Adaptive Traffic Control And Monitoring System Based On LD Algorithm

Amritha U, Lincy K

Dept. of ECE, Abdul Kalam Technological University, Jawaharlal College of Engineering and Technology, Palakkad, Kerala

Abstract- As there is rapid increase in urban population there is a need for some alternative measure which can be proven or best one to tackle the problem. An adaptive traffic controlling algorithm and monitoring system based on LD Algorithm is intended to schedule the phases of each isolated traffic efficiently. We use IR sensor to count the number of vehicles. Raspberry pi3 collects information and glow the traffic light according to the conditions. The algorithm considers the real-time traffic characteristics of the competing traffic flows at the signalized road intersection. In the LD controlling algorithm, the intelligent traffic lights installed at each road intersection coordinate with each other to generate an efficient traffic schedule for the entire road network. LD algorithm analyses different parameters and hence it is coded accordingly. In peak time traffic congestion is more especially in cities. Even emergency vehicles can't reach destination on time. This system enables emergency vehicle preference. The status of traffic can be viewed from camera real time by connecting it with app. Telegram app is used. This system works on the basis of internet facility.

Index Terms- LD Algorithm, VANET, Elapse time Density.

I. INTRODUCTION

Major problem in cities of developing Countries like India faces traffic congestion. It is due to the Growth in urban population and the middle-class segment contributes significantly to the increasing number of vehicles in the cities. Congestion on roads eventually results in slow moving traffic, which increases the time of travel, thus stands-out as one of the major problems in metropolitan cities.This system is to enhance the performance of traffic efficiency, several researchers have developed intelligent and efficient algorithms to schedule the competing flows of traffic at each signalized road intersection. The efficient schedule for each traffic light should reduce the waiting delay time of traveling vehicles at each road intersection and increase the throughput of road intersections through such an intersection. Several parameters have been considered to schedule the sequence phases of the timing cycle for traffic lights at each road intersection. It includes the number of traveling vehicles, the traffic speed, and the traffic volume of each flow. Adaptive traffic control and monitoring system aims to create an algorithm based traffic light control system (LD).Least density algorithm designed in such a way that the less density areas are supposed to follow red signal.IoT based junction traffic information gathering this type of application is intended to increase the traffic fluency and to decrease the traveling time, fuel consumption, and gas emissions of traveling vehicles. Traffic lights control the competing traffic flows at each road intersection. They provide safe scheduling that allows all conflicting traffic flows to share the road intersection. In this system IR Sensors are introduced to count the vehicles. And thus density of traffic is measured. The queuing delay at each signalized road intersection decreases traffic fluency, which decreases traffic efficiency throughout the road network.To enhance the performance of traffic efficiency, several researchers have developed intelligent and efficient algorithms to schedule the competing flows of traffic at each signalized road intersection. The efficient schedule for each traffic light should reduce the waiting delay time of traveling vehicles at each road intersection and increase the throughput of road intersections through such an intersection. Several parameters have been considered to schedule the sequence phases of the timing cycle for traffic lights at each road intersection. It includes the number of traveling vehicles, the traffic speed, and the traffic volume of each flow, to mention a few.The proposed system using raspberry pi duly interfaced with sensors, changes the junction timing automatically to accommodate movement of vehicles smoothly avoiding unnecessary waiting time at the junction. The sensors used in this project are IR and photodiodes are in line of sight configuration across the loads to detect the density at the traffic signal. The density of the vehicles is measured in three zones i.e., low, medium, high based on which timings are allotted accordingly.An algorithm to simplify the complexity and the output ismore accurate.IR sensor only counts the vehicles. in this system we are using a technique or an algorithm which is used to calculate density.

II. LITERATURE SURVEY

The traffic control system design of emergency vehicles has to pass smoothly.[2] Each individual vehicle is planned to equip with special Radio Frequency Identification Tag(RFID) such that it is impossible to remove or destroy tag. Usually RFID reader and microcontroller on-chip to read the RFID tags attached to the vehicle. It counts number of vehicles that passes on a particular path during a specified duration using sensors. It also determines the network congestion, and hence the green light duration for

that path. If the RFID-agreed belongs to the stolen vehicle, then a message is sent to the police control room. In addition, when an ambulance is approaching the junction, it will communicate to the traffic controller in the junction to turn ON the green light. It is seeing terrible road congestion problems in its cities. Infrastructure growth is slow as compared to the growth in number of vehicles, due to space and cost constraints. Also, Indian traffic is non-lane based and chaotic. It needs a traffic control solutions, which are different from the developed Countries. Intelligent management of traffic flows can reduce the negative impact of congestion. RFID [13]is a wireless technology that uses radio frequency electromagnetic energy to carry information between the RFID tag and RFID reader. The drawback of RFID is that it detects electromagnetic rays so there may be fluctuations in count. Range is limited.

