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Road Safety at Ghats using IoT

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Abstract: ***This paper describes how to overcome accidents at Ghat roads. In the developing countries accident is the major cause of death. If we look at the top 10 dangerous roads in the world we can see that all of them are mountain roads and curve roads. In the mountain roads there will be tight curves and the roads will be narrow. In these kinds of situations the driver of a vehicle cannot see vehicles coming from opposite side. Thousands of people lose their lives each year because of this problem. The solution to this problem is developing the Aurdino based project to provide safe and secure journey while travelling to the Ghat roads, Hill Stations, etc. It is provided by alerting the driver about the vehicle coming from opposite side. This is done by keeping a sensor in one side of the road before the curve and keeping a LED light after the curve, so that if vehicle comes from one end of the curve sensor senses and LED light glows at the opposite side. By looking at the LED light on/off criteria driver can become alert and can slow down the speed of the vehicle.***

Keywords: Mountain Roads, Accident prevention, Ultrasonic sensor, Aurdino IDE, Alerting Driver.

I. INTRODUCTION

Our society is facing many problems, major problem is accidents. Accidents mainly occur due to carelessness driving and bad conditions of the road. As a major component of road geometric design, curved road segment, due to their alignment characteristics are most prone to traffic crashes among all road geometric elements. According to a survey, crashes on curved segments accounted for 10% of total number of traffic crashes. Correspondingly, the number of deaths accounted for 13% of total number of deaths. In Narrow roads, Hilly areas, Ghats sections', negotiating hairpin bends and curves is not an easy task. Driver has to be alert all the time while driving in such situations.



Fig: Ghat Road

Accidents mainly occur due to over speeding of vehicle while driving. While driving on roads at ghat section many drivers faces accident which results them into serious injuries or even death is the main reason behind this accident is curves and bends of roads while turning in ghats.[1]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. According to Million Death Study (MDS) about 2.3 million people die in India per year. In that 137 thousand is because of road accidents. The problem in these curve roads is drivers can't able to see the vehicle or obstacles coming from other end of the curve[2]. If the vehicle is in very speed then it is difficult to control and there are chances of falling to cliff. The solution for this problem is alerting the driver about the obstacle or vehicle. Usually horn is used for this purpose. But in the rainy seasons horn will not be heard. So horn is not a good solution to solve this problem. These are the major reasons for accidents. To avoid these problems in curve roads or T roads we are introducing ghat road alerting system.

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II. EXISTING SYSTEM

In the existing situations, the mountain roads will be tight curves and the roads will be narrow. In these kinds of situations the driver of a vehicle cannot see vehicles coming from opposite side. The other end of the curve road cannot be seen by the driver because of the obstacles like trees or rocks. There is no facility of alerting driver to prevent from accidents. There may be a high chance of happening accidents during this time.

III. PROPOSED SOLUTION

To avoid these problems in curve roads or T roads we are introducing Arduino based project. It provides by alerting the driver about the vehicle coming from opposite side. This is done by keeping a sensor in one side of the road before the curve and keeping a LED light after the curve. Ultrasonic sensor which is also called as obstacle sensor sends signal as pulse from trigger. If vehicle is present signal will hit the vehicle and it is received by the sensor. So that if vehicle comes from one end of the curve sensor senses and LED light glows at the opposite side. By looking at the LED light on/off criteria driver can become alert and can slow down the speed of the vehicle and he could even stop it fit's necessary. By this project we can make safer from accidents and can save thousands of lives.

IV. SYSTEM DESIGN

The system design is the process of defining elements of a system like Aurdino uno, LED, components and their interfaces and data for a system based on a specified requirements. The purpose of the design phase is to plan a solution of the problem specified by the requirement document. The design of a system is perhaps the most critical factor affecting the quality of the software, and has a major impact on the later phases, particularly testing and maintenance. The output of this phase is the design document. The design of this system mainly consists of hardware design and software design.

