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AUTOMATIC MOVABLE ROAD DIVIDER

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ABSTRACT

Nowadays, the drastic increase in road traffic congestion has led to severe consequences on individuals, economy and environment, especially in urban areas in most big cities worldwide. The purpose of using a road divider is to separate the incoming and outgoing traffic vehicles in the traffic. With increasing population, the vehicles are increasing, but there is limited resources which leads to more number of vehicles on roads The main aim of the project to use every second efficiently to save a human life while traveling in an ambulance. This can be achieved with a Movable Road divider. In the proposed model, we are not using a machine and operating it manually rather operating it automatically with the help of sensors. Road traffic congestion is among the most challenging issues that current road traffic authorities as well as peoples are facing due to its compelling impacts. Among all these impacts, the delay of emergency services delivery to the emergency location is the most critical due to the incurred cost in terms of deaths, injuries and financial losses in case of fires, car crashes, terrorist attacks, etc. The communication system installed in the ambulance can clutch the traffic at signals until it crosses the crowded area. The system is designed for junction/cross-roads, where often ambulances have to wait until the normal traffic is cleared. This is quite an inconvenience for the patient who needs immediate treatment. Thereby this system is designed that can by-pass the existing signaling system temporarily.

I. INTRODUCTION

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 challenges for developers in urban areas for planning sustainable cities.

In developing countries, like India, traffic is inherently chaotic and noisy. Identification of the magnitude of traffic congestion is an essential requirement for defining the congestion and finding appropriate measures. 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 result 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 a congestion release strategy for metropolitan areas instead of the traditional solution of widening the roads. The Movable traffic divider helps in there configuration of road capacity, so as to attain optimum benefit from roadway usage on the existing road.

II. HARDWARE

Arduino:

Arduino is a tool for making computers that can sense and control more of the physical world than desktop computers. It's an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board. Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling a variety of lights, motors, and other

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physical outputs. Arduino systems can be stand-alone, or they can communicate with software running on computer (e.g., Flash, Processing, MaxMSP.) The boards can be assembled by hand or purchased pre-assembled; the open-source IDE can be downloaded for free. The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

Figure 1: Arduino UNO

Figure 2: Arduino NANO

Ultrasonic Sensors:

On the designed road divider, ultrasonic sensors are set on both the sides facing towards the road. The primary function of this sensor is to take readings of traffic density and to calculate them in terms of percentages.

Figure 3: Ultrasonic Sensor

Servo:

Servo Motor converts the electrical energy into mechanical energy. It accepts energy in the electrical form from the DC source and converts it into mechanical energy at its output. It consists of two windings namely field winding and armature winding. The field winding is stationary and the armature winding can rotate. We can connect the field winding as well as armature winding to DC supply. The field current produces the magnetic flux in the air gap between the armature and field windings and the current carrying conductor is placed in this magnetic field.

Figure 4: UltraSonic Sensor

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WIFI Adapter ESP8266:

The ESP8266 module is powered by a Ten silica Xtensa LX106 core processor, which runs at a clock speed of 80 MHz It typically comes with various flash memory sizes, ranging from 512KB to 16MB, allowing ample space for program storage and data handling. One of the notable features of the ESP8266 is its built-in Wi-Fi connectivity. It supports 802.11 b/g/n standards, providing reliable wireless communication capabilities. The module can function as a Wi-Fi client, connecting to an existing wireless network, or as an access point, allowing other devices to connect to it. This flexibility enables the ESP8266 to serve as a standalone Wi-Fi-enabled device or as part of a larger network infrastructure. The ESP8266 module can be programmed using the Arduino IDE or using various programming languages such as C++ and Micro Python.

