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PRIORITY BASED TRAFFIC SIGNALS USING GOOGLE MAPS

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ABSTRACT

In today's life, we have to face many problems: Traffic has become more and more serious. Car ownership is high among the population and economic development is an important factor in transportation. Traffic congestion is a condition of the road network that occurs with increased usage and is characterized by slower vehicle speeds, longer journey times and longer journeys. Currently, most of the traffic lights in the country operate on a fixed cycle or are checked by traffic inspectors 23 times a day, depending on the characteristics of the traffic. These guidelines and solutions are designed to identify sections of the road with less traffic, but for large sections such solutions are not good due to the change in short-term spatio-temporal congestion. We use the Wi-Fi-enabled WeMos D1 with an ESP 8266 module to send and receive data. WeMos connects to the Telegram bot to communicate with the system and retrieve API keys from the Google Cloud Platform. Here, latitude and longitude are entered in the command given to the telegram bot, which allows us to understand the congestion and the need to change traffic in a region. The traffic level will determine the timing of a particular aspect of traffic lights.

Keywords: API: Application Program Interface, IR Sensor: Infrared Sensor, PIR Sensor: Passive Infrared Sensor, IDE: Integrated Development Environment.

I. INTRODUCTION

Traffic congestion is an annoying problem in our daily life. Waiting for a long time at traffic lights often leads us all to despair. Sometimes traffic in one direction is more important than the other, but since the other direction is divided into equal times, the direction with more traffic is affected. Here, we determine the duration for which the signal will be green or red, depending on the traffic situation in each direction, by dividing it into three areas: high, medium and low. Here We monitor traffic on Google Maps. We will access Google Maps through our Telegram bot code. Telegram Bot is an automatic communication client created by the "Botfather" Telegram library. This will help us understand the installation time required for the intersection. We will also need the Google API key, which we will get from Google Cloud Platform. As trends in technology, individual computers, software packages, platforms, and APIs continue to evolve, it has become easier for developers to create systems to manipulate and control signals. Information system. Therefore, in order to improve the ability of intelligent transportation vehicle telematics systems, in this study we used Google's crowd traffic data to control traffic by adjusting the light cycle duration to deal with congestion situations. Due to the use of information from the crowd, this system does not impact the high real estate costs associated with sensor networks. A complete system module level analysis is provided for reference. The proposed system has temporary communication protection failed. In addition to data analysis of congestion levels, comprehensive data processing to determine the time and status of the distribution system has been tested and confirmed as possible and fast for the traffic model. After further testing, the requested data was sent correctly, with an average delay of 1.5 seconds and a maximum delay of 3 seconds.

II. PROCESSES AND PRODUCTION METHODS

There have been previous attempts to use speed based traffic signals to control traffic.

A. Traffic Control Using Interactive Communication

In this way, an array of IR or PIR sensors can activate changes in cycle time or lighting conditions. Ifa green light is not needed on low-traffic roads, proximity sensors will change the light when there is traffic. This type of controlis based on some prior knowledge of the traffic pattern of the intersection, so that the signal duration ime and location of the proximity sensors can be adjusted according to the impact of the intersection. However,

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this method is not reliable because the reliability of these sensors is not high and the margin of error is very large. Infrared sensors sometimes absorb light as well. So transportation doesn't work very well. Infrared sensors are only suitable for short distances. We must place the infrared sensors correctly; Otherwise, they will not be able to catch up with fast traffic.

B. Using shape for flow control

Here, instead of using timers or electronic sensors placed on the road, vehicles are detected by taking images. Webcams placed at traffic lights are used by predictable vehicles to capture the road and control traffic. It has been shown that the use of image processing in traffic management is a better technique than the existing technique. Since the green light is on on an empty road where there are no vehicles, it reduces traffic without wasting time. In Matlab, is used to reduce density. The system considers four main stages: a) image acquisition, b) RGB to grayscale conversion, c) image enhancement and d) morphological manipulation. A video camera was set up and used to capture video of the highway. Video is continuously recorded in consecutive frames, and each frame is compared to the originally captured image.

