

# ACCIDENT PREVENTION SYSTEM IN HILLY AREAS AND DEADLY ZONES USING IoT & RF

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## I. Abstract

Accidents in hilly areas and hazardous zones are frequently caused by poor visibility, sharp curves, and limited warning systems. This project introduces an advanced Accident Prevention System utilizing ultrasonic sensors, RF433MHz communication modules, Arduino Nano, traffic signals, and an accident detection system using MEMSADXL335 sensor with Blynk IoT integration. The system uses ultrasonic sensors to detect vehicles approaching dangerous areas, such as sharp curves or steep slopes. Upon detecting a vehicle, the system activates nearby traffic signals, providing oncoming drivers with real-time alerts. Additionally, the system is equipped with RF433MHz modules (Tx and Rx) for vehicle-to-vehicle communication. When two vehicles approach a sharp curve simultaneously, the system automatically triggers a speed control mechanism in the vehicle units to prevent collisions by maintaining a safe distance between them. In case of an accident, the MEMSADXL335 sensor integrated into the vehicle unit detects abnormal movements or crashes. The system then immediately alerts authorities or nearby rescue services through the Blynk IoT platform, ensuring swift responses and accident reporting.

## II. INTRODUCTION

To monitor road conditions in real-time: deploy IOT-based sensor (such as temperature, humidity and motion sensors) to continuously monitor critical parameters like roads surface condition visibility, and weather in hilly and deadly zones. Enhance road safety in Hilly and hazardous zones, prevent accidents through real-time vehicle detection and alerts. There are different reasons why roads on mountain and hills are constructed in an exceedingly curved way rather than straight way. First, it's because heavy vehicles like trucks and semi-trucks find it difficult while moving on steep hill. Another thing is that in cold season, the road can get icy and so in straight path it'd be difficult for vehicles and even people to maneuver up and down on slick way.

### III.LITERATURE SURVEY

#### **a) Implementation of critical intimation system for Avoiding Accidents Hairpin Curves & Foggy Areas**

**Authors:** Anuradha A. Kasangottu war, Trupti Shripad Tagare Design and implement a critical intimation system to alert drivers of potential hazards on hairpin curves and foggy areas, reducing the risk of accidents. the significance of reducing accidents in challenging terrains such as hill stations, where visibility is low and curves are sharp. The system is designed to alert drivers using sensors and communication units to detect approaching vehicles in critical zones. The primary goal is to enhance road safety through timely intimation and decision-making support.

#### **b) Vehicle detection and Collision Avoidance in Hairpin Curves**

**Authors:** V. R. Prajwal, Karthikeyan V

Design a system architecture that integrates sensors, processing units, and communication systems. the significant safety challenges posed by hairpin bends, especially in hilly terrains where visibility is often limited. These sharp curves can obscure oncoming vehicles, increasing the risk of head-on collisions. Traditional safety measures, such as convex mirrors, are often inadequate, particularly during nighttime or adverse weather conditions. the system aims to provide timely warnings to drivers, allowing them to make informed decisions and navigate hairpin bends safely. This proactive approach is designed to reduce accidents and improve traffic flow in challenging road conditions.

#### **c) Sensor Based Accident Prevention system in Curving**

**Authors:** M G Anand, A Dhanya Kumar, N B Bhaskar

Design and implement a sensor based accident prevention system to reduce accidents on curving roads. In hilly and curvy roads, accidents often happen because drivers can't see the vehicles coming from the other side of the curve. These blind spots make it difficult to judge if the road is clear, especially during bad weather like fog or rain. Many times, people use horns to alert others while taking sharp turns, but this doesn't always work. Some drivers don't honk, and even if they do, the sound might not be heard clearly. This way, both drivers can slow down and drive more carefully, reducing the chances of accidents. Our system is simple, cost-effective, and can be very helpful in preventing collisions in dangerous curves on the road.

