Smart Movable Road Divider and Clearance Ambulance Path Management Through IOT

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Abstract: *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. The problem with Static Road Dividers is that the number of lanes on either side of the road is fixed. Since the resources are limited and population as well as number of cars per family is increasing, there is significant increase in number of cars on roads. The existing Road Dividers consists of equal number of lanes. Usually, in morning and evening peak hours the opposite side of the Road Divider is generally underutilized. To overcome this, Smart Movable Road Divider is implemented where the divider is moved based on the density of the traffic using IR Sensors. If the density of the traffic is high on one side, the divider is moved to the other side. This calls for better utilization of existing resources like number of lanes available. Our aim is to formulate a mechanism of automated road divider that can shift lanes, so that we can have number of lanes in the direction of the rush. Each ambulance will be equipped with GPS and GSM modem which in case of emergency will send its GPS coordinates to the cloud server, which will then mark the shortest distance from its present location to the hospital viathe place from where the emergency call has been raised.*

Index Terms: *Cryptography, AES, ASIC, FPGA, data path.*

1. INTRODUCTION

Travel delays, congestion and accidents. The main problem with Static Road Across the World many Nations are facing Traffic Congestion problems due to the number of automobiles increasing day by day. Though the number of vehicles increased, the Road infrastructure is nearly the same which cannot be able to cope up with the changes like unpredictable Divider is that the number of lanes on either side of the road is fixed. Since the resources are limited and population as well as the number of cars per family is increasing, there is a significant increase in the number of cars on roads. Controlling oftraffic on the road has become a severe problem in today's society. There are so many situations where the ambulance gets struck in traffic , it has to wait for some minutes to hours to clear the traffic congestion due to which the patient's life might be at risk because ofthe latency in the traffic . Increasing traffic and road surface has few severe environmental issues related with it, such issues includes traffic jams, traffic congestion, and numerous types pollution and related health problems. Congestion in traffic eventually results in slow speeds , which increases the time of travel which stands out as one of the major issues in metropolitan cities. The Interaction between the vehicles slows the speed ofthe traffic flow when there is high demand which results in some congestion. This can be a possibility for any mode oftransportation, tis article will focus on traffic congestion on civic roads . As demand approaches the capacity of a road, extreme traffic congestion sets in. When vehicles are fully stopped for periods of time, this is colloquially known as a traffic jam or traffic snarl-up.

To overcome these problems and to save many lives we have proposed this paper which provides the functionality of path clearance. The number of lanes on either side of the lane is fixed which a problem with static roads is. The number of cars per family is increasing though the resource and population are limited there is a signific ant increase in number of cars on roads, which leads for a better utilization of existing resources like number of lanes available. The main focus of this article is to take the traffic controlling to a new era by avoiding traffic congestion, and to control high density traffic and to reduce the time of journey in peak hours for a better and smarter solution for the above said traffic problems. In case of Ambulance clearance unit whenever the traffic signal section receives the signal from ambulance, the microcontroller turns ON the signal light to green. Whenever the ambulance reaches near to the traffic signal, the traffic

signal will be made to green through RF communication. It is important for the ambulance to reach the hospital within the required time. Considering the fact that an ambulance stuck in traffic is a common sight in many places across the world every day, a productive free path for ambulance is the need in the present condition and this demonstration may pave the way to achieve that. Therefore, the ambulance can reach the hospital in time without any delay.

2. PROPOSED DESIGN METHOD

Smart Movable Road Divider for controlling the traffic congestion in metropolitan cities and to provide a free path for the ambulance. On reducing the latency in trafficfree path for ambulance. To overcome this, Smart Movable Road Divider is implemented where the divider is moved based on the density of the traffic using IR Sensors. If the density of the traffic is high on one side, the divider is moved to the other side. Then the density of traffic is stored in cloud which is possible through loT. A free path for Ambulance is provided using RF Module by controlling the traffic signal. A Prototype is developed and tested for the Congestion control which also works on safety measures by intimating the drivers about the movement of the Divider. The system generates emergency alerts, notifying both the traffic management system and nearby vehicles about the approaching ambulance.

Traffic signal preemption is activated, granting the ambulance a clear path by temporarily interrupting the normal signal operation and providing a green signal along its route. The traffic management system intelligently adjusts signal timings, optimizing traffic flow and prioritizing the ambulance's movement.

