COLLISION AVOIDANCE AT HAIRPIN CURVES USING SENSORS

[1]R. ANUSHA, [2]K. SONIA, [3]V.M.K. VAMSI PRASAD, [4]J.RAJ KUMAR,
[5]Mr.M. SRINIVASA CHAKRAVARTHY
[1,2,3,4]UG Student,[5]Associate Professor, Department of Computer Science and Engineering,
Godavari Institute of Engineering & Technology, Rajahmundry, AP

Abstract:

In the world, India ranks top in road accidents. Mainly road accidents are caused due to High speed or when the driver is not aware of the other vehicles coming opposite to it especially in the deep curves. Such types of curves are called as HAIR PIN CURVES. The existing system makes use of convex mirrors at the curves so that the driver can easily detect the vehicle coming in the opposite direction. This system works well during the day but not effective in night. The proposed system makes use of sensors at hairpin curves which work very efficiently during the night time. Placing the sensors at each side of the curves will help us to solve the problem. The usage of sensors is that if the vehicle is 10 meters away from the curve the sensor sends the signal to the vehicle coming in opposite direction in the form of light. In the same way the sensor at the other side of the curve will send signal to the vehicle coming from the opposite direction. In this way by using sensors we can avoid a greater number of accidents mainly at the deep curves. Reducing the rate of accidents increases the well-being of a person.

Key words: Hairpin curves, Accidents, Deep curves, Internet of things etc.

1. INTRODUCTION

Hairpin turns are often built when a route climbs up or down a steep slope, so that it can travel mostly across the slope with only moderate steepness and are often arrayed in a zigzag pattern. Highways with repeating hairpin turns allow easier, safer ascents and descents of mountainous terrain than a direct, steep climb and descent, at the price of greater distances of travel and usually lower speed limits, due to the sharpness of the turn. Highways of this style are also generally less costly to build and maintain than highways with tunnels. Hairpin curves are used when the terrain is very steep. Roadways will have a maximum grade that a vehicle or truck can traverse. The zigzag component of the picture above minimizes the grade, or steepness of the roadway. If you have ever ridden a bike up a steep hill, you might have found yourself zigzagging back and forth across the roadway to get up the hill. The same principle applies here. When designing a roadway, there are guidelines as to the length of the radius of curve based primarily on the design speed. The faster the designs speed, the longer the radius of the curve. Truck traffic is a major factor in the design criteria for the minimum radius of curvature. Turning templates are used to determine if a truck can make the turn without too much of tracking. A bend in a road with a very acute inner angle, making it necessary for an oncoming vehicle to turn almost 180° to continue on the road. Such turns in ramps and trails may be called switchbacks in American English. While driving on roads at hairpin section, many drivers face accident which results them into serious injuries or even death. The main reason behind this accident is curves and bends of roads while turning in Ghats. It becomes difficult to see vehicles coming from other lane and turning drivers usually have to assume a way for turning at such critical section this creates a great risk of life other reason for accident in hairpin section is that only one vehicle can turn at turnings at a time. If two vehicles come face to face while turning, it creates a chance of accidents and it becomes difficult to handle. At night, due to no streetlights it becomes a difficult task of driving on hairpin bends and especially while turning. It becomes more difficult at night to make a turn as vehicle coming from another side of road is not visible due to darkness.

2. LITERATURE SURVEY

Literature survey is the most important step in software development process. Before developing the tool, it is necessary to determine the time factor, economy and company's strength. Once these things are satisfied, then the next steps are to be determined which operation system and programming languages are needed for the development of the project. Before developing the project, the people need external support. This external support can be taken from books or websites. Before developing the project, the above consideration is taken into account for the development of the proposed system.

R. S. Rakul has proposed "Implementation of Vehicle Mishap Averting System Using Arduino Microcontroller". The Unit has been designed to prevent an accident by collision. The 'heart' of the Unit is Arduino microcontroller which performs all the vital tasks of the system. And it will be discussed in the following subsequent sections. This system will receive information from the Ultrasonic transceiver, and accordingly transmit the data via the Wi-Fi router to the controller. Through the buzzer indication, light emitting display, and liquid crystal display, the vehicle information will be shown to the vehicle users. The primary purpose of the system is to prevent collision between two or more vehicles when they take a turn on U-bends.

