International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 11 Issue: 04 | Apr 2024 www.irjet.net p-ISSN: 2395-0072

USE OF TRAFFIC SENSOR FOR REDUCTION OF ACCIDENT PERCENTAGE ON SAMRUDDHI MAHAMARG

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ABSTRACT - The Samruddhi Mahamarg is an important infrastructure project, however given the increased number of accidents, and analysis of safety precautions is required. The goal of this article is to lower the accident rate on the Samruddhi Mahamarg. This study explores the causes of road accidents by examining the role of human, animal, and highway hypnosis variables. As a result, the research discussed in this paper concentrates on the factors that lead to accidents and how to use contemporary technology to minimize them. Our aim is to save as many lives as possible by lowering the frequency of accident.

Keyword: Accident reduction, sensor, sos, road safety, highway traffic

1.INTRODUCTION

The Samruddhi Mahamarg, also known as the Nagpur-Mumbai Super Communication Expressway, is an ambitious infrastructure project in the Indian state of Maharashtra. It's designed to be a high-speed, access-controlled, and eight-lane expressway that will connect the city of Nagpur in eastern Maharashtra to Mumbai in the west. The engineering is very well done and there are no shortcomings in it. But the speed of operation is too high (about 120kmph). Hence, the reaction time available is too less (about 0.7 seconds). The tyre gets heated up and the air expand and hence, they burst. We cannot completely stop the accidents but we can reduce them in some percentage using the sensor. We have selected the Doppler Radar for our project from all the sensors. Doppler radar sensors operate based on the doppler effect, which detects frequency shifts in radio waves reflected off moving objects (e.g. vehicles). Doppler radar sensors operate based on the Doppler effect, which detects frequency shifts in radio waves reflected.

Figure1: Samruddhi Mahamarg

1.2 AIM

Our project aims to understand the causes of accidents that occur on the Samruddhi Mahamarg and take steps to solve these issues, by using sensor.

1.3 OBJECTIVES

- To get the information about the samruddhi mahamarg and accident rate on that road.
- To find solution to reduce the accident percentage on samruddhi mahamarg.
- Use of doppler radar sensors for reduction of accident rates.
- Adding smart reminder distress sound system (SOS) and Emergency detection device to give an alert alarm before accidents.

2. LITERATURE REVIEW

2.1 General

We decided to work on Samruddhi mahamarg after seeing incresing percentage of accidents on that road. we cannot completely vanish the problem but we can reduce them in some manner by following rules and regulations. but not all people follow the rules so for them we decide to put some technology in accordance to reduce the accidents and save lives of people.

2.2 literature review

1. Dheeraj Bengrut (2023)

The goal of the study was to audit the shortcomings in the road infrastructure, such as poor signage visibility, risk factors for accidents like speeding driver hypnosis brought on by repetitive driving, lax enforcement of safety regulations in enforcing measures like the efficacy of speed limits, and insufficient public awareness campaigns (counselling).The results of a road safety audit can assist interested parties in pinpointing problem areas and creating focused interventions to enhance traffic safety.

2. Pranay P. Deogade (2023)

In order to lower accident rates on the Samruddhi Expressway, this review study examines the critical analysis and tactical application of traffic safety measures. The alarming rise in traffic accidents and their severe effects are highlighted in the article as reasons why it is so important to address this issue. The review paper first looks at the causes of traffic accidents, such as human error, poor infrastructure, and ignorance. It also discusses several efficient traffic safety strategies and the role public awareness campaigns have in reducing accidents on expressways. It covers appropriate signs and effective traffic control systems. It is suggested that integrating smart technologies like sensors and traffic cameras could improve road safety.

3. Kookjin Sung, Manoranjan Majji (2022)

In this research, an optical signal modulation technique combined with the Doppler shift idea is presented as a novel way to estimate the velocity of a moving vehicle. A proximity range rate-measuring optoelectronic sensor prototype is developed. The prototype system is constructed with a TIA circuit, an LED light source, a photodetector, and a digital signal processor. Based on experimental results, it is possible to induce frequency shifts in modulated light proportional to the relative velocity between the light source and sensor. When the modulation is carried out beyond the bandwidth of the LED light source, the accuracy of the suggested sensing system is discovered to be limited; also, the prototype bandwidth is much smaller than that of a comparable system constructed utilizing radio waves.