It is possible to find all the vehicles appearing in the video using image processing algorithms. If the total traffic is more than the threshold, the busy traffic status will appear in the list.

Image based rendering, accurate, requires high performance hardware which comes at significant cost. The operation of these hardware systems requires the operation of large machine

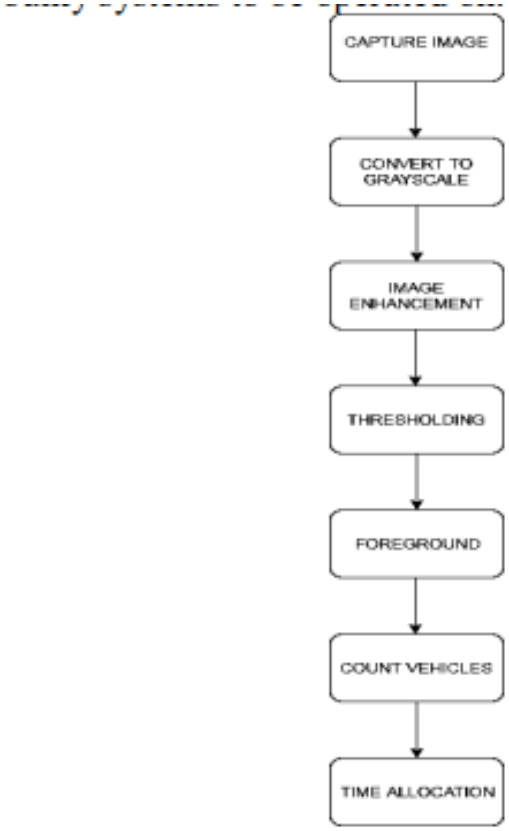

Fig 1: Flowchart for Image Processing Based Traffic Signal System

III. PROPOSED SYSTEM AND FLOW OF THE SYSTEM

The proposed methodology adopted in the present project work is depicted in the block diagram below shown above in a very highly abstracted manner with various blocks numbered as 1 through, which are explained as follows.

TRANSFORMER:

There are two types of transformers: 1. Step-up transformer 2. Step down transformer The one which we have used in our project is the Step-down transformer. The step-down transformer steps down the incoming voltage to the desired voltage, 5 Volts.

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RECTIFIER:

Since our devices work on direct current (DC), therefore we have to convert the incoming alternating current (AC) to direct current (DC). Also, Lithium polymer batteries can power up our microcontroller as the output obtained from the Lithium batteries is direct current (DC) only.

REGULATOR: The voltage regulator's prime function is to remove the voltage spikes in the incoming DC signal and stabilize the desired voltage. It is also used to protect our passive devices from voltage irregularities.

WeMos D1 MINI: Wemos D1 Mini is a mini wi-fi device based on the ESP8266EX chip. This device is a very compact solution for prototyping small smart objects linked to the World Wide Web thanks to the ESP8266 wi-fi functionalities. The Wemos D1 Mini features 4MB of flash memory, 80MHz of the system clock, around 50k of usable RAM, and an on-chip Wi-fi Transceiver. We have programmed the microcontroller using Arduino IDE, and we have used the following libraries: 1. Google API library 2. Universal Telegram Bot library 3. ESP8266 library TRAFFIC LIGHTS: We have used LEDs to represent the traffic signals. The LED's have been represented in the following manner: 1. Red - Stop Signal 2. Yellow - Wait Signal 3. Green - Go Signal GOOGLE MAPS API: We are using this feature to obtain the live traffic data from Google's server based on the service provided by the transits currently present in that area. The data obtained from Google API depends upon the following factors: 1. Historical Data 2. Seasonal Occasions 3. Third-party apps 4. Local authorities' server

