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SYSTEM FOR PREVENTING ACCIDENTS IN DEADLY AND HILLY AREAS

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Abstract— There will be many curves and hairpin bends in hilly areas. One of the often used forms of transportation in these areas is the road. In hilly areas, there are more accidents and fatalities every day. There will undoubtedly be bends and sharp curves on the roads in this area. As a result, it is challenging to spot the vehicles approaching from the side. The suggested technology attempts to lower the danger associated with operating a vehicle in terrain with sharp curves and hairpin turns. The purpose of this paper is to use the Accident Avoidance System to effectively prevent car accidents and to give users the highest level of security during severe or inclement weather. It is exceedingly challenging to operate a car as smoothly in bad weather as it is in normal circumstances. In general, only these poor weather conditions are to blame for the majority of incidents. As a result, we suggest a methodical architecture in this work to prevent early collisions, which are typically caused by inclement weather and asynchronous vehicle speeds. In our suggested system, the speed of each vehicle is controlled by warning the driver with the use of LED lights in order to prevent early crashes. The relative speed and distance of all the cars are assessed using Ultrasonic sensors.

Keywords— LED (Light Emiting Diode); infrared (IR) sensors ;Arduino UNO ; TinkerCAD ;Ultra Sonic sensor .
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I. INTRODUCTION

Approximately 2.3 million individuals each year pass away in India, according to the Million Death Study (MDS). Road accidents are the cause of 137K of those. 377 people on average per day. 3.7% of those were caused by unforeseen difficulties. There are many dangerous roads and bends in the world, including mountain roads, tight curve roads, and hairpin bends like those on the Leh Manali Highway, Kolli Hill Roads, Gata Loops, and three-level zig-zag roads in Sikkim.The difficulty with hairpin curves is that drivers cannot see the coming traffic or impediments from the opposite side of the curve. High speeds make it challenging to manage the speed of the vehicle, increasing the risk of cliff falls and the possibility that missing persons may not be found. In these kinds of locations, accidents are not the only thing that happen frequently; many automobiles even fall off mountains without leaving any sign of the vehicle or the driver. Both the roads and numerous human lives were lost as a result of this. Mountain roads are frequently exceedingly narrow, and an accident there could even force the closure of the road for several days while it is being cleared. According to some reports, mountain roads are known to remain closed for several days following both minor and severe accidents or natural disasters. the involved automobiles.

A vehicle may occasionally need to be removed from cliffs or valleys using heavy machinery. This is a significant task as well. This results in losses of money, time, and even the lives of accident victims and those who are stranded on the roadways for several hours or even days. This goal is typically served by convex mirrors or horns, but it is invalid.Accidents are the leading cause of many fatalities in developing nations. All of the top 10 nations on the global scale have mountainous terrain and winding roads. Because to the small roads and sharp turns inside the mountain, vision is limited.The driver of the vehicle cannot see the vehicle approaching from the opposite side in this reasonable condition. The developing nations must adopt the road-building model used by industrialised nations like the United States, the Netherlands, and Denmark. Buses and trucks are more frequently engaged in accidents because of the absence of adequate safety requirements in poor nations where they operate. This issue resulted in the deaths of thousands of people.The frequency of collisions has decreased thanks to the use of daytime lighting, high-placed stop lamps, reflectors, and colourful apparel. This method did not help them because of the limited visibility. The solution to this issue is to inform the driver of the approaching car from the other side. This is frequently accomplished by placing

an LED light after the bend and an Ultrasonic 1 sensor on the opposite side of the road, so that when a vehicle approaches from one side of the curve, it detects the LED light. By observing the LED light on/off criterion, the driver can become vigilant and even slow down the vehicle's speed.

II.LITERATURE REVIEW

The "Sensor Based Accident Prevention System" Aravinda B, Chaithra Lakshmi C, Deeksha, and Ashutha K are the authors. In this study, a sensor-based accident prevention system is introduced.- That is, we are keep an LED light after the curve and an ultrasonic sensor on one side of the road. A signal is sent as a pulse from the trigger by the ultrasonic sensor, also known as an obstacle sensor. If a vehicle is there, the signal will hit it and reach the sensor. The other side of the curve will then be illuminated with light at that time. The light won't illuminate if the car isn't present because the sensor won't be able to pick up the signal. The car light will shine when the signal senses it, serving as an indication.

