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SMART TRAFFIC SIGNAL MONITONG AND CONTOLLING SYSTEM

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Abstract—

Over population is one of the biggest problems in the world today. Speaking about facts, increase in the number of humans means increase in the number of cars on roads. Thus traffic management is a critical issue faced in many metropolitan cities today. There are many problems of congestion with traffic light in many cities especially for emergency vehicles. Lack of efficient traffic control leads to loss of lives because of ambulance delay in case of getting stuck in traffic jams. In this project we propose a smart traffic control system which consist a combination of 2 independent systems to overcome this problem. 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 and We use RFID reader and Arduino Uno 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 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 RF434 modules for wireless communications between the ambulance and traffic controller. The proposed system also send the traffic information to cloud server which will provide the traffic notifications to users.

1. INTRODUCTION

It is well known that the increasing of car numbers in big cities arises a real problem of traffic congestion. Different research papers have been introduced to solve this problem, although people is still suffering. The congestion traffic between the position of patient and hospital becomes case of delivering. Thus, the need of a system to reduce life loosing, and delivering delay has been required necessarily. The system controls the traffic lights using wireless communication system and selects short

path with less congestion. All that to reduce the time taken by ambulance to deliverthe patient to the hospital in optimal time. Numerous technologies can be utilized to cover the hardware requirements of the automatic control system, such as Arduino and related shields as well as other embedded systems. Moreover, wireless communication systems have been employed to send and receive data between the terminals. The most common used communication system is GSM. This is due

to low cost and availability around the covered area in addition to reliability. In terms of data centers, the different software and algorithms have been implemented to reach the target of ambulance movement control systems. Moreover, special specifications are selected to the servers to overcome the problem of data storing and processing speed. The database is used to store the information as well as producing a number of reports as requested by managers. It is important to note that all the applications are built as a webpage based to be more global and easy in access from different places. In the proposed system, the ambulances are monitored, tracked and guided by implemented algorithms at the data center. In addition, this algorithm selects the optimal path for an ambulance depending on crowd sensor readings fixed on the roads to offer the shortest and safe way to deliver the patient to the emergency department. The investigated system consists of two main parts, which are data center and ambulance. The job of data center is explained above, while the ambulance includes the hardware equipment. It uses the microcontroller of Arduino added to GSM shields. The GSM shield is utilized to transfer readings the data center for processing and decision. Numerous software environments have been utilized and web based databases built. The achieved results show a superior performance of the proposed system in terms of accuracy and reliability

India the second most populous Country in the World and is a fast growing economy. With globalization the problem of congestion on highways and in cities is

becoming more and more acute. The goal of intelligent traffic management systems is to achieve improvements in mobility, safety and productivity of the transport system through integrated application of advanced monitoring. Intelligent management of traffic flows can reduce the negative impact of congestion. Technologies like ZigBee, RFID and GSM can be used in traffic control to provide cost effective solutions. RFID is a wireless technology that uses radio frequency electromagnetic energy to carry information between the RFID tag and RFID reader. Some RFID systems will only work within the range inches or centimeters, while others may work for 100 meters (300 feet) or more.

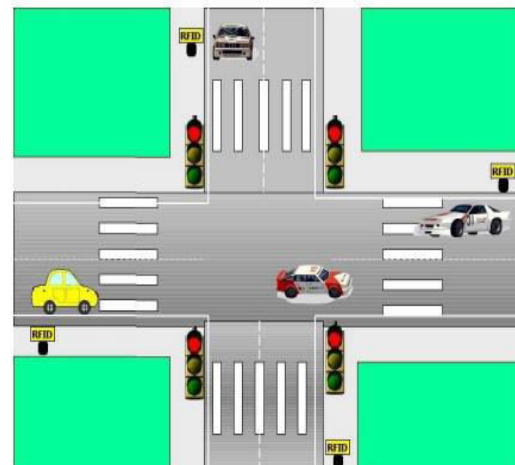


Fig.1.1 RFID Reader positioning system on the road

2. PROPOSED SYSTEM

From the current problem section, it can be seen that, existing technologies are insufficient to handle the problems of congestion control, emergency vehicle clearance, stolen vehicle detection, etc. To solve these problems, we propose to implement our Intelligent Traffic Control

System. It mainly consists of three parts. First part contains automatic signal control system. Here, each vehicle is equipped with an RFID tag. When it comes in the range of RFID reader, it will send the signal to the RFID reader. The RFID reader will track how many vehicles have passed through for a specific period and determines the congestion volume. Accordingly, it sets the green light duration for that path. Second part is for the emergency vehicle clearance. Here, each emergency vehicle contains RF transmitter module and the RF receiver will be implemented at the traffic junction. The buzzer will be switched ON when the vehicle is used for emergency purpose. This will send the signal through the RF transmitter to the RF receiver. It will make the traffic light to change to green. Once the ambulance passes through, the receiver no longer receives the RF signal and the traffic light is turned to red. The third part is responsible for stolen vehicle detection. Here, when the RFID reader reads the RFID tag, it compares it to the list of stolen RFIDs. If a match is found, it sends SMS to the police control room and changes the traffic light to red, so that the vehicle is made to stop in the traffic junction and local police can take appropriate action. In this system we are also using wifi module to send the traffic information to cloud server which will provide the traffic notifications to users.

