

SMIDER: The Automated Road Divider

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Abstract--In recent years, there has been proportional increase in numbers of automobiles on the roads. Although the number of vehicles using the roads has increased, the static road infrastructure is almost the same and is unable to cope with changes like congestion, unpredictable travel-time delays and road-accidents that are taking a serious shape. Traffic congestion has been one of the major concerns faced by the metropolitan cities today. Road Divider is generically used for dividing the Road for ongoing and incoming traffic. This helps keeping the flow of traffic. Generally, there is equal number of lanes for both ongoing and incoming traffic. Our idea is to formulate a mechanism of automated movable road divider that can shift lanes, so that we can have a greater number of lanes in the direction of the rush. An Automated movable road divider can provide a solution to the above-mentioned problem effectively. This is possible through IOT. The sensors placed on the dividers sense the flow of traffic whether flow of traffic is smooth or not? If the flow is smooth on either side then there is nothing to worry but the lane which is having more traffic, the divider is moved to a certain distance to the smoother lane in order to smoothen the busy lane.

Keywords: IOT, static road, sensor, automated, traffic, movable, road divider.

I. INTRODUCTION

Countries around the world are day by day facing problem of traffic congestion due to increase in number of vehicles in society. Although the number of vehicles using the roads has increased, the static road infrastructure is almost the same and is unable to cope with changes like congestion, unpredictable travel-time delays and road-accidents that are taking a serious shape in spite of actions being taken. Measuring reasons of congestion is foremost thing in deciding the solution to it. The designing of the roads is done considering the adverse conditions and the clear distance amidst the vehicles vary depending on the actual conditions suggesting the difference between theoretical derivation and practical conditions. Regulations & legislations study help us in determining the actual onsite and the government determined flow of traffic. Traffic congestion can be determined with respect to travel time delay, speed change, volume occupied and level of service. Traffic

congestion also depends on the pattern of city, weather it is centric, grid or organic pattern. Depending on different congestion scenarios every country has adopted its own measures like high density traffic toll way in US, vehicle exclusion zones in UK and flexible working hours in UAE. Many other countries are in progress of adopting different measures for lowering down the effects of congestion. India with its growing economy is also experiencing growth in vehicular population although great variations in vehicle are seen but traffic free road is still in ideas. Now a day the conventional method of building more roads is no longer a solution. Traffic intelligent system is the step taken in providing good transport system to human community. In view to the above paper deals with study of traffic in Mumbai and suggesting a movable traffic divider technique for the same which can be used irrespective of the topographical, climatic, geographical obstructions and in combination which can help us to solve the traffic congestion problem in an optimal manner.

II. LITERATURE SURVEY

The concept of movable road dividers was from the 90's, the reason was that there was traffic congestion from that period. At that period the machine was called as zipper machine, which is used to shift the divider from one lane to another lane. It was introduced in earlier 90's and the first working model of zipper machine was bought by Hawaii department of transport in late 90's. The machine contains a s-shaped inverted conveyor channel which lifts the barrier segment weighing almost 450kgs. The minimum length of the machine is 100 feet. The barrier segment is attached to the machine and whenever there is traffic congestion the machine will move and along with the machine the barrier segment that contains the divider also moves resulting in the width of the lanes. In the proposed model, we are not using a machine and operating it manually rather operating it automatically by using two dividers namely normal and extended dividers. In this paper we place the ultrasonic sensor to one side of the road to detect

whether there is any traffic congestion or not, if there is a congestion then the extended divider raises up and normal divider is set to ground level, else the normal divider is raised up and extended divider is set to ground level. And if there is a congestion then a message is sent to the nearby traffic control police stating that traffic congestion has occurred. So, this is simple and can replace the heavy machines.

The movable divider is capable of providing extra lanes with certain specified width to traffic congested side of road, by acquiring one lane of another side which carries light traffic at that time. Provision of lanes to a congested side totally depends on 'either another directing side of the road is also congested or not?' Thus, by providing the suggested mechanism, we can use the width of the road to its full efficiency. The divider is said 'Smart' because it can detect the congestion through sensors and thus microcontrollers send signals to divider to slide. So, basically movable divider is used to solve problems of traffic congestion on one side of the road with other side is free from heavy traffic. By doing this we can use road width at its full efficiency without widening of road which ultimately helps to preserve acquired land for other purposes besides of road from the unnecessary widening of road, which also leads to reduce cost of the widening of road, land acquisition and compensation. By using renewable energy sources, we can reduce the operating charge of the movable divider.

IV.METHODOLOGY

The proposed methodology contains the following modules:

- **Communication module:** GPRS/GSM/WIFI module.
- **Processing module:** Arduino / NodeMCU
- **Motor driver module:** Used to control and drive the motors based on the input.

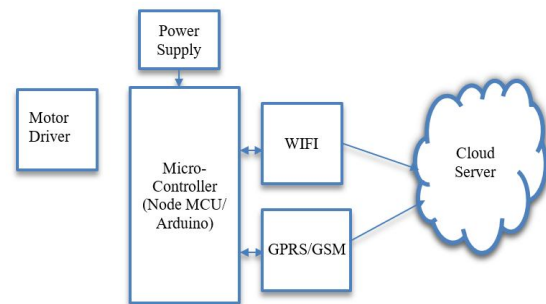
The input is fetched from the Cloud server which is sent by the control authority using mobile app like MQTT. Depending upon the traffic density the Road Divider moves forward or Backward in order to reduce the traffic congestion. Road Divider has IR sensors which able to sense the objects which is very near to the divider and it is useful to stop the movement of the road divider when the vehicles very near to the divider.

