

Implementing Intelligent Traffic Control System for Congestion Control, Ambulance Clearance, and Stolen Vehicle Detection

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Abstract— In this paper, we proposed an **Implementing Intelligent Traffic Control for Congestion, Ambulance clearance, and Stolen Vehicle Detection**. This system was implemented based on present criteria that tracking three conditions in those one is heavy traffic control and another one is making a root of emergency vehicle like ambulance and VIP vehicle. In this paper we are going to implement a sensor network work which is used to detect the traffic density and also use RFID reader and tags. We use ARM7 system-on-chip to read the RFID tags attached to the vehicles. It counts number of vehicles that passes on a particular path during a specified duration. If the RFID tag read belongs to the stolen vehicles. GSM SIM300 used for message send to the police control room. In addition, when an ambulance approaching the junction, it will communicate the traffic controller in the junction to turn on the green light. This module uses Zigbee modules on CC2500.

Keywords— ZigBee, CC2500, GSM, SIM300, ARM-9, ambulance vehicle stolen vehicle, congestion control, traffic junction.

I. INTRODUCTION

The aim of this project is, INDIA is one of the most populous Country in the World and is a fast growing financial prudence. It is seen that terrible road congestion problems in cities. Infrastructure growth is slow as compared to the growth in number of vehicles, due to space and cost bounds. Also, Indian traffic is non-lane based. It needs a traffic control solutions, which are different from the other Countries? Smart management of traffic flows can 1. reduce the negative effect of congestion. In recent years, wireless networks are widely used in the road transport as they provide more cost effective

options. Technologies like XBee, GSM and RFID can be used in traffic control to provide cost better solutions. RFID system 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 or more. A GSM modem is a special type of modem, which accepts a SIM card and operates over a subscription to a mobile operator, just like a mobile phone. The XBee operates at low-power and can be used at all the levels of work configurations to perform predefined tasks. It operates in ISM bands (868 MHz in Europe, 915 MHz in USA and Australia, 2.4 GHz in rest of the world).

The whole project is grouped into 5 parts. Sections II talks about the literature survey. Section III discusses about the current problems that exist in making way to an ambulance and other vehicles. It also talks of how the proposed model will overcome the problems faced in developing Countries as well as developed countries. Section IV gives the implementation details of the proposed model. Section V presents the enhancement of this work.

II. BLOCK DIAGRAM

The implementation of proposed system mainly involves three steps, which are Congestion control, Ambulance clearance, and stolen vehicles detects. The block diagram of the system is shown in Fig. 1.

III. BLOCK DIAGRAM EXPLANATION

Power Supply Unit:

When working with electronics, you always need one basic thing: Power. In every electronic circuit power supply is required. The proper working of

each and every component, it is important to supply the exact amount of voltage and current. If the power exceeds its limit, it can be fatal.

The +5 volt power supply is based on the commercial 7805 voltage regulator IC. This IC produces a steady +5 volt output, accurate to within 5% (0.25 volt). It also contains current-limiting circuitry and thermal overload protection, so that the IC won't be damaged in case of excessive load current; it will reduce its output voltage instead.

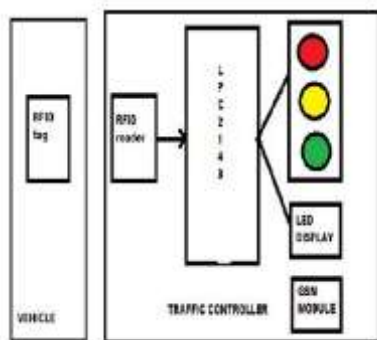


Fig.1. Block diagram

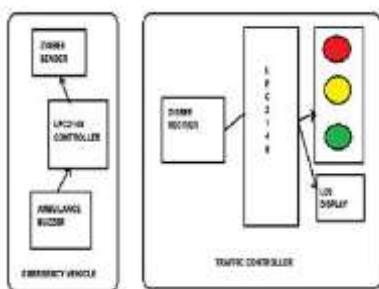


Fig.2. Block Diagram

1. First part contains automatic signal control system. Each vehicle 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 the how many vehicles have passed through for a specific period and determine the congestion volume. Accordingly, it sets the green light duration for the path.

2 . Second part for is the emergency vehicle clearance. Here each vehicles contain Zigbee transmitter and Zigbee receiver will be implemented at the at the traffic junction. The buzzer will be switched ON when the vehicle used for emergency purpose.

3. 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. List of

components used in the experiment are CC2500RF module, Microchip ARM-7, RFID Reader-125KHz-TTL and SIM300 GSM module.

ZIGBEE MODULE:-

The CC2500 is a RF module and has transceiver, which provides an easy way to use RF communication at 2.4 GHz. Every CC2500 is equipped with the ARM-7, which contains Unique Identification Number (UIN). This UIN is based on the registration number of the vehicle. One of the most important features is serial communication without any extra hardware and no extra coding. Hence, it is a transceiver as it provides communication in both directions, but only one direction. The ARM-7 and CC2500 always communicate with ARM-7 via serial communication. Rx pin of CC2500 is connected to Tx (RC6) of microcontroller and Tx pin of CXC2500 is connected to Rx pin of microcontroller (RC7). Other two pins are used to energize transceiver. It is used to transmit and receive the data at 9600 baud rate. Figure 4.1.a shows the image of transreceiver. Here, we uses CC2500 ZigBee module and it has transmission range of 20 meters .

