3rd International Conference on Communication and Information Processing (ICCIP-2021)
Available on: SSRN
(SSRN is an open-access online preprint community, owned by Elsevier.)

IoT Based Smart Road Safety and Vehicle Accident Prevention System for Mountain Roads

Kailas Shinde[a], Pranjal Shinde[b], Shivani Valhvankar[c], Swapnil Narkhede[d]

[a-c] *UG Students, Department of Electrical Engineering, JSPM's, Bhivrabai Sawant Institute Of Technology And Research, Wagholi, Pune-412207.India.*
[d] *Assistant Professor, Department of Electrical Engineering JSPM's, Bhivrabai Sawant Institute Of Technology And Research, Wagholi Pune-412207.India.*

Abstract

Within the upgrading countries accident is that the major reason for death. If we tend to remark dangerous roads within the world then all of them area unit mountain roads and curve roads. The intensity of the deaths area unit additional in incurved roads. Within the mountain roads there'll be slim roads with tight curves. In such forms of things the driving force of a vehicle cannot see vehicles coming back from alternative aspect. as a result of this downside thousands of individuals lose their lives every year. Whereas we tend to area unit talking regarding mountain roads here alternative aspect can be cause a drop-off. The answer for this downside is alerting driver regarding the vehicle coming back from alternative aspect. One among the answer is planned during this paper. We will alert driver by inserting inaudible sensing element in one aspect of the road before the curve and keeping junction rectifier light-weight alternative aspect of the curve, so if vehicle comes from one finish of the curve sensing element can sense the vehicle and junction rectifier light-weight glows at the other aspect as Red. By gazing the Red junction rectifier light-weight driver will become alert and might prevent the speed of the vehicle. And still if associate accident happens we will save the lifetime of victim by giving medical help like a shot. This will increase the survival probabilities of victim.

Keywords- Arduino, Curve Roads, Ultrasonic Sensor

1. Introduction

We all reside in twenty first century currently and therefore the increment is increasing in an exceedingly trickster rate. Because the population is increasing day by day the possibilities of accident occurring is additionally increasing. Hindrance of this meeting accidents area unit of nice concern these days. The most reason for of these accidents area unit negligence, negotiation of safety measures etc.
As technology is obtaining advanced in an exceedingly bigger speed safety measures conjointly being changed however still accidents area unit still happening. GPS (Global Positioning System) and GSM (Globalization Management System) were introduced however each of those were helpful once accident had happened as GPS is employed to convey in for relating to the placement and GSM is beneficial [6].

for causation messages from the users mobile to point the authority that accident happened. GPS associated GSM area unit is used for indicating that accidents occurred; however, our planned model is an exception to any or all this because it prevents the accident from occurring and so saves lives.

2. Literature Review

There are a unit several existing plans towards safety against road accidents like thanks to advanced technology GSM associated GPS were introduced so they're useful in trailing the vehicles that met with an accident however they're not preventive for avoiding the accidents. Arduino based mostly vehicle accident detection system was planned as associate approach towards avoiding road accidents. During this planned model Arduino, GSM, GPS, LCD, vibration sensors were used. during this system vibration sensing element is employed as associate input supply to system that is analyzed by the Arduino and once the sensing element reading exceeds the conventional or threshold acceptable action starts going down because it can direct the GSM to send messages from the user mobile to the authority as they will send immediate facilitate to the accident victims. Next approach was created by chance system exploitation inaudible sensing element. Inaudible sensors were used alongside controller and Arduino to stop the accident from occurring. Buzzers and lamps area unit placed on each the aspect of the roads alongside controller and inaudible sensors.

