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

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Abstract-*Many people are suffering due to heavy traffic. The traffic signals were available at various places but it is not easy to control the crowd. In order to avoid this here were modulated and developed a system called a traffic congestion controller with wireless control for ambulance and VIP vehicles. Here we come up with a Traffic congestion Control, Ambulance Clearance, and Stolen Vehicle Detection. This combination was applied based on the instant criteria that tracking three conditions in which one is heavy traffic control and another one is making the root of emergency vehicles like ambulance and VIP vehicle. In this module, we are going to accouterment a sensor network work that is used to detect the traffic density and also use RFID reader and tags. We use the RFID reader to read the RFID tags attached to the vehicles. It counts the vehicles that proceed in a particular direction during a set-out duration using an infrared sensor. If the RFID tag reader belongs to the stolen vehicles where the GSM SIM900 is used for sending communication towards the police control room In inclusion, where an ambulance or some VIP vehicle if proceed towards the junction, it will liaise the traffic controller in the junction to turn on the green light in the path.*
Keywords: RFID, GSM SIM800, Stolen vehicle detection, Emergency vehicle detection, and Traffic control.

1.INTRODUCTION

India is the second-largest populous country in the World and is a prospering economy. It is seeing abhorrent road congestion problems in its cities. Substructure growth is deliberate as compared to the growth in the number of vehicles, due to space and cost constraints. To evade this assess time consumption an intelligent traffic control system is used which twists the signal in the path of the ambulance to green as well as assess the congestion in the signal junction and sends it to an ambulance through GSM so that the Driver can determine either he should take that path or not. The same system is also used to discern the stolen vehicles. The RFID tag of the stolen vehicle should be rescued in the database so that when it is spotted in any signal junction an SMS is sent to the control room.

1.1 Traffic control system

In this unit, for the experiment target, we have used passive RFID tags and RFID readers with frequency 125 kHz. An RFID tag, when a vehicle hears in the range of the receiver will transmit the unique RFID to the reader. The microcontroller linked to the RFID reader will count the RFID tags. The infrared transmitter is one sort of technology that uses radiofrequency electromagnetic energy to carry information emits infrared rays generally called as IR Transmitter. likewise, the IR Receiver is used to receive the IR rays transmitted by the IR transmitter. One major point is both the IR transmitter and receiver should be positioned straight line to each other.
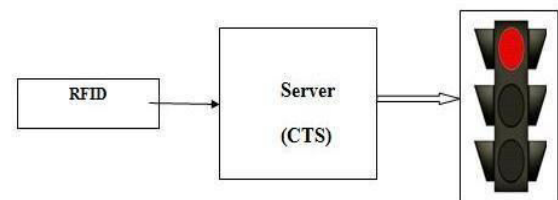

Fig.1. Stolen Vehicle Detection Module

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1.2 Stolen Vehicle Detection System

In this component, for testing intents, we compare the unique RFID tag read by the RFID reader to the stolen RFIDs stored in the system. If a match is set up, then the traffic signal is instantly turned to red for a duration of 30 seconds. Also, an SMS is dispatch specifying the RFID. number by using GSM module SIM900. The LCD display will show that stolen vehicle. Here the input is taken from the RFID reader and move

to the central computer system. CCS will execute the matching of lost vehicle RFID tags database &input, and traffic light of the signal will switch to Red.

1.3 Emergency Vehicle Clearance System

In this component, there are 2 portions, the first part in which the transmitter is placed in the emergency vehicle. When the switch is pushed, it will transmit the signal. The signal includes a unique id and security code. The transmitter comprises atmel162. A microcontroller. The second part is the receiver, which is placed at a traffic pole. It also includes a microcontroller and GSM component. The receiver balances the security code received to the security code present in its database. If it matches, then it will spin the green light on. For the testing target, we used short-range RFID readers in our prototype.

First, the receiving portion is turned on. The red and green signal will be on for 10 seconds period and the orange light will be on for 2 seconds duration one after the other. Secondly, we carry the RFID of the stolen vehicles into the range of RFID readers. Then the signal will turn to red for a period of 30 seconds and an SMS is received. Thirdly, we bring 12 RFIDs into the range of RFID readers, and then the green light period will change to 30 seconds. Fourthly, we bring an emergency vehicle implementing the GSM transmitter into the range of GSM receiver, and then the traffic light will change to a green till the receiver acquires the signal. In the default condition, the red and green light will set for 10 seconds. The time period will be diverse according to traffic terms, stolen vehicles, and emergency vehicles.

