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Accident Prevention on Hilly Regions Caused Due to Curves and Climatic Change

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Abstract—Road accidents are responsible for almost 12 lakh deaths worldwide each year. In a year, there are a lot of road accidents which result in people becoming disabled. A lot of these accidents take place in hilly regions. One of the common reasons for these accidents are poorly built roads or unattended hazard zones.

Road safety is a multi-dimensional issue. It incorporates Different departments and various organization's teamwork to build well structured roads and take care of the unsafe zones which are a very common reason for these accidents . The poorly built road or completely neglected danger zones also contribute to the happening of these accidents. The safety measures that should be taken for conical roads are completely avoided which results in a number of accidents and deaths occurring on a frequent basis. It is very important to construct a system that has the capability to avoid such road accidents.

Our project is a system which provides more security in the hilly regions for the drivers. It is an IOT based system to check the speed in which a vehicle. If any vehicle exceeds the speed limit then other people on the road will be alerted by a buzzer. It will also alert the driver on a two way track about the status of the other track i.e, if any other vehicle is arriving from the other side.

I. AIM:

The proposed system aims to enhance the safety of drivers in hilly regions by providing alerts for potential hazards and enforcing speed limits to promote safe driving practices. The proposed system would use sensors to detect the speed of passing vehicles and compare it to the posted speed limit. If a vehicle exceeds the limit, an alert in the form of a buzzer would be provided to the driver to remind them to slow down. Overall, the system is aimed at improving safety for drivers in hilly regions by providing various alerts and warnings to help prevent accidents caused by poor visibility, high speeds and other hazards.

II. SCOPE

The scope of the project is to develop a comprehensive safety system for drivers in hilly regions, specifically focusing on mountain roads around cities. The system will to detect and respond to potential hazards and enforce speed limits. The actuators will provide outputs to alert drivers of dangerous conditions and the status of vehicles on two-way roads. The system will be integrated into the vehicle's onboard computer and navigation system to provide real-time alerts to the driver and other road users. The goal of the project is to improve the safety of drivers and reduce the number of accidents caused by hazardous road conditions and reckless driving in hilly areas.

III. EXISTING SYSTEM

There are many existing plans and technologies aimed at reducing the number of road accidents, such as the use of GSM and GPS for vehicle tracking. However, these technologies are primarily used for post-accident response, rather than for preventing accidents from occurring in the first place. One proposed approach to preventing road accidents is the use of an Arduino-based vehicle accident detection system. This system utilizes sensors such as vibration sensors and GSM and GPS to detect and respond to potential accidents by sending

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alerts to the authorities for immediate assistance. Another approach is the use of ultrasonic sensors in an accident control system. This system uses ultrasonic sensors, controllers, and Arduino to detect approaching vehicles and alert drivers through the use of buzzers and lamps.

Governments also take various measures to reduce the chances of accidents on turning roads such as providing glasses so that vehicles coming from the other side are aware of the coming vehicle Overall, various technologies and approaches are being developed to reduce the number of road accidents by detecting and responding to potential hazards. These include the use of sensors, controllers, and communication technologies such as GSM and GPS to alert authorities and drivers of dangerous conditions marks are located within quotation marks only when a complete thought or name is cited, such as a title or full quotation. When quotation marks are used, instead of a bold or italic typeface, to highlight a word or phrase, punctuation should appear outside of the quotation marks. A parenthetical phrase or statement at the end of a sentence is punctuated outside of the closing parenthesis (like this). (A parenthetical sentence is punctuated within the parentheses.)

IV. PROPOSED SYSTEM

The proposed system aims to address the issue of visibility on mountain roads with tight curves, where drivers may not be able to see approaching vehicles from the opposite side. The system will alert the driver of approaching vehicles by installing sensors on one side of the road before the curve and using a buzzer and signal light (red or green) on the opposite side.

When a vehicle is detected by the sensor, the signal light on the opposite side will turn red and the buzzer will sound to alert the driver. Additionally, a temperature sensor will be used to detect if the temperature drops below a certain point, which could cause visibility issues due to fog. If this happens, the buzzer will increase sound to alert the driver.

Overall, the system aims to improve safety on mountain roads by alerting drivers of approaching vehicles on tight curves and by warning the driver of visibility issues caused by low temperatures. This will help to reduce the number of accidents and save lives on these dangerous roads.