4. Endeavour sailing (2014)

In this research they found out the distress system (sos) use in many ways such as, for emergency signal, ships, construction site, ambulance as an emergency alarm etc.

3. METHODOLOGY

The accidents that occur on Samruddhi Mahamarg route are the primary issue. And the proportion is really high. We chose the doppler radar sensor in order to lessen them. To start, we attached the sensor to the street light, but there was a problem: the light was only visible at night. Next, we made the decision to install an SOS light that would be directly linked to our doppler radar. We intended our idea to save an increasing number of lives in this manner.

3.1 selection of topic

As per suggested by our guide we selected our topic based on Samruddhi Mahamarg and accordingly we started collecting information related to the topic that is use of traffic sensor for the reduction of accident percentage on Samruddhi Mahamarg.

3.2 Data collection

The process of collecting and evaluating data encompasses a broad range of information, such as traffic volume and speed, crash history, road user behavior, and land use.

3.3 Planning

1. Detecting causes of accident
2. Finding solution to reducing accident.
3. Final working on the idea.
4. Making mini model to show how it will work in actual.

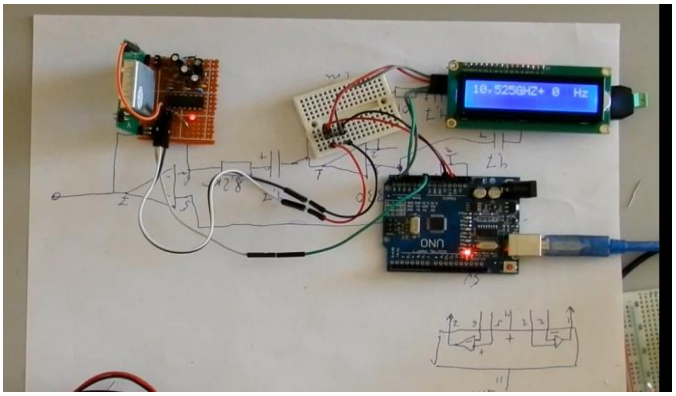

Figure2: Doppler Radar Sensor

3.4 working

We assigned work to every member and started implementing our idea

4.Causes of accident

Following are the main causes which are responsible for accident as per study.

Figure3: Accident

4.1 Over speeding

The Samruddhi Mahamarg is six-lane expressway with a speed limit of 120 kmph. However, many drivers exceed the speed limit, which increases the risk of accidents.

4.2 Animal attack

Animal attacks on roads can be dangerous for both drivers and animals. It's important to stay alert while driving, especially in areas known for wildlife crossings, and to adhere to speed limits. Additionally, measures like wildlife warning signs and fences can help mitigate the risk of animal collisions on roads. If encountering an animal on the road, it's best to slow down and give them space to safely cross.

4.3 Hypnosis

Drivers who use their vehicles continually for extended periods of time are hypnotized by the highway. One of the main problems for drivers on the route is road hypnosis. Drivers experience changes in their physical, behavioral, and psychological states. Despite being sat in a normal position; drivers frequently experience sleepiness or drowsiness.

5. Solution for expressway safety

5.1 Attaching cameras with street light:

Implementation of camera according to safety purpose. for taking an record of accidents and the causes. also to check if people are following rules for speed and other purposes or not.

5.2 Attaching Doppler Radar Sensor with street light

Doppler radar sensor basically worked on doppler effect. Which will directly detect the speed of vehicles. If the speed will above the speed limit, then the street light will turn from white to red immediately.

5.3 Connecting doppler radar sensor with SOS system (Distress Sound System)

In the earlier system there was one drawback. Because the light will only visible at night. So for more safety purpose we started research and after that we decided to attach the SOS with the doppler radar. If any passing vehicle will increase its speed limit above then the SOS automatically will produce sound. But in that case, there are chances of increasing sound pollution, for that we decided to increase the distance between each SOS which will fixed on the road.

6.CONCLUSION

We conclude that the Samruddhi Mahamarg project is a big undertaking that is highly beneficial for covering large distances in a shorter amount of time. However, many were avoiding using the road because of the rising number of accidents. Therefore, we made the decision to apply contemporary technologies to resolve this problem. We can lower the percentage of accidents on that route by installing a sensor that is immediately connected to cameras, LED lights, and an SOS system. Our primary goal is to use innovative technology to save lives.

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8. BIOGRAPHIES

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