

# INTELLIGENT TRAFFIC CONTROL AND VEHICLE RECOGNIZATION SYSTEM

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## ABSTRACT

Due to rapid urbanization there is a need for implementing an effective traffic control system to avoid heavy congestion. And also, to make a better solution for ambulance clearance helps to protect the human life. The idea behind the proposed system is to provide effective traffic control systems by the use of embedded technologies. This project concentrates on ambulance clearance and the stolen vehicle detection. This makes use of RFID, MOTOR, LCD and ZIGBEE along with embedded technology. Here each vehicle is placed with an RFID tag. Whenever the RFID reader reads the tag of ambulance it turns ON the red light for that particular path till the reader reads the RFID tag. Whenever the RFID reader reads the tag of stolen vehicle it turns ON the red light for that particular path till the reader reads the RFID tag and close the gate. When the tag of stolen/ ambulance vehicle is read by the reader it turns on the Red signal and sends the corresponding data to Control Room through ZigBee. This prototype can be tested using Simulation tool and the expected results can be obtained.

**Keyword:-** Arduino Uno, RFID Reader, RFID tag, Red & Green LED, LCD 16 \* 2, L293D Motor Driver, DC motor, ZigBee TX RX.

## 1. INTRODUCTION

India is the second most populous Country in the World and is a fast growing economy. It is seeing terrible road congestion problems in its cities. Infrastructure growth is slow compared to the growth in number of vehicles, due to space and cost constraints Traffic management and control has become an important task in today's fast moving activities. Traffic means moving from one location to another. It may be via road transport, shipping, by rail or even by air. Number of vehicles and number of tracks for movements are there. Also, Indian traffic is non lane based and chaotic. It needs a traffic control solutions, which are different from the developed Countries. Intelligent management of traffic flows can reduce the negative impact of congestion. In recent years, wireless networks are widely used in the road transport as they provide more cost effective options 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. A GSM modem is a specialized type of modem, which accepts a SIM card and operates over a subscription to a mobile operator, just like a mobile phone. AT commands are used to control modems. These commands come from Hayes commands that were used by the Hayes smart modems. The ZigBee operates at low-power and can be used at all the levels of work configurations to perform predefined tasks. It operates in ISM bands. LCD implies Liquid Crystal Display. We utilize 16\*2 shows in our framework. LCD has numerous applications like PC screens, TV and so on. We utilize two LED in shading green and red to tell activity light. At the point when rescue vehicle is identified around, then red light is supplanted with green, which implies to framework give green activity flag.

## 2. LITERATURE REVIEW

### 2.1 Intelligent Traffic Control System (Emergency Vehicle Clearance & Lost Vehicle Detection)

Abstract: Currently many urban cities are facing the main problem of promptly increasing the automobiles causes increasing the traffic in various cities. There are also the main problem concerning to vehicles is that the robberies of vehicles. So for that this system introducing an intelligent traffic control system with the further modules as locating the lost vehicle with by using RFID system and the lane clearance of crisis vehicles. In this system each vehicle is furnished with a unique special RFID (radio frequency identification tag) which has a unique identification number. At traffic signal junction there are the RFID readers for identification of vehicles. The task of counting vehicle is done at traffic controller room by the microcontroller with help of IR (Infrared) sensors. It will also assemble fine form bank account if any vehicle disrupts the traffic signal rule. Also by finding out the surrounding location of the pinched vehicle and give this information to the nearest police station or policeman. So it can be easily to find out lost vehicle. The emergency vehicles like police vans and ambulance, fire brigade’s trucks have always had to reach at the destination. When an emergency response vehicle is imminent the junction, it will communicate to the traffic controller in the junction to turn ON the green light. This system gives very efficient way to reduce the cramming on road.