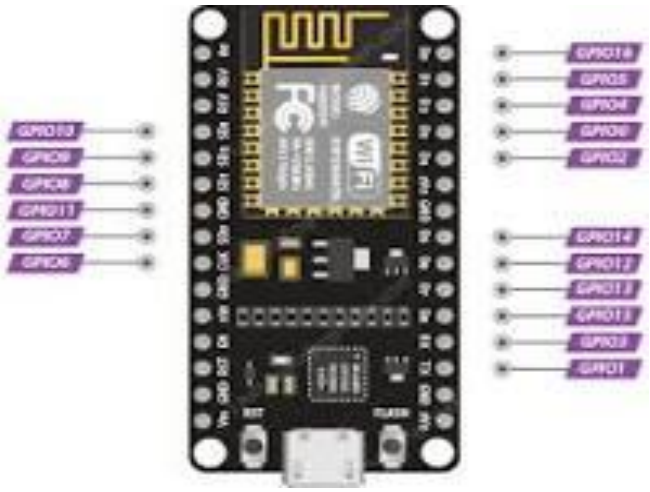

Figure 5: ESP8266 WIFI Module

III. CIRCUIT DIAGRAM AND BLOCK DIAGRAM

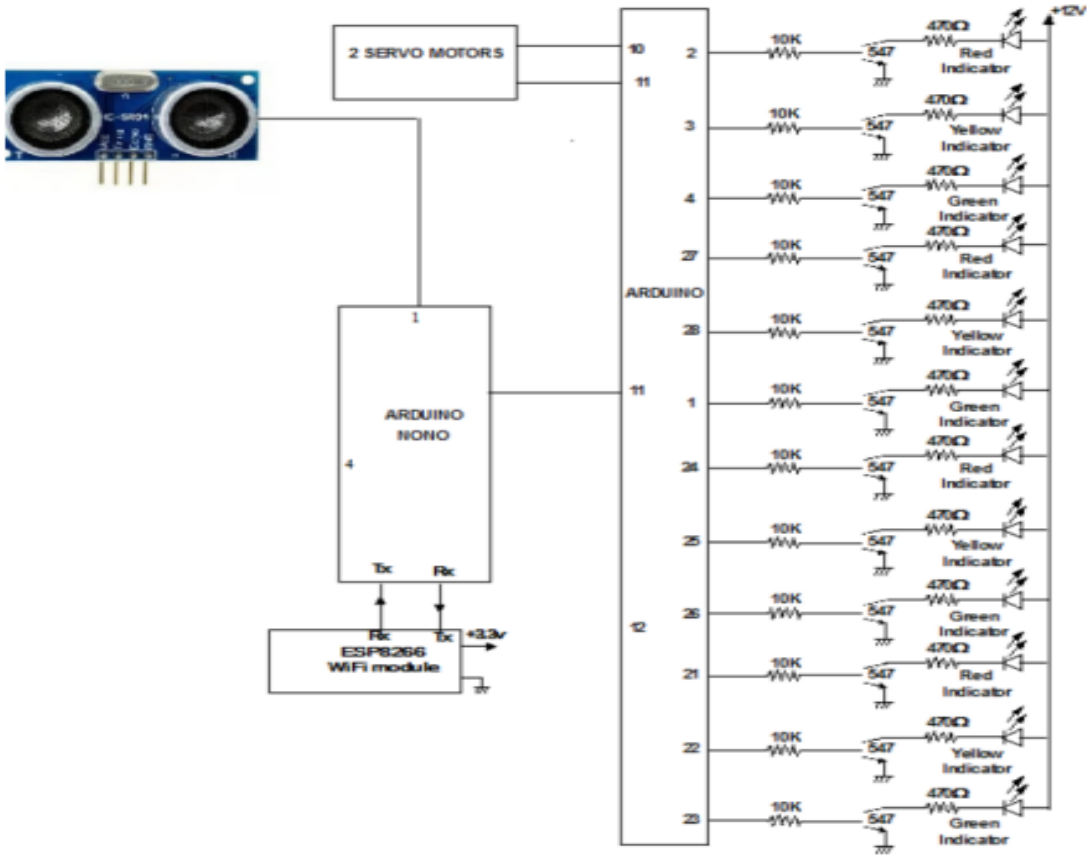

Figure 6: Circuit Diagram

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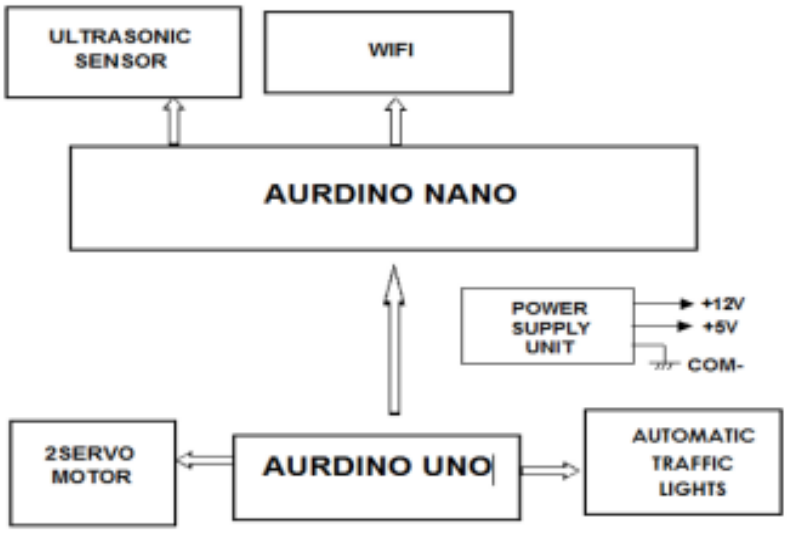

Figure 7: Block Diagram

IV. RESULTS

The first set of visual results showcases the automatic movable road divider kit with the power supply turned off. - The pictures highlight the various components of the kit, including the control unit, sensors, and communication modules. - The images provide a clear representation of the physical setup of the system, giving readers a visual understanding of its components.

