



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

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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.

KEYWORDS: Data Mining, Congestion Control, RFID tags, RFID Readers, Arduino Microcontroller, Lost Vehicle, IR sensors.

I. INTRODUCTION

From 20th century the evolution of big industries is rapidly increasing and developing. So it causes to increase the conveyance extensively. Rapid transits system and fast transportation are major part of economic development for any industry. In this conveyance, it includes transport of goods, manpower, machineries and various products related to the industry etc. This emphatic factors impact on development of industries.

As industry field developing speedily, transport between automobiles also increases. That inclines to rise no of automobiles on the road. So now here is a major problem arisen in front of Traffic Managing Authority to manage and regulate the traffic and has to learn or develop new procedures for reduce this problem. In urban cities, the density of vehicles is quickly growing as compared to road infrastructures. So it corresponds to increase of road users.

For this growth of the automobiles, the TLC (traffic light control) system does not give agreement as people want. Now days many topics are present ahead of traffic light controller are stated below: -

1) *Massive traffic jams:*

As the no of vehicles or automobiles are rises, vast traffic bottleneck also increasing rapidly in major towns or cities. This mostly happens at the time of morning and evening at town square and signal junction.

2) *Still need to wait even if no traffic: -*

Many times occurs that we have to wait for green light even if there is no more traffic. It occurs ample times. It happens because the traffic signal lights work on the predetermined time spam.

3) *Absence of traffic information to user: -*

Currently the traffic system does not provide much more information to the users including traffic bottleneck roads and alternative way to go to the destination.

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4) *Emergency vehicle stuck in congestion:* -

The emergency automobiles like police vans, ambulance and fire brigades etc. usually caught in the huge traffic jams mainly at the town square & traffic junction. This is very thoughtful problem about to the traffic and can imperil on many lives.

The main aim of this project to overcome all of these disadvantages with respect to the traffic light controller system (TLCS). For that we are developing an Intelligent Traffic Control System (ITCS) which work very resourcefully and intelligently. It does not require more human interaction as an operator. Project's aim to reduce the traffic congestion, lane consent of the emergency vehicles detection of the lost or stolen vehicles. This also gives the penalty to the traffic rule breakers in form of fine intelligently and also gives the traffic jamming information to the users who want.

This paper is organized as follows: the section II gives the brief information previous system in the form of Literature survey. Then after section III includes the details of the project associated work. The section IV contains system construction and system modules. The last section gives conclusion and future development of this system

II. RELATED WORK

This system uses some hardware components. They work efficiently for giving proper information about traffic and helps to take suitable choice to traffic controller.

The hardware component as follows:

A. *RFID (Radio Frequency Identification):*

RFID is Radio Frequency Identification used for discovering the objects. It uses wireless system or electromagnetic fields to transmit the data. It also used for automatically tracing and identifying the tag attach to the object. The tag contains general information about the object and it is the info which kept electrically. Tag can be read from numerous distances from the signal through RFID readers.

Functioning of RFID:

It comprises two parts, a tag and a reader. The RFID tag are implanted with transmitter & receiver. RFID component on the tags have two parts. In which 1st one is microchip that stores object information and process object's information and 2nd part is antenna to receive and transmit a signal. A tag can superior serial number per each object. This number cannot be used for another RFID tag.

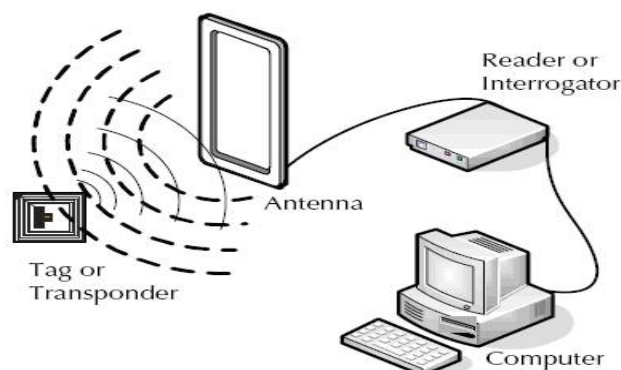


Fig. Working of RFID

To read the information encoded in a tag two-way radio transmitter-receiver called as mediator that emits the signal to using the antenna. The tag answers with the information which stored in its memory and the mediator will then transmit the read results to an RFID program.



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There are two types of RFID tags.

1) Passive RFID Tag:

It uses the mediator radio wave energy to allow the information stored in tag and also send to reader. A passive tag is more chipper and smaller because it has no battery instead of that the tag uses radio energy conducted by the reader. To operate the passive RFID tag, it must be illuminate with power level jaggedly thousand times stronger than signal transmission. This makes the difference in the interfering and exposure to radiation.

