

SMART SAFETY AND ACCIDENT PREVENTION SYSTEM FOR MOUNTAIN ROADS

Mrs. K. Aravinda Shilpa¹, R. Krishnaveni², P. Bhashini Deepika³, M. Vijayalakshmi⁴

¹(Assistant Professor, Department of EE, Andhra University College of Engineering for Women, Visakhapatnam, India)

^{2,3,4}(Student, Department of EE, Andhra University College of Engineering for Women, Visakhapatnam, India)

ABSTRACT

The Growth of population is increasing day by day along with the technology. According to recent survey, the accidents are the main causes of death in developing countries. The most dangerous accident-prone areas are on mountain roads have many narrow curve roads, Hair pin bend curves and on T-roads. Mountains have mini narrow curves due to this curve's drivers can't able to see the vehicles /obstacles that are coming from the other side of the curve. The main prospective of this project is to save trees from severe accidents that occur on mountain roads. In this project the system contains sensors which are powered by Arduino uno, it includes IR sensors, LED lights and buzzer. When two vehicles pass from the opposite side of a curve on mountain roads. The IR sensor detects the vehicle, The LED colour changes to red and raises the Buzzer, giving signal of danger. This alerts driver to prevent accidents on mountain curve roads.

Keywords: Arduino Uno, Proximity sensor, Buzzer, LED, accidents, Mountain Curves, System.

1. INTRODUCTION

In the developing country such as India which is home to second largest road network accidents are the major causes of death. In the mountain roads there are narrow curve roads. The dangerous roads in the world are very narrow such as mountain roads, narrow curve roads or T roads. The most dangerous mountain roads are very narrow and they have many curves. In such situations drivers may not be able to see the vehicle coming from opposite side. Thousands of people lost their lives because of this problem. The problem at mountain road is also occurred by falling of mountains, trees and the big rocks. The major issue in curve roads is that the other end of the curve road cannot be seen by the driver because of the obstacles like trees present in the middle which causes number of accidents.

2. LITERATURE SURVEY

1. In 2007, Piyooosh Rautela Swarn Shekar pant[1] mentioned approximately the speculation the street injuries withinside the mountain roads are in large part because of the 3 simple avenue parameters that distinguish mountain roads from the ones withinside the plains; width, gradient and sinuosity. The paper utilises GIS-primarily based totally surroundings for correlating those parameters and delineating coincidence-susceptible avenue stretches. The proposed new method for differential coincidence threat in mountain roads has been utilised for demarcating avenue stretches with differential chance of avenue injuries. The alternative avenue cease of car can't be visible in curve roads for a driver.

2. In 2017, Ranga Sreedhar Galla[2] has proposed a device to lessen injuries on hilly and slippery roads. The road stop of an automobile cannot be seen in curve roads for a driver. At night time injuries might also additionally appear via way of means of depth of head mild from contrary facet of vehicles. Also, the mild depth hassle happens each curved roads and mountain roads;

Thousands of humans lose their lives. The answer for this hassle is alerting the driving force approximately the car coming from contrary facet. This is carried out via way of means of maintaining a sensor in a single facet of the street earlier than the curve and maintaining a LED mild after the curve, in order that if car comes from one cease of the curve sensor senses and LED mild glows at the alternative facet.

3. The paper titled “Accident Detection and Prevention system to reduce traffic hazards using IR sensors” by Shaik Mazhar Hussain[3] (2019) discussed that the system has two phases-Accident Detection and Accident Prevention. The detection phase is carried out using IR sensors that could detect and alert the people by sending SMS using GSM module that contains predefined numbers and accident location using GPS module. Second Phase, Accident prevention is carried out using IR sensors by warning the driver about the neighbouring vehicles when the distance between them is beyond the threshold value.

4. In 2018, Trupati Tagare, Anuradha A. Kasangottuwar[4] proposed system to reduce or completely eliminate the need of traffic signals at junctions in both heavily populated cities and smaller towns as they are often mismanaged and do not adapt to the various traffic conditions automatically. If it is manually controlled, it is not guaranteed that the controller is controlling it in the most efficient way. We are aiming to develop a model in which the system consists of modules Vehicle control in Weather affected Areas and hairpin bend: Virtual Antenna module measures Fog Presence using LDR in different areas and update the information to vehicle owners through RF module.

3. SYSTEM REQUIREMENTS

3.1 Hardware Requirements:

AURDINO UNO

The Arduino Uno is a microcontroller board which is based on the ATmega328.

