AUTOMIZED INTELLIGENT TRAFFIC CONTROL SYSTEM

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ABSTRACT

This paper proposes an architecture for creating an intelligent system for controlling road traffic. This system uses a simple radio frequency identification tag(RFID tag) for tracking vehicles. The system can operate in real time, improves traffic flow and safety and fully automated, saving costly constant human interaction. We use RFID per client, NSK EDK-125–TTL, and PIC18F46K22structure on-chip to scrutinize the RFID names joined to the vehicle. It consists of modules for i) Allowing prioritized vehicles viz Ambulance, fire extinguisher service vehicle etc. ii) Enabling people to track their stolen or lost vehicles. iii) Automatic control of traffic signal based on the density of vehicles in the roads by the centralized server. This module uses ZigBee modules on CC2500 and PIC18F46K22 system on-chip for remote correspondences between the protect vehicle and action controller.

Keyword: - ***Intelligent system for controlling road traffic**, RFID, ZigBee, prioritized vehicles, centralized server*

1. INTRODUCTION

All around the world one of the major problem people are suffering from is the traffic congestion. Traffic congestion is the sole reason for the wastage of time of people all around the world. It is estimated that an Indian citizen spends an average of 7-8 years in traffic jams. India loses around 60,000 crores alone due to traffic congestion and Delhi alone wastes around 40,000 liters of fuel due to traffic congestion. This is an unbearable loss to any country and countries like USA, Mexico, China are victims of even more losses because of these traffic congestions.

Many solutions are being provided for the reduction of traffic problems, For example, Pune has separate lanes for the movement of public transport vehicles, this will help the traffic movement to ease a little bit because no other vehicles will be allowed in that lane. Bangalore city is also moving towards this implementation along with separate lane for two wheelers because survey has shown that more than 60% of the Bangalorians own and use two wheelers daily.

These solutions are again not very cost effective because construction of separate lanes can cost huge sum of money to the government also and maintenance is very tough. These solutions pose no guaranteed solutions for traffic congestion problem also. To have a near perfect solution to these problems we can make use the available highly advanced technologies to automatically control the traffic without the intervention of any humans so that not only traffic jams are reduced but also emergency vehicles are made to move faster and easier in the traffic.

As a solution to these problem we can make use of RFID tags and uniquely identify each vehicle, this will help in, firstly, detecting the density of traffic in each lane in a junction and also detect emergency vehicle and the lane through which they are entering and the lane through which they are exiting so that no lane will be jammed up for hours and no emergency vehicle get stuck in the traffic during emergency.

Fig-1: Traffic in Bangalore city

2. Existing system

2.1 GREEN WAVE TECHNOLOGY:

In [1], the author A. K. Mittal and D. Bhandari discussed green wave system, which was utilized for giving smooth stream of activity to the crisis vehicles and to identify the robbery vehicles. A 'green wave' is the synchronization of the green period of movement signs. With a 'green wave' setup, a vehicle going through a green flag will keep on receiving green flags as it goes not far off. Notwithstanding the green wave way, the framework will track a stolen vehicle when it goes through an activity light. Favorable position of the framework is that GPS inside the vehicle does not require extra power. The greatest disservice of green waves is that, when the wave is exasperates, the unsettling influence can bring about movement issues that can be exacerbated by the synchronization.

2.2 TRAFFIC LIGHT PRIORITY USING RFID:

In [2], the creators S. Sharma and A. Pithora discussed traffic light priority using RFID. Utilization of RFID activity control to keep away from issues that more often than not emerge with standard movement control frameworks, particularly those identified with picture handling and pillar interference strategies are examined. This RFID system manages a multivehicle, multilane, multi street intersection range. It gives a productive time administration conspire, in which a dynamic time calendar is worked out continuously for the entry of each activity section. The constant operation of the framework imitates the judgment of a movement policeman on obligation. The quantity of vehicles in every segment and the steering are decencies, whereupon the estimations and the judgments are based.

2.3 INTELLIGENT TRAFFIC CONTROL USING RFID:

In [3], the author Rajeshwari Sundar and Santhosh Hebbar discussed intelligent traffic control using RFID. Here each individual vehicle is equipped with special radio frequency identification (RFID) tag (placed at a strategic location), which makes it impossible to remove or destroy. We use RFID reader, NSK EDK-125–TTL,and PIC16F877A system-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. It also determines the network congestion, and hence the green light duration for that path. If the RFID-tag-read belongs to the stolen vehicle, then a message is sent using GSM SIM300 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. This module uses ZigBee modules on CC2500 and PIC16F877A system-on-chip for wireless communications between the ambulance and traffic controller. But the drawback of this system is that it lacks a centralized server and thus fails to take the control decisions efficiently in cases like multiple emergency vehicles entering the signal at different lanes and also it fails to identify the lane from which emergency vehicle is entering the signal thus giving a ambiguity in giving green signal to the lane.