2) Active RFID Tag:

Active tag has inherent battery periodically transmits its id signals means its own signal. A battery assisted passive has a small battery on board and it activated when it is detected by RFID reader.

The RFID tags comprise 2 parts. 1st one is integrated circuits of storing processing modulating- demodulating a radio frequency signal. Tag information is stored in a non-volatile memory. The RFID tag contains fix or programmable logic for allowance the transmission and sensor data respectively.

RFID Readers:

They are the readers which transmits an encrypted radio signal to interrogate the tag. RFID tag gets the message and then replies to its identity and other information. It may be only having a matchless serial number that cannot be altered or may be a batch member or a stock number. RFID tag located or placed in such a way that it arises in the range of RFID readers and read the tag consecutively.

B) Arduino UNO Microcontroller:

The Arduino UNO microcontroller is easy to utilize up till now powerful single board computer that has gained significant grip in the hobby and professional market. The Arduino is open-source, which means hardware is cheap in price and development software is free. The Duemilanove board features an Atmel ATmega328 microcontroller working at 5 V with 2Kb of RAM, 32 Kb of flash memory for storing programs and 1 Kb of EEPROM for storing parameters. The clock speed is 16 MHz, which translates to about executing about 300,000 lines of C source code per second. The board has 6 analog input pins and 14 digital I/O pins.

There is a USB connector for talking to the host computer and a DC power port for linking an external 6-20 V power source, for e.g. a 9 V battery, when running a program while not connected to the host computer. Headers are provided for interfacing to the I/O pins using 22g solid wire or header connectors.

An important feature of the Arduino is that you can create a control program on the host PC, download it to the Arduino and it will run automatically. Remove the USB cable association to the PC, and the program will still run from the top each time you push the reset button. Remove the battery and put the Arduino board in a closet for six months. When you reconnect the battery, the last program you stored will run. This means that you connect the board to the host PC to develop and debug your program, but once that is done, you no longer need the PC to run the program. The Arduino Uno has a number of facilities for communicating with a computer, another Arduino, or other microcontroller.

The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 1 (TX) and 0 (RX).

An ATmega8U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The TX and RX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer.

In this system, Arduino is used for doing all functionalities on kit. The code of Arduino is generated and stored into its memory through official Arduino IDE software. The connections of kit are given to the digital I/O pins because this system works on digital commands.

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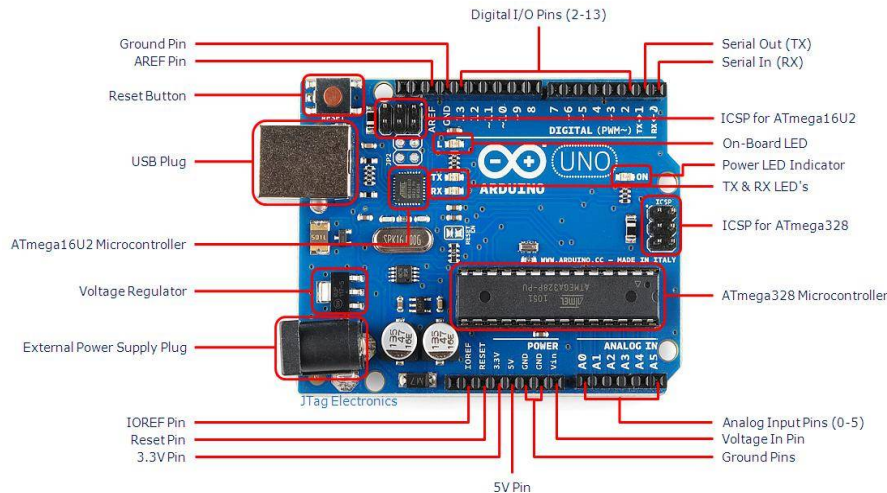


Fig. Arduino UNO Microcontroller

III. SYSTEM ARCHITECTURE & MODULES

The system architecture of Intelligent Traffic Control System proposes various blocks. In this system server stores the info of vehicles in database. It preserves all types of records related to vehicles which are passing at traffic junction like vehicle name, id, of road user, name of rule violators, lost vehicle id, etc. A serial USB cable used for interfacing between Arduino microcontroller and computer system which also has a database. This system also contains the Infrared (IR) sensors, for each side of junction which are positioned far from traffic junction up to 100 meters. They provide the count of vehicles while the vehicles are approaching to the traffic signal junction.