2.1 Objective

- To improve quality of power Remote sensing
- To Maintain Continuity of offer • Real time observance.
- It will ready to notice The Faults thanks to Over Current, Over Voltage, magnified Temperature at Real Time.
- Monitoring Multiple Transformers Sitting In associate workplace is feasible.
- Pre fault Condition is well Detected and Cleared at Same Time to Avoid System Failure. Fault observance needs Less Time conjointly Use Of wireless local area network provides Most correct, Fast Response.
- This style of observance Protects electrical device And Overall System therefore System dependability And Stability will increase

3. Methodology

This system is divided into 2 half, they're (accident detection and prevention) and Alerting the members of the family by causation message and placement of the accidental place(Vehicle accident identification module).Accident detection and hindrance system comprises inaudible sensor(HCSR 04),Led lights(Red and Green) and Arduino Nano. Vehicle accident identification system comprises GSM module (SIM 900), GPS module (Neo 6M), Arduino Uno and Button. Inaudible sensing element uses +5V DC offer. Its vary is from two cm to100 cm. Detection and hindrance style is completed for sensing the vehicle or obstacle and to control the junction rectifier by exploitation Arduino one.0.10 IDE tool that is open supply computer code. Programming are often done by exploitation embedded C or C++. Package that we tend to used is windows ten. The junction rectifier light-weight here we tend to used is of inexperienced and Red color uses most +5V DC offer.

The system is put in at the curves and bends. The proximity sensing element senses the space of a vehicle approaching or moving removed from it. Supported its input from the proximity sensing element, the counter and therefore the signal can amendment their several counts and color to point the driving force. Now, as an example, we tend to think about that 5 vehicles area unit coming back down Capitol Hill, and 2 vehicles area unit moving up. The proximity sensing element at the curve whereas intensifying Capitol Hill senses that 2 cars area unit approaching towards it, as a result, the counter on the opposite aspect shows a count of two. On the opposite aspect of the curve, the opposite proximity sensing element senses that 5 cars area unit coming back towards it that the counter located on the opposite aspect, displays 5. And therefore the signals

On each the edges have red signal, so the drivers are often cautious and might prevent, and might safely man oeuvre. Because the vehicles depart from the sensing element, the show can amendment and become zero and signal can become inexperienced. Once there's only 1 automobile on either of the edges, the signal is inexperienced and therefore the driver gets to grasp that there's no vehicle on the opposite aspect. By implementation of this good accident hindrance system

