

IOT BASED SMART TRAFFIC SIGNAL MONITORING SYSTEM

¹Amala Preethi and ^{*2}Dr. B. G. Prasanthi

¹P.G. Student, St Joseph's College, Bangalore.

²Assistant Professor, St. Josephs College, Bangalore.

Article Received on 14/04/2021

Article Revised on 04/05/2021

Article Accepted on 24/05/2021

***Corresponding Author**

Dr. B. G. Prasanthi

Assistant Professor, St.
Josephs College, Bangalore.

ABSTRACT

In our present life we can see traffic signal is one of the very big issues in current situation in all over the world and over the years there is a sudden increase in the number of vehicles on the road. one of the main reason for traffic is time fixed for the red light in the signal or

large delay of the signal light. The time of light is fixed in the traffic system and it is not considered as based on the total number of vehicles on the direction.

Like every signal there is a fixed time on the road even if it is more traffic. As day by day population is also increasing, so that the traffic also becoming more dense.

We proposed this traffic system controller in a road using microcontroller. This idea will reduce the traffic which is caused by traffic lights. So this idea is based on the arduino. Where the model contains IR transmitter and IR receiver which this two are fixed at the possible direction on the traffic signal roads. The arduino decides and control vehicles, of traffic signal based on the number of vehicles. The arduino produce data based on the total number of vehicles count and that data will be recorded. For current scenario the record of the data details can be stored by informing arduino to the computer system to the controller then that will send correct delay of signal into the red lights.

INTRODUCTION

A traffic signal or stoplight is a control of vehicle traffic passing through more roadways by giving a visual indication to drivers when to move, when to stop, when to slowdown and everything about traffic. As now current situation the problem faced in any city is traffic. Traffic congestion is a problem for everyone faces in their daily life. Stopping vehicle in

between heavy traffic is a more problem for humans like causing headache, tension of work, time to reach Destination, and one of the main problem is for ambulance to reach hospital, and it is a very big problem for each and every person driving the vehicle and also for the traffic police who is controlling the traffic. One of the oldest way of controlling the traffic was by traffic police at every junction traffic police were placed and individually, manually they were controls the flow of traffic through hand signalling and in many ways. But however this was little cumbersome and then they came up with different ways of handling to control using traffic signals.

Important things in internet of things in smart cities is the intelligent transportation system. ITS improves vehicle to vehicle and vehicle to other infrastructure communications for improving the facilities of road. And this is also helps to control traffic congestion and to reduce the accidents on the road which is dangerous in the urban areas. Managing and controlling traffic signal time is main important in urban areas. Managing time on the road will decrease the time of waiting of the drivers on the road and that also help to reduce fuel consumption.

IMPORTANT MAIN SOURCES OF TRAFFIC CONGESTION

The first main reason for traffic congestion is that every single person wants to move at the same time at every single day. This is because the school and economy system expect that people go to school and work at the same time. This is for the efficient operations of the system as this is the only way people can interact with each other. Changing this system will have a serious impact of the society and therefore it is not feasible to make any changes to the existing system. While it is nearly impossible to completely eliminate traffic congestion, there are a lot of ways to curb the effect of traffic on our daily lives.

With the increase in the number of vehicles with every passing day, this does call for an increase in the size of roads to accommodate the extra vehicles entering the roads. This can only be done up to a certain limit. Even the roads cannot be extended more than a certain limit. India approximately has more than 5.4 km of roads. The alarming statistics here is that almost of all our cities excluding delhi we have road surface areas well below the global norms.

SMART TRAFFIC SIGNALS MAKE INTERSECTIONS SAFER, MORE EFFICIENT

Smart traffic signals are becoming a regular part of urban traffic management, helping to make roads safer for drivers, pedestrians and cyclists.

Traffic signals are an integral part of keeping both drivers and pedestrians safe at intersections. As traffic control systems have become more intelligent, the use of smart traffic signals to optimize urban traffic flow has become increasingly important.

PROPOSED SYSTEM

The proposed system contains the solution to three problems of a traffic system.

