

ACCIDENT PREVENTION FOR HAIRPIN BENDS USING ARDUINO UNO

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Abstract - An accident prevention system is a device that helps to avoid or reduce the impact of road crashes by using different methods such as measuring speed, distance, and angle of vehicles, capturing images of the road conditions, sending location and emergency messages to authorities and family members, etc. A hairpin bend is a turn that looks like a hairpin or a U-shape on a road that goes up or down a slope. A vehicle has to make a very tight turn to stay on the road. Hairpin bends are common on mountain roads or hilly areas where the road has to fit in a narrow space. Accident prevention system for hairpin bend using Arduino is a great way to keep drivers safe while they are on the road. This system uses an Arduino microcontroller to detect a sharp bend in the road and alert drivers when they are approaching a hairpin turn. The system works by using an Arduino board to detect the sharp turns in the road and then activating a warning light to alert drivers when they are approaching a hairpin turn. The Arduino board is programmed to detect the vehicle in the opposite directions and then send a particular light signal when it reaches a certain angle. This signal can be used to trigger a warning light that will alert drivers to slow down and be cautious when approaching a hairpin turn. This allows drivers to slow down and be cautious even before they reach the turn.

Index Terms - Arduino UNO, RS232, LED display, LCD, Camera.

I. INTRODUCTION

Vehicles play an important role in our daily lives, e.g., moving from one place to another, transporting goods, food, etc., and reducing people's travel time. Based on current knowledge and reports, many accidents on mountain roads occur due to poor visibility of other oncoming vehicles, landslides, and poor weather conditions. However, no safety precautions or measures have been taken to avoid them. Because of this, lives are lost. Vehicles that make sharp turns are more prone to accidents. Due to the lack of visibility between the line and the curving vehicle, drivers must exercise extra caution when negotiating these deep turns. There are also traffic jams caused by disorderly traffic. Vehicles are important in everyone's daily life. In addition, there is a high rate of accidents caused by high speeds and reckless driving. In hilly areas, the situation is more dangerous. Due to the sharp turns, vehicles have no visibility. The proposed system will therefore help avoid cornering accidents and save lives.

II. LITERATURE SURVEY

The paper [1] proposes a prototype of Collision detection system is developed using a server running as an eye in the sky and a device having GPS and can communicate with server. Smartphone is considered to represent a mobile vehicle having a device containing GPS for identifying geographic location of the vehicle and transmit and receive data to and from server by sending data fields about current status as the device is moving it send location updates to server. Server processes this data and identifies the existence of overlapping safety zones and replies the information about nearby devices and collision warnings if any overlapping is detected among safety zones. This system is successfully deployed and tested with a few mobile devices in which alerts are generated for overlapping safety zones for the devices.

The paper [3] proposes as the population is increasing day by day the chances of accident occurring is also increasing. The main cause of all these accidents is negligence, negotiation of safety measures etc. As technology is getting advanced in a greater speed safety measure also being modified but still accidents are still happening meeting with an accident.

The paper [4] proposes in hilly areas negotiating a hairpin bend is not an easy task. The driver must be alert always negotiating blind curves. Accidents mainly occur due to over speeding of vehicle while negotiating a sudden curve. In hairpin bends always first preference should be given to uphill vehicles. Deciding the importance based on priority algorithms one vehicle is allowed and the speed of other vehicles is gradually reduced by DC motors. The location of the vehicle is based on GPS. Deciding the importance based on priority algorithms one vehicle is allowed and the speed of other vehicles is gradually reduced by DC motors.

The paper [5] describes an accident cannot be completely avoided, but they can be mitigated with appropriate traffic management. The sensor on the other side of the curve sends a signal to the vehicle approaching from the opposite direction in the same way. Each system has NODE MCU module, ultrasonic sensor and (LCD) Liquid crystal display that are powered by solar energy. The proposed sensor-based safety system can be placed at a hairpin bends to alert vehicle drivers using the road.

The paper [7] describes an accident by high intensity of light cannot be eliminated by previous system and reduces of air pressure cannot be sensed. By using pressure sensor that will eliminate accident happened by sudden reduction of tyre pressure. The sensors are used here for controlling and preventing accident in most hilly regions and curve roads. The sensor which is placed in front of the vehicle, detects the obstacle in any form and alerts the driver by alarm indication. The light intensity of the opposite vehicle is also monitored and controlled by using certain controlling methods.