It has 14 digital input/output pins (in which 6 are PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, an ICSP header, a reset button and a power jack. It consists of everything needed to support the microcontroller; by simply connecting it to a computer with a USB cable or power it with a AC-to-DC adapter or battery.



IR SENSOR

The Proximity Sensors are used to detect objects and obstacles in front of sensor. Sensor transmits infrared light and when any object comes near the sensor, the object is detected by the sensor by monitoring the reflected light from the object.

The sensors are also used in robots for obstacle avoidance, for automatic doors, for parking aid devices, for security alarm systems, or contact less tachometer for measuring the RPM of rotation objects like fan blades.



3.2 Software Requirements:

The Arduino IDE (integrated development environment), is an open-source software used to program Arduino board. It is used to write and upload programs to Arduino board and is easy to use and run the program. It is Efficient in embedded development and embedded learning. This software supports languages such as C and C++ with some special rules to organize the code.



4. WORKING:

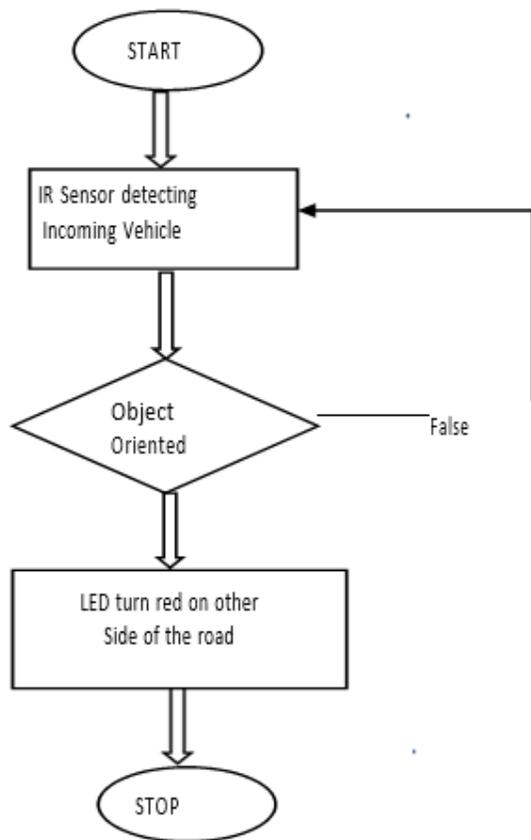
The IR sensor is connected to the Arduino. When power supply is given to the Arduino, then IR sensor detects the vehicle.

Case-1: When the vehicle is coming from side A, then IR1 sensor detects vehicle. It shows RED signal to side B and the buzzer is ON. In which it alerts the vehicle driver of side B to slow down to cross the curved road. On side A GREEN signal is ON, so that the vehicle on side A can move.

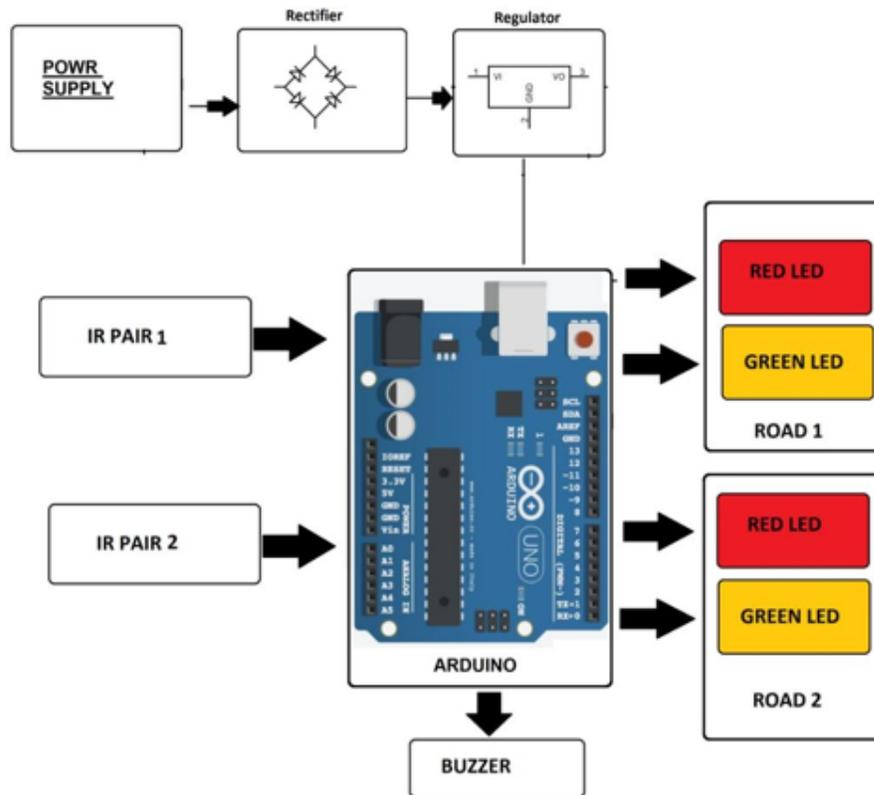
Case-2: When there is a vehicle on side B the IR 2 sensor detects the vehicle and gives RED signal to side A with beep sound. It alerts the drivers on side A that the vehicle is coming from side A, so that driver can slow down the vehicle and cross the curve. The GREEN signal is given on side B, that it can move.