When any emergency vehicle like fire brigades police van, ambulance is imminent to the signal junction then controller drives the signal which turns the red signal to the green signal until emergency vehicle passes from junction. This architecture detects the lost automobiles by using RFID tags. When the lost vehicle noticed then the message will send to owner of the vehicle.

When anybody breakdowns the traffic law at signal then certain quantity of money will deducted from his/her bank account. If he/she breaks rule more than 5 times then the license will become invalid

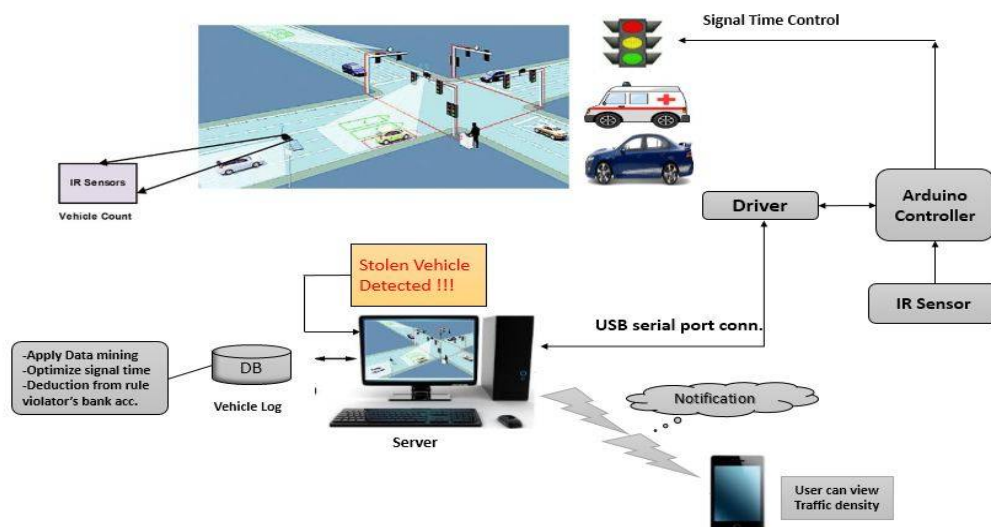


Fig. System architecture

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This system implements five major modules which as follows:

A) Switching Traffic Light Dynamically:

The counts of vehicles which will get from the IR sensors are used to decide the light presence period. If the count is huge i.e. high road traffic, then the arrival of green light will more. If there is no car or bus at any lane of road at junction, then that road's traffic light time is reduced and also other roads time will decrease.

B) Priority Services/ Emergency Vehicle Lane Clearance:

The priority vehicles mean that the emergency cars or buses like police vans, ambulance etc. have the higher importance than other vehicles. When these high priority vehicles arrive at traffic junction, then red signal goes to green instantly until it drives away from junction on the way to its destination. Then again the green signal turns to the red.

C) Punishing Rule Breakers:

If any road user breaks up the traffic rule, then he/she will have penalized in the form by reducing certain quantity from his/her bank account. The driving license will have cancelled if rule breaks more times.

D) Missing/Lost Vehicle Discovery:

This system provides the capability to finding out lost/missing vehicle by using the RFID tags. The record of stolen or lost vehicle is already stored in to the database of this system. If any stolen vehicle will notice, then a message will display on the control room's desktop screen.

E) Android Application:

The android application is used to giving the message about the traffic condition time to time to the android application users and also provides the count of the vehicles which are present at the traffic junction.

System Flowchart:

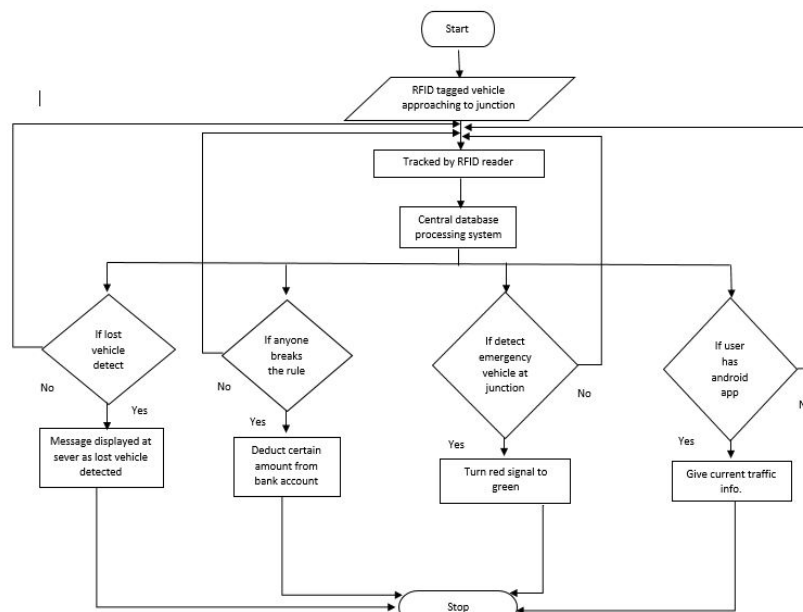


Fig. System Flowchat

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IV. SIMULATION RESULTS

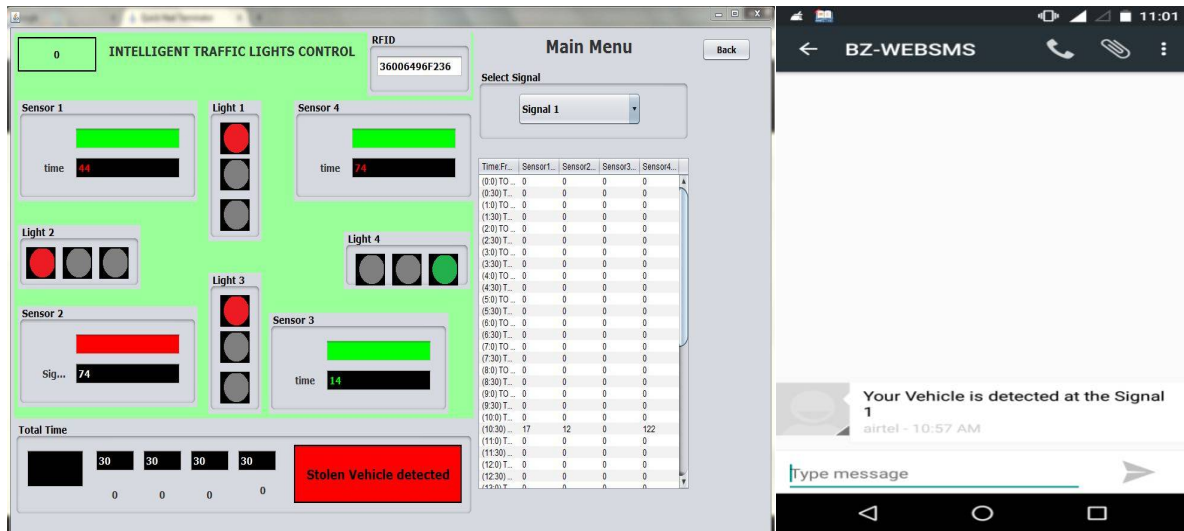


Fig 1. Stolen Vehicle Detection.

Fig 2. Notification to the stolen vehicle owner.

In above fig 1 & fig 2 we show detection of stolen vehicle using RFID tag and sends the notification to the stolen vehicle owner when his vehicle is detected at signal. In this scenario we propose one system in which every vehicle equipped with RFID tag. Also it shows vehicle is detected at which signal at piazza.

