SMART MOVABLE ROAD DIVIDER USING IoT

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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 mainchallenge for developers in urban areas for planning of sustainable cities. In developing countries, like India, traffic is inherently chaotic and noisy. 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 under-utilized. This is true for peak morning and evening hours. This 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. An Automated movable road divider can provide a solution to theabove-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.**

I INTRODUCTION

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 main focus of this paper 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.

II SYSTEM ARCHITECTURE

Systems design is the process of defining the architecture, modules, interfaces, and data for a system to satisfy specified requirements. Systems design could be seen as the application of systems theory to product development. There is some overlap with the disciplines of systems analysis, systems architecture and systems engineering. If the broader topic of product development "blends the perspective of marketing, design, and manufacturing into a single approach to product development,then design is the act of taking the marketing information and creating the design of the

product to be manufactured. Systems design is therefore the process of defining and developing systems to satisfy specified requirements of the user. The physical designrelates to the actual input and output processes of the system. This is explained in terms of how data is input into a system, how it is verified / authenticated, how it is processed, and how it is displayed. In physical design, the following requirements about the system are decided.

1. Input requirement,

2. Output requirements,

3. Storage requirements,

4. Processing requirements,

5. System control and backup or recovery.

User Interface Design is concerned with how users add information to the system and with how the system presents information back to them. Data Design is concerned with how the data is represented and stored within the system. Finally, Process Design is concerned with how data moves through the system, and with how and where it is validated, secured and/or transformed as it flows into, through and out of the system.

A Data flow diagram (DFD) is a graphical representation ion of data processing of the flow of the data through an information system, modeling its process aspects. A DFD is often used as preliminary step to create an overview of the system, which can be elaborated later. DFD can also be used for visualization of data processing.

A Data shows what kind of information will be input to and output from the system, where the data will come from and go to, and where the data will be stored. It does not show information about timing of the process or information about whether processes will operate in sequence or in parallel. The data flow diagram for the project is shown in Fig1.

At first the user is connected to wifi module and if its connected it will do the operation if not it goes back to the 1st step and connects again. Once initialization is done the functions are performed and all the data are stored in the app.

III SYSTEM IMPLEMENTATION

A. Modules

- Ardunio
- Motor drivers
- Relay
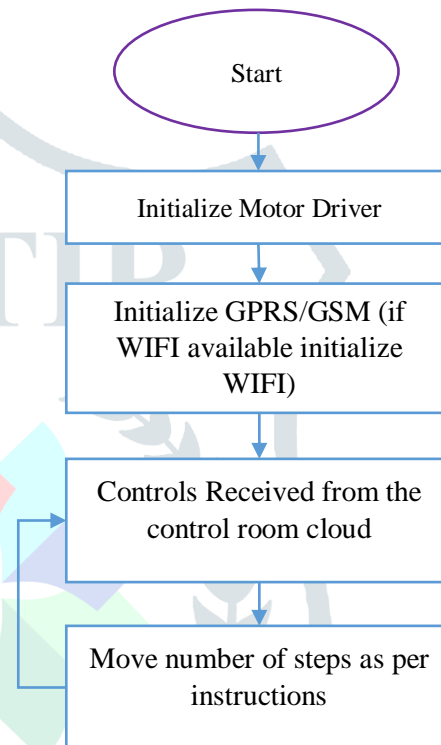- IR sensors
- L293D Motor driver
- Wifi / GSM module

Fig 1:Data Flow Diagram

Hardware Components

IR Sensors: An infrared sensor is an electronic instrument that is used to sense certain characteristics of its surroundings. It does this by either emitting or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion. Infrared waves are not visible to the human eye. In the electromagnetic spectrum, infrared radiation can befound between the visible and microwave regions. The infrared waves typically have wavelengths between 0.75 and 1000μm. All objects which have a temperature greater than absolute zero (0 Kelvin) possess thermal energy and are sources of infrared radiation as a result. Sources of infrared radiation include blackbody radiators, tungsten lamps and silicon carbide. Infrared sensors typically use infrared lasers and LEDs with specific infrared wavelengths as sources.

GPS Receiver: Global Positioning System (GPS) is a satellite navigation system and is used to capture geographic location and time, irrespective of the weather conditions. It is maintainedbythe U.S. Government and is freely available to anyone who has a GPS receiver. It obtains the GPS information from satellites in National Marine Electronics Association (NMEA) format. The NMEA has defined a standard format for the GPS information. This is followed by all the satellites. The standard defines various codes such as Fig. 2. Architecture of the proposed system. GLL-Latitude/Longitude data, GSV–Detailed satellite data and RMC-Minimum Recommended Data.

GSM SIM 900: Global Standards for Mobile Communication (GSM) is a set of standards for Second Generation (2G) cellular networks. The GSM SIM 900 module uses any network provider's SIM to cover too per communicate over the telecommunication network. This modem can be used to send and receive text messages and to make and receive voice calls. GSM SIM 900 is a quad-band GSM modem that functions at 850, 900, 1800 and 1900 MHz frequencies. This modem also supports features like transferring voice data, integrated support for GPRS and TCP/IP stack

L293D Motor driver : L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. Dual H-bridge Motor Driver integrated circuit (IC). The l293d can drive small and quiet big motors as well.

1V TESTING

The use of testing the system is to identify the errors. Testing is regarded as the process of trying to identify every conceivable false or weakness present in the work product. It will provide a way for checking the functionality of components, assemblies, sub assemblies, and a finished product.