A. System Architecture

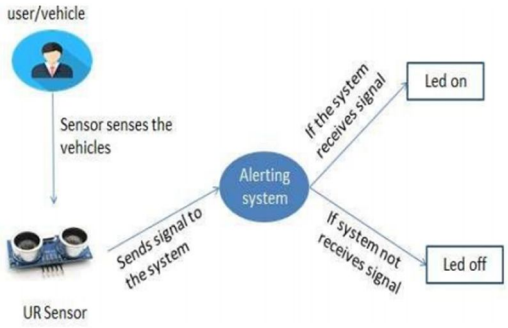


Fig: System Architecture

B. Use case Diagram

To provide a basis for planning the technical contents of iterations, an architectural view called the use-case view is used. There is only one use-case view of the system, which illustrates the use cases and scenarios that encompass architecturally significant behavior, classes, or technical risks. The use-case view is refined and considered initially in each iteration

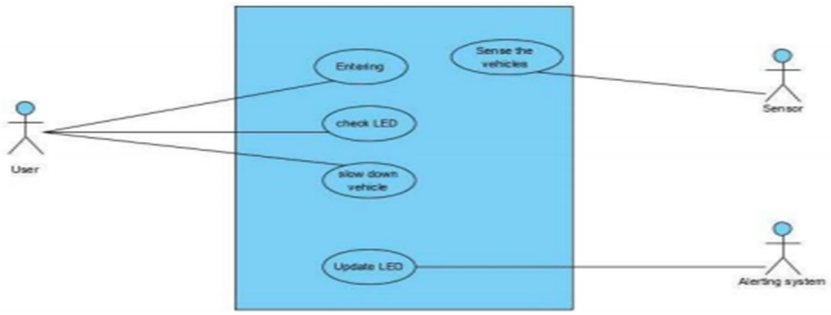


Fig : Use Case Diagram

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C. Activity Diagram

Activity diagram is basically a flowchart to represent the flow from one activity to another activity. The activity can be described as an operation of the system. The control flow is drawn from one operation to another. This flow can be sequential, branched, or concurrent. Activity diagrams deal with all type of flow control by using different elements such as fork, join, etc.

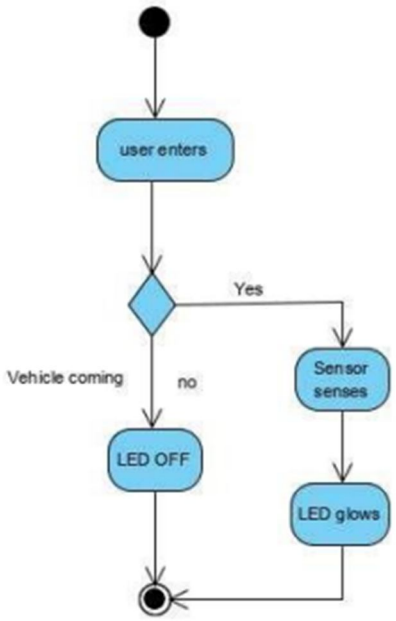


Fig : Activity Diagram

V. EXPERMENTATION AND RESULTS

1) Step 1: We should write the code for Aurdino uno to function according to our requirements.

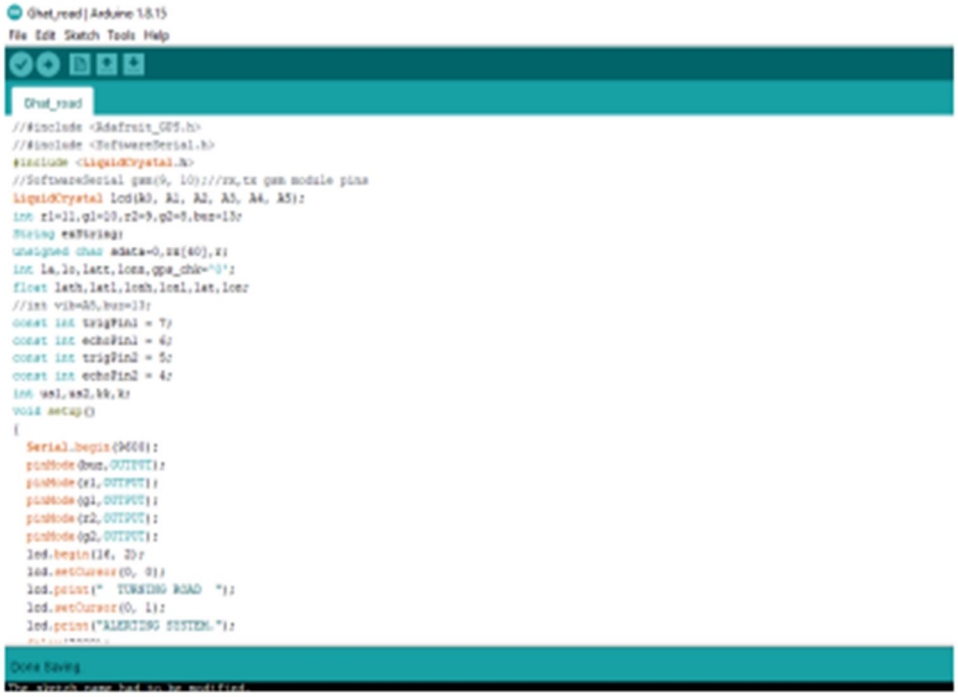


Fig : Aurdino IDE

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2) *Step: 2* Dump the code into the Aurdino and provide power supply for Application. Below is the diagram when no vehicle is coming on both sides of the road. The road was empty and we can see LED turned into green as a signal that no one was coming and its safe for the drives to move forward.

