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Adjustable Road Divider Using IoT

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Abstract— Traffic congestion is the major problem in countries like India. We are facing a lot of issues regarding traffic majorly in the morning and the evening hours. This paper proposes an embedded system solution for traffic congestion using existing resources effectively. So, our project help people to save their time and fuel. It consists of IR Sensors which detects number of vehicles on both the lanes and a DC gear motor is fixed to move the road divider. A buzzer is arranged to alert people when the divider is moving. If number of vehicles is more on right side, the divider moves towards left and accordingly.

Keywords: ***Arduino UNO, Barrier, Density of traffic, IR Sensors, Lane divider, Movable road divider, Traffic control.***

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I. INTRODUCTION

In [4] Now-a-days number of private vehicles increasing day by day especially in major cities like Hyderabad and creating more rush. [1] High volume of vehicles, the inadequate infrastructure and the irrational distribution of the signalling system are main reasons for chaotic congestions. It indirectly adds to the increase in pollution level as engines remain on in most cases, a huge volume of natural resources in forms of petrol and diesel is consumed without any fruitful outcome.

Divider is generally used to divide the road into parts. Movable road divider moves according to the flow of traffic. In many areas we observe heavy traffic on one side of the road and the other side remains empty. In such situations we can use the empty side of the road to clear traffic on opposite side. We can give priority to government vehicles and VIP vehicles.

II. EMBEDDED SYSTEMS

An [9] embedded system is a computer hardware system having software embedded in it. An embedded system can be an independent system or it can be a part of a large system. An embedded system is a microcontroller or microprocessor based system which is designed to perform a specific task. It is a large combinational system. It is combination of three major components: hardware, application software, real time operating system.

III. PRESENT SIGNALLING SYSTEM

We can observe that the present signalling system is controlled by traffic police and traffic signals. These traffic signals are embedded with fixed time. We require man power to handle thetraffic conditions

IV. LITERATURE SURVEY

1. IoT deployed automatic movable smart road divider to avoid traffic problems (Year 2019): From the project [5], Ultrasonic sensors are placed to generate high frequency sound waves. Time period cameras are used to gather information and send to cloud. The blob analysis and the traffic density victimization morphological filtering has discovered in this system.
2. Implementation of movable road divider using Internet of Things (Year 2018): In this project [4], the objective is to reduce traffic congestion in a smarter way and also reduce manual dependency and manual traffic coordination. This mechanism not only saves times but also fuel.
3. Design and implementation of smart movable road divider (Year 2017): The project [3], formulated a mechanism of automated movable road divider that can shift lanes, so that we can have more number of lanes in the direction of rush. The sensors placed on the dividers sense the flow of traffic.
4. Reducing emergency services response time in smart cities (Year 2015): The aim of this project [2] is to reduce the delay of emergency vehicles and police cars which are leading to increase in deaths on roads and financial losses. This can be achieved with a traffic management system (TSM).

Density based traffic signal system (Year 2014): The paper [1] describes the development of a density based dynamic traffic system. The image captured in the traffic signal is processed and converted into grayscale image then its threshold

is calculated based on which the contour has drawn in order to calculate the number of vehicles present.

V. IMPLEMENTATION OF PROPOSED SYSTEM

The implementation of the paper design can be divided into sections:

a. Hardware and Software implementation.

- Hardware Requirements
- Arduino UNO
- IR Sensors
- DC gear motor
- Piezo electric buzzer
- LCD

b. Software Requirements

- Arduino IDE Software

A. DESCRIPTION

- Arduino UNO: This is a board based open-source Microcontroller and Arduino developed.
- IR Sensors: In order to detect the motion of vehicles IR sensors are used.
- DC gear motor: In order to move the road divider, DC gear motor is used.
- LCD (Liquid Crystal Display): The data from IR sensors is transmitted and the number of images on both sides is displayed on LCD. It produces visible image.
- Piezoelectric Buzzer: Before movement of divider, buzzer beeps to alert people.
- Arduino IDE: With Arduino board this software can be used. Code can be easily written with this open-source software.

B. PROCEDURAL FLOW

- Start.
- Download Arduino IDE software and power up your board.
- Launch Arduino IDE, then open your first project and select your Arduino board.
- IR sensors, Rectifiers, Arduino UNO are under transmitting section.
- DC gear motor, LCD and speaker are at receiving side.
- Connect the Arduino UNO cable with one port of PC.
- Compile the program in Arduino IDE.
- End.

VI. PROPOSED SOLUTION

The number of vehicles on both the lanes are identified using IR sensors which are placed on both sides. These sensors transmit the data collected to Arduino. Count of both the lanes are displayed on LCD screen "RIGHT:004 LEFT:008". Now buzzer beeps and divider start moving using DC gear motor according to the count. If number of vehicles are more on right side, divider moves towards left and accordingly. Work flow of proposed system is shown in Fig.1 in the form of flow chart.