A. Flowchart:

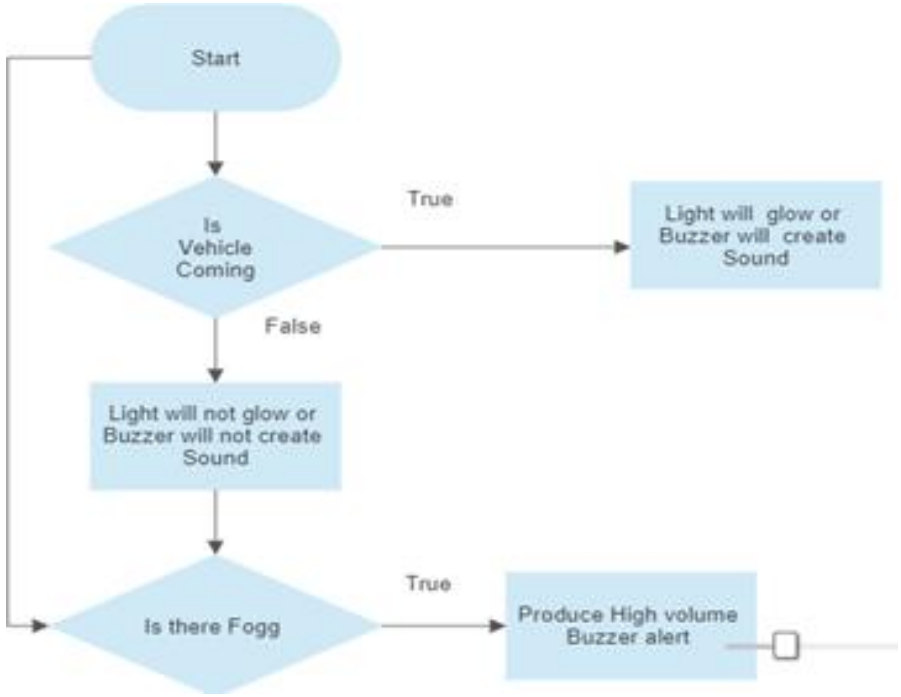

Fig. 1. Workflow of the system

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B. Architecture:

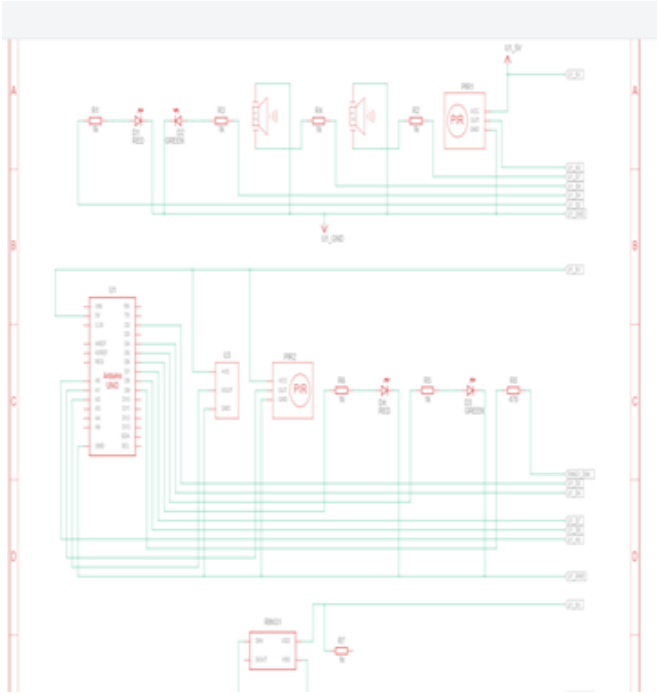

Fig. 2. Architecture of the system

SYSTEM SPECIFICATION:

A. *Black Diagram*: The proposed system for alerting drivers on mountain roads with tight curves will require the following hardware components:

Solderless Breadboard: This will serve as a base for building the circuit and connecting all the components.

Arduino UNO: The microcontroller that will control the sensor input, signal processing and actuator output.

100R and 1k resistors: These will be used to control the current flowing through the circuit and protect the components from damage.

Jumper wires: These will be used to connect the various components in the circuit.

V. DESIGN

Neo pixel ring: A ring of addressable RGB LEDs that will be used as the signal light.

PIR sensors: These will be used to detect the presence of vehicles approaching the curve.

Temperature sensor: This will be used to detect the temperature on the road and provide visibility warning when it drops below a certain point.

Actuators: 16X2 LCD display: This will be used to display the status of the system and other information to the driver.

LED: This will be used as the signal light to indicate the presence of an approaching vehicle.

Buzzer: This will be used to produce a sound to alert the driver of the presence of an approaching vehicle or visibility issues.

The system will also require the following software components:

Arduino IDE: This will be used to write and upload the code to the Arduino UNO.