Image pre-processing is the term for operations on images at the lowest level of abstraction. These operations do not increase image information content but they decrease it if entropy is an information measure. The aim of pre-processing is an improvement of the image data that suppresses undesired distortions or enhances some image features relevant for further processing and analysis task. Image preprocessing uses the redundancy in images. Neighboring pixels corresponding to one real object have the same or similar brightness value. If a distorted pixel can be 98 picked out from the image, it can be restored as an average value of neighboring pixelsTo some degree, every piece of video will need some preprocessing, but the amount is wholly dependent on both the source video and the format you are creating.In recent years, video processing techniques have attracted researchers for vehicle detection. One of the most important and basic in auto controlling traffic is detection and classification. This process cause to extract a lot of parameters of traffic, Onepromising approach is vehicle tracking via video image processing, which can yield traditional traffic parameters such as flow and velocity, as well as new parameters such as lane changes and vehicle trajectories. With the ever increasing number of vehicles on the road, the Traffic Monitoring Authority has to find new methods of overcoming such a problem. The main aim of this research is to design an intelligent traffic light controller using embedded system. This research also aims to design a safe and efficient traffic flow, to assign the right way and minimizes the delay or waiting time at road. To make traffic light controlling more efficient, we exploit the emergence of new technique called as “Intelligent traffic light controller”. This makes the use of Sensor Networks along with Embedded Technology. The timings of Red, Green lights at each crossing of road will be intelligently decided based on the total traffic on all adjacent roads. Thus, optimization of traffic light switching increases road capacity and traffic flow, and can prevent traffic congestions

III. PROPOSED SYSTEM

An adaptive traffic control and monitoring using IoT propose an efficient traffic control in junctions or intersections. The system considers real time traffic characteristics of all traffic flows at each road intersection by reducing expected queuing delay time of each vehicle and increasing throughput of road intersection. Traffic can be analyzed using a camera. The traffic is counted using IR Sensor. This information is connected to raspberry pi 3.And the current status of one junction is send to neighboring junction using IoT. The algorithm is simulated using python.

Block Diagram

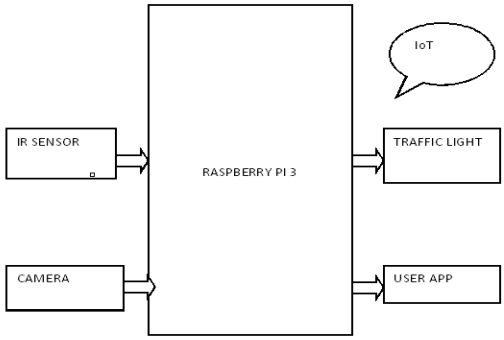

Fig 1 Block Diagram

1 Raspberry pi

The heart of the project includes Raspberry pi 3. Since it has more features as compared to microcontroller. The data are stored in pi board and it perform the instructions. IoT is interfaced with this. So raspberry pi provides inbuilt Wi-Fi.python version 2.7.12 is used. It has 1GB RAM. It is an ARMbased processor which operates on 700 GHz to 1.2 GHz.Major components include HDMI, USBPort and SD card. It is equipped with numerical interfaces, display series interference-to connect touch screen. Camera serial interference is to capture pictures. It Provide general programming environment and also provide direct control of hardware through interfaces.

Fig2 Raspberry pi section

2 IoT

we are using message queuing transfer protocol. The definition of Internet of Things (IoT) evolves around a worldwide network of interconnected objects, where objects can be addressable through unique identity

accessible through Internet self-organized and repairable. The Internet of Things (IoT) is a concept reflecting a connected set of anyone, anything, anytime, anyplace, any service, and any network. The proposed system use IoT for connection of networks and it sends information about the traffic in one section to other fast manner.IoT is mainly used for information gathering.

3 User App

Open source app telegram is interfaced with set of programs to view all details in mobile.App follows Jaisson script

4 IR Sensor

The sensors used in this project are IR and photodiodes are in line of sight configuration across the loads to detect the density at the traffic signal. it is used to count the vehicle density and thus sends data to raspberry pi in the intersection.at a time it measures the vehicle intensity by counting number of vehicles.as vehicle cross the IR sensor the flux get cuts and thus sensor sense the presence of vehicles thereby congestion is noted.

Fig 3 IR sensor

Further the project can be enhanced by synchronizing all the traffic junctions in the city by establishing a network among them. An infrared sensor is an electronic instrument which is used to sense certain characteristics of its surroundings by either emitting and/or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion. Infrared light is a small part of the light spectrum. This traffic light control system can be further enhanced in such a way to control the traffic signals automatically based on the traffic density on roads with the help of IR sensor modules with automatic turnoff if there are no vehicles on either side of the road which leads to power consumption.