VII. FUNCTIONALITY OF PROPOSED SYSTEM

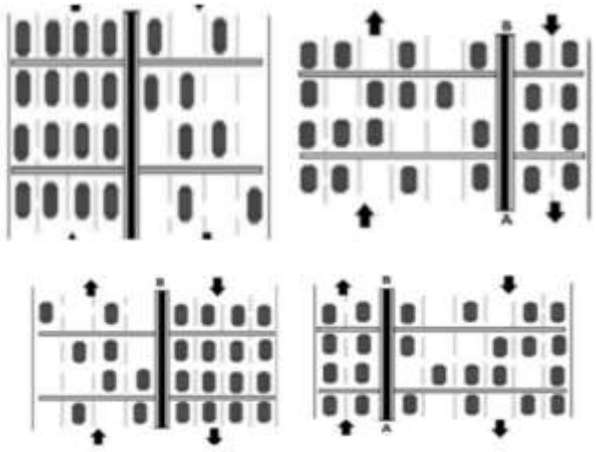

Figure 1[6]: when traffic is heavy on left side

Figure 2[6]: when traffic is heavy on right side

- From “Figure 1” we can observe that number of vehicles is more on left side.
- So, the divider moved towards right side.
- From “Figure 2” we can see that numbers of vehicles are more on right side.
- So, the divider moved towards left side.
- Figure 3 Shows the flow chart of the project.
- From figure 3, we can see that the data is collected from the sensors and according to the data received conditions are evaluated.

Here, we considered three conditions with respect to number of vehicles.

- If the vehicles on both the lanes are same, there is no need for any action.

This is a continuous process.

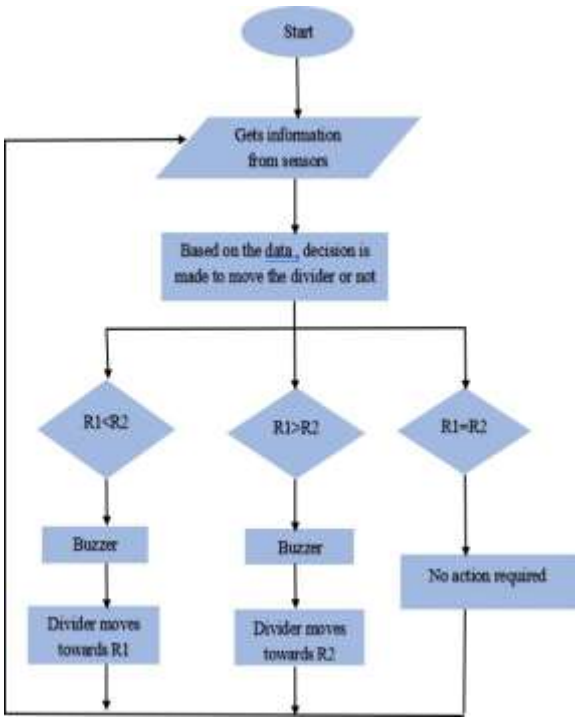

Figure 3: Flow chart

"Figure 4" shows the block diagram of proposed system. We are using Arduino UNO, IR sensors, LCD, DC gear motor and a buzzer.

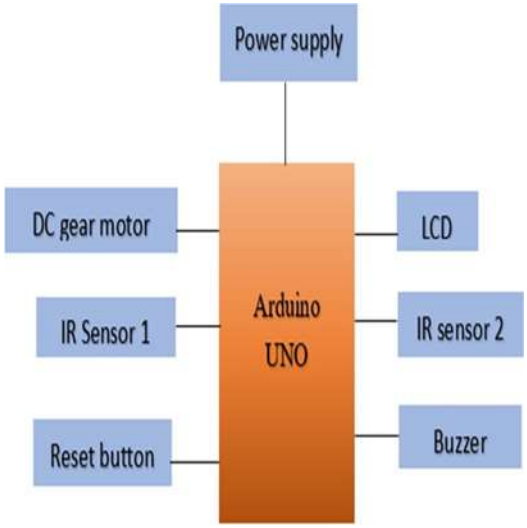

Figure 4: Block diagram

VIII. RESULTS AND DISCUSSION

The output for Adjustable Road Divider Using IoT is shown below. Figure 5 shows the functional setup of Adjustable Road Divider.