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Tinker CAD: This will be used to simulate the circuit and verify that it is working as intended before uploading the code to the Arduino UNO

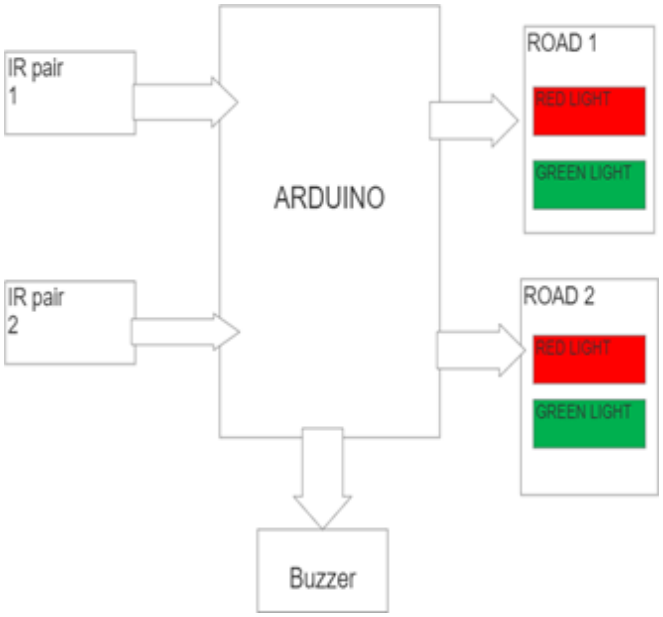

Fig. 3. Block diagram of the system

A. Circuit Diagram

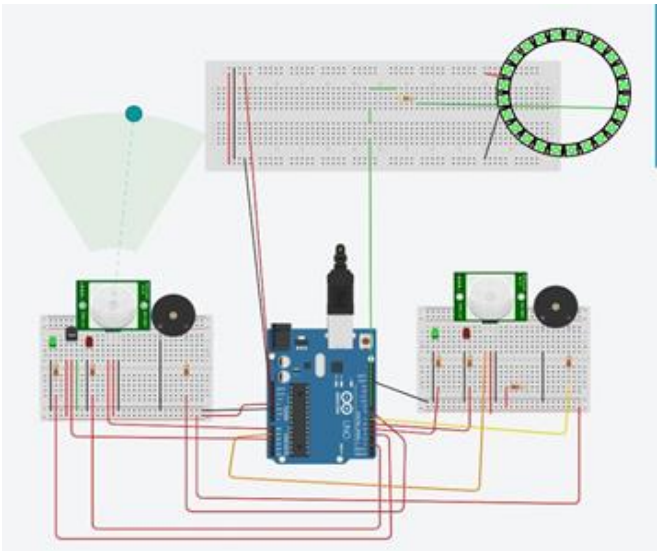

Fig. 4. Green signal when no vehicle passing

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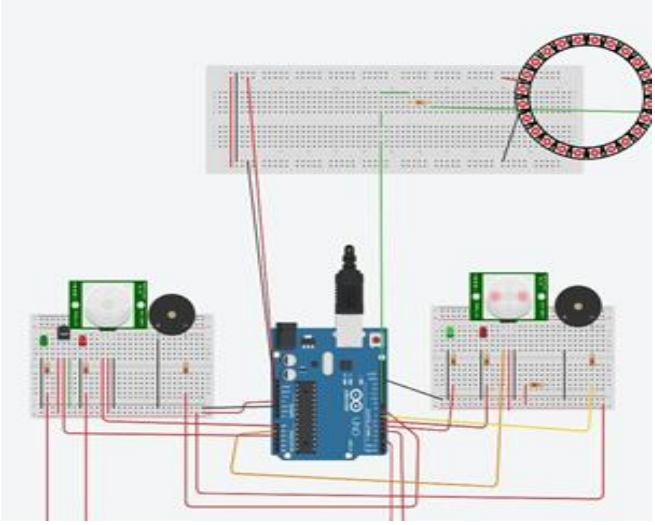