The sender part is placed in the ambulance and it transfers signal precisely and the LCD display status at different conditions (in that figure one is normal conjunction image (traffic signal running as per the default time period) and another one is LCD display status, when an ambulance coming close to junction the real connections of different components like RFID, GSM interfacing various microcontrollers the status updated at the time of stolen vehicle is found. The stolen vehicle RFID number should be upgraded in the database. If the stolen vehicle is found, then it will instantly turn on the red light in the signal.
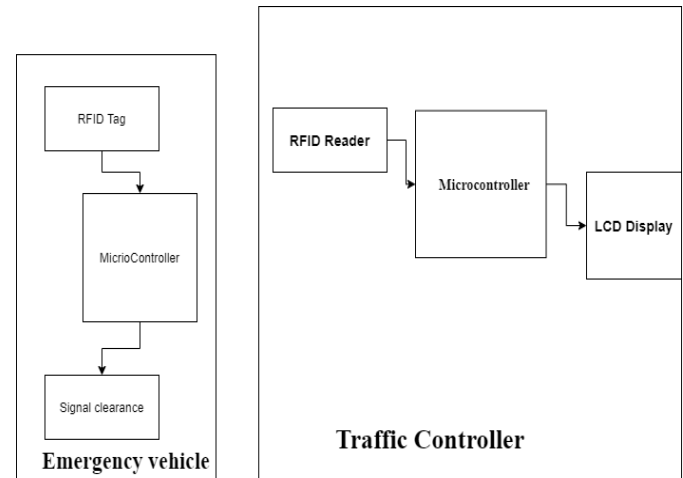

Fig.2. Emergency vehicle clearance system

2.PROPOSED SYSTEM

It is certainly seen that, from the current problem the current technologies are inadequate to knob the problems of congestion control, emergency vehicle clearance, stolen vehicle detection. To deal with these issues, we introduce to implement our Intelligent Traffic Control System. In our encountered system the numbers of vehicles arriving are cached by using IR sensors the IR sensors is connected to the micro-controller.

The micro-controller counts the vehicle quantity and regulates the traffic signal automatically. The micro-controller is used to check and restrict the traffic signals in four road junctions by cardinally controlling the traffic lights. The stolen vehicle system can be enforced by using RFID tags. Each vehicle have RFID tag. If it show up in the range of RFID reader, it will pass the signal to the RFID reader. Here, when the RFID reader reads the RFID tag, it correlates it to the list of stolen RFIDs. If a match is found, it delivers SMS to the police control room and alter the traffic light to red, so that the vehicle is contrived to stop in the traffic junction and local police can take relevant action.

In a Emergency vehicle clearance system each emergency vehicle has a transmitter module and the receiver will be carried out at the traffic junction. The alarm will be turned ON when the vehicle is used for emergency purpose. This will pass the signal through the transmitter to the receiver. It will make the traffic light to alter to green. Once the ambulance moved through, the receiver no longer accepts the signal and the traffic light is twisted to red. It applies three frequency bands for transmission- 868 MHz band with a single channel has a raw data rate of 20 kb/s. The 915MHz band with 10 channel's central frequency separated from the contiguous band by 2 MHz and data rate of 40 KB/s. BPSK balanced

symbols are imparted at 1 bit per symbol using Direct Sequence Spread Spectrum (DSSS) technique with 15-bit chips. It employs O-QPSK intonation with 4 bits/symbol transmitted using DSSS with 32 Bit chips. To diminish the transmitted power, the GSM transmitters use Energy Detection (ED) and connect Quality Indication (LQI). It is the duty of the physical layer to operate channel assessment.

2.1. Microcontroller

Renesas micro-controller beats its predecessor i.e. 8051 family of micro-controllers, with distinct in-built features. A few of the many faces are mentioned below.

Renesas is a 16 bit micro-controller Minimum information time can be changed from ultra-low speed (30.5us) to high speed (0.03125us).16 to 512KB of ROM and 2 to 32KB of RAM are convenient depending upon the series and number of pins. On-chip high-speed (32 MHz to 1 MHz) as well a low-speed (15 KHz) oscillator is conferred.10 bit resolution A/D preacher (6 to 26 channels depending upon the series) .thoroughly 3 UART for Serial Interface. Exactly 0-7 channels for timer with built in PWM features. Most of the pins of Renesas have aggregate features. Cost of Renesas micro-controller is analogously less. Rigid body of micro-controller hence less reserpine's to damages due to electrostatic charge which Operates with 5v power supply.