The "Smart Road Safety and Vehicle Accident Prevention System for Mountain Roads" Sandeep Rudra and Kartik Venkata Mutya. Road traffic accidents are becoming a major public health issue in many nations, with the number of fatalities in emerging nations dangerously rising. One of the key contributing factors in all traffic accidents is reckless and careless driving brought on by long waits and blind bends. Road traffic accidents claim the lives of an estimated 1.2 million people each year, and another 20 to 50 million sustain injuries. The current situation demands a submissive, cost-effective technique to stop these traffic collisions. It is hoped that the method described in this article would aid in allaying this worry, particularly in light oflarge vehicle accidents on highways by being easily implemented in low income countries and this mechanism can save thousands of life

R. Arun Kumar, D.r. Saranya,This essay comes to the conclusion that a variety of circumstances, including drunk driving, texting while driving, speeding, distractions, and sleeping while driving, might cause accidents. Among other things, drowsiness is to blame for most accidents. If the driver falls asleep while travelling at 100 km/h, the buzzer will activate in 4 seconds.

"Using Arduino To Reduce Traffic Accidents On Sharp Curves." According to research by Ranga Sreedhar Galla, the major goal of this study is to reduce accidents on slick, uphill roads. The driver cannot see the other road end of the car on curves. Accidents frequently occur at night as a result of extremely intense headlights coming from the other side of the vehicles.

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III PROPOSED METHODOLOGY

The systematic, theoretical analysis of procedures used in a field of study is known as methodology. It includes a theoretical investigation of the body of procedures and rules connected to a field of knowledge. It usually includes ideas like paradigms, stages of a theoretical model, and quantitative or qualitative methodologies. Methodology is not the same as a technique because it does not aim to offer solutions. A methodology, on the other hand, provides the theoretical groundwork for comprehending how a technique, collection of methods, or best practises might be applied to a particular scenario. We are learning about planning, design, and implementation testing through a methodology.

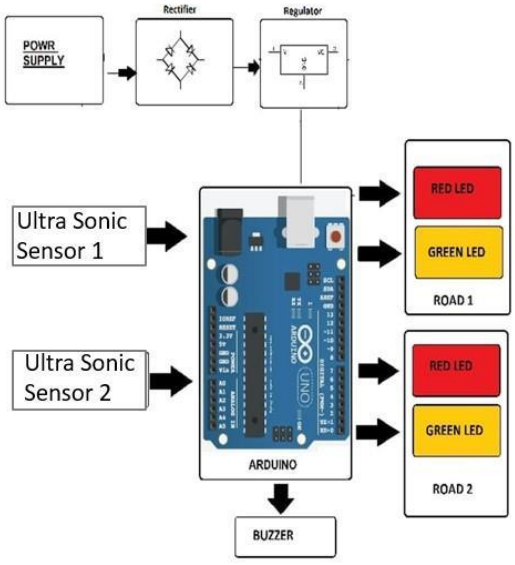

Figure:3.1. Block Diagram of Proposed Method

This study is useful in reducing accidents that occur on roadways in hazardous areas, such as mountains and hills. When a vehicle is moving at a high speed, it becomes impossible to manage that speed and there is a risk of cliff falls.We employ infrared (IR) sensors to detect the vehicle or obstacle approaching from another curve as the answer to this problem, warning the driver about the obstruction or vehicle coming from the opposite side of the valley. The Arduino board, Ultra Sonic sensors, LED lights, and buzzer are all used in this accident prevention system. Before the curve, we are keeping Ultra Sonic sensors on each side of the road, and we are also keeping an LED light. The trigger of an ultrasonic sensor sends a pulse of signal. The Ultra Sonic sensor detects a car approaching from the opposite side of a mountain curve, changing the LED colour to red and raising the buzzer to signal danger. It then changes one LED colour to green to allow one car to pass, and the other LED colour also changes to green. Thus, by using this method, we can make all the winding and mountainous routes safer from collisions and potentially save thousands of lives.