3. Proposed System

From the above existing technologies mentioned, we can conclude that they are inefficient in handling problems such as congestion control, Stolen vehicle detection and emergency vehicle clearance.To solve the above problems in a efficient way, we are propose to implement an completely atomized intelligent traffic control system. It has three parts - first part is Automatic signal control system, here we are equipping each vehicle with an RFID tag. When the vehicle comes in the range of the RFID reader it will send the signal and the system will calculate and track how many vehicles have passed through there by determining the density of vehicles in each junction and providing green light to the lane with highest density percentage. Second part is Emergency vehicle clearance system, here each emergency vehicle contains an ZIGBee transmitter module along with the RFID tag, the ZIGBee receiver will be implemented at the traffic light junction. The buzzer will be switched on only at the time of emergencies. When the receiver receives the ZIGBee signal, the system will identify the lane and respective lane will get the green signal until receiver stops receiving the ZIGBee signal and the last part is Stolen vehicle detection System, here whenever an vehicle comes near the junction it's RFID tag is compared with the list of RFID tags which have been marked as stolen in the database of the server. If a match is found, SMS will be sent to police control room and also the owner of the vehicle along with changing the traffic signal to red of the appropriate lane till local police can take some action. Components used for this experiment are Digital RF module 433 MHz, Microchip PIC18F46K22, RFID Reader-125 KHz TTL and SIM 800 GSM module.

4. Working Modules

4.1 Microcontroller (PIC18F46K22):

Peripheral Interface Control (PIC) 16F arrangement has a considerable measure of favorable circumstances when contrasted with different arrangement. It executes every guideline in under 200 nanoseconds. It has 40 sticks and has 8K program memory and 368 byte information memory. It is anything but difficult to store and send UINs. At the intersection, it is anything but difficult to store expansive number of crisis vehicles. Before changing to green, it ought to fulfill every one of the conditions. Basic intrude on alternative gives the favorable position like bounce starting with one circle then onto the next circle. It is anything but difficult to switch at whatever time. It devours less power and works by vehicle battery itself with no additional equipment.

Fig -2: RFID reader–125 kHz–TTL

Fig -3: GSM Module SIM800

Fig -4: ZIGBEE Module

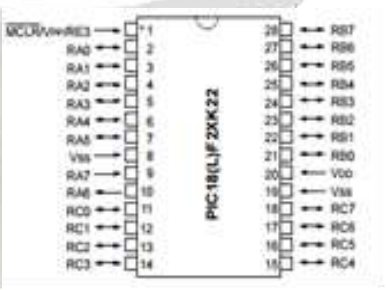

Fig -5: Pin diagram of PIC18F46K22 C22500

Fig -6: Microcontroller PIC18F46K22

4.2 ZigBee Module:

The CC2500 is a RF module and has transreceiver, which gives a simple approach to utilize RF correspondence at 2.4 GHz. Each CC2500 is furnished with the microcontroller (PIC18F46K22), which contains Unique Identification Number (UIN). This UIN depends on the enlistment number of the vehicle. A standout amongst the most critical elements is serial correspondence with no additional equipment and no additional coding. Consequently, it is a transreceiver as it gives correspondence in both bearings, yet just a single heading. The microcontroller and CC2500 dependably speak with the microcontroller by means of serial correspondence.

4.3 GSM Module SIM 800:

SIM800 is an entire Quad-band GSM/GPRS arrangement in a SMT sort which can be installed in the client applications. SIM800 bolster Quad-band 850/900/1800/1900MHz, it can transmit Voice, SMS and information data with low power utilization. With small size of 24*24*3mm, it can fit into thin and conservative requests of client outline. Including Bluetooth and Embedded AT, it permits add up to cost reserve funds and quick time-to-market for client applications.