Lorate Shiny1, A. Rajakumaran2, S. Vijay are proposed "Vehicle Control System with Accident Prevention by Using IR Transceiver" Drivers go at very high speed usually near school zone or indulge in speeding causing inconvenience to the other vehicle users and pedestrians. Even though these are meant for the safety of the vehicles traveling and for the general public, it is not usually practiced and ignored by the vehicle drivers. The main objective of this paper is to design a Vehicle controller meant for vehicles speed control and monitors the zones, which can run on an embedded system. Vehicle Controller can be custom designed to fit into a vehicle dashboard and displays information on the vehicle.

P. Aravind, V. Kishore are proposed "E-Vehicle- Automatic Speed Control Using Android Mobile Application": In the rapidly changing world, the speed has become an important factor in humans' life. Everyone wants to get fast as much as possible. In the fast speed world, there are two perspectives, one is maintaining the speed and the other is to maintain the safety medium as well. In the smart speed world, the technologies play a major role. Smart phones are the key part of the growing technologies in the globe. Android application is a one which is ruling almost 75% of the crowd. So, our objective is to ensure maximum safety to the person who is driving the vehicle and to the people on the road in all parameters through a mobile app.

K. P. Sreevishakh et al has proposed an automatic accident prediction and the notification system using AMR and Sonar sensor. The Unit has been designed to prevent an accident by collision. The 'heart' of the Unit is Arduino microcontroller which performs all the vital tasks of the system. And it will be discussed in the following subsequent sections. This system will receive information from the Ultrasonic transceiver, and accordingly transmit the data via the Wi-Fi router to the controller.

3. PROPOSED MODEL

The project has been designed to prevent an accident by collision. This project proposes an idea to reduce the accidents and provide safety measuring techniques in hairpin curves using sensors, which detects the obstacles within 10 meters range of the vehicle using ultrasonic sensors. If a vehicle is at 10 meters from the curve, then the sensor will automatically sense the signal and gives the signal to the driver coming in the opposite direction with a LED light and a buzzer. It uses two Ultrasonic sensors, which are placed on either side of the hairpin bend. One sensor S1 is installed by the side of the uphill section of the road, similarly other sensors S2 is installed by the side of the downhill section of the road. The sensors are mutually connected to ESP8266 through wires. Based on the output of sensors, position of vehicles on either side of the bend is detected which is provided as an input to the NodeMCU. The NodeMCU which works on a power supply of 5V runs and triggers the warning LEDs to glow (L1 in Downhill or L2 in Uphill) and thereby intelligently controlling the movement of vehicles at the bend. Warning LEDs along with a Buzzer are placed at the either side of the curve of a hairpin bend.
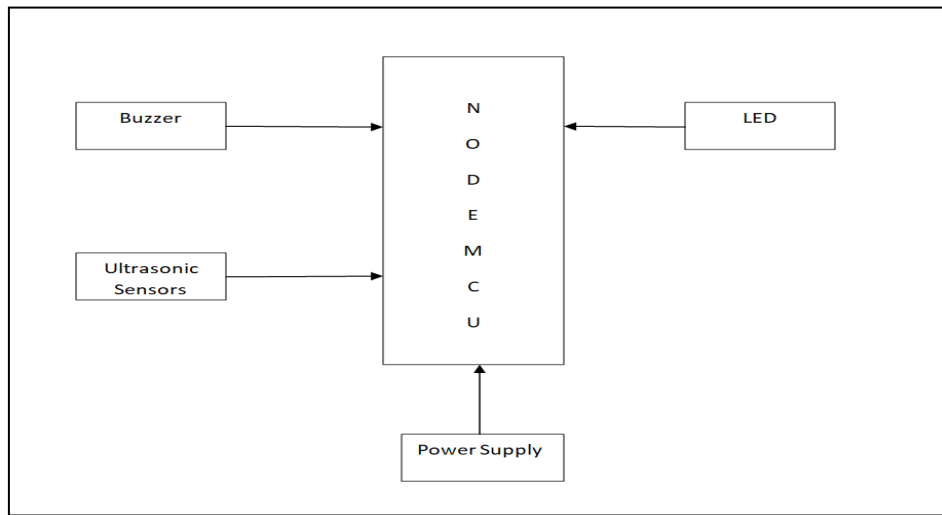
Fig 1 System Architecture

The above Figure 1 gives an overview about the architecture of Collision Avoidance At Hairpin curves.