#### **d) Accident prevention and road safety in hilly region using IOT module**

**Authors:** R. Bhumika,A.Harshitha,SD.Meenaand M. Asha

Develop an IOT based system to prevent accidents and enhance road safety in hilly regions.Accidents in hilly areas are a major concern due to narrow roads, sharp turns, steep slopes, and unpredictable weather conditions. These factors make driving in such regions risky and often lead to serious accidents. Many times, accidents occur because there is no

warning system in place to alert drivers about upcoming dangers like hairpin bends, landslides, or sudden obstacles. To reduce such accidents, we decided to develop a project using **IoT (Internet of Things)** technology that can help in preventing accidents and improving road safety in hilly regions. Our idea is to use sensors to detect things like the presence of vehicles, dangerous turns, and even landslides. These sensors will collect real-time data and send alerts to drivers through a display or buzzer system. This project mainly focuses on monitoring the road conditions and sending warnings to drivers so they can slow down or take extra care. It can also help authorities by giving them updates about road conditions or any accidents that may have happened. By using modern technology like IoT, we believe we can create a smart and affordable system to make hilly roads safer for everyone.

#### **IV. ANALYSING AND DESIGN**

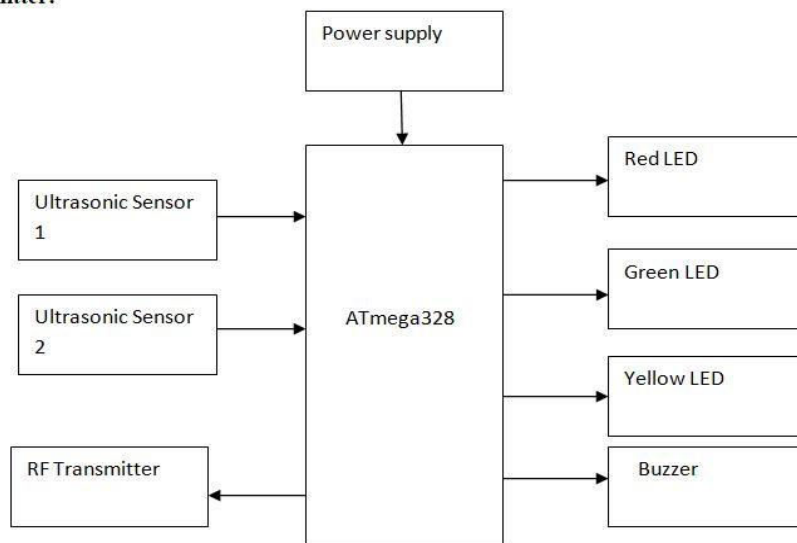
##### **PROPOSED SYSTEM:**

The proposed system consists of ultrasonic sensor, Mems Sensor, Power Source, Node MCU ESP8266, Buzzer, LED's, AT mega 328, RF Module (Transmitter, Receiver), Relay, Motor and finally Blynk App. The Transmitter is kept in desired location like deadly Zones, curve roads and Receiver is kept in the vehicle and Blynk app is downloaded by victims in the vehicle. The Proposed system transmitter will help in predicting the vehicles at deadly zones and gives the signal to the vehicles through the LED's. and the Receiver part will predict the vehicle accident movement and stops the vehicles motor at curve areas. Blynk app will give the accident information to the near by police station and hospital and gives the information in blynk app and through G-mails. The sending information from Node MCU to Blynk app is with the help of Esp8266. The Esp8266 is Wi-Fi module which is built in Node MCU. This allows vehicles to receive warnings about road conditions, traffic jams, or even accidents in advance. Vehicles equipped with IoT devices can communicate with each other, sharing information about obstacles or accidents on the road. This vehicle-to-vehicle communication helps prevent collisions by alerting drivers about unexpected dangers in time to take action. Moreover, the system can track environmental changes like weather conditions, which are crucial in hilly areas where sudden changes can lead to hazardous situations. If the weather turns bad, sensors detect things like heavy rain or fog and send alerts to both drivers and local authorities.