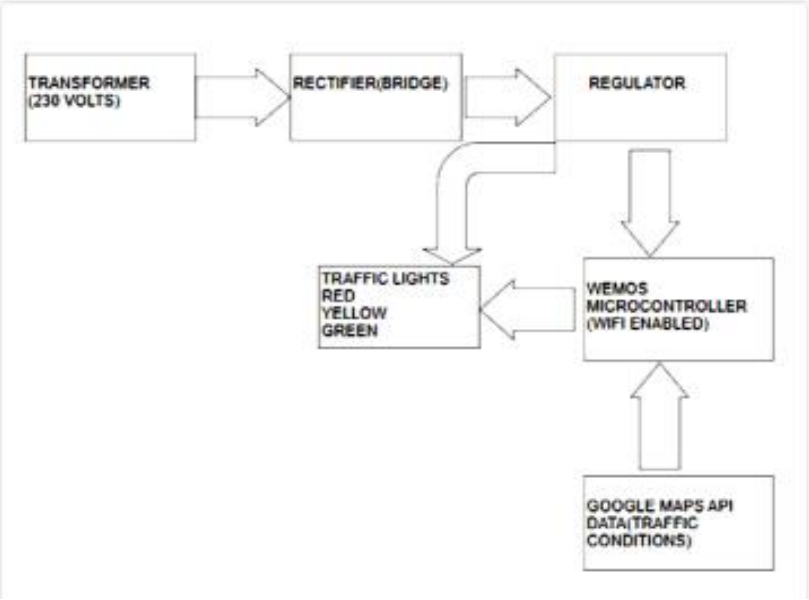

Fig 2: Block-diagram of the proposed methodology

IV. TIME ALLOCATION

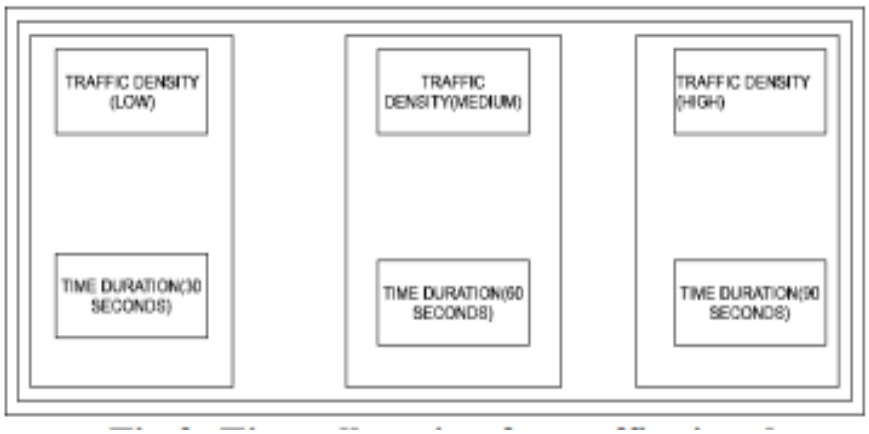

Fig 3: Time allocation for traffic signal

As you can see in the above figure, the time allocated to different directions at a junction will depend on the current traffic density. If the density is high, 90 seconds are allocated to that particular direction; if the traffic

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density is normal, 60 seconds are provided. If the traffic condition is light, 30 seconds are provided. This allocation of time will help in better management of the system.

