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IOT BASED MOVABLE DIVIDER AND TRAFFIC SIGNAL VIOLATION DETECTION

Arihant.M.Rode[1], Leena Patil[2], Rutuja.S.Shende[3], Suramya.B.Deshpande[4] ,Vaishnavi.S.Kurode[5], Aastha.S.Meshram[6]

[1,3,4,5,6]*Student, Department of Computer Science and Engineering, Priyadarshini College of Engineering, Nagpur, Maharashtra, India*

[2]*Professor, Department of Computer Science and Engineering, Priyadarshini College of Engineering, Nagpur, Maharashtra, India*

[1]*arihantrode89@gmail.com*, [2]*lhpatil10@gmail.com*, [3]*rutujashende2017@gmail.com* , [4]*suramya1312@gmail.com* , [5]*kurode.vaishnavi12@gmail.com* , [6]*aasthamesh.cs0622@gmail.com* .

Abstract— As you know Population of India is increasing day by day, so does the users using vehicles and because of which number of vehicles are growing, but there is no increase in lane area of road, because of which a huge problem arises that is Road Traffic Congestion. For this problem, we have come up with a solution. We will increase the lane area of one side of the road and this will be done with the help of a divider which is nothing but a moving road divider. It will increase lane area of the congested side of the road. Like in morning time everyone has to leave for their jobs and at this time a part of the road is much in use and other is almost empty, so to give more space to vehicles going for job, road divider can be moved to the almost empty side of road and similarly this same thing can be applied at evening time but in exactly opposite way. To detect this, we are using various sensers and a technology called Internet of Things (IOT). Not only this but we will also be detecting Traffic Signal Violation, to detect this, we will embed the signals with RFID readers and vehicles with tags. All this includes some hardware like Arduino UNO, IR sensers, RFID, Ultrasonic senser, DC motor.

***Index Terms*—Traffic Congestion, Movable divider, Internet of Things, Divider, Traffic Violation**

I. INTRODUCTION

In recent years we have seen that our country is facing the problems of traffic congestion due to increase in number of vehicles in society. Currently all this is happening because of increase in population which has been increased from 136.64 crores to 139.82 crores in past two years which indirectly tells the number of vehicles running around the whole country, we cannot even tell the exact number of vehicles.

Traffic problems lead to many inconvenient things like we get late for our important meetings and occasions which are very important for us, so by adapting our technology we can decrease the traffic and can get to out destinations within the time. As the traffic is flowing in a convenient manner this will indirectly decrease the number of accidents which are happening because of traffic. Many times, we can see that ambulances get stuck between the roads because of traffic so when we will adapt our movable divider on roads, we can divert that traffic and can make a safer, traffic free path for ambulance to move and can save the life of a patient. We can say that by adapting our idea we can not only save the fuel but can also save our time. The basic idea of our project is that we will create a movable divider using IOT which will move according to the traffic on the road.
Here we're are using IOT, because Internet of Things (IoT) is a technology that helps us implement this idea of movable divider, IoT describes the network of physical objects(things) that are embedded with sensors, software and systems over the internet. We are using this technology because of low-cost, low-power sensor technology, physical things can share and collect data with minimal human intervention. Along with that it communicates with so many hardware like IR sensors, RFID module and other modules, way to do this is simply to download the template, and replace(copy-paste) the content with your own material.

II. LITERATURE SURVEY

1. Implementation of Movable Road Divider using Internet of Things (IOT) [1]

The designed system shows that the vehicles on the road are taken in to count and depending on the congestion of traffic the divider moves. Two sensors are employed here for normal and high. The information obtained from sensors are updated in website through Wi-Fi module and divider is moving as per this information.

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2. *Movable Road Divider* [2]

The main aim of this project is to reduce traffic congestion in the day-to-day life. Here, in their proposed system they were using IR sensor on the starting of road and incrementing the count when vehicle get detected and according to the congestion, they are moving divider, along with this they were also providing facility for ambulance.

3. *Design and Simulation of Intelligent Traffic Control System* [3]

They designed system for Intelligent traffic control based upon the number of vehicles at the traffic signal. They have used the feature like SSADM and Fuzzy logic control system. The drawbacks are Overhead of Complex technology and the system is only designed for specific traffic signal patterns such as crossroads.

4. *Movable Traffic Divider: A Congestion Release Strategy* [4]

The proposed uses Metro count and pneumatic tubes to detect traffic congestion. They got the various traffic patterns from the Metro Count output and from those patterns, they suggested to use movable traffic dividers, in order to reduce the traffic congestion, if used in appropriate way.

5. *Movable Traffic Line* [8]

This model states a way to build a relatively cheap and stable way of using movable traffic lines to control traffic and increase or decrease the number of lanes according to the specific time of the day.
It shows a method of using cables and suspension wires to change lanes that have been laid out on the road and make them portable across the width of the road.