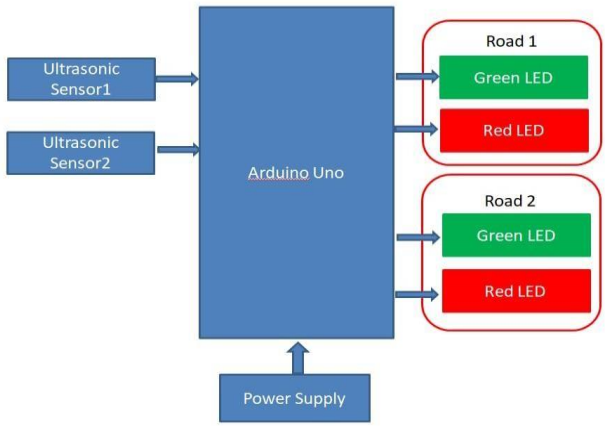

Fig1 Block Diagram of Vehicle detection

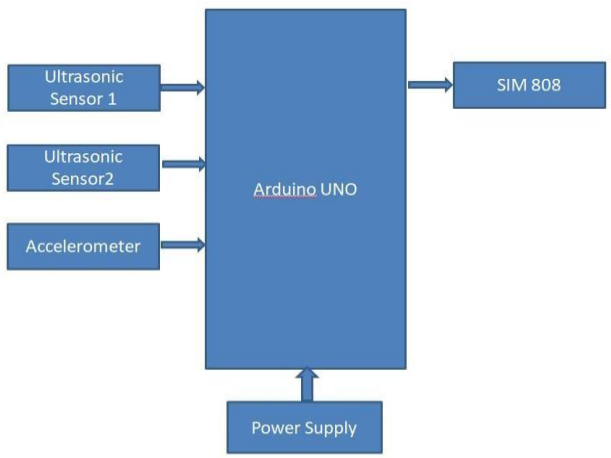

Fig2 Block Diagram of accident detection

4.Results

By application of this smart accident prevention system, the number of accidents occurring in curves of hills have not only decrease but also providing signal information to vehicle driver which are coming from opposite side, hence it alerting us. This is an innovative approach where we have also used counters to count the number of vehicles progressing from the opposite side, i.e. for example, if two cars coming from right-side then the left side counter shows two and if three cars are coming from left side then right-side counter shows three. Moreover, there will be red signals alerting drivers to drive slow and consequently green signals to convey message that no vehicle is coming from the opposite side.

In case accident happen only when we know the exact location of accidental place. This project presents an inexpensive but intelligent framework that can identify and report an accident to the family member. If in case accident occurs, button will get pressed and it will send message to the family members using GSM module and send location of accidental place using GPS module.

Proteus simulation:-

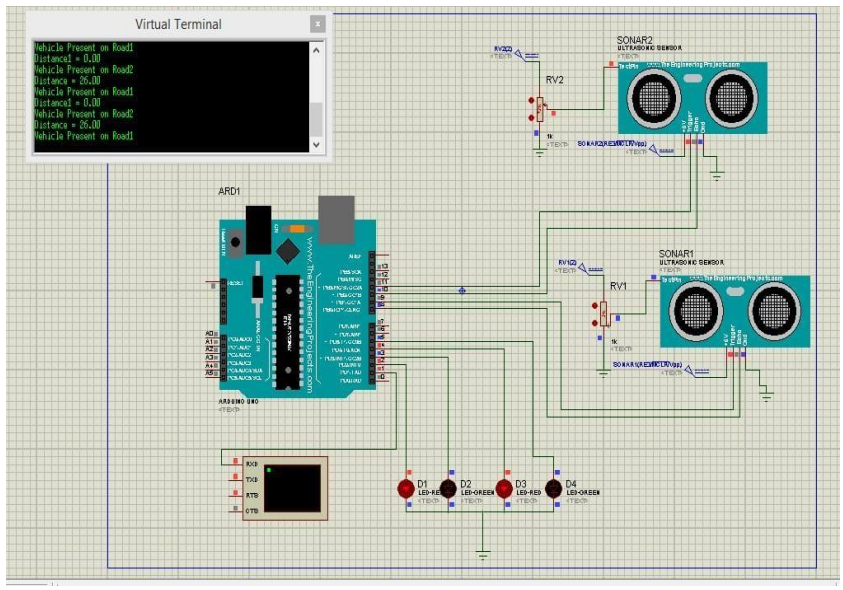

Fig.1Vehicle alert schematic diagram

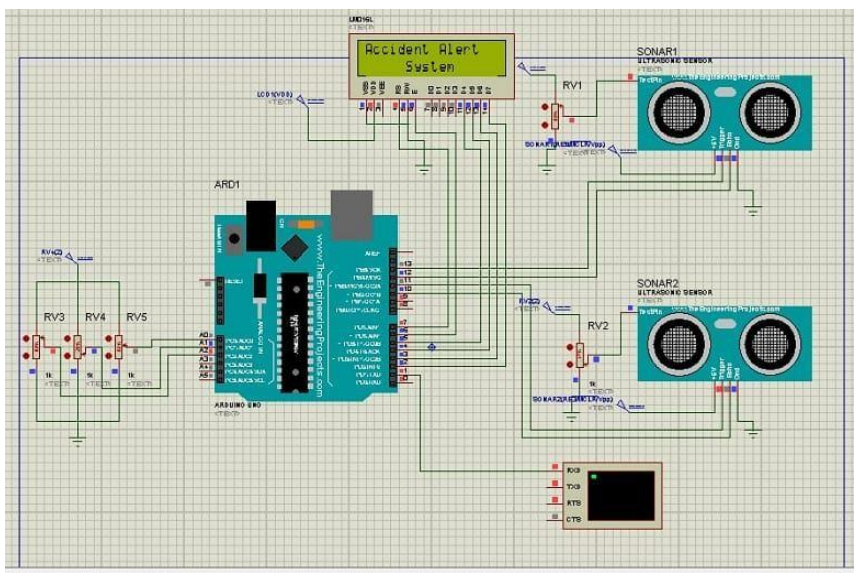

Fig.2 Accident detection schematic diagram

Condition: 1 Vehicle Alert:

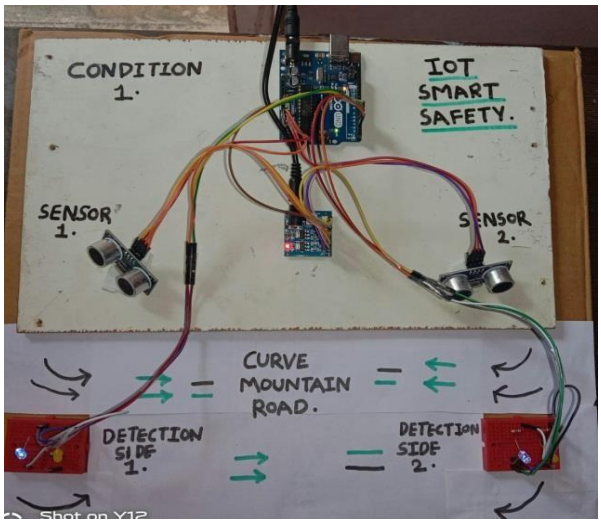

Fig.3 When no car is present on opposite side

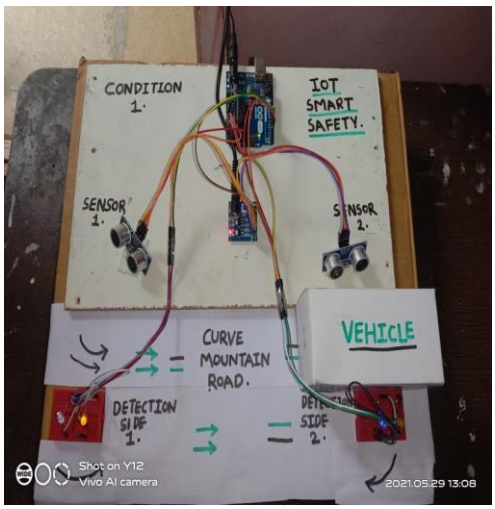

Fig. 4 When one car is present on opposite side

Condition: 2 Accident Alert:

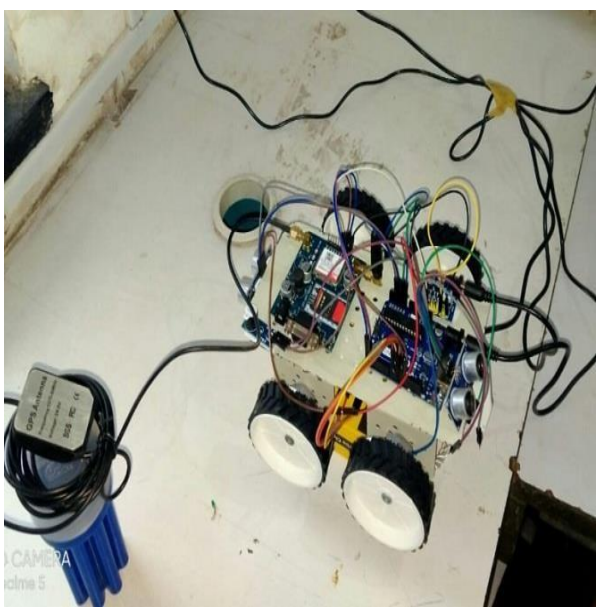

Fig.5 Accident alert model

Fig.6 IOTD dashboard

The proposed work can be extended to create an application to store information within the arduino microcontroller; Arrangements to safeguard the sensing element from being broken in crucial places and decrease the scale of unit so it occupies little place and simply unbroken in slim roads. Recently IoET and Clod based applications are getting famous due to its may user-friendly features []. The proposed work can also be extended in this direction.