The paper [8] describes the various alternatives were suggested to deal with the aforesaid problems. The main mechanism is the communication between the vehicle and the roadside unit have established a technique to alert the driver of their respective vehicle while taking turns via a wireless communication system. This system will use the (GPS) global positioning system for tracking and locating the accident location and an onboard GPS module is used to communicate the coordinates via SMS.

The paper [9] proposes the driving is one of the very difficult tasks in hills. Drivers have to be alerts all the time while driving in these regions. To avoid these problems in curves or hairpin bends a piezoelectric sensors-based system is implemented the system was able to alert the vehicles in the opposite side, but not able to detect vehicle when the vehicle is not over the piezo sensor. Additionally, the system was able to collect the information regarding the number of uphill and downhill vehicles in a spot and update it over the cloud along the over speeding vehicle data.

The paper [10] proposes the availability of the on and off vehicle information increases, the opportunities to use information not generated within a given supplier's electronics system also increases. The use of this "free" information increases the opportunities of the electronics system integrator and may allow more complex and value-added systems at lower overall cost to the end user. The use of electronics in heavy vehicles continues to experience good growth but continues to lag that of the automotive market due to the need to demonstrate a return through reduced operating cost, lower accident costs, or increased productivity.

III. EXITING SYSTEM

One possible system for accident prevention for hairpin bends is based on proximity sensors. The system involves installing a set of proximity sensors, warning lights and a convex mirror by the side of the road. The warning lights indicate the status of the road, with red meaning danger and green meaning safety. The convex mirror helps the drivers to see around the bend.

IV. PROPOSED SYSTEM

A new system has been developed to detect vehicles on one side of a hairpin road and provide assistance to oncoming vehicles. The system uses Python-based image processing to classify different vehicles passing through one direction of the road. It includes two cameras and two display boards, which notify oncoming vehicles about the vehicle category and time taken to pass the curve. The system has been demonstrated using webcams for input and the Python GUI library for display. Its vehicle classification accuracy is high. The display board provides useful information to drivers, helping them navigate the road safely.

A. LIQUID CRYSTAL DISPLAY

The liquid crystal display (LCD) is a small, flat electronic display that makes use of the liquid crystals' ability to modulate light (LCs). Light is not directly emitted by LCs. LCD is a small, flat electronic display that makes use of the liquid crystals' ability to modulate light.

B. CAMERA

A camera is a device that has a lightproof chamber with a lens and a shutter. The lens and shutter work together to project an image onto a surface where it can be recorded or translated into electrical impulses. The recording can be done on photosensitive film or an electronic sensor. The electrical impulses can be used for television broadcasting.

C. RS232

Recommendation for standard RS 232A standard for serial data transmission called 232 was first introduced in 1960. It formally defines the signals that are sent between a modern DCE (data circuit terminating equipment) and a DTE (data terminal equipment), which includes a computer terminal. The standard specifies the physical dimensions and printout of connectors, the electrical properties and timing of signals, the meaning of signals, and their meaning.

D. ARDUINO UNO

Arduino is a microcontroller board that is designed to make the use of electronics in inter-disciplinary projects more accessible. It is a single-board device that consists of open-source hardware, that is built around an Atmel AVR microcontroller (8-bit) or an Atmel ARM microcontroller (32-bit). Arduino boards are available in pre-assembled form or as do-it-yourself kits. Additionally, information regarding hardware design is also available for those who want to assemble an Arduino by hand. Arduino is open free source component to use.