2.2. GSM SIM 900

GSM (Global System for Mobile communications: formerly from Group Special Mobile) is the greatest popular standard for mobile phones in the world. GSM is a cellular network, which means that mobile phones linked to it by searching for cells in the actual vicinity.

GSM networks engage in four different frequency ranges. Most GSM networks moves in the 900 MHz or 1800 MHz bands, GSM-900 uses 890–915 MHz to transmit information from the mobile station to the base station (uplink) and 935–960 MHz for the other direction (downlink), affording 124 RF channels (channel numbers 1 to 124) spaced at 200 kHz. Duplex booting of 45 MHz is used.

2.3. RFID

Radio Frequency recognition (RFID) is an IT system that transmits signals without the existence of physical gadgets in wireless communication. It is categorized under automatic assimilation technology, which is well established protocol.

The working of an RFID system is very uncomplicated. The system applies tags that are attached to various components to be tracked. The tags store data and information regarding the details of the product of things to be traced. The reader reads the radio frequency and analyzes the tags.

The antenna administrates the means for the integrated circuit to transmit its information to the reader. There are two types of RFID divisions, active and passive tags. The tags that do not employ power are referred to as passive and they are driven by an antenna that facilities the tag to receive electromagnetic waves from a reader. On the adverse, active tags rely on power and they have inbuilt power sources that enable it to send and receive signals from RFID reader. RFID range gamble on transmit power, receive sensitivity and adequacy, antenna, frequency, tag orientations, surroundings. Generally, the RFID range is from a few centimeters to over hundred meters. RFID reader benefits frequency 125 KHz with a range of 10 cm.
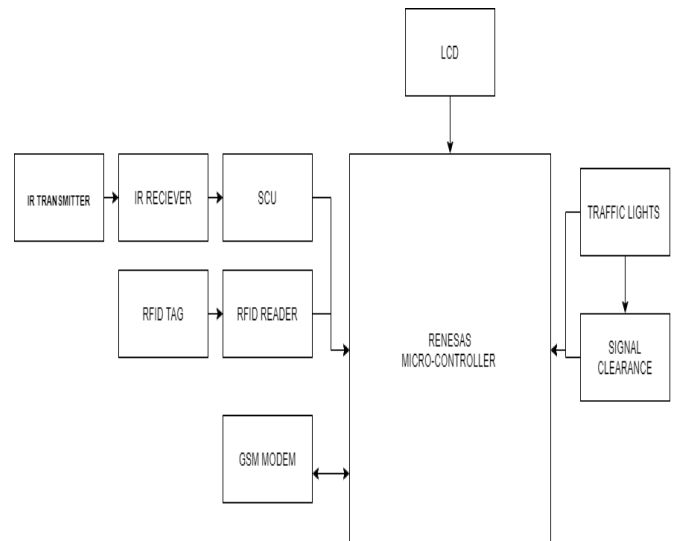
3.WORKING MODEL

Fig.3. Block diagram

2.3.1. Traffic control and stolen vehicle detection

The four IR transmitters and IR receivers are used to encounter the vehicles in four-way roads. Infrared transmitter is one type of LED which exhales infrared rays generally called as IR Transmitter. Equivalently, IR Receiver is used to receive the IR rays transmitted by the IR transmitter. One essential point is both IR transmitter and receiver should be placed straight line to each other. The transmitted signal isgiven to IR transmitter whenever the signal is high, the IR transmitter LED is organizing it crosses the IR rays to the receiver. The IR receiver collects the signal and transmits the signal to micro-controller. The micro-controller counts the quantity of vehicle. For demo purpose if the compact of vehicle is four then the traffic signals are turned to green lights after 10 seconds in such a way traffic signals are controlled in

four ways. In stolen vehicle detection system for testing desire, we contrast 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 directly turned to red for duration of 30 seconds. Also an SMS is sent determine the RFID number by using SIM900 GSM module. The LCD display will point out that stolen vehicle is present.

