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# IOT AUTOMATIC MOVABLE ROAD DIVIDER SYSTEM BASED ON TRAFFIC DENSITY

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## ABSTRACT

This paper presents a Smart Movable Road Divider designed to mitigate traffic congestion in metropolitan areas and ensure unobstructed pathways for emergency vehicles such as ambulances. The focus of this work is to address traffic latency and improve the efficiency of road usage. Traditional road dividers allocate an equal number of lanes in both directions, often resulting in underutilization of one side during peak hours. The proposed system employs an intelligent movable divider that adjusts its position based on traffic density measured by IR sensors. The system continuously monitors traffic conditions and stores data in the cloud using IoT technology. An RF module is utilized to facilitate the movement of the divider to clear a path for ambulances, while real-time traffic updates are provided to drivers. A prototype has been developed and tested, demonstrating its effectiveness in controlling congestion and enhancing safety by notifying drivers about divider movements.

## I. INTRODUCTION

With the rapid development of metropolitan cities globally, the number of vehicles on the roads has increased significantly. However, static road infrastructure has remained largely unchanged, struggling to accommodate this growth. This imbalance has led to increased congestion, unpredictable delays, and frequent road accidents. Traffic congestion remains a pressing issue, particularly in developing

countries like India, where traffic conditions are often chaotic and noisy.

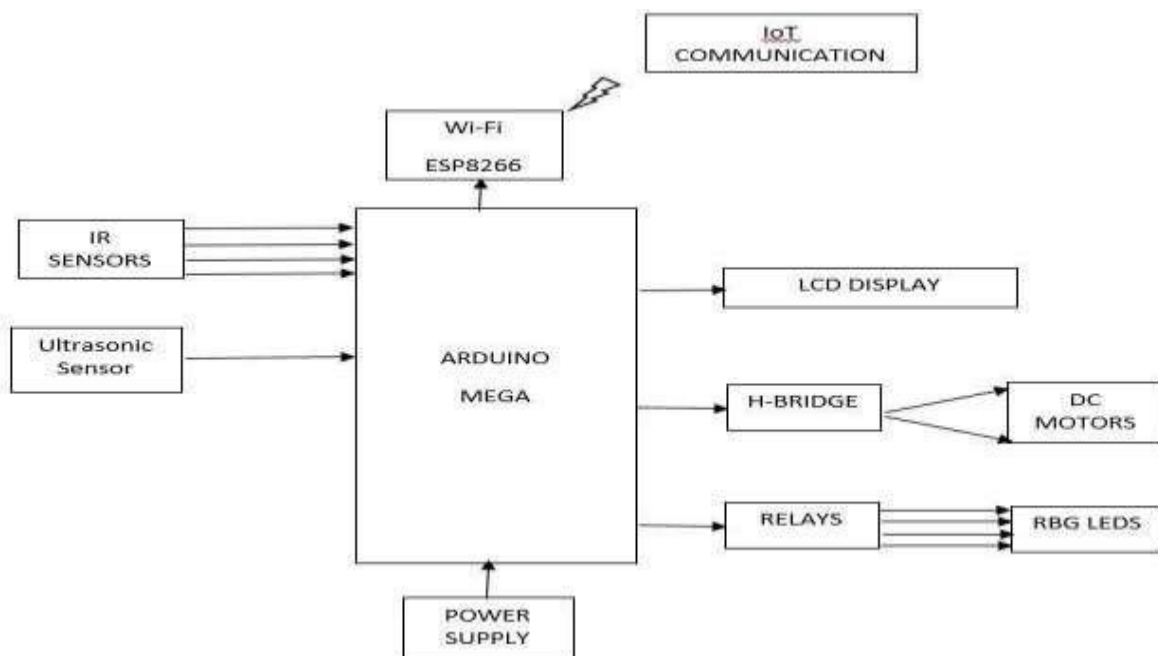
Traditional solutions, such as widening roads or building new ones, often fail to alleviate congestion effectively and can result in increased traffic volume. Instead, the paper proposes the use of movable road dividers to optimize road capacity and improve traffic flow. By dynamically adjusting the lane configuration based on real-time traffic data, this approach

aims to make better use of existing infrastructure and address peak-hour congestion.

The goal of this project is to modernize traffic management through an automated system that shifts road dividers according to traffic flow. IoT technology enables real-time monitoring and control, allowing for adjustments that improve traffic conditions and ensure clear paths for emergency vehicles. The system also integrates safety measures by informing drivers about divider movements.

## II. SYSTEM DESIGN AND ARCHITECTURE

The proposed system utilizes a microcontroller-based module equipped with ultrasonic sensors to monitor traffic density. The system adjusts the road divider position based on traffic flow, with a color-coded road signal and LCD display providing real-time updates. The system is designed to minimize collisions and improve traffic management through automated adjustments and safety notifications.



## III. LITERATURE SURVEY

### 1. Movable Traffic Divider: A Congestion Release Strategy

Movable Traffic Divider: A Congestion Release Strategy  
Author: AdvaitKawle, Dhruv Shah, KavinDoshi, Manish Bakhtiani,

YashGajja, Pratibha Singh Publications: International Journal of Recent Advances in Engineering & Technology (IJRAET) 2017  
Abstract: In recent years, with an ever increasing rate of development in metro cities around the world, 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 in spite of measures being taken to mitigate and reduce it. It has emerged as one of the main challenge for developers in urban areas for planning of sustainable cities. In developing countries, like India, traffic is inherently chaotic and noisy. Identification of magnitude of traffic congestion is an essential requirement for defining the congestion and finding appropriate measures. The paper studies the existing traffic congestion on one of the major route of western express highway in Mumbai with the help of instruments like Metro Count, which counts the data for the no. of axles as well as the speed of the vehicles simultaneously recording the results obtained and carefully analyzing the data. The main focus of this study is aimed at understanding the recurring urban congestion, its measurement, precautionary measure and suggests a remedial measure for the same. The implication of widening existing roads or building new ones will only results in

additional traffic that continues to rise until peak congestion returns to the previous level. The total available space within the city for the construction of roads, railways and other transportation is restricted. The paper discusses implementation of movable traffic dividers as congestion release strategy for metropolitan areas instead of traditional solution of widening the roads. The moveable traffic divider helps in there configuration of road capacity, so as to attain optimum benefit from roadway usage on the existing road.