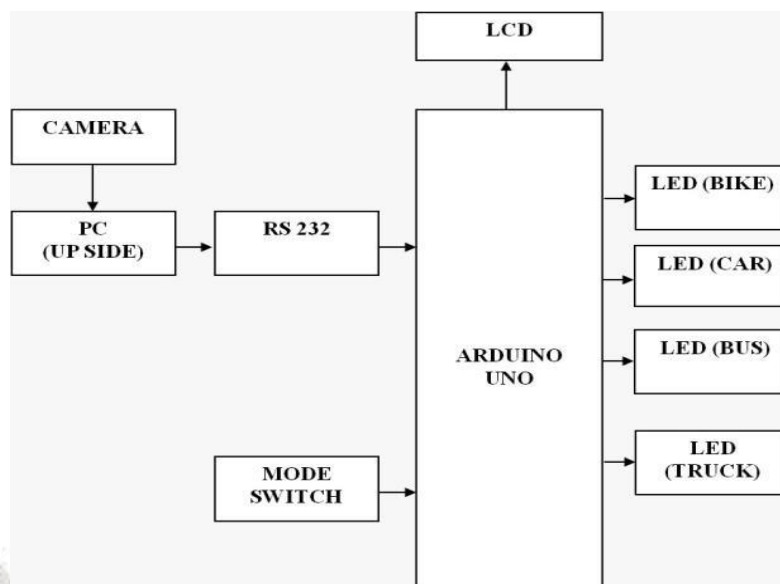


FIGURE 1: BLOCK DIAGRAM OF ACCIDENT PREVENTION FOR HAIRPIN BENDS USING ARDUINO UNO.

V. RESULT AND DISCUSSION

The proposed device can efficiently keep away from and manipulate site visitor’s injuries on hairpin bends. The system consists of two cameras and two display panels. To demonstrate the system, it reads inputs using a webcam and displays them using a Python GUI library. The system is accurate for vehicle classification. It gives the preference of the vehicle according to the class of the vehicle. The vehicle are bus ,car, bikes, and trucks are classified and identified by the system and indicate to the opposite side.



FIGURE 2: DESIGN OF THE SYSTEM

VI. CONCLUSION

The proposed system makes it possible to avoid accidents and effectively control traffic on twisty turns. This system consists of two cameras and two information boards. To demonstrate the system, it uses webcams to read input and a Python GUI library for display. This system is accurate for vehicle classification. Prefer a vehicle based on its class. The proposed system assists vehicles in winding curves, reducing congestion. The proposed system makes it possible to avoid accidents and effectively control traffic on twisty turns. Some functions can be added to the camera in the form of hairpins to record the vehicle and its license plate, so that in the event of an accident, detailed information about the vehicle can be obtained from the camera and can also be investigated by reviewing the footage of the accident. A warning system can be added when the vehicle crosses the on coming lane.

VII. REFERENCES

- [1] Anil Kumar Gupta, Gaurav Wable, Tamn Batra, "Collision Detection System for Vehicles in Hilly and Dense Fog Affected Area to Generate Collision Alerts" ,Proc. IEEE,2021.
- [2] Aswin M Suthan, Aswin P Anil, Crist Joseph, Abhishek Soman, Syamamol, "Accident Avoidance and Vehicle Detection in Hairpin Curves using Machine Learning" procIEEE,2020.
- [3] Jessen Joseph Leo, R.Monisha B.T.Tharani Sri Sakthi , A. John Clement Sunder, "Vehicle Movement Control and Accident Avoidance in Hilly Track" ,2016.
- [4] M. Poongothai, Gokul kathirvel, "IoT Based Accident Prevention System for Hairpin Bend Roads" in 2020.
- [5] Prajwal "Vehicle Detection and Collision Avoidance in Hairpin Curves" ,2015.
- [6] Rajesh Pandey, Avinav Pathak, Nidheesh Sharma, Rohit Vats, "Internet of Things Based Approach to Detect Obstacle in Fog to Avoid Accidents" ,2017.
- [7] R.Meena , Lavanya, and K. Suresh Kumar, "Pre- Crash Sensing and Warning System in Hilly Region" ,2014.
- [8] Tobias Glaessel, Daniel Bachinski Pinhal, Michael Masuch, "Manufacturing Influences on the Motor Performance of Traction Drives with Hairpin winding" in 2019.
- [9] V. Ramachandran, R. Ramalakshmi, K. Mathankumar, "Accident Prevention and Traffic Pattern Analysis System for Hilly Regions"@IEEE Dec 2019.
- [10] William R. Svihart and Jerry D. Woll Eaton VOW Technologies San Diego, California, "Integrated Collision Warning and Vehicle Information Systems for Heavy Vehicles" ,2019.