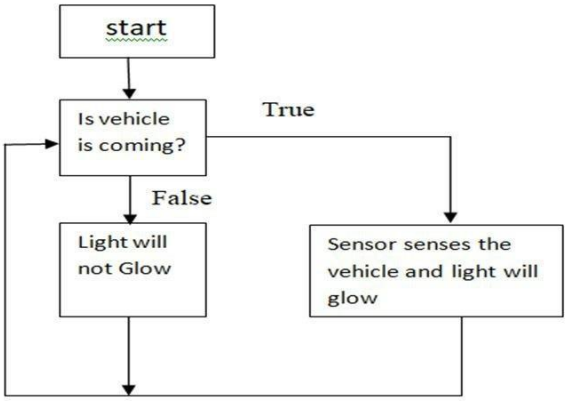

Figure:3.2. Flow Chart of Proposed Method

As seen in the flowchart above, when a vehicle is present on the other side, a sensor detects it, and a light will shine. At the opposite end of the curve, a red LED will glow for 30 seconds.

When a car approaches from the right, the ultrasonic sensor detects it and sends a signal to the Arduino, which then controls the buzzer and red LED to inform the motorist on the side opposing the U-turn. Due to this, fewer accidents will occur on curved roadways. When a car approaches from the left, the ultrasonic sensor detects it and sends a signal to the Arduino, which then activates the red LED and sounds the buzzer on the opposite side of the U-turn to alert the driver. Due to this, fewer accidents will occur on curved roadways.

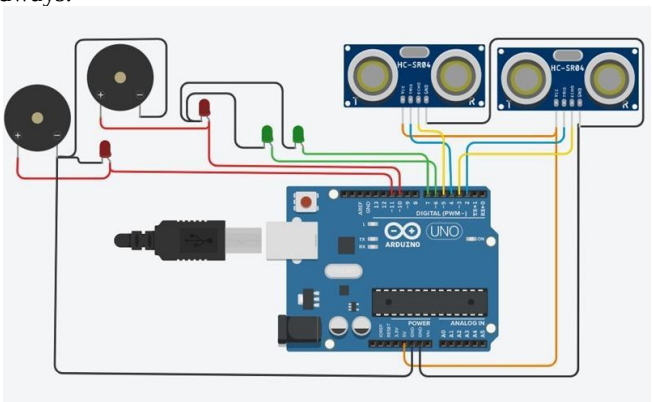

Figure:3.3. Simulation Diagram of Proposed Method

TinkerCAD software is used for circuit simulation and design purposes. Tinker cad has the advantage of being developed to include "circuits" functionality. Students are able to create circuits, programme micro controllers, and put electronics right into their 3D drawings thanks to this. There are over two dozen Arduino Starter circuits available in TinkerCAD. You can inspect, simulate, and alter the sample code that is included with each example.

IV RESULTS AND DISCUSSION

Below is a diagram of the accident prevention system for dangerous zones and steep areas:

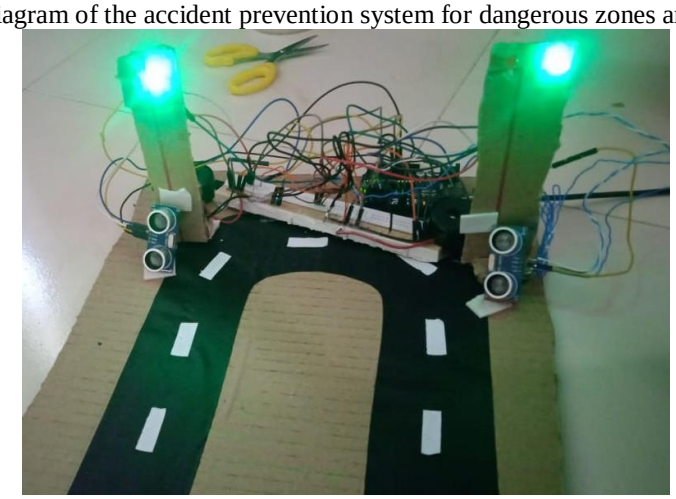

Figure 4.1: When no vehicle is present

Green LED s on both sides of the road glow when there are no vehicles on the road. It means the motorist vechicle proceed without risk.