Features of zigbee:-

1. Operating frequency-2.4GHz.
2. Supply Voltage-2.8 to 3.4 V.
3. Urban range-100 ft.
4. RF data rate -250000bps.



Fig:- Hardware of proposed Model

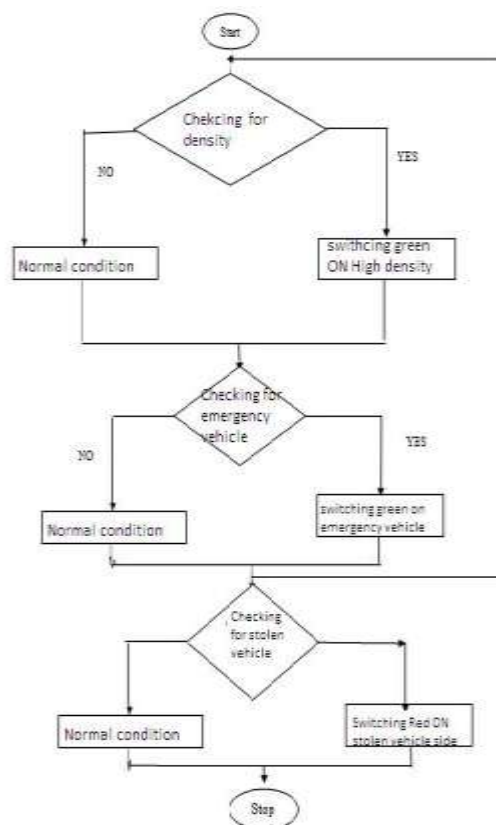
GSM Module:-

GSM modem is connected with the ARM-7 microcontroller. This allows the computer to use the GSM modem to communicate over the mobile network. These GSM modems are most frequently used to provide mobile Internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages. GSM modem must support an "extended AT command set" for sending/receiving SMS messages. GSM modems are a cost effective solution for receiving SMS messages, because the sender is paying for the message delivery. SIM 300 is designed for global market and it is a tri-band GSM engine. It works on frequencies EGSM 900 MHz, DCS 1800 MHz and PCS 1900 MHz. SIM900 features GPRS multi-slot class 10/ class 8 (optional) and supports the GPRS coding schemes. This GSM modem is a highly flexible plug and play quad band GSM modem, interface to RS232, it supports features like voice, data, SMS, GPRS.

RFID:-

Radio Frequency Identification (RFID) is an IT system that transmits signals without the presence of physical gadgets in wireless communication. It is categorized under automatic identification technology, which is well established protocol. The working of an RFID system is very simple. The system utilizes tags that are attached to various components to be tracked. The tags store data and information concerning the details of the product of things to be traced. The reader reads the radio frequency and identifies the tags. The antenna provides the means for the integrated circuit to transmit its information to the reader. There are two types of RFID categories, active and passive tags. The tags that do not utilize power are referred to as passive and they are driven by an antenna that enables the tag to receive electromagnetic waves from a reader. On the contrary, active tags rely on power and they have inbuilt power sources that enable it to send and receive signals from RFID reader. RFID range depends on transmit power; receive sensitivity and efficiency, antenna, frequency, tag orientations, surroundings. Typically, the RFID range is from a few centimeters to over hundred meters. FID reader uses frequency 125 KHz with a range of 10 cm.

IV. FLOW CHART OF SYSTEM MODULE:-



V. PROPOSED WORK:-

Under the proposed work, each intersection contains RFID reader. The road is divided into two lanes. Each lane has its RFID to track the vehicles to passing through it. Each intersection point has its own data base to store the information regarding to vehicles that passes from it with timestamp and traffic light. Every vehicle has a RFID enabled device that stores a vehicle identification number (VIN). Every vehicle has its unique VIN number that provides the information that regarding the priority of vehicle and type of vehicle. With the help of VIN we can uniquely identify the vehicle and its owner.

Vehicle Identification Number:- In the proposed work RFID, tag will store vehicle identification number. These numbers is divided in three parts. First part represents the priority of the vehicles. Next part represents the type of vehicle and next, digit represents the vehicle number. In the proposed work, different types of vehicles have different type of priorities. Vehicles are divided into 4 categories. First system category includes Ambulance, Fire brigade vehicles and VIP vehicles. These vehicles have a highest priority. The second category includes the buses school and colleges buses. These buses need to reach their destination on time so

these vehicles also need a fast service. Third category includes the car, motorcycle and scooter and forth category includes the heavy vehicles. Day time priority of 3rd category is high as compare to 4th category but during night hours the priority of heavy vehicles is high.

VI. CONCLUSION:

As the entire system is automated, it requires very less human intervention. With stolen vehicle detection possible junctions. Emergency vehicles need to reach their destinations at the earliest. If they spend a lot of time in traffic jams. 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. Currently, it is implemented system by considering one road of the traffic junction.

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