Implementation of Green Wave System for Traffic Clearance of Emergency Vehicles and for Detection of Theft Vehicles

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Abstract: One of the common problems that we are facing in our daily life is traffic jam. Suppose a vehicle gets stuck in the traffic jam, it reaches its destination definitely by a couple of minutes late. It's not a big deal to the common people those who are going to offices, schools, colleges. But think of if it is the case of an emergency vehicle, each and every second is very precious to them. If they reach their destination by a couple of minutes late, it may lead to the death of human lives or to some critical situations. To overcome this problem we have developed a "GREEN WAVE SYSTEM" which provides traffic clearance to the emergency vehicles. This system also helps in detecting the theft vehicles, if the information regarding that particular vehicle is given to the system's database. Green wave is the synchronization of green phase of signals. With the Green Wave setup the vehicle passing through that particular Traffic Control System. In existing system GSM Technology is used to update the database of the system, but here the system's database gets automatically updated whenever the data gets stored in the RTO(Regional Transport Office). Thus this system acts as an autonomous two tier system by performing both the operations.

Keywords: GreenWave, Emergency vehicle, Detection of theft vehicles, RFID Technology, Zigbee, cost effective

1. Introduction

Green Wave Systems are used for providing smooth flow of traffic to the emergency vehicles and to detect the theft vehicles. We have developed a cost effective and very efficient technology called "RFID technology" to implement this "GREEN WAVE SYSTEMS". This RFID Technology works in all weather conditions. The main objective of this technology is to identify the emergency vehicle and to track its location. Cameras based on Digital Image Processing are used to identify tense emergency vehicles in existing systems. But they do not work properly during rain, snow and fog conditions. The image will not be displayed properly in them, therefore detecting the vehicles will be highly impossible. To overcome this RFID transponders and readers are used to track the emergency vehicles.GSM Technology is used to update the system's database regarding the type of vehicle that is going to pass through this green wave system in existing systems. But GSM is not required here because the database connected to the micro controller of this traffic control system gets automatically updated when RTO(Regional Transport Office)gets updated.

2. System Structure and Block Diagram





This system consists of RFID Transponders or Tags and RFID Readers. During the manufacturing of the vehicle this

RFID Tag will be inserted into the dash board of the vehicle. This RFID tag consists of all the information regarding the vehicle. This tags will not be visible to our human eye. While we are buying a vehicle in the shore room, depending upon the tag we will get an unique plate number. The data regarding the vehicle will be stored in the RTO database. The RFID Readers will be mounted at the top of each Traffic Control System. When a vehicle is passing through this system, the reader reads the information present in the tag from distance apart and gives the information regarding the type of vehicle to the traffic control system. The Traffic Control System consists of a micro controller and Zigbee. The database will be connected to the micro controller and it gets all the information regarding the vehicles from RTO data base. Depending on the type of vehicle the Traffic control system operates. If it is an emergency vehicle it turns all red lights to green on the path of that vehicle. If it is a theft vehicle the RFID Reader informs it to the Police control room. The control room consists of Zigbee, it communicates with the Traffic control system, there it checks whether the information given right or wrong is based on the information stored in the database of the micro controller. There after it takes action that is it stops that particular vehicle by turning all green lights to red in order to catch that theft vehicle.

3. System Features

3.1 Categories

The Green Wave System possesses three different categories of vehicles namely normal vehicle, emergency vehicle and theft vehicle. Depending upon the requirement we can change the categories. This information will be stored in the RFID Transponders.

3.2 Priority of the vehicle

Here the emergency vehicles are given as highest priority thereafter the stolen vehicles and next to that is of normal vehicles.

Table 1: Information present in database:

UID (Unique Identification	Category	Priority	Location
Number)			code
Xx1456xx	emergency	HT(highest)	234
Xx2345xx	Normal	L(Low)	356
Xx1743xx	Theft	T(high)	420

3.3 Traffic Monitoring

All the information regarding the vehicles is stored in database of the system and it helps in monitoring the traffic.

3.4 Detecting the stolen vehicles

RFID Readers are fixed at each traffic control system and this will help in tracking the location of stolen vehicles.