5.Conclusion

The motive of this project is to decrease the quantity of accidents in curve roads. This can be done by alerting the driving force by means that of junction rectifier light-weight that glows once vehicle comes from the opposite aspect of the curve. The vehicle is detected by the assistance of inaudible sensing element that is interfaced to the microcontroller Arduino Nano. Furthermore, still in the event that mishap occurs, cautioning cherished one by causation message and arrangement of the unplanned spot misuse GSM module, GPS module and Arduino Uno. By this we will save thousands of lives within the curve roads

References

[1] 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, January2016.

[2] Ashutha K., Shetty Arpitha., ET. Al "Novel wireless data communication for fisherman", International journalof computer science and mobile computing (IJCSMC), Vol. 5, Issue 4, pp. 511- 517, April2016.

[3] Ashutha K., Ankitha K., "Error Minimization in BCH Codes", International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering (IJIREEICE), Vol. 4, Issue 5, pp. 402- 405, May2016

[4] 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).

[5] European road assessment program (Euro RAP), "European Road SafetyAtlas

[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] World Health Organization, "Global status report on road safety2015,"

[8] Wegman, "The future of road safety: A worldwide perspective," IATSS Research, vol. 40, no. 2, pp. 66– 71,2017. View at Publisher · View at Google Scholar·

[9] World Health Organization, "Save LIVES - A road safety technical package,"2017.

[10] Prachi Deshpande, Brijesh Iyer, "Research directions in the Internet of Every Things(IoET)",2017 International Conference on Computing, Communication and Automation (ICCCA), 1353 - 1357,2017.DOI: 10.1109/CCAA.2017.8230008

[11] Deshpande, P., Sharma, S.C., Peddoju, S.K. et al. Security and service assurance issues in Cloud environment. Int J Syst Assur Eng Manag 9, 194–207 (2018). https://doi.org/10.1007/s13198-016-0525-0

[12] Deshpande P. (2020) Cloud of Everything (CLeT): The Next-Generation Computing Paradigm. Advances in Intelligent Systems and Computing, vol 1025. Springer, Singapore. https://doi.org/10.1007/978-981-32-9515-5_20

[13] W. E. Marshall, "Understanding international road safety disparities: Why is Australia so much safer thanthe United States?" accident analysis & prevention, 2018.

Mr. Kailas Shinde

He had completed Diploma in Electrical Engineering from Government Polytechnic, Pune in 2018. Currently He is studying in Electrical Engineering of JSPM's Bhivarabai Sawant Institute of Technology & Research, Wagholi Pune in Savitribai Phule Pune University.

Mrs. Pranjal Shinde

She had completed Diploma in Electrical Engineering from Government Polytechnic, Awsari, Pune in 2018. Currently she is studying in Electrical Engineering of JSPM's Bhivarabai Sawant Institute of Technology & Research, Wagholi, Pune in Savitribai Phule University, Pune

Mrs.Shivani Valhvankar

She had completed Diploma in Electrical Engineering from Government Polytechnic, Pune in 2018. Currently she is studying in Electrical Engineering of JSPM's Bhivarabai Sawant Institute of Technology & Research, Wagholi Pune in Savitribai Phule Pune University.

Prof. Swapnil Narkhede

He has completed his M.E. (EPS) in 2016. At present he is working as faculty of electrical engineering at JSPM's Bhivrabai Sawant Institute of Technology and Research, Wagholi, Pune. His area of interest is Renewable Energy, Industrial Drives & Control, Smart Grid, and Stability of Electrical Power System & Control System. He has much experience in many projects and also worked as project guide for projects such as Electrical Vehicles, Solar Panels. Reverse Osmosis water filtering system,etc.