5 Camera

The camera used is zeronics USB High definition camera.1980 x 1080pixel. For more density area real time images are captured and sent to application and control room. Image is sending via IoT.high resolution. night vision is the peculiarity of this camera.Current status can be viewed by authorities by Telegram app by clicking capture button using our mobile.

Fig 4 Camera

6.Traffic System Based On Ld Algorithm

Adaptive Traffic controls system consist of

- Controlling algorithm using LD
- Monitoring image using IoT algorithm
- IR sensor based real time implementation of traffic control system
- App interfacing by combining the algorithm
- The prototype was tested under different combinations of inputs.

Parameters

The values are calculated real time.

- **ELAPSE TIME**-It is the time for next vehicle arrives after leaving one.it should not be zero. Elapse time is taken by setting timer. Keeping timer on when senses first vehicle then when another vehicle comes, timer stops. Note the difference between the time delays of each vehicle in seconds. As density increases elapse time decreases. Initially 20 ms is set as elapse time
- **RPM**-It is the rotation per minuterpm=(1/2* elapse time) =60.it is to measure speed of vehicle
- **CIRCUMFERENCE**-Circumference=2*3.14*r
- We assigned radius of city as 10cm for this project (demo purpose only).
- **DISTANCE**-Distance is defined as the length of the vehicles.distance is calculated as circumference/100000

- **PERSEC**-It is defined as ratio between distance and elapse time of a vehicle.it is used to understand number of vehicles passed per second.
- Per sec=dist./elapse time=10cm/20ms
- **DENSITY**-It is calculated in real time mode by the help of IR sensor. Density measures number of vehicles per second. Density=per sec*3600v.This density is compared with other three roads then which is highest it is allowed to make green on that road. Least density is calculated with high density.

Steps For Density Calculation

1. Set up the circuit
2. find least density
3. Compare it with high density
4. Calculate elapse time. It will be different in different cases
5. Calculate Rpm
6. Calculate circumference
7. Calculate distance
8. Calculate per second
9. Calculate density
10. Compare this density with our programmed density

By Comparing with previously introduced traffic scheduling systems, the LD algorithm decreases the average queuing delay at each traffic light . The vehicular speed are monitored using camera connected to raspberry pi and decrease queuing delay and travelling time. IoTthe most recent technology makes data transmission too fast and the details about one intersection is known to neighboringone. So that traffic block can be cleared soon. And waiting time can be managed. The basic idea is to make use of IR LEDs to send the infrared waves to the object. Another IR diode of the same type is to be used to detect the reflected wave from the object. For example, when emergency vehicle come like ambulance, police etc. is come which have already set sensor that time sensor detects this emergency vehicle and sender, receiver sensor send signals to each other.

7 Hardware implementation

The proposed system implemented using the raspberry pi kit and IR pair combination.

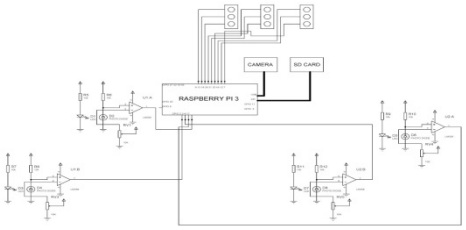

Fig 5 circuit diagram of proposed system

The algorithm sets the sequence phases of each traffic light cycle and the time of each phase according to the real-time traffic characteristics of competing traffic flows in the same manner as the LD algorithm.

8. Software Implementation

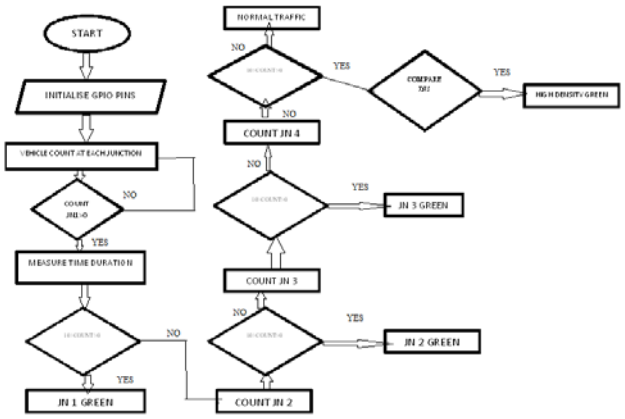

Fig 6 Flow chart of system

Pythonis the programming language used by raspberry pi since it is easy to program. Python is a high-level, interpreted, interactive and object-oriented scripting language.

i. Steps

1. download telegram app from Playstore
2. Create a new bot from botfather
3. Type /newbot-newbot opens
4. Name the new bot
5. The API id is copied and pasted in program
6. New bot is thus created
7. /start to start the program
8. Type the user id and password (user1234)
9. Four options are seen mode,density,vip,help
10. If we clicked on mode button then three options are available density, capture ,location
11. Select the button to view that particular section
12. Shut down to turn the system off