Case-3: When both sides vehicles are detected by the IR sensors then both sides RED signal and BEEP sound is given. To alert the drivers of both sides to slow down and be careful to cross the curve without any accidents. In this way drivers can pay attention while driving on narrow curves or hair pin curves on mountain roads to prevent accidents.

4.1 Flow Chart



4.2 Block Diagram



5. Advantages

1. Operation of the system is automated.
2. Accidents can be avoided in curve roads, hill roads and mountain roads.
3. Cost for installation is less.
4. Thousands of lives can be saved.
5. Maintenance is easy.
6. This System works irrespective of weather and climate.

6. RESULTS

The programming language is easy and the commands are to process the data from sensor to operate LED. Arduino IDE is used to write the code for Arduino UNO.

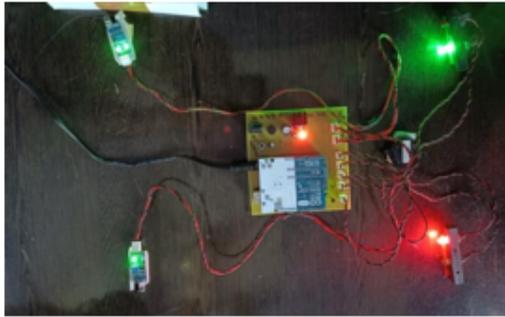


fig 1: vehicle coming from side A

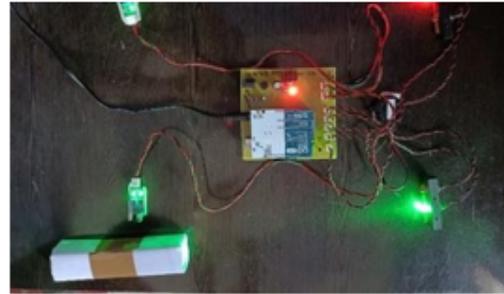


fig 2: vehicle coming from side B

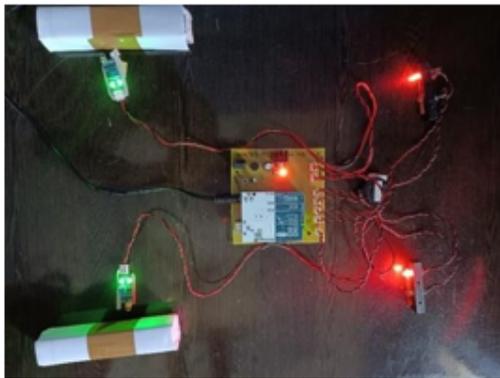


fig 3: vehicle coming from side A and side B

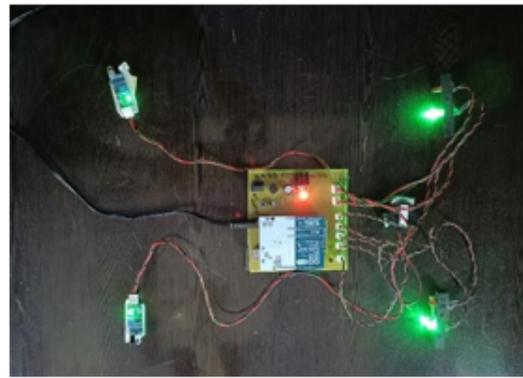


fig 4: No vehicle coming from either side of the road

6. CONCLUSION

The aim of this project is to save lots of thousands of individuals lives, and reduce the amount of accidents in curved roads or mountain roads. this can happen only by alerting the motive force by means of led light which glows only vehicle comes from opposite s ide of the curve. The vehicle is detected by the IR sensor which are connected to the microcontroller Arduino. So, if vehicle comes from one end of the curve sensor senses and LED light glows at the opposite side. By this we can save thousands of lives including animals.