### 2.2 Improved Traffic Control Systems For Emergency Vehicle Clearance And Stolen Vehicle Detection

Abstract: Due to rapid urbanization there is a need for implementing an effective traffic control systems to avoid heavy congestion. And also to make a better solution for ambulance clearance helps to protect the human life. The idea behind the proposed system is to provide effective traffic control systems by the use of embedded technologies. This paper concentrates on ambulance clearance and the stolen vehicle detection. This makes use of RFID, GPS, and GSM along with embedded technology. Here each vehicle is placed with an RFID tag. Whenever the RFID reader reads the tag of ambulance it turns ON the green light for that particular path till the reader reads the RFID tag. The position of theft vehicle is located with the help of GPS and the information is transferred through GSM to the control room. When the tag of stolen vehicle is read by the reader it turns on the Red signal. This prototype was tested using Simulation tool and the expected results are obtained

## 3. PROPOSED MODEL

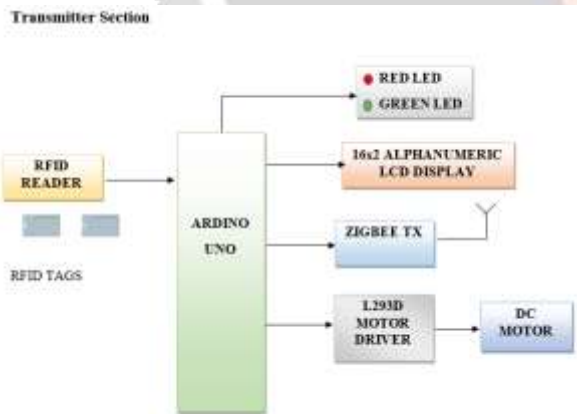


Fig1: block diagram tx

### Receiver Section

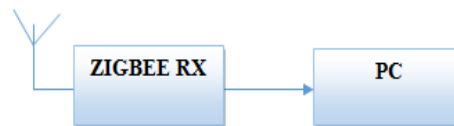


Fig2: block diagram rx

### Block diagram description

- Arduino Uno is the heart of our project.
- Project consists of Transmitter Part & Receiver part

- Transmitter part consists of RFID reader, Arduino UNO, Red & green Led Signals, 16x2 Alphanumeric LCD display, L293d Motor Driver, 60rpm geared Dc motor and ZigBee transmitter.
- Receiver Part consists of ZigBee Receiver & PC.
- If RFID tag gets swapped by Ambulance then Green Led becomes RED and LCD displays “Ambulance is coming” & ZigBee transmits the data to control room section (receiver part). Receiver section receives the data & displays the same on PC.

If RFID tag gets swapped by unauthorized vehicle then Green Led becomes RED and LCD displays “Stolen Vehicle Detected”, Dc motor starts rotate in clockwise direction which indicates that gate is closed & ZigBee transmits the data to control room section (receiver part). Receiver section receives the data & displays the same on PC.

## 4. HARDWARE REQUIREMENTS

### 4.1 ARDUINO UNO CONTROLLER



The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip.

### 4.2 LCD Display

LCD stands for **L**iquid **C**rystal **D**isplay. LCD is finding wide spread use replacing LEDs (seven segment LEDs or other multi segment LEDs) because of the following reasons:

1. The declining prices of LCDs.
2. The ability to display numbers, characters and graphics. This is in contrast to LEDs, which are limited to numbers and a few characters.
3. Incorporation of a refreshing controller into the LCD, thereby relieving the CPU of the task of refreshing the LCD. In contrast, the LED must be refreshed by the CPU to keep displaying the data.
4. Ease of programming for characters and graphics.

These components are “specialized” for being used with the microcontrollers, which means that they cannot be activated by standard IC circuits. They are used for writing different messages on a miniature LCD.

### 4.3 ZIGBEE MODULE

ZigBee could be a IEEE 802.15.4-based specification for a collection of high-level communication protocols accustomed produce personal space networks with little, low-power digital radios.