4. RESULTS

The below result shows the detection of the signal when the vehicles are far away from the sensors.

Fig 2: Vehicles far from Sensor

The below result shows the detection of the signal when the two vehicles are near the sensors.
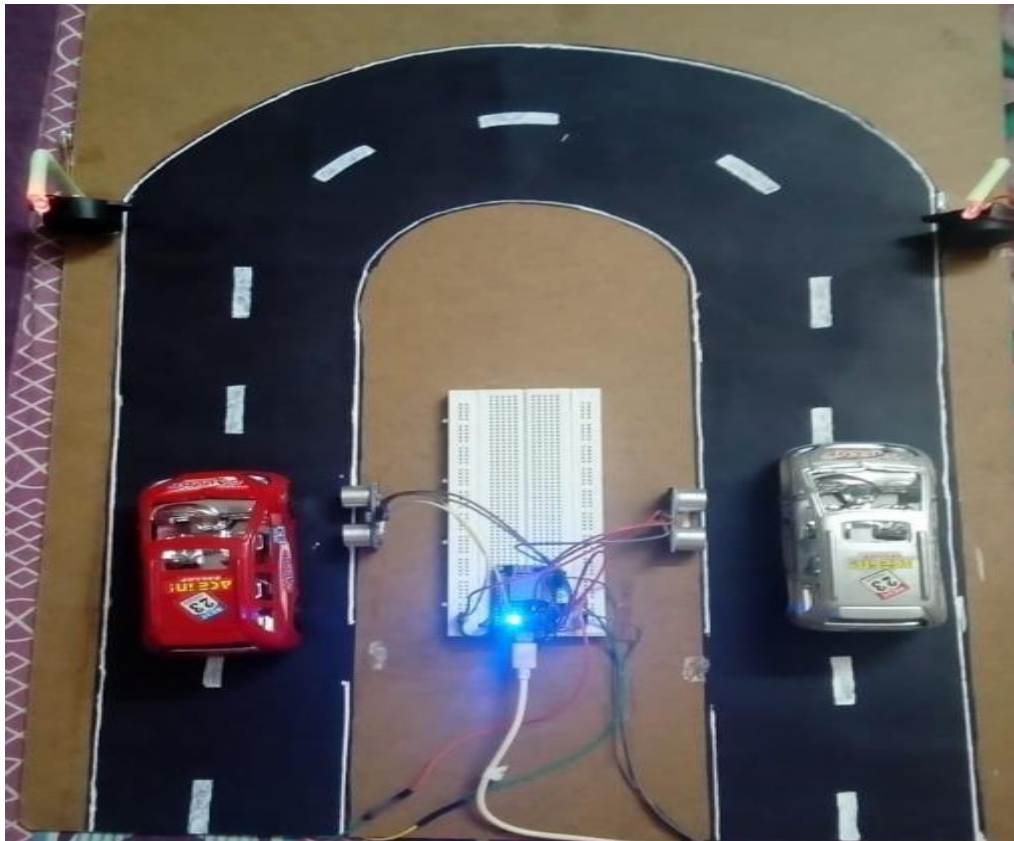