Hardware Used:

- IR Sensors
- GPS Receivers
- GSM SIM 900
- NODE MCU
- Relay
- L293D Motor Driver

Software Used:

- Programming language- C++

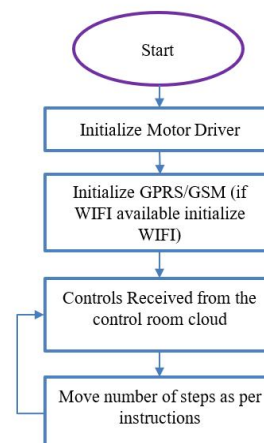


- Platform Windows
- Simulator: Arduino Simulator 1.4

Fig 1 System Architecture

In the dataflow diagram the connection has to be established between the road divider and the Mobile App using Cloud and the motor driver has to be initialized which is responsible for the movement of the road divider.

upon the received app the moves position.

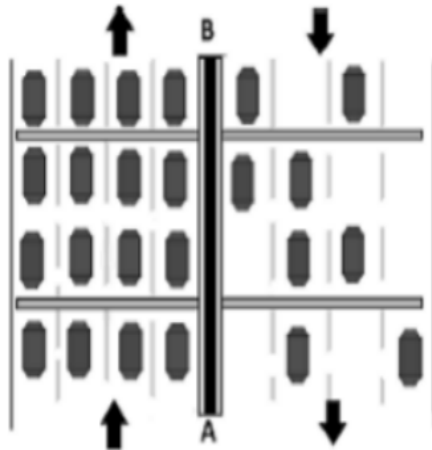


Depending controls from the divider respective

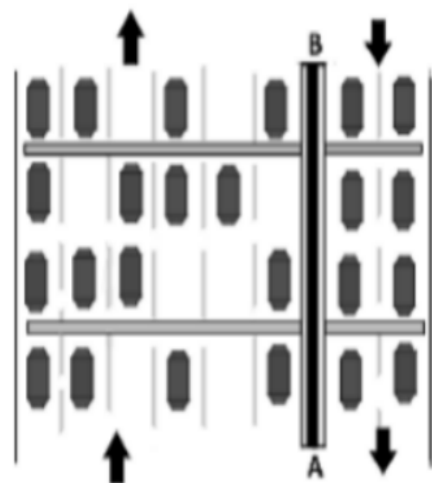
Fig 2 Dataflow Diagram

V.RESULT AND DISCUSSION

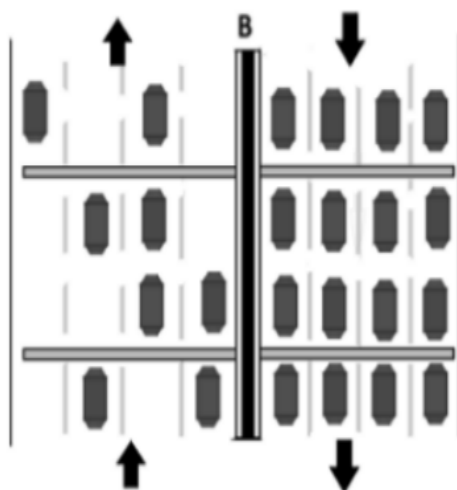
A quality output is one, which meets the necessities of the end client and presents the data obviously. The Road Divider senses the dense of the traffic and then



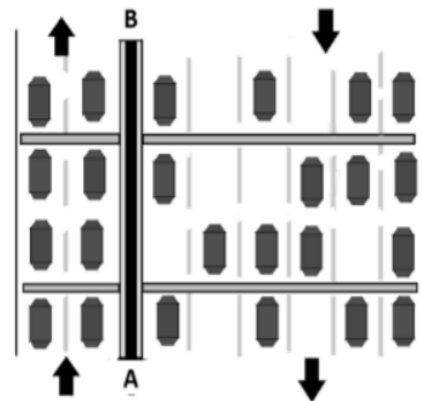
it slides or moves from one lane to the other lane.



In the figure Fig 3 and 3.1 we can see that the traffic is heavy on the left side of the road when compared to



the right side. So, the left lane needs to be widened



therefore divider is moved to the right so that the left lane gets wider and more vehicles can move and lessen the chances of the traffic. In figure 4 and 4.1 is also similar but since the traffic is to the right the divider moves to the left.

Fig.3 when the traffic is heavy on the left side of the road

Fig. 3.1 The divider is moved towards right side

Fig 4 When the traffic on the right is high

Fig 4.1 The divider is moved to the left side

The proposed structure helps to reduce the chances of traffic jams and to provide clearance of road vehicles. we have successfully designed and developed a demo model in which the results are satisfactory.

Advantages:

- Maximize the efficiency of the existing road structure and minimize the congestion
- More organized traffic flow can be achieved, reducing traffic jams
- To reduce time of journey in rush hours.

The proposed system also has some limitations which has to be considered even.

Disadvantages:

- It is not completely automatic divider
- It is not applicable if both sides are completely congested
- Problem of maintenance
- Skilled supervision staff and technicians required.

VI.CONCLUSION AND FUTURE ENHANCEMENT

The movable divider is capable of providing extra lanes with certain specified width to traffic congested side of road, by acquiring one lane of another side which carries light traffic at that time. Provision of lanes to a congested side totally depends on 'either another directing side of the road is also congested or

not?' Thus, by providing the suggested mechanism, we can use the width of the road to its full efficiency. By doing this we can use road width at its full efficiency without widening of road which ultimately helps to preserve acquired land for other purposes besides of road from the unnecessary widening of road, which also leads to reduce cost of the widening of road, land acquisition and compensation. By using renewable energy sources, we can reduce the operating charge of the movable divider.

In Future this proposed system can be operated automatically, Location based services can be integrated to this system and also able to detect high traffic density using automatically using image processing.

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