## V. BLOCK DIAGRAM

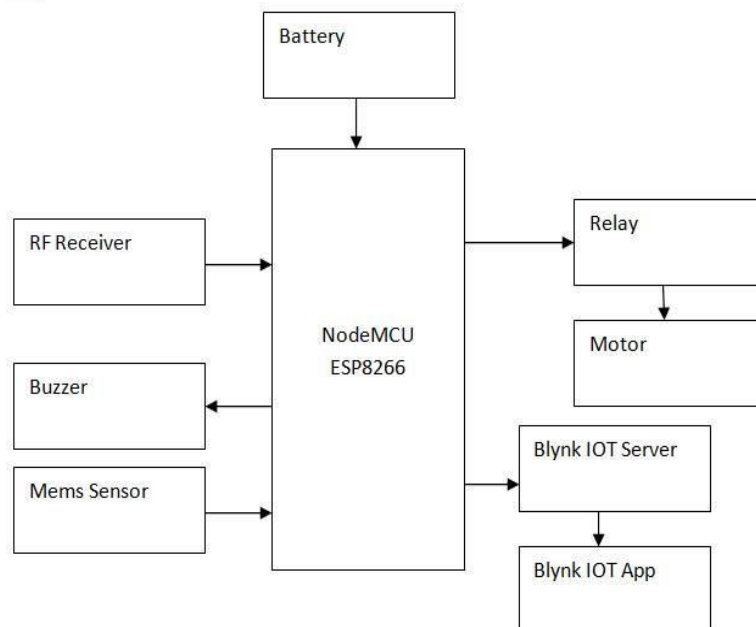
**Block Diagram:**

**Transmitter:**

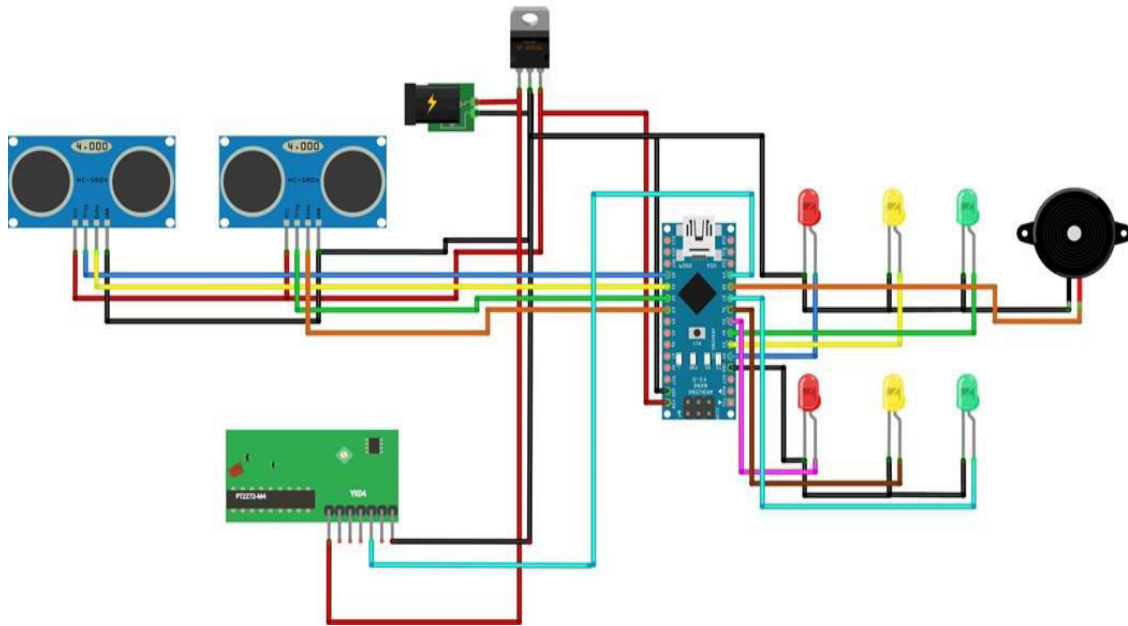


**Fig. 1 TANSITTER BLOCK DIAGRAM**

**Receiver (Bike):**

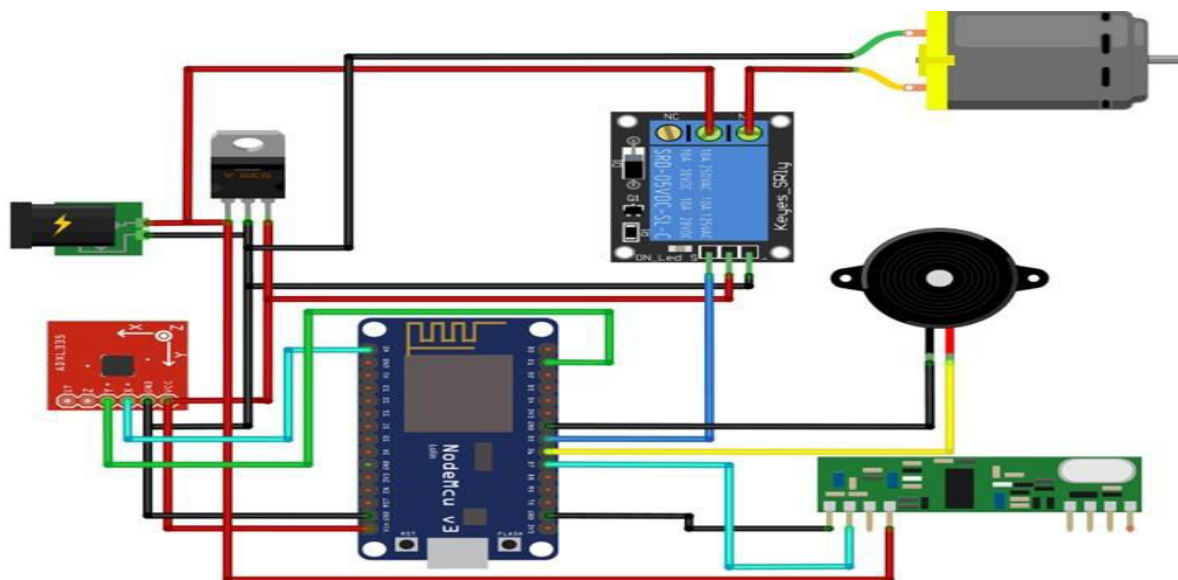


**Fig. 2 RECEIVER BLOCK DIAGRAM**



**VI. SCHEMATIC DIAGRAM**

**Fig.3 TRANSMITTER SCHEMATIC DIAGRAM**



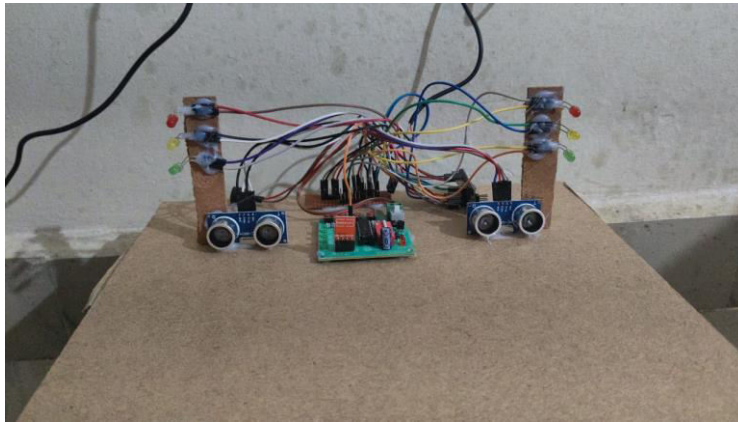
**Fig.4RECEIVER SCHEMATIC DIAGRAM****VII. RESULT**

Fig.5 Outlook of the transmitter

This device is fixed at side of a curve roads to monitor the distance of the Vehicle and when vehicle is coming it would be give signal by led lights. It would be shown in opposite to vehicles.

The following indication are observed in the transmitter when safe at road.

- Green LED is on
- Red is off and orange is off
- Buzzer is off

The following indication are observed in the transmitter when vehicle danger at curve.