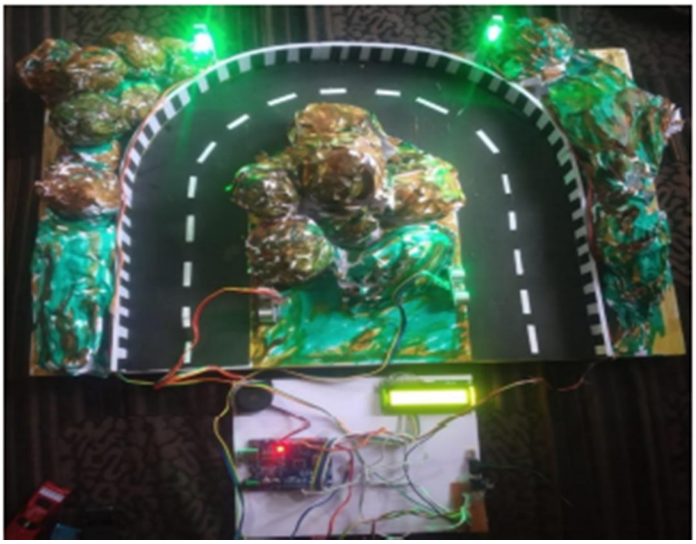


Fig: When no Vehicle is coming

3) *Step: 3* When vehicle is coming on left side od the road we can see that the LED turns into red on right side of the road stating that vehicle was coming from left side.

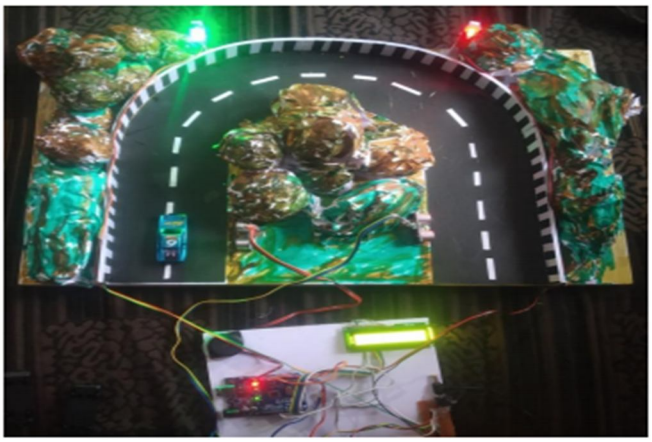


Fig: When vehicle is coming on left side

4) *Step 4:* when vehicle is coming on both sides of the road we can see that LED turned into red on both sides.

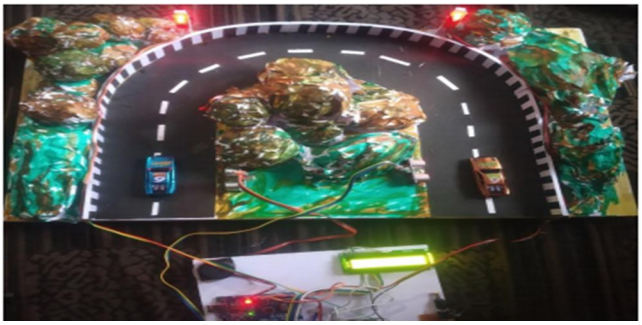


Fig: When both Vehicles are coming

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VI. ADVANTAGES

A. Avoid accidents in curve roads, mountain roads and hill roads.
B. Easily implementable to the existing roads.
C. Fully automated. (No person is required to operate).
D. Implementation/ Installation cost is very less.

VII. FUTURE WORK

A. Arrangements to protect the sensor from being damaged in critical places.
B. Decrease the size of unit so that it occupies small place and easily kept in narrow roads.
C. Implementing the system to detect number of vehicles and velocity of vehicle.
D. Implementing live visual monetarization to avoid delay in response when incidents happen.
E. Making the equipment's cost efficient to be more user friendly.
F. This system requires an external power supply, implementation of a self-powered system using renewable energy like wind and solar will make the system more effective and efficient.

