

TRAFFIC CONGESTION CONTROL SYSTEM USING ADVANCED IOT

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Abstract - In the present situation transport system is increasing all across the world, particularly in massive urban areas, so far simulating and reducing management to raise to accommodate this kind of increasing demand is arised. In this paper we have a tendency to study the improvement of traffic light controller throughout a town exploitation wireless detector. We've got planned a traffic light controller and machine that permit United states of America to review totally different scenario of traffic density in town. Exploitation wireless detector will simply senses the density of traffic as a result of the final design of wireless detector network associate infrastructure less communication network. Traffic jam evaluation has the purpose to optimize site visitors waft of human beings and merchandise due to the fact the variety of avenue customers forever will increase, and sources furnished with the aid of using cutting-edge infrastructures place unit restricted, smart control of site traffic can turn out to be a extraordinarily essential difficulty in the lengthy run. However, a few boundaries to the use of smart control exist. Avoiding traffic jams as an example is idea to be beneficial to every environment and economy, but advanced site visitors-waft may even bring about a upward push in demand. There place unit many fashions for site visitors simulation. In our evaluation we will be inclined to concentrate on development of traffic sign controller in a very metropolis exploitation Wi-Fi detector and embedded system.

Key Words: Embedded system, Optimize, Traffic density, Wi-Fi.

1. INTRODUCTION

Transportation is processing by all types of vehicles such as cars, motorcycles, bicycles, or public transportation. Usually, traffic lights are using to manage the flow of traffic however the traffic lights are not that good and it may cause traffic delays, keeping that in mind we bought this Traffic Congestion Control.

In this scenario, vehicle travelling increases all around the world, particularly in urban areas. Hence, optimized traffic control should better adapt to increased demand. Traffic lights are the signal devices which control the

traffic flows, crossings, trains etc. Traffic lights consist of three universal-colored lights those are: the green light which indicates to proceed, the yellow light which warns the traffic to get prepared and the red light which stops traffic from getting started. These days, most of the countries are suffering traffic troubles, which are affecting people who are travelling. The project is design to develop Traffic Control, to save fuel consumption and traffic jam detection. As we are using micro controller low power consumption criteria will be meet, clearance of traffic for emergency automobile is successfully implemented. System time management for traffic lights is controlled by help of volume of vehicle present in a lane.

The smart traffic congestion control system and Authors for this paper is D. Sarkar and his methodology was to propose the system which senses the traffic density and some environmental conditions by using sensor array which transmits information into android phone by connecting to Bluetooth. Advantage of this paper is Cost effective and reduces the efficiency and control mechanism and easily can be installed in Indian Roadways.

Vehicle traffic congestion control method and Authors of this paper is S. Sukude & S. Guite and their methodology is to propose model attempt to clean the traffic at four-way crossing we should sense the traffic by IR sensor. IR sensor is not only a reliable solution. It also works for city intelligent transportation system. Author for this paper are H. Wang and his methodology is to propose wireless sensor system provides city intelligent transportation and system is very easy.

2. METHODOLOGY

In this Project, we are using ESP32 Microcontroller, power supply, IR sensor, Green and Red LED lights, Ultrasonic sensor, Wi-Fi, Buzzer module and Blynk app as shown in figure 1.

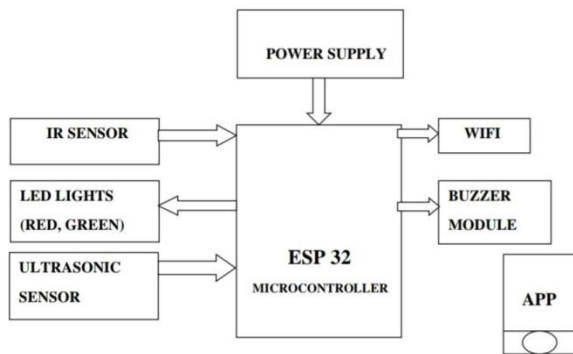


Fig -1: Block diagram of Traffic Congestion Control System

In this system, using IR sensor the volume of the traffic of vehicles is analyzed at a particular junction and the same information is given to the ESP32 microcontroller and this information is also updated through Wi-Fi to the traffic controller by a particular android app i.e., Blynk app.