Our idea is used to detect accident or fault ambulance and automate emergency assistance services. As a result, system is sending SMS to the nearest Emergency assistance service provider from accident location. The high demand of automobiles has also increased the traffic hazards and the road accidents. Life of the people is under high risk. This is because of the lack of best emergency facilities available in our country. An automatic alarm device for vehicle accidents. This design is a system which can detect accidents/fault vehicle in significantly less time and sends the basic information. This alert message is sent to the rescue team in a short time, which will help in saving the valuable lives. Arduino Based Vehicle Accident Alert System using GPS and GSM Accelerometer detects the sudden change in the axes of vehicle and GSM module send the alert message on your Mobile Phone with the location of theaccident.
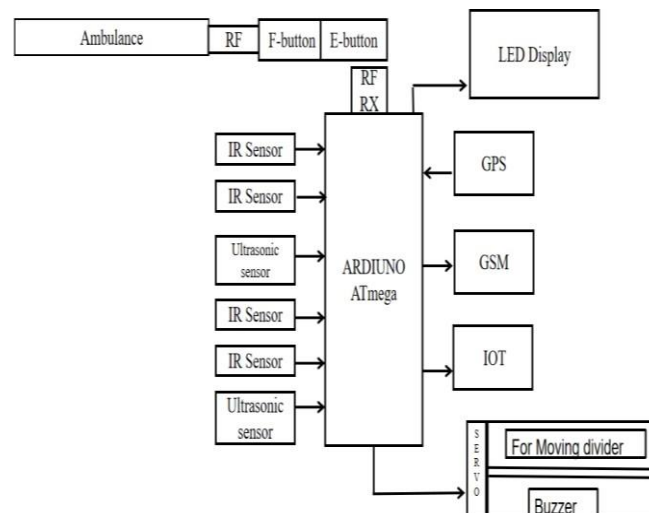

FIGURE 1. Block Diagram for the implementation of Road divider movement

Ambulance Detection:
This system should detect approaching ambulances using a combination of sensors, including visual (flashing lights recognition), and GPS tracking. Real-time Monitoring: Continuously monitor the road and surrounding areas in real-time to detect emergency vehicle.

Data Processing:
Process IoT device sensor data and edge devices for accurate ambulance detection.

Ambulance Verification:
Verify the identity and status of the ambulance to prevent misuse of the clearance system.
Emergency Services Communication: Integrate with the local emergency services communication network to facilitate coordination with first responders. Cloud-based Decision Making: Use cloud-based software to make decisions based on incoming data. Determine when to move the road dividers to clear a path for an approaching ambulance.

Road Divider Control:
Activate the road divider's motorized or hydraulic systems to create a lane for ambulance when necessary.
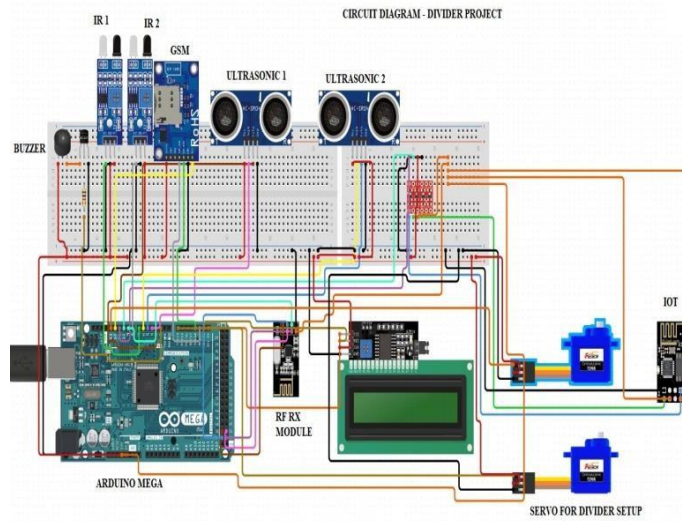

FIGURE 2. Circuit Diagram for the implementation of Road divider movement

3. WORKING OF PROPOSED SYSTEM

There are following modes to describe how divider is shift from their fixed position and how they provide the free space to vehicles:

Modes of Working:
Mode 1: As shown in figure that if one side of the lane of the road is having high traffic as compare to other then the divider will shift to the other which is having less traffic on the road and also saves the passenger time so that they reach their destination in proper time
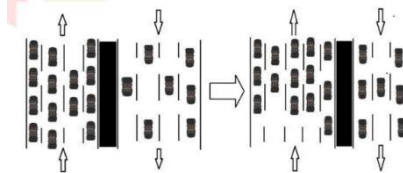.