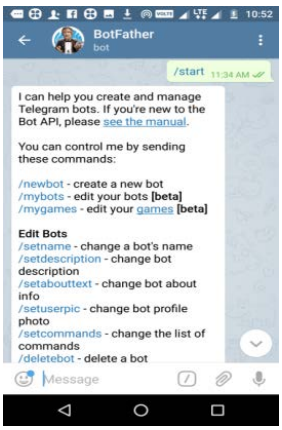

Fig 8 start bot father

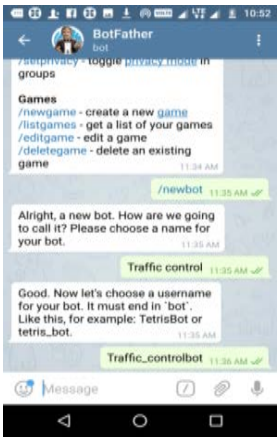

Fig 9 creating new bot

IV. RESULT AND ANALYSIS

The project "Adaptive traffic control system using raspberry pi based on LD algorithm" is done effectively.

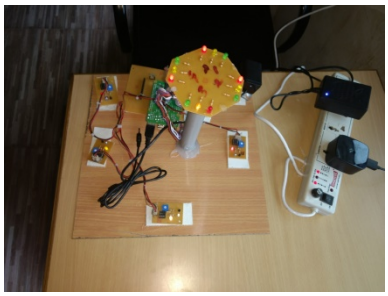

Fig 10 prototype of proposed system

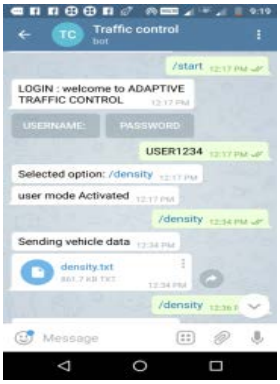

Fig 10 Screenshot of density

Fig11 VIP preference

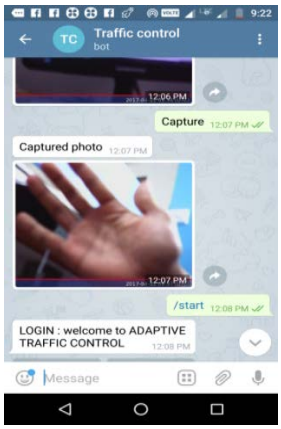

Fig 12 Image Capturing

Obtained Density

Density per second is analyzed real time. Time and date also visible, so we can select the particular traffic density in that particular time we wanted to know. These facilities of app can be given to authorities and VIPsonly. If no vehicle cross the junction it shows same value.

Density junction 4 : 0.0378116120169 2017-04-21 13:05:03

Density junction 4 : 0.0378116120169 2017-04-21 13:05:03

Density junction 4 : 0.0378116120169 2017-04-21 13:05:04

Density junction 4 : 0.0378116120169 2017-04-21 13:05:04

Density junction 4 : 0.0378116120169 2017-04-21 13:05:04

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Density junction 4 : 0.0378116120169 2017-04-21 13:05:04

Density junction 4 : 2.18205715999 2017-04-21 13:05:04

Density junction 4 : 2.18205715999 2017-04-21 13:05:04

Density junction 4 : 12.1437650221 2017-04-21 13:05:05

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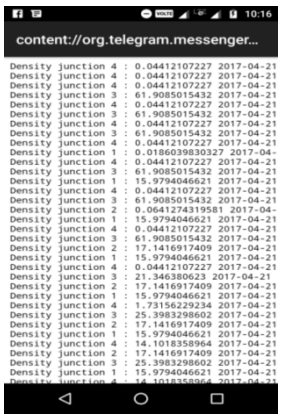

Fig 13 Screenshot of density

Fig 14Screenshot of turning off the system

V. CONCLUSION

The system include the successful operation of the intelligent traffic light control and monitoring system. The IR receiver with IR transmitter is placed at a gap. Raspberry pi detects and increase number of vehicle count in a recording interval for particular traffic light. The system is designed in such a way to solve congestion problem on junction without human in automatic mode. This system is operated in real time. Main component used is IR sensor. It takes count of vehicles and automatically turn green light on in more density areas. If any rally comes then IRsensor senses and directs that junction to allow green signal in traffic light signal. The coding is based on LD algorithm and python software is used for that. Since programming is more comfortable in python. Python version is used.LD algorithm is coded and obtained perfect output. While activating one junction green all others are activated red.Red indicate least density So even if any emergency vehicle is detected by sensor then by using app VIP vehicle can switch green by pressing that particular junction. These app are used for authorities and VIPs only. Or else ambulance can also use this app. The traffic is controlled by the app. So traffic problem is easily using highly advanced raspberry pi with the help of growing technology, the project has been successfully implemented. Thus the project has been successfully designed and tested.

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