Working principle:

Case 1: The IR1 sensor identifies the vehicle when it is approaching from side A. The buzzer is ON and RED signal is visible to side B. Whereby it warns the driver of the car on side B to slow down so they can cross the curved road.

Case 2: When a vehicle is present on side B, the IR 2 sensor recognises it and sends a RED signal with a beep sound to side A. It lets vehicles on side A know that a vehicle is approaching from that direction, allowing them to slow down and navigate the bend.

Case-3: When both vehicles are found by the IR sensors, both sides receive a RED signal and a beep sound. to warn the traffic on both sides to slow down and be cautious so they can safely navigate the curve. In order to avoid accidents, drivers can pay attention while navigating mountain roads with tight turns or hairpin curves.

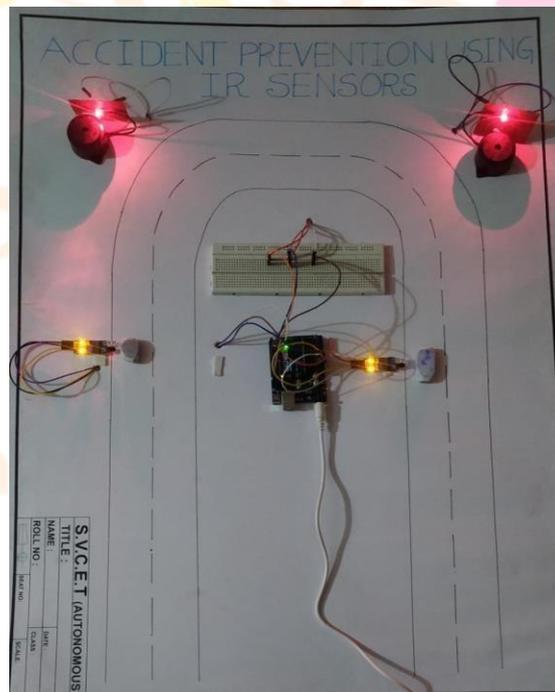
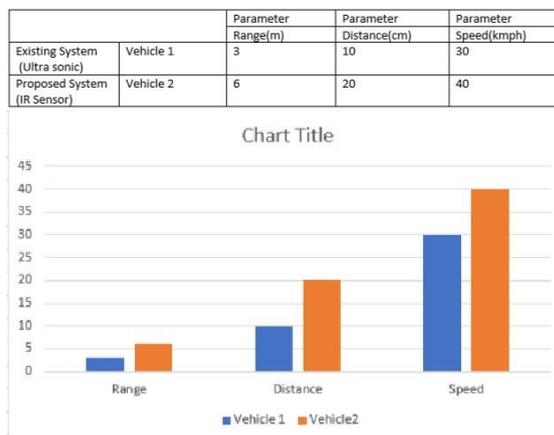


figure 5:Circuit Diagram

Conclusion: The aim of this project is to save lots of thousands of individuals lives, and reduce the amount of accidents in curved roads or mountain roads. this can happen only by alerting the motive force by means of LED light which glows only vehicle comes from opposite side of the curve. The vehicle is detected by the IR sensor which are connected to the microcontroller Arduino. So, if vehicle comes from one end of the curve sensor senses and LED light glows at the opposite side. By this we can save thousands of lives including animals.

Result: The accident avoidance system uses the either buzzer beeps or alarm sounds and vibration system as the first level of safety. This has made the driver to gain his senses back and snap out of drowsiness. The LED lights that gets impulses along with the alarm has been used to warn the other vehicle drivers and increases attentiveness. The LED lights can be visible during the fog and mist conditions.



Future Scope: Arrangement to protect the sensor from being damaged in critical places. Decrease the size of the unit so that it occupies small place and easily kept in narrow roads. Implementing the system to detect number of vehicles and velocity of vehicle. Impact sensor can be used for detecting the damage caused to a vehicle during an accident. GSM and GPRS can be used for tracking the location of the vehicle and message is send to user's relatives and the police station in the case of accident .

The proposed system deals with the detection of the accidents. But this can be extended by providing medication to the victims at the accident spot by increasing the technology we can also avoid accidents by providing alert that can stop the vehicle to overcome the accident.

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