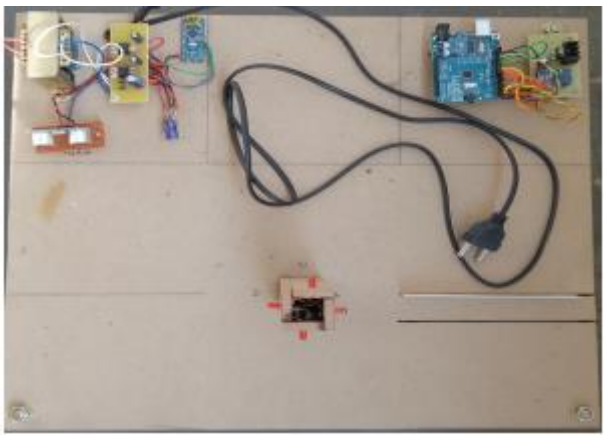

Figure 8: Power Supply Turned OFF

When no traffic is detected, the movable road divider remains in its current position, ensuring that there are no unnecessary disruptions or movements that could potentially impede the flow of vehicles. -By staying stationary during periods of no traffic, the automated system avoids unnecessary lane reconfigurations, minimizing any potential confusion or inconvenience to drivers. -The stationary position of the road divider in the absence of traffic contributes to the overall smoothness and consistency of the traffic flow, allowing vehicles to maintain their desired lanes without unnecessary lane changes.

Figure 9: No Traffic Detected

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The movable road divider seamlessly moves as traffic is detected, facilitating the smooth flow of vehicles without causing congestion or disrupting the lane. By promptly responding to the presence of vehicles, the automated system ensures that cars can navigate through the road without encountering unnecessary delays or bottlenecks. The dynamic movement of the road divider effectively prevents traffic build-up, allowing for efficient lane management and minimizing the likelihood of gridlock during peak hours. With the divider adapting to the traffic conditions, drivers experience improved maneuverability, enabling them to change lanes safely and easily without impeding the flow of other vehicles.

Figure 10: When Traffic is detected the divider is extended

When an ambulance is approaching from point D, the traffic management system swiftly detects its presence and takes immediate action. 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. This coordinated effort ensures a smooth and unhindered passage for the ambulance until it exits the area. Once the ambulance has safely passed through, the traffic signals return to their regular operation, seamlessly resuming normal traffic patterns. This approach enables efficient traffic management while prioritizing the urgent needs of emergency vehicles.

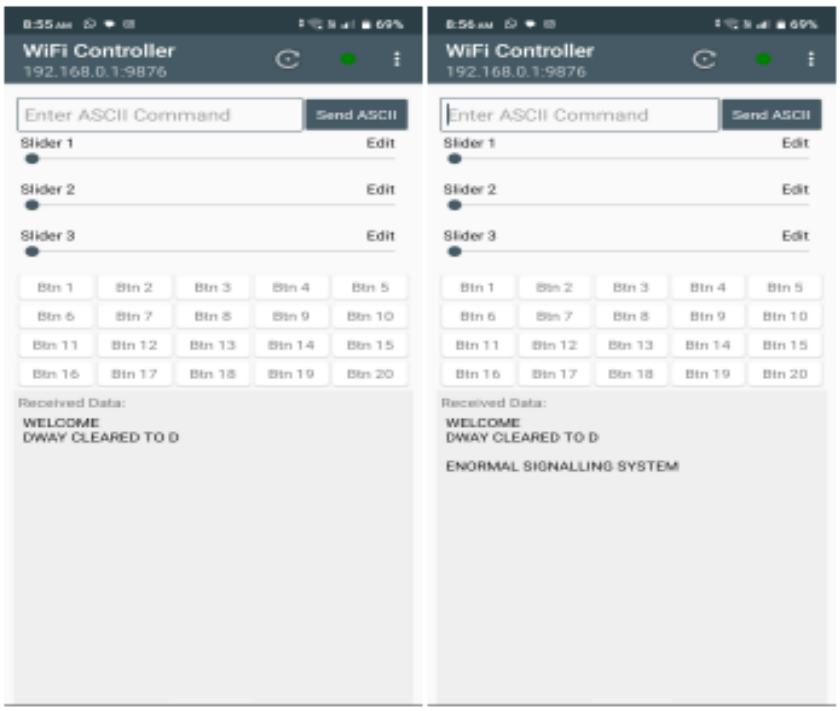

Figure 10: Making Way for Ambulance (WIFI Application Screenshot)

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V. CONCLUSION

The project work Titled "Movable Road Dividers for Vehicular Traffic Control" is successfully designed & developed, and a demo unit is fabricated and the results are found to be satisfactory. Since it is a demo module, we have considered one way only and according to that information is transmitted through WIFI. But when the system is utilized for real applications, the same mechanism can be implemented for multiple directions depending on the traffic conjugation. In this system, an integrated system of Wi-Fi modem (IoT), Ultrasonic Sensor is introduced for efficient and economic traffic control operation. The developed system provides an improved database for traffic conjugation at each location. We analyzed the solutions currently available for the implementation of IoT. By implementing this system, we will avoid high traffic congestion in peak hours. It can automatically monitor the traffic density & send the information to the traffic department.

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