The technology outlined by the ZigBee specification is meant to be easier and fewer dearly-won than alternative wireless personal space networks (WPANs), like Bluetooth or Wi-Fi. Applications embrace wireless light-weight switches, electrical meters with in-home-displays, traffic management systems, and alternative shopper and industrial instrumentality that need short-range low-rate wireless knowledge transfer. Its low power consumption limits transmission distances to 10–100 meters line-of-sight, depending on power output and environmental characteristics

It supports two-way communication. It is based on IEEE 802.15.4 standard for WPANs. Application of ZIGBEE is low data rate, long battery life and secures networking. It operates at 2.4GHz. ZIGBEE devices can form networks with Mesh, Star and Generic Mesh topologies among themselves. The network can be expanded as a cluster of smaller networks.

### 4.4 RFID READER



This module directly connects to any microcontroller UART or through a RS232 converter to PC. It gives UART/Wiegand26 output. This RFID Reader Module works with any 125 KHz RFID tags.

#### Specifications

OperatingFrequency:125Khz

ReadDistance:10cm

Size of RFID reader module: 32mm(length) \* 32mm(width) \* 8mm(height)

### 4.5 LIGHT-EMITTING DIODE (LED)

The longer lead is the anode (+) and the shorter lead is the cathode (&minus). In the schematic symbol for an LED (bottom), the anode is on the left and the cathode is on the right. Light emitting diodes are elements for light signalization in electronics. They are manufactured in different shapes, colors and sizes. For their low price, low consumption and simple use, they have almost completely pushed aside other light sources- bulbs at first place.



#### 4.6 DC motor



A DC motor is an electric motor that runs on direct current (DC) electricity. It converts mechanical into electrical energy. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. The speed of a DC motor is directly proportional to the supply voltage, so if we reduce the supply voltage from 12 Volts to 6 Volts, the motor will run at half the speed. The speed controller works by varying the average voltage sent to the motor.

## 5. RESULTS

### Cases of result:

1. When no any vehicle passes through RFID Reader
2. When authorized vehicle is passing through RFID Reader
3. When unauthorized vehicle is passing through RFID Reader
4. Result on database



Fig: Case 1 Result



Fig: Case 2 Result



Fig: Case 3 Result

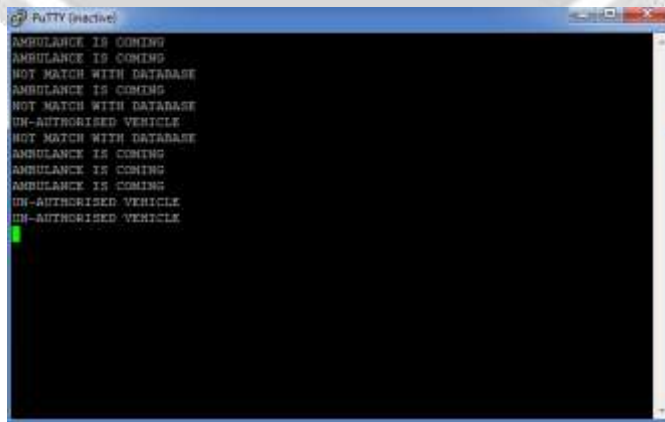


Fig: Result on database

## 6. ADVANTAGES

- Reliable
- Economical
- Eco-friendly
- Low cost
- Maximize accuracy

## 7. APPLICATIONS

- Traffic control
- Signaling system
- Ambulance detection

## 8. CONCLUSION

With the implementation of this system the manual effort and the time on the part of the traffic policeman is saved. As the whole system works automatically, it requires very less human intervention. With this system, traffic congestion can be detected and managed accordingly; a stolen vehicle can be detected by turning the signal to red and traced with the help of GPS. Also way is given to the emergency vehicles by clearing the lane by turning the signal to green so that they reach their destinations at the earliest to save the precious lives of many people. Further enhancement can be done by using longer range RFID readers.

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