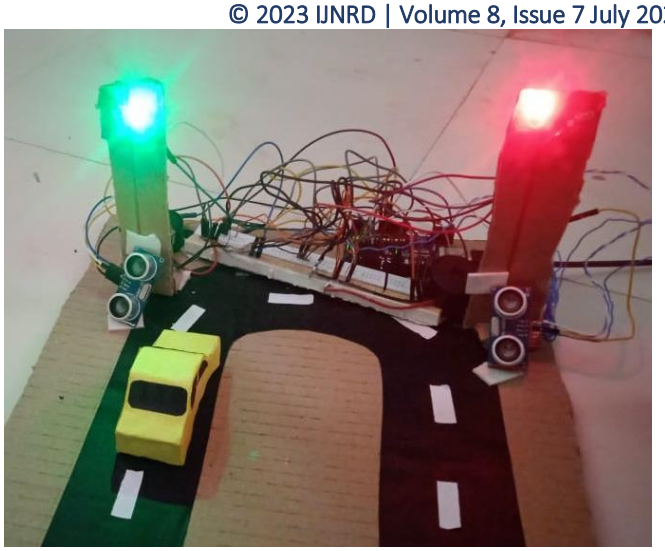

Figure 4.2: When a vehicle is present on right side

When a vehicle passes in one road, the sensor detects it, and in the opposite road, a red led glows and a buzzer sounds. It identifies the driver of the vehicle who is approaching from the other direction.direction.

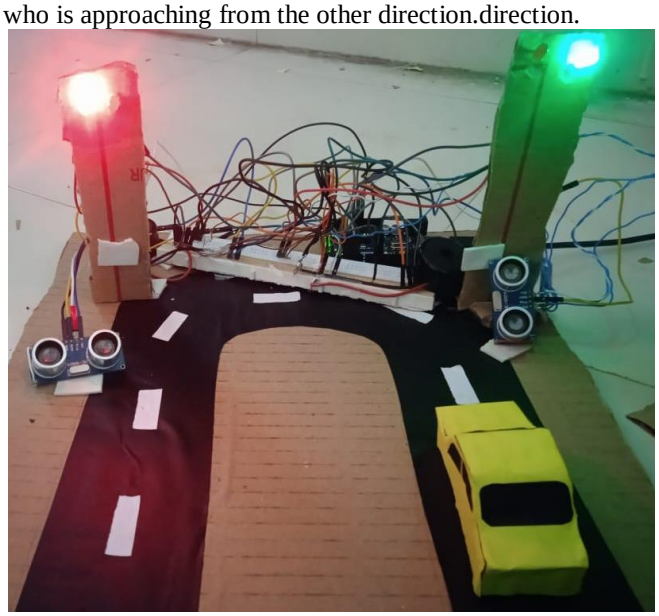

Figure 4.3: When vehicle is present on left side

When a vehicle passes in one road, it is detected by the sensor and a red led glows and buzzer rings which are present in the opposite road. It indicates the driver, who is coming up the opposite roads from the vehicle.

V. Conclusion and Future Scope

The reduction of accidents on curve roads is the goal of the study, Accident prevention system on steep areas and dangerous zones. To do this, an LED light that illuminates as a vehicle approaches from the opposite side of the bend alerts the driver. The Ultra Sonic sensor, which is connected to the Arduino UNO micro controller, is used to detect the vehicle. This article could prevent thousands of fatalities on winding roads. A contemporary technology solution for safety measures on mountain routes, especially the curving segment of the road, is urgently needed in our nation. This article will undoubtedly guarantee the security of motorists on mountain highways, so ensuring the preservation of human life.This study presents a contemporary solution to the problem.

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