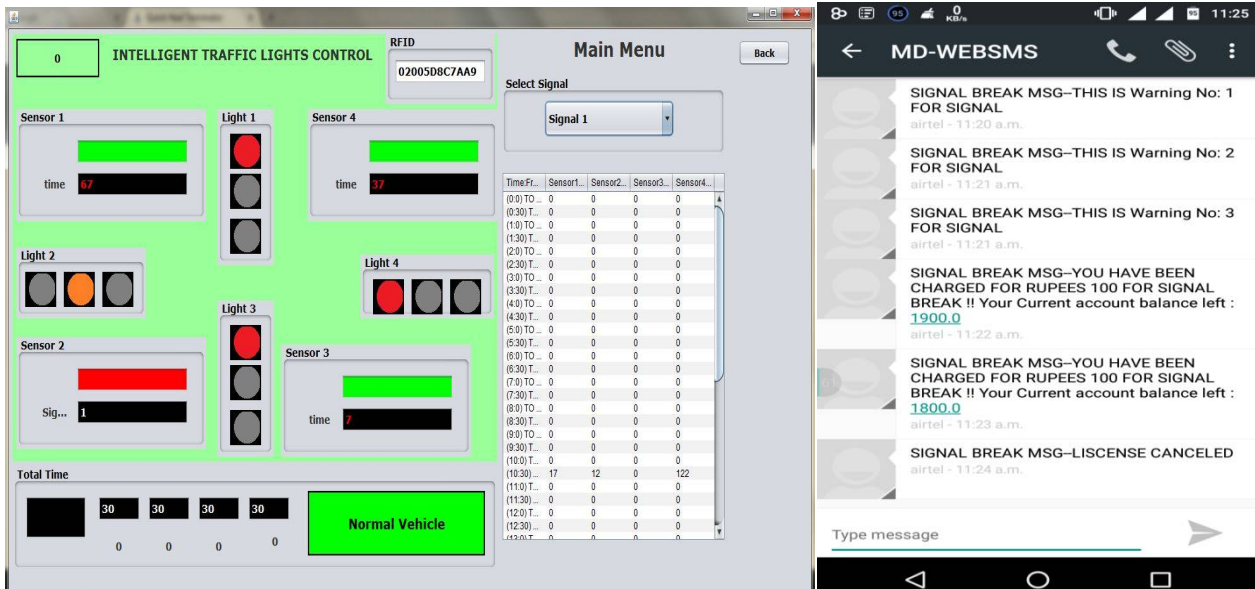


Fig 3. Normal Vehicle Detection.

Fig 4. Notification to the rule Breakers.

In above fig 3 & fig 4 we show detection of normal vehicle using RFID tag and send the notification to the rule breakers when his vehicle is detected at signal. It sends warnings to the registered user whenever he breaks the rules one by one. Also it deducts the balance from rule breaker account.

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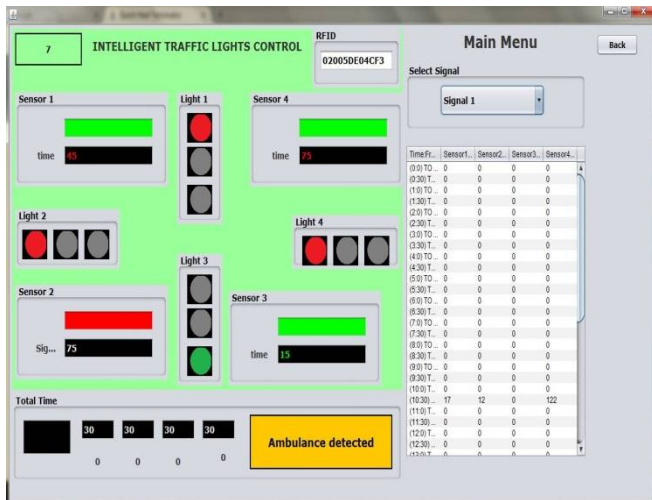


Fig 5. Ambulance Vehicle Detection.

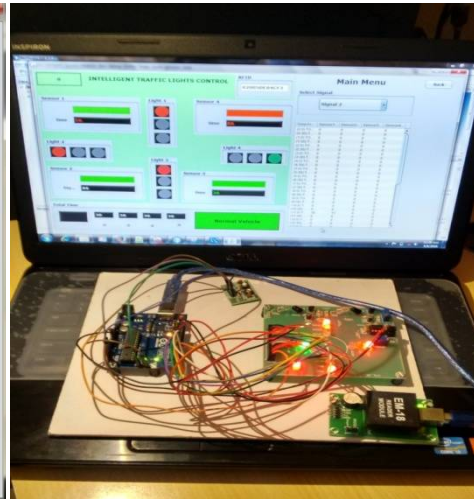


Fig 6. System Hardware.

In above fig 5 we show the ambulance vehicle detection. Whenever ambulance approaching at the traffic junction it automatically clears the path for emergency vehicle. Fig 6 shows the working of system hardware which runs automatically without human intervention.

V. CONCLUSION AND FUTURE WORK

Switching of traffic light dynamically is based on present traffic density. So individual work of traffic policeman gets saved. It also required very less human interface. The emergency vehicles want to reach the destination earlier. If they caught in traffic jams, so it will very difficult to reach the destination in right time. So by proposing the system where automatically turning the signal to green until the emergency vehicle goes away from traffic junction. With lost/larceny vehicle detection, the lost vehicle detected at signal via RFID tag and the signal goes to server room and server room sends the message to the traffic police and he inform to police and take their action. Also the attachment of designing a smart application which offers information about the current traffic status on that respective signal and gives the count of the automobiles. In future this system can be develop by adding the automatic tolling system in which the toll will be routinely calmed from the bank account and using the high megapixel cameras at the crossroads for getting accurate count of vehicles. By using this cameras system can give the information in the form of videos and images to the application live.

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BIOGRAPHY

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