The bloc diagram of proposed system as follows.

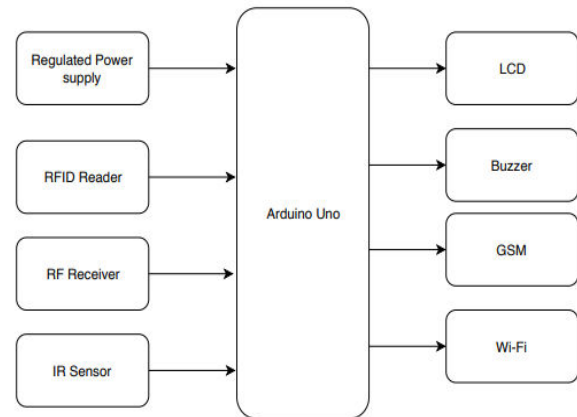


Fig3.1 Block diagram for junction section of proposed system

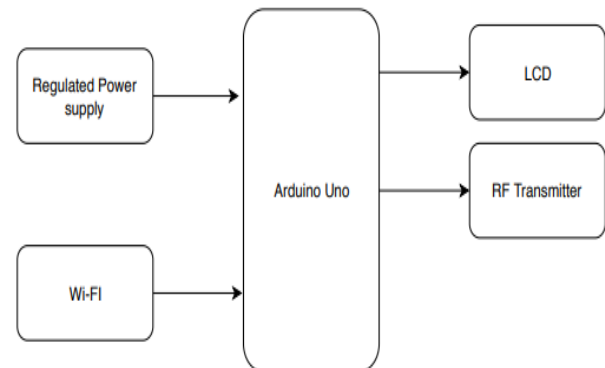


Fig3.1 Block diagram for ambulace section of proposed system

3. WORKING

In this system, there are mainly 3 modules as follows.

A. Automatic Signal Control System In this module, for experiment purpose, we have used passive RFID tags and RFID reader with frequency 125 KHz. RFID tag, when vehicle comes in the range of the receiver will transmit the unique RFID to the reader. The microcontroller connected to the RFID reader will count the RFID tags read in 2

predefined duration. if count is high, the green light duration is set to high. If the count is less, the green light duration is set to low.

B. Stolen Vehicle Detection System In this module, for testing purpose, we compare the unique RFID tag read by the RFID reader to the stolen RFIDs stored in the system. If a match is found, then the traffic signal is immediately turned to red for a predefined duration.

C. Emergency Vehicle Clearance System

In this module, there are 2 parts, first part which is RF transmitter is placed in the emergency vehicle. When the switch is pressed, it will transmit the signal to junction to make the green in corresponding direction. The signal contains unique id and security code. The transmitter contains Arduino uno and RF module.

4. RESULT

The proposed system was fully developed and tested to demonstrate its feasibility and effectiveness. The proposed system is more user friendly than existing system. And it also gives greater performance. The screenshots of the smart and dynamic home control application developed has been presented in Figure bellow.

Kit photo here

Fig6.1 Screenshot of Proposed system

5. CONCLUSION AND FUTURE SCOPE

With automatic traffic signal control based on the traffic density in the route, the manual effort on the part of the traffic policeman is saved. As the entire system is automated, it requires very less human intervention. With stolen vehicle detection, the signal automatically turns to red, so that the police officer can take appropriate action, if he/she is present at the junction. Also SMS will be sent so that they can prepare to catch the stolen vehicle at the next possible junctions. Emergency vehicles like ambulance, fire trucks, need to reach their destinations at the earliest. If they spend a lot of time in traffic jams, precious lives of many people may be in danger. With emergency vehicle clearance, the traffic signal turns to green as long as the emergency vehicle is waiting in the traffic junction. The signal turns to red, only after the emergency vehicle passes through. Further enhancements can be done to the prototype by testing it with longer range RFID readers. Also GPS can be placed into the stolen vehicle detection module, so that the exact location of stolen vehicle is known. Currently, we have implemented system by considering one road of the traffic junction. It can be improved by extending to all the roads in a multi-road junction.

Further the system implemented with the help of OpenCv image processing for increased accuracy and performace.

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