6. *Apparatus and method for moving Roadway Lane Divider* [9]

This model states an improved method to expeditiously move a road divider on a roadway, to change the number of lanes in the road in a pair of adjacent groups. It uses a hoist mechanism (to pull upwards) with vertical support above the road to traverse the divider through the breadth of road and can account for numerous different traffic patterns.

III. PROPOSED WORK

Here, in this project we are using IOT technology. For establishing connection between hardware devices, we have used Arduino Uno and ESP 8266 as our main microcontrollers. We've created a prototype and We've divided this prototype into two modules as follows:

1. *Traffic Detection and Movable Divider*

The goal of this module is to detect the traffic congestion on road and move divider as per the detected traffic congestion.

In this module, we have used IR sensors for detecting traffic congestion and Dc motor for moving the divider. Both of the above-mentioned hardware is controlled by using Arduino Uno. To be more specific regarding detecting traffic, In our prototype we've placed four IR sensors on each lane of road and there are total two lanes in our prototype i.e. Incoming and Outgoing lane. In each lane, first two IR sensors are used to detect the vehicle coming into that lane (incrementing vehicle count) and the two IR sensor which are placed at the end of the lane are used to detect the vehicles leaving that lane (decrementing vehicle count).

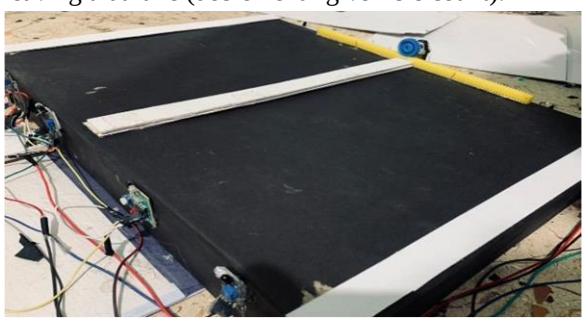

Figure 1:Project Prototype

In this way we are maintaining the vehicle count in each lane. At the runtime, we are comparing the vehicle count in both the lanes and we've set some threshold for the count. If the count on the right lane is greater than the

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threshold, then the divider starts moving to left lane.

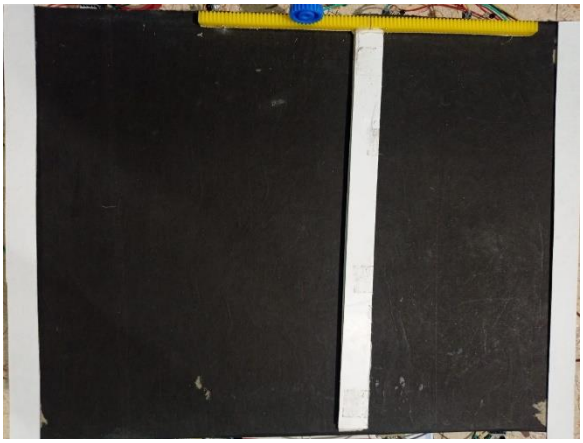

Figure 2:Moving of Divider into another lane

For safety precautions, we're only moving the divider when vehicles are away from divider by some distance, other than this, we're also providing signal when divider is moving into another lane.

2. *Traffic Signal Violation Detection*

The goal of this module is to track/detect the vehicles which are violating the traffic signal norms defined by the traffic department.

For achieving the goal of this module, we've used RFID module to detect the vehicles which are violating the norms. The RFID module is attached at signal and the RFID tag is present at the vehicle, whenever the vehicles violate any traffic signal norms, then the RFID module will detect the tag associated with vehicle and store the vehicle details.

After getting the details of the vehicle, challans are created by the traffic police department. The process creation of traffic challans can also be automized.

IV. ADVANTAGES

- Intensity of the traffic reduces easily during rush hours
- Vehicle's total journey time during peak hours reduces easily
- Congestion of traffic during peak time can be avoided
- Emergency vehicles can get easy traffic clearance
- Time and fuel can be saved

V. CONCLUSION

In this paper, we have tried to solve the problem of traffic congestion on the road and detect traffic signal violation. A threshold will be set, according to which the divider will move. If traffic density of one side of the road has crossed the threshold value and other side has not, then the divider will move to the later side of road i.e., to that side of the road whose traffic density has not crossed the threshold value. If both sides of road cross the threshold, no action is taken by the divider. It stays in its original position. This project can be applied on the busy roads not only this, it can also be used to give space to emergency vehicles.

VI. FUTURE SCOPE

- In future, Convolutional Neural Network (CNN) i.e., image processing can be used to detect traffic density. If the architecture of CNN is robust then it can detect traffic congestion accurately.

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