As shown in block diagram, In this project we are using ESP32 microcontroller, in this microcontroller Wi-Fi is inbuilt. Hence, we are using this microcontroller. This microcontroller is a development board and open-source firmware. It supports RTOS and operates at 80 to 160MHz adjustable clock frequency. Power supply is the input to the microcontroller which requires 5v supply. IR sensor acts as input to the microcontroller and also acts as output for the other lane, when it is acting as output in the other lane and that information is given by the microcontroller. LED lights acts as output, Green LED light indicates the vehicle to move and Red LED light indicates the vehicle to stop. The Ultrasonic sensor acts as input to the microcontroller and in this system ultrasonic sensor is used to detect the obstacle and to avoid the obstacle, when the object/person moving/crossing the road in wrong direction. Buzzer module acts as output, when the Ultrasonic sensor detect the obstacle, the buzzer sounds automatically and the notification will also be shown in the blynk app and also the status of ultrasonic sensor and the distance at which the object/person detected will also be shown in the blynk app.

According to the working principle, Green LED light should glow for releasing traffic at one lane and Red LED glows in other lanes for a waiting time. By this proposed system we can automatically monitor and control the traffic. Our proposed system also provides the concept of ultrasonic beams by this we can easily track the person who is not following the traffic rules and if they are crossing the road in wrong direction in the traffic signal.

3. COMPONENTS DESCRIPTION

3.1 Power Supply

A Power supply is an electronic device; it is also known as 'charger or 'AC adapter' power adapters convert AC to DC voltage. Computer uses various DC voltages, and the external adapter which provides power supply. In this project we are using 5v adapter as power supply. Some power resources produce other sorts of input and output as well, for capabilities consisting of outside tracking and control.

3.2 ESP32 Micro-controller

ESP32 is low-cost, low-power system in chip micro-controller. It is integrated with Wi-Fi and Bluetooth as shown in figure 2. It also supports multiple programming environments, they are: ARDUINO IDE, Platform I/O IDE, LUA, Micro Python, Java script and ESPRESSIF IDF.



Fig 2 ESP32 Micro-controller

The Node MCU is known as open-source firmware board. Micro-processor operates at 80 - 160 MHz adjustable clock frequency. Scheme doesn't need any electronics it can be plug in the cable thus, it is easy to manipulate then that works as ARDUINO.

3.3 IR Sensor

An infrared sensor is an electronic device which gives or detects IR radiation to the aspects of the surroundings. IR sensor can measure and can detect the motion. This consists of an IR LED which emits the light in specific IR wavelengths and detect range of sensor can be adjust by the potentiometer with a interference and also it can be easy to assemble, easy to use features and avoid obstacle. IR sensor can manage voltage from 3v to 32v DC supply and current up to 20mA per channel. The IR sensor is shown in figure 3 which detects the density of the traffic.



Fig 3 IR Sensor

3.4 Buzzer

Buzzer is a small PCB Mountable 3v active electromagnetic Buzzer. It operates on 3v supply, uses a coil element to generate an audible sound. A buzzer or beeper is an audio signaling devices, which will be mechanical, electromechanical, or piezoelectric (Piezo for short). Uses of buzzers and beepers are included with alarm devices, timers, and confirmation of user input such as a mouse click or keystroke. The Buzzer module is shown in figure 4.



Fig 4 Buzzer

3.5 Ultrasonic Sensor

Ultrasonic waves travels faster than the speed of audible sound. It consists of transmitter, receiver and a control circuit. It also offers excellent range accuracy and stable readings. The I/O pins are trigger and echo pins which can be connected to the I/O pins of the microcontroller/ ARDUINO. In this project we are using HC-SR04 ultrasonic sensor as shown in figure 5.



Fig 5 HC-SR04 ultrasonic sensor

3.6 Red/Green LED Light

It is a 3mm LED and it also a two-lead semiconductor moderate source. When the appropriate voltage is applied to the terminal of the LED, then the electrons can recombine with the holes inside of the device and produce a power within side of the form of photons. This effect is called as electroluminescence. LEDs are been used as indicator lamps in many devices and are used for lighting. The color of the LED is determined by the energy band gap of the semiconductor. The LED lamps are available in different colors. Hence in our project we are using Green and Red LED lights Red LED as shown in figure 6 indicates the vehicle to stop and the Green LED as shown in figure 7 indicate the vehicle to move.



Fig 6 Red LED Light

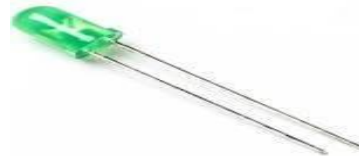


Fig 7 Green LED Light

3.7 Embedded C

Embedded C Programming is called as the soul of the processor functioning internal each and every embedded machine we come upon in our day-by-day life, which includes cell phones, washing machines, and virtual cameras. Each and every processor is related to the Embedded software program The first and primary component is the embedded software program that makes a decision to characteristic of the embedded machine. Embedded C language is a maximum often used to software the microcontroller. The embedded C language is a programming language which provides code efficiency, factors of dependent programming and a wealthy set of a operators. Many programs may be solved extra effortlessly and successfully with embedded c than with different extra specialized languages. The embedded c program language period on its very own is not always able to acting operations (which includes input/ output) that could usually require intervention from the running machine.