References

- [1] World Health Organization, —Global status report on road safety 2015.
- [2] Ranga sreedhar galla. 2017. “Diminishing Road accidents on sharp curves using Arduino”. Gokaraju Rangaraju Institute of Engineering and Technology, Department of Electrical and Electronics Engineering, Telangana, 1(5).
- [3] Chitransh Srivastava, Nikhil Acharya et.al. 2016. Implementation of collision avoidance system for hairpin bends in Ghats using proximity sensors.

- [4] Prof. Lakshmi Praba Balaji, et. al., 2017. Smart highway systems for accident prevention using IoT. Management & Research, Akurdi, Pune, India.
- [5] Dasari Vishal, et. al., 2017. Smart highway systems for accident prevention using IoT. International Conference on Electrical, Electronics, Communication, Computer and Optimization Techniques (ICEECCOT).
- [6] International journal of innovative research in electrical, electronic and instrumentation and control engineering, Vol. 4, Issue 6, June 2016 —Sensor Based Accident Prevention System by Aravinda, Chaithralakshmi, Deeksha, Ashutha.
- [7] Jessen Joseph Leo., R. Monisha., et.al. : Vehicle movement control and accident avoidance in hilly track, IEEE Int. Conf. on Electronics and Communication Systems (ICECS).pp. 1-5(2014).
- [8] Ki-Hyeon Kim., Dong-Hoon Yum., et.al. : Improving driver's visual field using estimation of curvature, IEEE Int. Conf. on Control Automation and Systems (ICCAS).pp. 728-731(2010).
- [9] Duy Tran, Weihua Sheng., et.al. : A Hidden Markov Model based driver intention prediction system, IEEE Int. Conf. on Cyber Technology in Automation, Control, and Intelligent Systems (CYBER).pp. 115-120(2015).
- [10] Jiang Yuying., Wu Yazhen., 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).
- [11] 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.
- [12] Ashutha K., Shetty Arpitha., ET. AI "Novel wireless data communication for fisherman", International journal of computer science and mobile computing (IJCSMC), Vol. 5, Issue 4, pp. 511- 517, April 2016
- [13] Ashutha K., Ankitha K., "Error Minimization in BCH Codes", International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering (IJREEICE), Vol. 4, Issue 5, pp. 402-405, May 2016. JAC : A Journal Of Composition Theory Volume XIV, Issue VIII, AUGUST 2021 ISSN : 0731-6755 Page No: 206
- [14] Ashutha K., Ankitha K., "Error Minimization in BCH Codes", International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering (IJREEICE), Vol. 4, Issue 5, May 2016.
- [15] World Health Organization, —Global status report on road safety 2015, |
- [16] World Health Organization, —Decade of Action for Research, vol. 40, no. 2, pp. 66–71, 2017. View at Publisher • View at Google Scholar •
- [17] World Health Organization, —Save LIVES - A road safety technical package, | 2017.
- [18] W. E. Marshall, —Understanding international road safety disparities: Why is Australia so much safer than the United States? | accident analysis & prevention, 2018.
- [19] Wang, X. Wu, M. Abdel-Aty, and P. J. Tremont, —Investigation of road network features and safety performance, Accident Analysis & Prevention, vol. 56, 2013.
- [20] European road assessment program (Euro RAP), —European Road Safety Atlas |.

AUTHOR



K. Aravinda Shilpa Research Scholar in Department of Electrical Engineering, Andhra University College of Engineering (Autonomous). She has completed B.E in the year 2005 from AU & M.Tech in 2012 from JNTUK. Her research area is Power Electronics. Presently, She is working as an Assistant Professor (C) in Andhra University College for Engineering for Women.



R. Krishnaveni Student in Department of Electrical Engineering, Andhra University College of Engineering for Women. She completed B.E in the year 2022. She is majorly interested in Power Electronics.



P. Bhashini Deepika Student in Department of Electrical Engineering, Andhra University College of Engineering for Women. She completed B.E in the year 2022. She is majorly interested in Power Electronics



M. Vijayalakshmi Student in Department of Electrical Engineering, Andhra University College of Engineering for Women. She completed B.E in the year 2022. She is majorly interested in Power Electronics