Fig 3: Signal Detection in case of two vehicles near the sensor

The below result shows the detection of the signal when one vehicle is near the sensor.
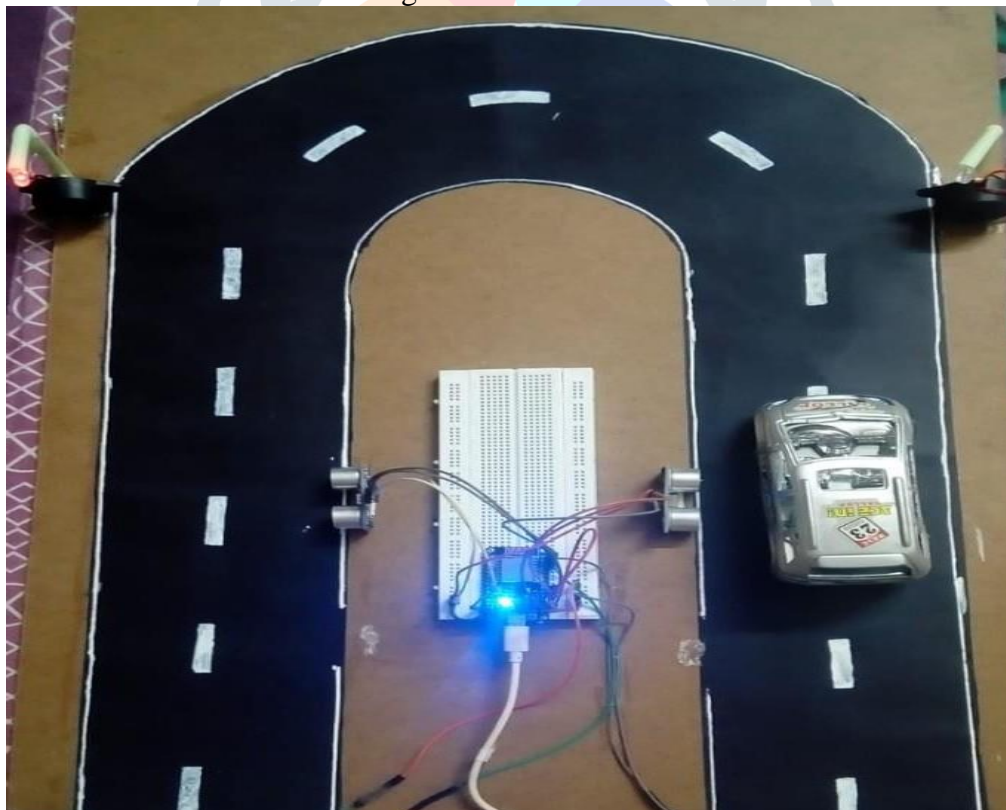

Fig 4: Signal Detection in case of one vehicle near the sensor

5. CONCLUSION

People have become much more dependent on transportation systems in recent years, transportation systems themselves face not only several opportunities but several challenges as well. Continuous growth of population all over the world creates a great challenge to the transport management systems. The conventional methods are no longer effective enough for solving complex and challenging transportation management problems. Knowledge from different research areas is needed for developing these systems. Very often complex transportation systems require integration of different methods from different branches of science. Our Collision Avoidance System consisting of a NodeMcu Esp8266, ULTRASONIC sensors, warning LEDs, BUZZER when implemented has proven to be more effective than just a normal traffic mirror setup.

REFERENCES

[1] R.S. Rakul, S. Ravia and K.N. Thirukkuralkani proposed a paper on "Implementation Of Vehicle Mishap Averting System Using Arduino Microcontroller".

[2] Jessen Joseph Leo and R. Monishaz proposed a paper in International Conference on Electronics and Communication System JCECS -2014 on "Vehicle Movement Control and Accident Avoidance in Hilly Track".

[3] D. Haripriya, M. Puthanial and Dr. P. C. Kishore Raja published a paper on "Accident Prevention System and Security for Vehicles'' in International Journal of Computer Trends and Technology in 2014.

[4] S.P. Bhumkar, V.V. Deotare and R.V. Babar published a paper on "Accident Avoidance and Detection on Highways" in 2012.

[5] S. Uvaraja and V. Raghav Prashanth, "Advanced Pre-Warning System (Railways)," IACSIT International Journal of Engineering and Technology, vol. 4, no. 2, April 2012.

[6] K.P. Sreevishakh, Prof.S.P. Dhanure, "Automotive Crash Insight using AMR Sensor System," International Journal of Advanced Research in Computer and Communication Engineering, vol. 4, Issue 5, May 2015.

[7] Apeksha S. Chavan, Dipali D. Pansare, Swapnil P. Kadam, Naval K. Mayekar, KavitaV.Jha, Poonam R. Bhagwat, "Design of Accident Prevention System Using QRD 1114 and CNY 70 Sensors," International Journal of Emerging Technology and Advanced Engineering, ISSN 2250-2459, vol. 3, Issue 5, May 2013.

[8] James K. Kuchar and Ann C. Drumm, "The Traffic Alert and Collision Avoidance System,'' Lincoln Laboratory Journal, vol.17, no. 2, 2007.

[9] S. Saranya, M. Shankar, N. Muthulingam, and T.Sakthivarman, "Intelligent Automobile System for Accident prevention and detection," International Conference on Engineering Trends and Science & Humanities (ICETSH-2015), ISSN: 2348 – 8549.