- Red LED is on
- Green is off
- Buzzer is on

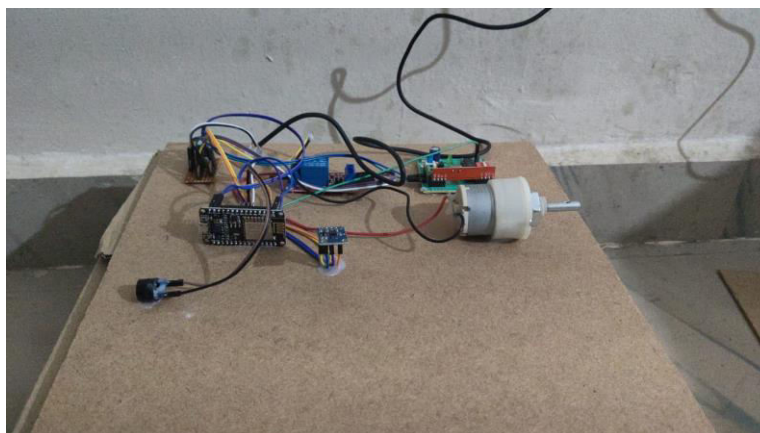


Fig 6 Outlook of the Receiver

This device is fixed at the inside the vehicle to monitor the position of the vehicle and receive the signals from transmitter and detects the led lights when two vehicles are near to curve it will stop the vehicle in case vehicles are met accident through the Blynk IoT software information passes through calls and messages in Blynk app and emails.

- It stops the vehicle automatically when the transmitter gives red led on both sides.
- It will pass information when the vehicles are met accident and gives buzzer sound to nearby people.

The following indicates are observed when vehicle is safe

- Green LED is on
- Motor is on
- Buzzer is off

The following indicates are observed when two vehicle is danger in curve road.

- Red LED is on
- Motor is off
- Buzzer is on

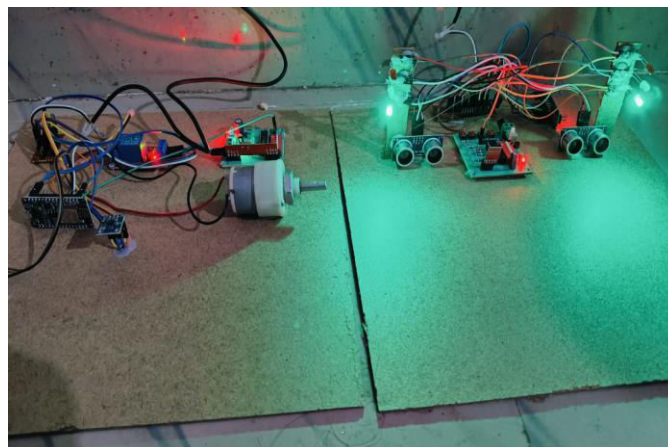


Fig 7 Project Outlook

These two devices are fixed at transmitter on road and receiver inside the vehicle. The transmitter will give the signals to the vehicle at curve road when two vehicles are at curve in opposite side at road gives the buzzer sound to vehicles and when they too near through the receiver vehicles will be stopped. when the vehicles met accident through the mem's sensor detects the vehicle position and passes the information through Blynk IoT to near police Station and hospital and mails to the family. This is the outlook of the project.

## VIII. CONCLUSION

In the present globe the proportion of accident has increased so widely because people weren't helping when accident occurs even person is fallen before of their eyes .So our main motive of this project is to avoid the accident by implementing sensor based technology and in future if accident of person is happened he wouldn't need to depend upon others he can safely travel or can pass curves or hilly roads when LED light glows it gives in indications of alert .The purpose of this paper is to decrease the quantity of accidents in curve roads. this can be done by alerting the driver by means of LED light which glows when vehicle comes from the opposite side of the curve. The is detected by the assistance of Ultrasonic sensor which is interfaced to the microcontroller Arduino NANO. By this we can save thousands of lives within the curve roads.

## IX. REFERENCES

- [1] Jessen Joseph Leo., R. Monisha., et.al.: Vehicle movement control and accident avoidance in hilly track ,IEEE Int. Conference on electronic and communication system (ICESP).pp.1-5(2014).
- [2] Ki-Heyon Kim. Dong-Hoon Yum.,et.al. :Improving driver's visual field using estimation of curvature, IEEE Int.Conf.on control Automation and System (ICCAS).pp.728-731(2010)
- [3] Duy Tran., WeihuaSheng.,et.al.: A hidden Markov Model based driver intention prediction systems, IEEE Int. Conf. On cyber technology in Automation, Control, and intelligent System (CYBER).pp.115-120(2015)
- [4] Jiang Yuying., WuYazhen.,et.al.: A surveillance method for driver's fatigue and distraction based on machine vision, IEEE Int. Conf. on Transportation, Mechanical, and Electrical Engineering (TMEE).pp.727-730(2011)
- [5] Ashutha K., Ankitha K., Smart Shopping Car using embedded system and wireless module ,Recent Patent on computer science (CSENG), UAE vol. I, pp. 1-6 January 2016