4. System Hardware

4.1RFID Transponders

RFID Tags or Transponders are fixed inside the dash board of the vehicle during manufacturing. There are three types of RFID tags. Both Active and Semi Passive tags require ON BOARD POWER SUPPLY. They take power from RFID Readers. They cover less distance and they are very cheap compared with the Active Tags.Now in our projecr we are going to use Passive Tags.

4.2 RFID Reader

RFID Readers will be fixed at each Traffic Control System. These Readers reads the information present in the Tags and informs this information to Traffic Control System.

4.3 Traffic Control System:

This system consists of a 8051 Micro Controller and Zigbee. The database will be connected to this micro controller which contains all the information regarding the vehicles. Depending upon the type of the vehicle it performs the operation.

5. Flow Chart of System Software



6. Prototype Implementation

In our prototype we have used 8051 Micro Controller along with the low frequency RFID Reader. Here we used Passive Transponders. The three different categories of vehicles we used in our project are emergency, stolen and normal vehicles. In our coding section, three different unique identification numbers are stored in our program. The Traffic signals red and green are shown by LED lights. The code written is compiled in the AVR studio 5,and burned on Micro Controller using universal series bus programmer. This prototype structure is same as shown in figure 1.The RFID Tags are fixed in three toy cars and the RFID Reader reads the UID's from those tags and sends this information to the micro controller embedded in the traffic control system.

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The database connected to the micro controller verifies the information regarding that particular UID's and depending upon the type of categories defined, if is an emergency vehicle, the traffic LED's gets activated and turns to green color. If a stolen vehicle passes then it checks the information present in the data base. Then after confirming it as a theft vehicle then LED's get activated and turns it to red color. If a normal vehicle passes through this system then the LED's go blank that means it fails to detect the vehicles, therefore it does not support anti collision features for passive transponders. It is considered as the drawback of this prototype. The developed system uses low frequency tags which covers 4 to 5 cms. To resolve all these problems readers with anti collision features and with wide range are to be used. By doing so, a highly efficient prototype will be finally developed.

7. Results and Conclusion

This developed program was successfully burned on the Micro Controller sing USB programmer. The RFID Reader detects an emergency vehicle and provides traffic clearance to it, when it passes over it, and it detects the theft vehicles, informs it to the Police Control Room and turns all the LED's to red till the theft vehicle is caught.

Table 2: Difference between Existing and Developed system

Existing System	Proposed System
High cost	Low cost and more efficient
	system
GSM is used for updating the data	The system gets automatically
base.	updated from R.T.O database.
GPS is used to track the location	RFID Transponders and readers
of the vehicle which requires more	are used to track the location of
power.	the vehicle.
Cameras based on digital image	RFID Technology is used to
processing are used to identify the	identify the type of vehicle, and
type of vehicle, which does not	it works in all weather
work during rain, gog, snow	conditions.
conditions.	

Life is the precious gift given by the GOD to us. This "GREEN WAVE SYSTEM" helps in protecting human lives, by reaching to their destination in time in emergency situations.

This system helps in reducing co emissions and usage of fuel by the vehicles which are passing through this green wave and finally develops a smart city where traffic will be very less.

CASE 1: It is the case where the normal vehicle is passing through that particular traffic light system the RFID reader inserted at the traffic light system reads the information from the tag which is inserted inside the vehicle and gives the information to the system and then the LCD interfacing with that Traffic light system displays some normal instructions like adjust your seat belt, slow down etc. The PC shows that it as a normal vehicle on the screen.



CASE 2: It is the case where the emergency vehicle is passing through that particular Traffic light system, then the RFID Reader which is inserted at Traffic light system reads the RFID tag information and gives this information to the traffic light system. Then the LCD interfacing with that system displays that an instruction that it as an ambulance is going to pass, please give way. Automatically the traffic control system turns green as the vehicle passes through it. The PC shows that it as an emergency vehicle and green light is on.



CASE 3: It is the case where the stolen is passing through that traffic light system, the information regarding the vehicle like vehicle's plate number or UID number is reported to the police control room, then the control room gets communicated with the traffic light system through RF reader, then it checks the information present in the database connected with the microcontroller. After confirming it as a theft vehicle it turns the traffic lights to red until the vehicle is caught. The PC shows that it as a theft vehicle and turns the traffic lights red.

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