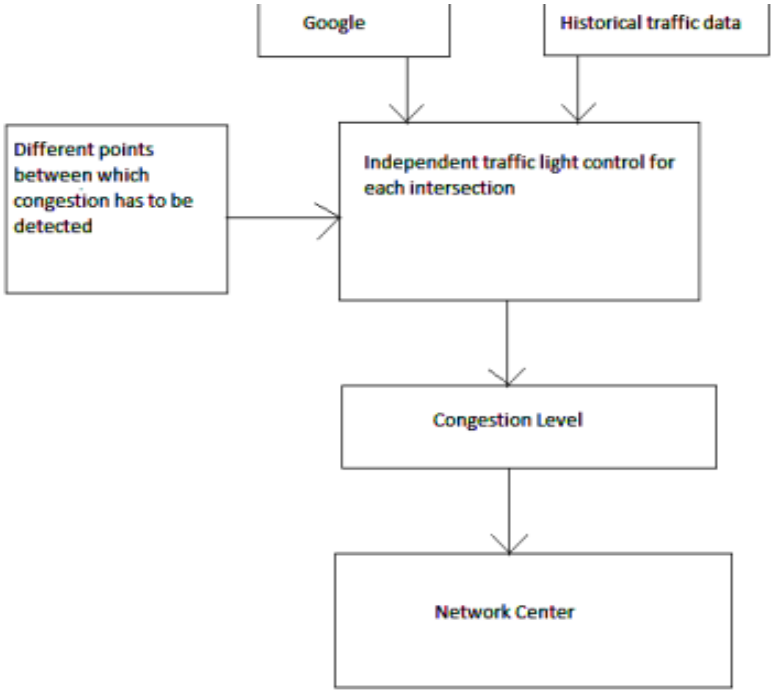

Fig 4: Flow-chart of the methodology used

The above flowchart represents the acquiring of the traffic information into the system. The information is accessed from Google or taken using historical data. This information is sent to the traffic light control system, determining the points where congestion has to be detected. This is then forwarded to obtain the congestion level and then passed to the network center for achieving this over a range of traffic junctions

SCOPE OF THE PROJECT

Often we see that a particular direction has a lot of vehicles, say 200. The vehicles in this direction have to wait 60 seconds and then get the green light for 60 seconds. A lot of times, this time is not enough. In the other direction, 50 vehicles need only 30 seconds to pass by. But due to the uniform time given to all the directions, they get 60 seconds, which causes a state of no motion for about 30 seconds. Hence, this project serves to give the green light time depending upon the traffic density.This project can be implemented in regions with traffic issues. It can be utilized when there are many exits at a roundabout t, and the traffic is unevenly distributed. The traffic police of a city can use this project to coordinate the traffic on a big scale

ADVANTAGES OF THE TECHNOLOGY

The following advantages drive the use of C in embedded systems • It is small and reasonably simpler to learn, understand, program, and debug. C Compilers are available for almost all embedded devices in use today, and there is a large pool of experienced C programmers. Unlike assembly, C has the advantage of processor-independence and is not specific to any particular microprocessor microcontroller or system. This makes it convenient for a user to develop programs that can run on most of the systems. • As C combines the functionality of assembly language and features of high-level languages, C is treated as a 'middle-level computer language' or 'high-level assembly language.' It is fairly efficient • It supports access to I/O and provides ease of management of large embedded projects.

Advantages of Arduino IDE The biggest advantage of Arduino is it's ready to use structure Arduino has its library of examples present inside its software • Arduino has an easy, effortless function. • Arduino has many forums present on the internet Advantages of the Google Map approach: It is a software-oriented approach. It works on real-time based systems. It takes historical data into account.Using this method, a lot of money is saved, which would otherwise be used in installing complex hardware systems. • This approach allows us to implement our system over a network of junctions.

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DISADVANTAGES OF THE TECHNOLOGY

The model needs continuous internet connectivity so that the microcontroller could analyze the live traffic data results, and it can allocate the time according to that. The model is currently applicable to only a certain number of traffic junctions in a city with a good number of smartphone users as google collects data from the transits' smartphones. Google traffic information is also based on previous historical data, weather information, festivals, and occasions. While you are no longer limited to a maximum number of requests per day (QPD), the following usage limits are still in place for the Maps JavaScript API: 500 requests per second (QPS).

IV. CONCLUSION

In the field we examined, vehicle inspection is carried out with infrared, passive infrared sensors or ultrasonic sensors. This process has many limitations and may not work; That's why we use Telegram Bot to use Google map. Here we enter the latitude and longitude in the telegraph code to find the status of the place. This is done by loading the Telegram library on the Arduino and then starting a conversation with the Telegram bot. This bot communicates with Wemos and Google API. We can also use this method to monitor citywide traffic from the intersection. The proposed approach represents software driven approach to traffic management.

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