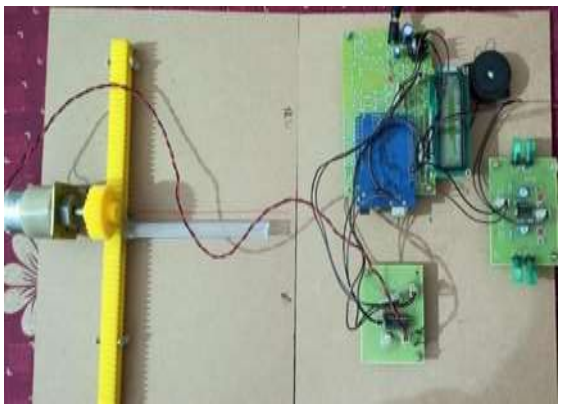

Figure 5: Functional setup of road divider circuit

"Figure 6" shows the setup after giving power supply,

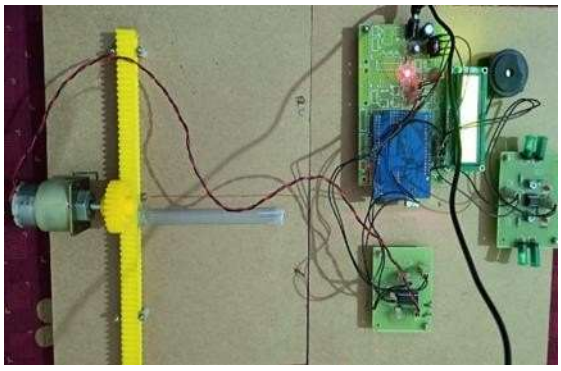

Figure 6: Functional setup after giving power supply

We are using ATMEGA 328P microcontroller. A piezoelectric buzzer is also arranged. After giving power supply LED glows. "Figure 7" shows the count of vehicles in case 1. The count of the vehicles on right side is shown as 10. The number of vehicles on left side is shown as 6. So now the divider have to move towards left side.

Figure 7: Count of vehicles in case1

"FIGURE 8" shows the results of case 1

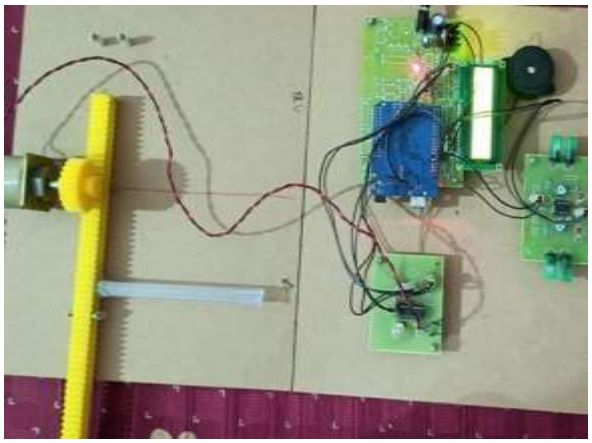

Figure 8: Divider moves towards left

"FIGURE 9" Shows the count of vehicles in case2.The number of vehicles on left side is noted as 4 and number of vehicles on right side is taken as 0. So, the divider should move toward

Figure 9: Count of vehicles in case 2

In case 2, number of vehicles are more on left side. So, the divider should move towards right side. Figure 9 shows the movement of divider towards right side. Before movement of divider buzzer beeps. IR sensors detect the motion or heat of objects. Microcontroller controls the circuit. Piezoelectric buzzer is used because, noise is very less for it compared to other buzzers.

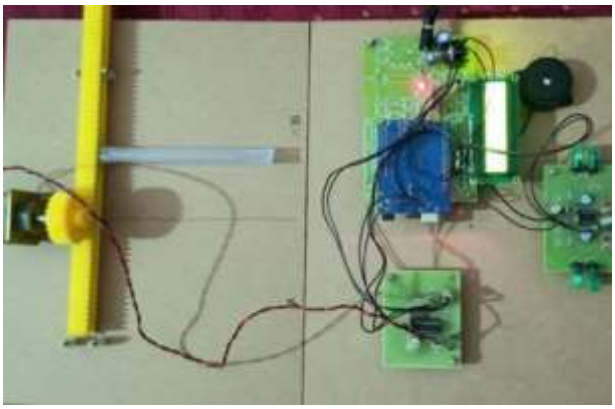

Figure 10: divider moves towards right

IX. CONCLUSION

The implementation of the adjustable road divider is a method which works on image processing in real time to control traffic.It identifies number of vehicles on each lane and makes decision for movement of barrier .The road with highest priority is cleared first.This idea reduces the traffic in peak hours.

X. FUTURE SCOPE

We can extend this project to identify and prioritize government vehicles like ambulances using RFID tags. This will help patients in ambulance to reach hospitals fast. We can even connect the data collected to the cloud so that people are able to know the traffic condition in particular area.

XI. ACKNOWLEDGMENT

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