2. Implementation of Movable Road Divider using Internet of Things (IOT) Author: HemlataDalmia, Kareddydamini, AravindGoudNakka Publications: 2018 International Conference on Computing, Power and Communication Technologies (GUCON) Galgotias University, Greater Noida, UP, India. Sep 28-29, 2018 Abstract: The purpose of using road divider is to separating the two ways of traffic ie ongoing and incoming vehicles in the traffic. With growing population, the vehicles used per family increases, but there is limitation in resources and leads to more number of carson roads. In that case static road divider fixes the number of road lines on either side of road. This invites the better usage of available resources. In most of the cities, there are areas like industrial and shopping places where traffic flows only in one direction both in morning as well as in evening. In the peak hours, most of the time one road side is unutilized. It

causes time loss of public and traffic jams. We aim to build a smart road divider in terms of automated road divider which moves or shift the lane directing the rush in traffic. Such type of mechanism of traffic system not only saves time but also fuel. It can add one more lane based on the traffic in the particular direction. With the smarter planet application proposed below, manual dependency and manual traffic coordination is reduced. Like this a proposal of smart traffic is built in which low, medium and high density of rush in the traffic will be shown in IOT server in using graph. It provides a better solution for traffic problem.

3. Design and Implementation of Smart Movable Road Divider using IOT Author: B Durga Sri1, K Nirosha1, Sheik Gouse1 Publications: Proceedings of the International Conference on Intelligent Sustainable Systems (ICISS 2017) IEEE Abstract: 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. For example, in any city, there is industrial area or shopping area where the traffic generally flows in one direction in the morning or evening. The other side of Road divider is mostly either empty or underutilized. This is true for peak morning and evening hours. These results in loss of time for the car owners, traffic jams as well as underutilization of available resources. Our

idea is to formulate a mechanism of automated movable road divider that can shift lanes, so that we can have more number of lanes in the direction of the rush. The cumulative impact of the time and fuel that can be saved by adding even one extra lane to the direction of the rush will be significant. With the smart application proposed below, we will also eliminate the dependency on manual intervention and manual traffic coordination so that we can have a smarter traffic all over the city. An Automated movable road divider can provide a solution to the above-mentioned problem effectively. This is possible through IOT. IOT refers to Internet of Things where the actual digitalization comes into picture. Here sensors play a major role. We can achieve this using Arduino board. 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.

4. Implementation of Movable Road Divider using Internet of Things (IOT) Author: Hemlata Dalmia;

Kareddy Damini; Aravind Goud Nakka Publications: 2018 International Conference on Computing, Power and Communication Technologies (GUCON) Abstract: The purpose of using road divider is to separating the two ways of traffic ongoing and incoming



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5. Design and implementation of smart movable road divider using IOT Author: B DurgaSri; K Nirosha; Sheik Gouse Publications: 2017 International Conference on Intelligent Sustainable Systems (ICISS) Abstract: Road Divider is generically used for dividing the Road for ongoing and incoming traffic. This

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distance to the smoother lane in order to smoothen the busy lane.

6. Software Implementation of an Automatic Movable Road Barrier Author: RoopaRavish; Varun R. Gupta; K J Nagesh; AmruthKarnam; ShantaRangaswamy Publications: 2019 International Carnahan Conference on Security Technology (ICCST) Abstract: One of the most commonly used solutions to control the traffic in most of the cities is the road divider system. It divides the roads into equal parts/sides, one for incoming traffic and other for outgoing traffic. There may be many such lanes on each side of the road. The idea of equal road division for both sides in all time may cause inconvenience and the concept is practically inefficient. This is because the flow of traffic is not consistent throughout the day. During peak hours the flow of traffic is highly inclined in one direction. Hence, in order to improve and control real-time traffic, it is ideal to have a system of movable road divider. This paper discusses an approach towards implementing automatic road divider system and various customized solutions. Different ways to implement the aforementioned system for highly specialized environments are also discussed in this paper. This is shown through simulation. Our implementation uses methods to recognize the vehicle density on each side of the road and adjust the roadway barrier accordingly. This minimizes the traffic congestion and allows smooth flow of vehicles by providing ample

commute area towards the side with a heavier flow of traffic.

#### IV. ADVANTAGES

The proposed Smart Movable Road Divider system offers several key benefits. First, it enhances emergency vehicle clearance by integrating RFID technology and cloud computing, ensuring that ambulances and other emergency vehicles can traverse congested areas without delays. Additionally, the system improves traffic efficiency by dynamically adjusting the road divider positions based on real-time traffic data, effectively reducing congestion and minimizing travel time. Furthermore, it delivers environmental benefits by optimizing traffic flow, which leads to improved fuel efficiency and a reduction in CO<sub>2</sub> emissions, contributing to a more sustainable urban environment.

#### V. CONCLUSIONS

The proposed Smart Movable Road Divider system effectively addresses traffic congestion and enhances road safety by providing clear paths for emergency vehicles. The system's integration of IoT and real-time data analysis offers a modern solution to traditional traffic management challenges. It is applicable to various traffic zones and can significantly improve traffic conditions in metropolitan areas, benefiting both commuters and urban planners.

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