The first problem being the setting time for each traffic signal. So for this we should change the timings of a signal. So in a traffic junction of four lanes first the measured density should be found on each lane at a distance of 100 meters through by using the infrared sensors. Once the maximum limit of the IR sensor reaches the count on any signal that is on any lane is turned on to green, this is done so because of its having density on the lane is allowed to clear the traffic first, after this in a circular pattern the other lanes will be given green signal. If in the case of where the signal timing increased to 90 seconds if and only if the density is greater.

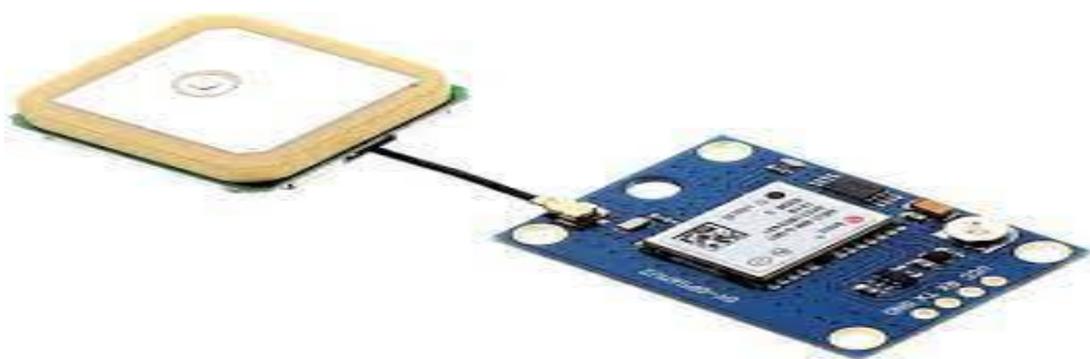


The second problem is being the easy and convenient way for emergency vehicles in the traffic junction to pass, though it is not necessary for emergency vehicles like the ambulance, fire engine, etc. To follow all the traffic rules, but still our public does not allow to make way for these vehicles to pass through the junction easily, so for this we have used a solution of an

RFID reader that will be installed on the roads and in every emergency vehicles the RFID tag that will be installed . Once the emergency vehicles are detected through an RFID reader on any lane, that lanes based on the despite density circumstances the signal is switched to green.



Then The third problem is about the non working of traffic signals. In this cases where the signal is not working properly in the traffic signal, this may lead to so many problems like accidents, and sudden increase in the number of vehicles, overflow of traffic in somany roads, so to solve this problem, GPS module we are using to track the location of the non working traffic signal once if it is tracked in the location, the information or the message is sent to admin through a GSM module. This helps to take notifications for to alert the authorities who are taking the responsibility for this to take the necessary actions.



ALGORITHM 1

Initialize start time=6.00 am, end time=11.00 pm;

Repeat below steps start from starttime to endtime

Set counter value as 1 to 4 by incrementing counter value by 1 for each green signal

If counter=1:

Calculate time delay for green as number of vehicles at north multiplied by in seconds switch on green for time delay

Switch on yellow for 4sec on & off green signal

If counter=2:

Calculate time delay for green as number of vehicles at east multiplied by 4 in seconds switch on green for time delay

Switch on yellow for 4 sec on & off green signal

Go to red signal

If counter=3:

Calculate time delay for green as number of vehicles at west multiplied by 4 in seconds switch on green for time delay

Switch on yellow for 4 sec on & off green signal

Go to red signal

If counter=4:

Calculate time delay for green as number of vehicles at south multiplied by 4 in seconds

End

Switch on green for time delay switch on yellow for 3 sec on & off green signal

Go to red signal

Switch on yellow lights in all direction

This algorithm starts with initializing the start time and end time. the start time is initialized to 6:00 am and the end time to 11:00 pm. After initialize the steps to be repeated from start time to end time is set by assigning the counter values as 1 to 4 where the counter value is incremented by 1 for each green signal.

So first , If the counter values is set to 1 then the time delay is calculated for green as number of vehicles at north and that is multiplied by in a seconds and then switch is on green for time delay. Then yellow switch is gets on just 4 seconds before the green signal gets off.

Then second, If the counter value is set to 2 then the time delay for green is calculated as number of vehicles at east and that is multiplied by 4 seconds and switch on green for time delay. Same as before the yellow gets on for 4 seconds before green gets off after which the signal directs to the red light.