3.8 Arduino IDE

The Arduino Integrated Development Environment - or Arduino Software (IDE) –is a textual content editor for writing code, a message, a textual content console, a toolbar with buttons are not unusual place features and a chain of menus. It connects to the Arduino hardware to add packages and to talk. ARDUINO is an open-source electronics platform based totally on easy-to-use hardware and software. ARDUINO are capable of study input – mild on a sensor, a finger on a button, or a Twitter message – and flip it into an output – activating motor, turning on an LED, and publish on online. You can inform your board what to do through sending hard and fast commands to the microcontroller. To do we use the Arduino programming language (Primarily based totally on Wiring), and the Arduino Software (IDE), primarily

based totally on Processing. Programs written by using Arduino Software (IDE) are referred to as sketches.

These sketches are written inside the textual content editor and are stored with the record extension. The editor has functions for cutting/pasting and for searching/changing textual content. The message provides comments even after saving and exporting and additionally presentations errors. The console presentations textual content output through the Arduino Software (IDE), along with entire mistakes messages and different information.

The backside right hand book of the window presentations on board and serial port. The toolbar buttons assist you to confirm and add packages, create, open, and store sketches, and open the serial monitor.

3.9 Blynk Application

Blynk app is a platform used to build a interface and also it is used for monitoring and controlling the hardware projects with IOS which is early known as iphone OS and android applications. It is mainly used to control the Arduino, Raspberry Pi over the internet. Blynk application is a digital dashboard which can build a graphic interface for projects by simply dropping and dragging gadgets.

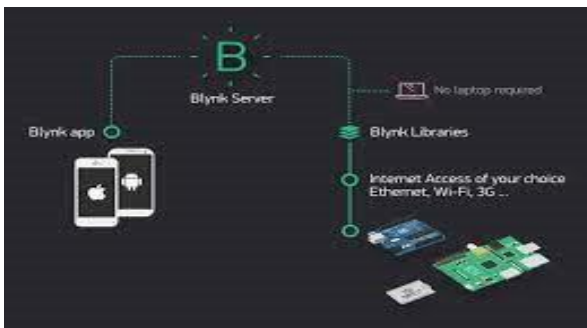


Fig 8 BLYNK App

It works on three major components they are Blynk app, Blynk server and Blynk libraries as shown in figure 8.

Blynk app is used to create the interfaces of projects using various types of widgets. Blynk server is responsible for the communication that happens between the hardware and that happens between the hardware and smart-phone. Blynk libraries enable the communication with the server and it processes all incoming and outgoing commands.

In Blynk app if once the button is pressed then the message travel to the blynk cloud, where it magically finds its way to your Hardware. It works the same in the opposite direction and everything happens in a Blink of an eye.

4. PROJECT SCENARIO

Our project model consists of four lanes and each lane consists of IR sensor and Green/Red LED lights, the Ultrasonic sensor and module is placed in the middle of our project which is shown in fig 4.1. Placing the vehicle/object in front of IR sensor, the vehicle can move only in left and straight direction. Hence, the left side and straight direction LED glows Green and rest two LED glows Red as shown in figure 9.



Fig 9(a) Model of the project. 9(b) working of the project

If the object/person moving in a wrong direction then it may cause accidents or traffic jams so to avoid the accidents and other obstacle, the ultrasonic sensor is used which is placed at the center of our model, when the object/person detected by the ultrasonic sensor then automatically the buzzer sounds and the accident or traffic problems can be solved and also notification will also come through blynk app. The notification consists of the status of ultrasonic sensor and the distance at which object/person is detected.

5. CONCLUSION

Traffic congestion is one of the foremost hassle with the general public transportation machine of all growing nations in latest time, because It now no longer simplest will increase the gas intake however it additionally reasons air pollutants in addition to the threat of coronary heart attack. This paper offers an IOT and Embedded primarily based totally wise traffic visitors congestion manage machine as a way to lessen the traffic visitors congestion hassle. In this paper we're changing the time control machine with the density primarily based totally traffic visitors congestion machine. This paper also implements

volume based efficient traffic congestion control system, a low power consuming traffic control system. Collision detection and control traffic jam Traffic Clearance for emergency vehicle is correctly implemented. Hence, many treasured lifestyles may be saved. As we're the use of micro controller low electricity intake standards can be met. By growing this task we will keep gas intake, manage traffic jam and discover collision.

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