TYPES OF TESTS

The Unit testing:

The Unit testing will involve the designing of test cases which validate that the internal program logic is properly functioning, and the inputs of that program will produce the valid outputs. All of the decision branches and the flow of internal code must be validated. It is considered as the testing of individual software units for the application.

The Integration testing:

The Integration tests were designed for testing the integrated software components in order to determine when they actually run as one program. Testing is considered as an event driven andit is more concerned by the basic outcome of fields or screens.

The Functional test:

The Functional tests will provide a systematic demonstration that the functions which are tested were available as described by the business and the technical requirements, user manuals and the system documentation.

The System Test:

The System testing will ensure that the entire integrated software system will meet the requirements. A configuration is tested to ensure predictable and known results.

The example of system testing is the configuration of oriented system integration test. The System testing will be based on the process flows and descriptions, emphasizing the pre-driven process links and the integration points.

V PERFORMANCE EVALUATIONVALIDATION

The Test Results:

All of the test cases that are mentioned above are passed successfully. No defects were encountered.

The Acceptance Testing :

The User Acceptance Testing is the critical phase in any project and it requires the significant participation from the end user. It will also ensure that the system will meet the functional requirements.

The Test Results:

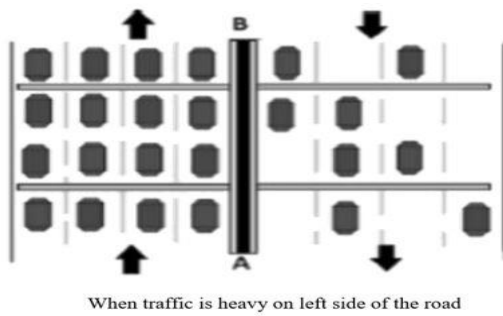All of the test cases that are mentioned above are passed successfully. No defects were encountered.
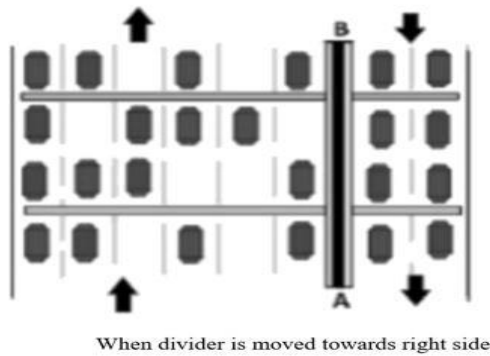
When traffic is heavy on left side of the road
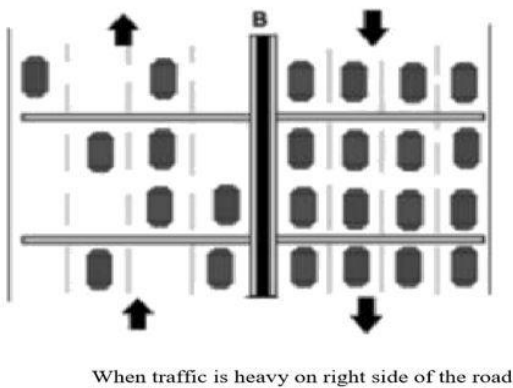
Fig 2: When traffic is heavy on left side of the road

When divider is moved towards right side

Fig 3:When divider is moved towards right side

When traffic is heavy on right side of the road

Fig 4:When traffic is heavy on right side of the road
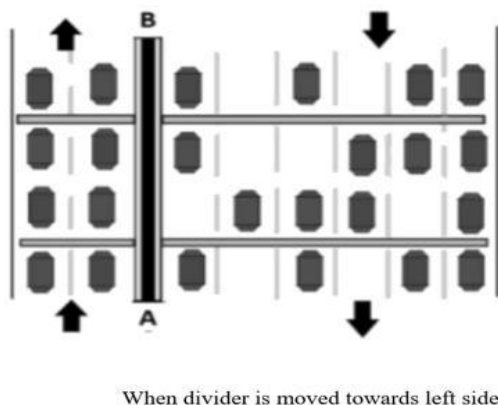

When divider is moved towards left side

Fig 5:When divider is moved towards left side

Fig 6:Smart Road Divider

V1 CONCLUSION

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 sends 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.

VII REFERENCES

[1] HarshiniVijetha, Dr. Nataraj K R " IOT Based Intelligent Traffic Control System", IJRASET,Volume V,Issue 5,May 2017, ISSN: 2321-9653.

[2] S. Jyothirmayee, G. Vamshi Krishna, J. Nanditha, B. ShashankYadav "CONTROLLING OF TRAFFIC USING MOVABLE ROAD DIVIDERS", International Journal of Advance Engineering and Research Development (IJAERD) Volume 5, Issue 04, April-2018, e-ISSN: 2348 - 4470, print-ISSN: 2348-6406.

[3]Shrikrushna V. Jadhav "SMART ROAD DIVIDER SOLUTION FOR TRAFFIC CONGESTION", International Education & Research Journal [IERJ], E-ISSN No : 2454-9916 | Volume : 4 | Issue : 6 | June 2018

[5] AdvaitKawle, Dhruv Shah, KavinDoshi, Manish Bakhtiani, YashGajja, Pratibha Singh "Movable Traffic Divider: A Congestion Release Strategy"

[4] B Durga Sri, K Nirosha , Sheik Gouse "Design and Implementation of Smart Movable Road Divider using IOT"2017 International Conference on Intelligent Sustainable Systems , 7-8 Dec. 2017,published in IEEE xplore.

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