2.3.2. Emergency Vehicle Clearance

In this factor, there are 2 parts, starting part which is GSM transmitter. When the switch is pressed, it will transfer the signal. The signal consists of unique id and security code. The transmitters have a micro-controller. The micro-controller passes the commands and data to the GSM via serial communication. Second part is the receiver, which is located at traffic pole. It also have micro-controller. The receiver analyzes the security code received to the security code present in its database. If it matches, then it will twist the green light on. The time period will be varied confer to the traffic conditions, stolen vehicle, and emergency vehicle. It transmits signal frequently. The stolen vehicle RFID number should be restored in the database. If stolen vehicle is found, then it will directly turn on red light in the signal. It sends rapidly a message to recognized person.
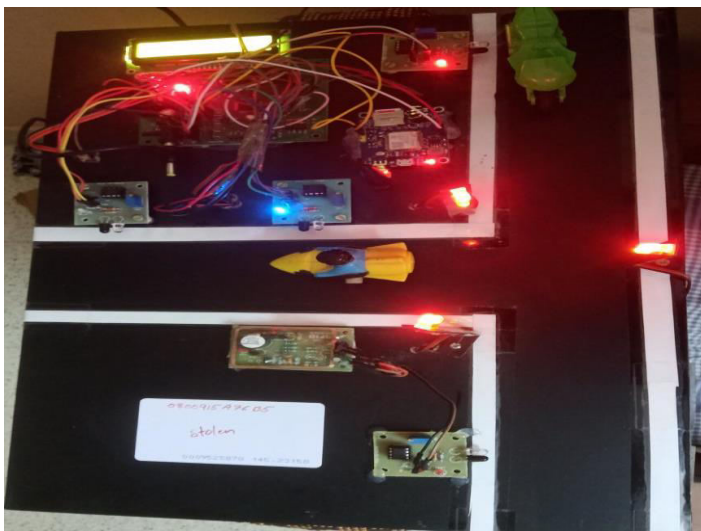
3.OUTPUT

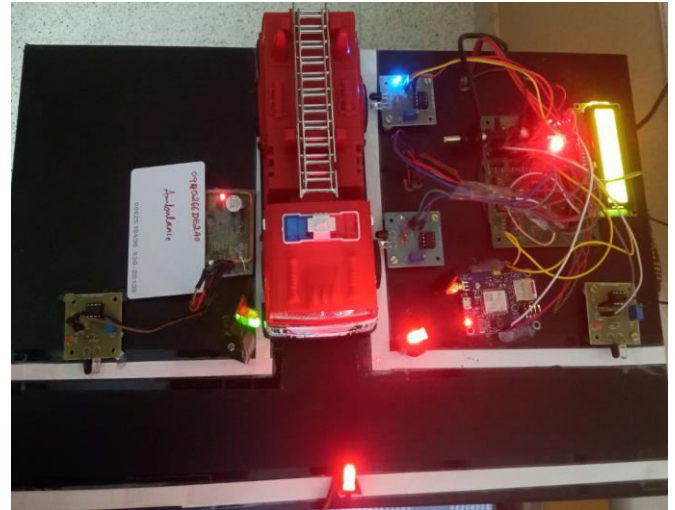Fig.4. Traffic control system and Stolen vehicle detection
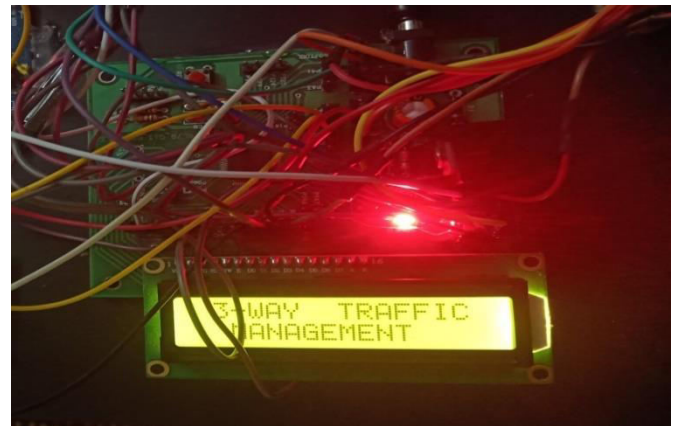

Fig.5. Emergency vehicle clearance

Fig 6.LCD Display

4.RESULTS AND CONCLUSION

With self-starting traffic signal control based on the traffic frequency in the route, the human effort on the part of the traffic policeman is saved. As the complete system is computerized, it requires very less human mediation. With stolen vehicle disclosure, 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 commissioned regarding the location with emergency vehicle clearance, the traffic signal turns to green as long as the emergency vehicle is waiting in the traffic junction. The signal changes to red, only after the emergency vehicle passes through. This system is achieved in four way roads. Further improvements can be done to improve traffic control for multi way road junction. Also, in stolen vehicle system GPS system can be joined to track the stolen vehicle.

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