Fig. 5. Red Signal when vehicle passing

Working Model-

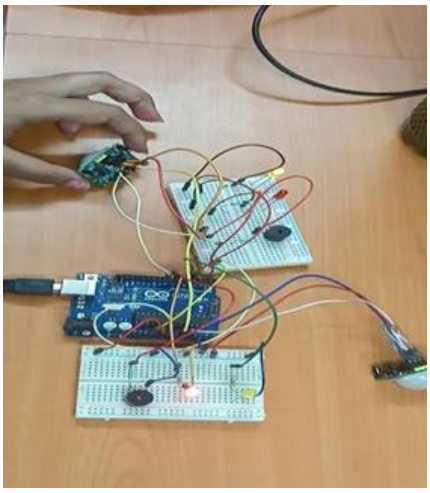

Fig. 6. Red Signal when vehicle passing

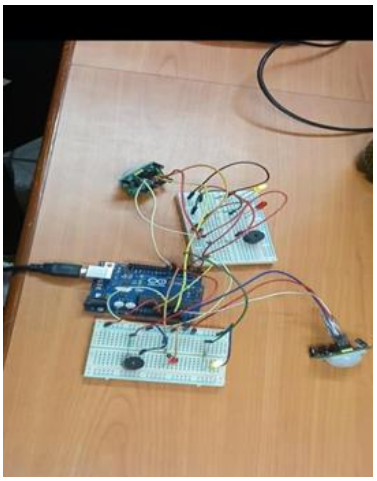

Fig. 7. Green signal when no vehicle passing

VI. RESULT

This project aims to decrease the number of accidents on curve roads by using an infrared (IR) sensor to detect approaching vehicles and an Arduino UNO microcontroller to control an LED light that alerts the driver of the oncoming vehicle.

VII. CONCLUSION

We are proposing a project to improve safety on mountain roads, specifically on curved sections, through the use of modern technology. This could potentially save lives and improve the reliability of these roads. It's important to note that there are already various technology solutions that can be implemented on mountain roads such as smart traffic lights, warning systems for drivers, and cameras to monitor dangerous sections of the road. Additionally, It would be important to conduct a thorough study and analysis of the specific problem and its causes, as well as consider the cost-benefit and feasibility of the proposed solution before implementing it.

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VIII. FUTURE SCOPE

There are several ways to protect sensors in critical places:.

Adding a protective cover: A cover can be placed over the sensor to protect it from dust, water, and other environmental factors.

Using a redundant sensor: Having a backup sensor can ensure that the system continues to function even if one sensor is damaged.

Adding a failsafe mechanism: A failsafe mechanism can be added to the sensor system to shut down the system in the event of damage or malfunction.

There are several ways to decrease the size of a unit to make it more compact and able to fit in narrow spaces:

Miniaturization: By using smaller and more compact components, the overall size of the unit can be reduced.

Modular design: By breaking down the unit into modular components, it can be made smaller and more flexible.

Using lightweight materials: Using lightweight materials such as plastic or carbon fiber can reduce the overall weight and size of the unit.

Implementing a system to detect the number of vehicles and their velocity can be done by using various technologies such as:

Video cameras: By using video cameras, the system can detect the number of vehicles and their speed by analyzing the images captured.

Radar: Radar technology can be used to detect the presence of vehicles and their speed by measuring the reflection of radio waves.

LIDAR: LIDAR (Light Detection and Ranging) can be used to detect the number of vehicles and their speed by sending out laser beams and measuring the time it takes for them to bounce back.

A speedometer can be added to the system to measure the speed of vehicles by using various technologies such as:

GPS: Global Positioning System (GPS) can be used to determine the speed of a vehicle by measuring the distance covered and the time taken to cover that distance.

Wheel sensors: Speedometers can be integrated with wheel sensors, which can measure the speed of a vehicle by measuring the rotations of the wheels.

Hall Effect Sensors: Speedometer can be integrated with Hall Effect sensors which can measure the speed of a vehicle by counting the number of magnets that pass by the sensor.

References

[1] Jessen Joseph Leo., R. Monisha, et.al., “Vehicle movement control and accident avoidance inhilly track”, IEEE Int. Conf. on Electronics and Communication Systems (ICECS).pp. 1- 5(2014).
[2] AnandBalajiP, “Hill Road Safety Assistance using Piezoelectric Sensor”, International Conference on Energy, Communication, Data Analytics and Soft Computing (ICECDS) 2017.
[3] Anuradha A, Kasangottuwar, “Implementation of Critical Intimation System for AvoidingAccidents in Hairpin Curves & Foggy Areas”, International Journal of Science Technology &Engineering, Vol. 5, Issue 5 November 2018.
[4] Avinash S Shetty, Bhavish Bhat P B, et.al, “Smart Transport System Signaling SensorSystem Near Hairpin Bends”, International Journal of Scientific & Engineering Research, Vol. 9, Issue 4 April 2018.
[5] Ashutha K, Ankitha K, “Smart Shopping cart using embedded system and wireless module”, Recent Patents on Computer Science (CSENG), UAE, Vol. 8, pp. 1-6, January 2016.