4.4 RFID Reader–125 kHz–TTL:

Radio Frequency Identification (RFID) is an IT framework that transmits signals without the nearness of physical contraptions in remote correspondence. It is arranged under programmed identification innovation, which is settled convention. The working of a RFID framework is extremely straightforward. The framework uses labels that are connected to different parts to be followed. The labels store information and data concerning the subtle elements of the result of things to be followed. The per user peruses the radio recurrence and identifies the labels. The receiving wire gives the way to the incorporated circuit to transmit its data to the peruser. There are two sorts of RFID classes, dynamic and uninvolved labels. The labels that don't use power are alluded to as detached and they are driven by a receiving wire that empowers the tag to get electromagnetic waves from a peruser. Despite what might be expected, dynamic labels depend on power and they have inbuilt power sources that empower it to send and get signals from RFID peruser. RFID run relies on upon transmit control, get affectability and efficiency, receiving wire, recurrence, label introductions, environment. Regularly, the RFID range is from a couple of centimetres to more than hundred meters. RFID per user utilizes recurrence 125 KHz with a scope of 10 cm.

4.5 System Setup Module:

This is set up at the centralized server. Here we are mainly using three data table.

- Registration of Vehicles.
- Registration of signal lights.
- Registration of Stolen vehicle.

Another table is used to track the movement of vehicles, that is, tracking vehicles entry and exit lane.

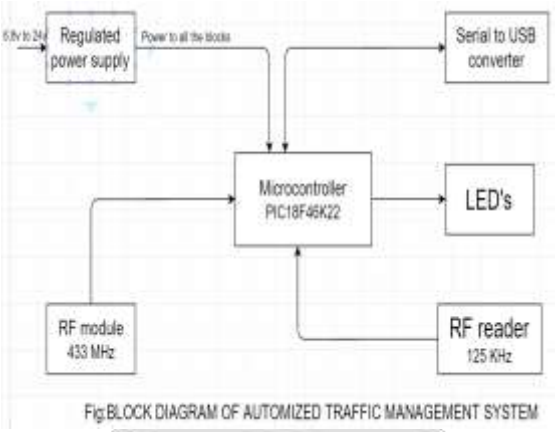

Fig:BLOCK DIAGRAM OF AUTOMIZED TRAFFIC MANAGEMENT SYSTEM

4.6 Automatic Signal Light Control Module :

This module helps in swapping signal lights to different lanes.

- At the hardware model, the RFID tag attached to the vehicle is read by the RFID reader and the RF signals are transmitted for processing to centralized server using RF transmitters.
- Port Communication module at centralized server is used to receive RF signals using RF receiver connected via USB port.
- With appropriate programming at the back end the server is able to calculate the density at each lane and the lane with highest density is given green signal.
- With the help of Dynamic Time Scheduling Algorithm, we are able count the number of vehicle and if the number of vehicles is greater than 10 green light is given for about 30 seconds, 5-9 vehicles 2-25 seconds and so on.

Fig -7: Pole status at different condition

Fig -8: Circuit connections

4.7 Stolen Vehicle Detection Module:

This Module helps in identifying stolen vehicle with the help of RFID tags.

- In this module, every time a vehicle is detected we compare the the unique RFID tag with RFID value stored in the DB which is marked as stolen.
- After detection, with appropriate programming we swap the signal to red, if otherwise.
- After swapping of signal, with the help of GSM module neighbourhood cops and even the owner of the vehicle is notified via a SMS.

4.8 Emergency Vehicle clearance system :

This module helps in giving emergency vehicles highest priority and swapping the signal lights to green.

- In this module, we compare the unique RFID value read by the RFID reader with the emergency vehicle's RFID stored in the system.
- After detection, with the help of ZigBee confirmation is obtained whether the vehicle is actually in emergency or not, if so with appropriate programming signal of the appropriate lane is turned to green.

5. CONCLUSION AND ENHANCEMENT

As we have already seen that with the help of this intelligent traffic control system manual effort on the part of traffic police man is saved. The system proposed in this paper is entirely automated so it takes very less human intervention. The use of real time data obtained through RFID sensor technique that serves as input to traffic light will be an innovative way of controlling traffic volume in developing countries. The priority based vehicle passage helps to save lot of people's life during emergency. The stolen vehicle detection module, which sends a SMS to the corresponding police officer will help them to catch the thief in next possible junction. With multiple lane junction based on the vehicle density the signal is given to a particular lane which is more efficient than any other time based techniques.Facilitate improvements should be possible to the model by testing it with longer range RFID peruses. Additionally the framework can be produced to track the development of any criminal's vehicle by refreshing vehicle data to the server. The framework can likewise be reached out to monitor the vehicles bouncing the signs.

6. REFERENCES

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