VIII. CONCLUSION

In this project, we got to know about the accident which occurs on the road at Ghat section. We understand the causes and effect of accidents and then founded out a solution introducing a new technique to avoid such accident. The purpose of this project is to reduce the number of accidents in curve roads. This is done by alerting the driver by means of LED light which glows when vehicle comes from the other side of the curve. The vehicle is detected by the help of Ultrasonic sensor which is interfaced to the microcontroller Arduino UNO. By this we can save thousands of lives in the curve roads. Arduino is the heart of the system which helps in transferring the message to different devices in the system. Life is important than any other thing, once gone cannot be regained. So, to save this valuable life, this method have important role. It can help Road users at Ghats from being killed in a serious injury.

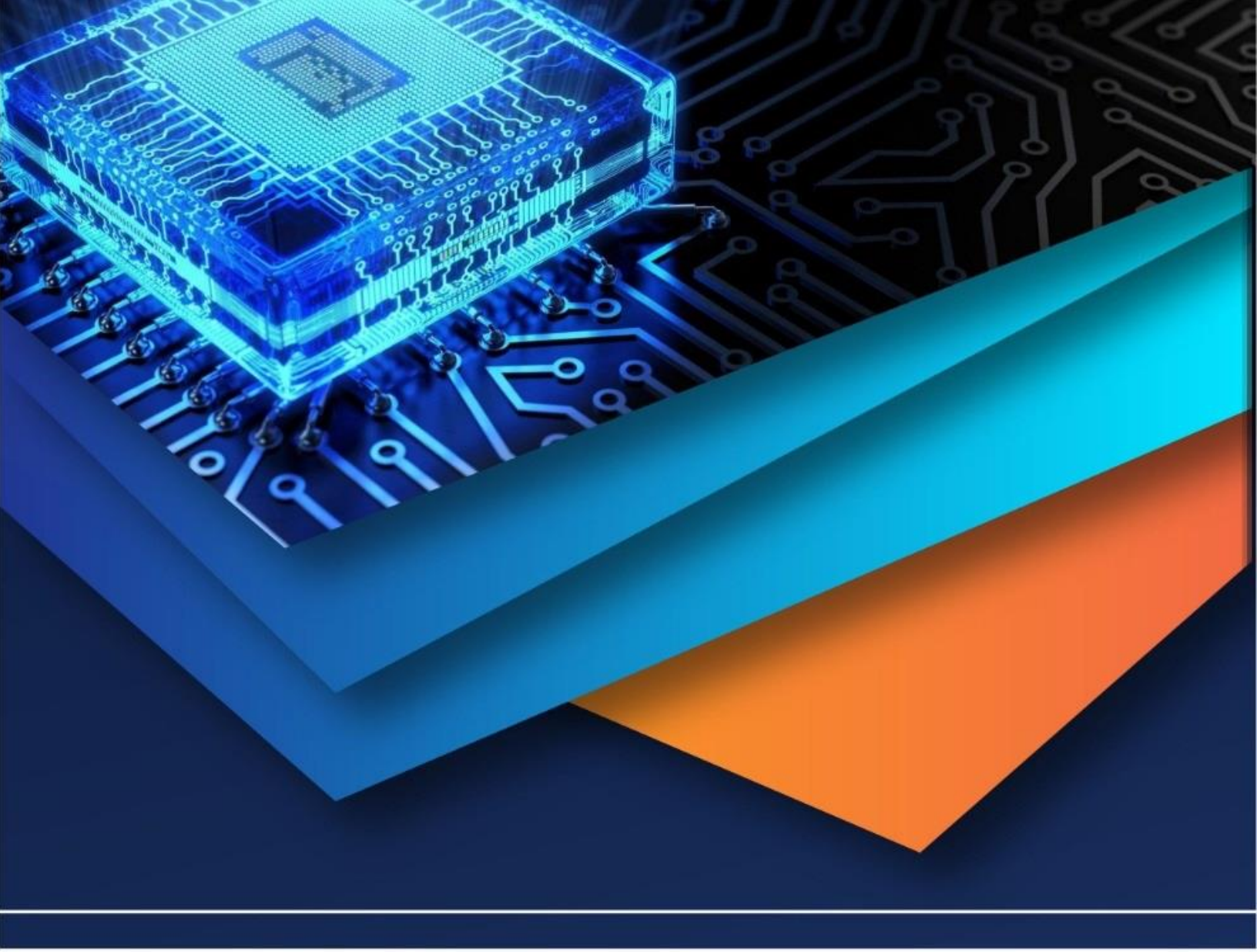
IX. ACKNOWLEDGMENT

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