Then next, If the counter value is set to 3, the time delay for green is calculated as number of vehicles at west multiplied by 4 in seconds so switch is on green for time delayed then the yellow signals gets on for 4 seconds after which the green signal gets off and then the red signal is on.

Then, If the counter value is set to 4, the time delay for green is calculated as number of vehicles at south multiplied by 4 in seconds and then the repetition ends. At the end green is switched on for time delay, yellow is switched on for 4 seconds and green signal gets off and then it goes to the red signal which means the red signal gets on then the yellow lights are on in all direction.

ALGORITHM 2

TRAFFIC CONTROL ALGORITHM

No. Of sensors = 4 and are denoted by S1,S2,S3,S4

No. Of cars in Lane 1 (N1) = S1-S2

No. Of cars in Lane 2 (N2) = S3-S4

$L_i = (L1, L2)$, $N_i = (N1, N2)$, $T_i = (T1, T2)$

Step 1: Start

Step 2: Sensors will read the no. Of vehicles on each lane (i.e, L1, L2)

Step 3: if (Vehicle Count < Threshold)

Then status = normal traffic. Turn on the green signal for the first lane then after that it will on in the second lane (L1, L2). When signal is green for one lane. in the second lane it will remain red signal.

Step 4: else status = congestion.

Step 5: COMPARE (N1, N2), Select the highest of the two, turn on green signal for that lane (say L_i) for time (T_i). when time T_i ends, turn on the red signal.

Step 6: Jump to Step 3.

RESULTS AND ANALYSIS

The proposed system helps based on monitoring the time in better way and the main advantage over the existing system is helps like reducing number of accidents, reducing fuel cost.

The proposed system is designed in a way that it can be control the traffic congestion and also it can track the number of vehicles.

CONCLUSION

In this paper, the proposed model reduce the occurrence of traffic jams, caused by high red signal delays and provides the required time to vehicles to cross the signals and dynamic traffic signal is proposed by which all the traffic congestion related issues can be solved. And it helps to reduce travel time of the vehicle. In addition to this the proposed scheme also helps for the emergency vehicles, etc., and we can see in this the main sources of traffic congestion how the problems are occurring and how it is effecting due to this traffic congestion. So like this vehicles user can activate the smart traffic application when in an emergency situation to get to a certain location. e. g. ambulance that will take the patient to the hospital. And smart traffic application will find the faster route and identify the smart traffic light location to be traversed.

Each of the system use different components for managing traffic congestion like IR sensors, RFID, GPS module.

This research presents an effective solution for growth of traffic flow particularly in big cities which is increasing day by day and traditional systems have some limitations as they fail to manage current traffic effectively.

REFERENCES

1. Dave, P. N. D. M. P. S. P. Smart traffic management system using iot, International Journal Of Computer Engineering and Applications, 2018; 12.
2. K.S.D.M.R.B. Patian Rizwan, "Real – Time Smart Traffic Management System For Smart Cities by Using Internet of Things and Big Data," International Conference on Emerging Technological Trends [ICETT], Kollam, 2016.
3. M.P.a.B.B. Sivasankar, "IOT Based Traffic Monitoring Using Raspbeery Pi," International of Research in Engineering Science and Technology(IJRESTs), 2016; 2454-664.
4. Babu, P.R.K.S.M.R. Real time smart traffic management systems for smart cities by using internet of things and big data, 2016.
5. Viswanathan, V. And Santhanam, V. Traffic signal control using wireless sensor networks. 2nd International Conference on Advances in Electrical and Electronics Engineering (ICAEE2013), 2013.

6. H.O.Al- Sakran, Intelligent traffic information system based on the integration of internet of things and Agent technology,” International Journal of Advanced Computer Science and Applications (IJACSA), 2015; 37-43.
7. https://en.m.wikipedia.org/wiki/traffic_congestion
8. [https://en.m.wikipedia.org/wiki/traffic signal](https://en.m.wikipedia.org/wiki/traffic_signal)
9. M.H.A. A wadalla Design of a smart traffic information system, International Conference on Intelligent Computing, Instrumentation and Control Technologies (ICICT), 2017; 757-762.
10. W.Balid, H. Tafish, H. H. Refai, Intelligent vehicle counting and classification sensor for real time- traffic surveillance, IEEE Trans. Intell. Transport. Syst., 2018; 1784-1794.