FIGURE 3. Left Side Traffic

Mode 2: which will provide the same information as that if the number of vehicles of one lane is more as compare to other than the divider will shift to another lane of the road which is having less traffic.
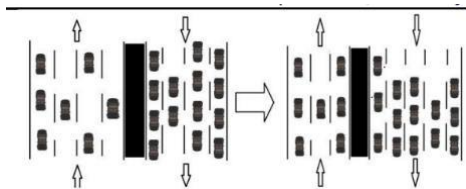

FIGURE 4. Right Side Traffic

Mode 3: the information is that if the traffic of one-lane road is same as the other lane road then the divider will not shift from place this situation and it easily handled the traffic on both sides this situation is named as constant divider.
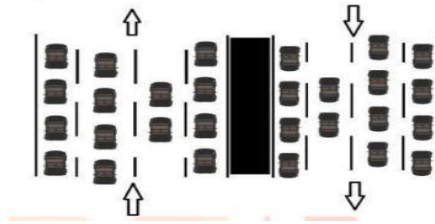
FIGURE 5. No Traffic

Mode 4: A more important mode. In this mode the divider will shift according to that is if the ambulance is present on the lefthand side of the road then the divider will shift to other side or vice-versa so that the ambulance will first go out and reach their destination in a proper time and saves the lives of human which is more important for us
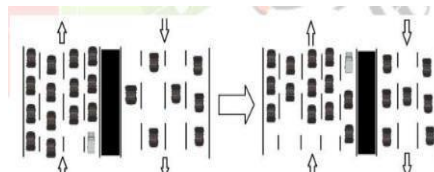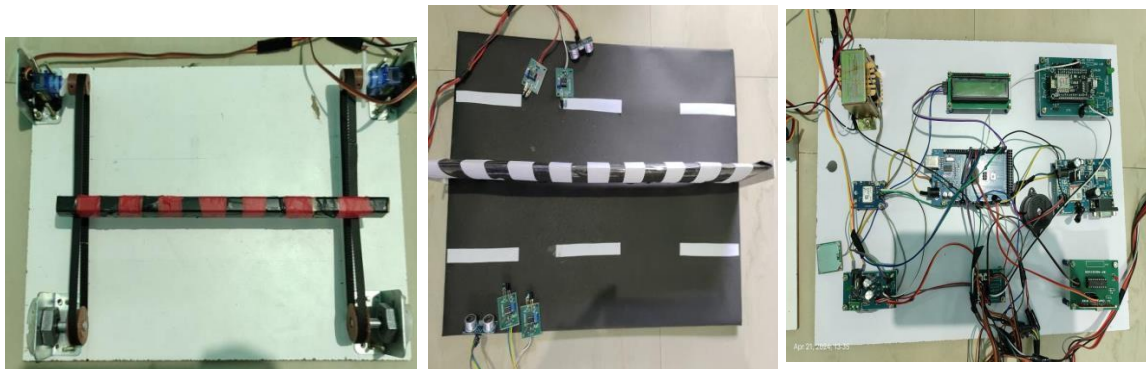

FIGURE 6. Ambulance presence

FIGURE 7. Hardware Prototype

6. CONCLUSION AND FUTURE SCOPE

Our project they have analyzed about the traffic congestion problems in certain regions and we have done a comprehensive survey on the traffic congestion, causes and its problem. To avoid congestion and reduce the time of journey in the peak hours and to provide smarter and better solution for the above said traffic problems, for this they have proposed a prototype model of a Movable Road Divider. This idea aims to reduce traffic by smartly sensing the traffic flow on either side of the divider, and move the divider accordingly, hence saving the time and fuel. This also works on safety measures by intimating the drivers about the moment of the divider. This also allows the user that is Traffic Police to manually control the divider position based on requirements and to provide a free path for ambulance which ensures the ambulance to reach the hospital without any delay.

In future this system can be used to inform people about different places traffic condition. Data transfer between the microcontroller and computer can also be done through IOT network. This technique allows the operator to gather the recorded data from a far end to his home computer without going there. Traffic lights can be increased to N number and traffic light control can be done for whole city by sitting on a single place.

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