

IOT based Stolen Vehicle Detection and Ambulance Clearance System

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Abstract— This paper deals with the effective use of wireless technology and high speed micro controller to provide smooth and clear flow of traffic for emergency vehicle to reach the destination on time. This is implemented by using RFID reader for detecting the RFID tag placed in the emergency vehicle. When the emergency vehicle comes closer to traffic zone, the RFID READER in the junction senses the RFID TAG .Only when the codes are matched between the RFID READER and the RFID TAG, the arrival of the emergency vehicle is detected and this information is given from the microcontroller (ARDUINO UNO) to the control room. In this way, the traffic signal changes from red light to green light. On the other hand, the theft of stolen vehicle is detected. Through the GPS S1216, which provides the longitudinal and latitudinal information where the vehicle is exactly located. This information is updated in the server using the IOT module (ESP8266), with which the stolen vehicle is detected.

Keywords—RFID, ARDUINO UNO, GPS S1216,IOT MODULE ESP8266

I. INTRODUCTION

India is the second most populous country and is 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 as compared to the growth in number of vehicles, due to space and cost constraints. 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 electro-magnetic 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 100 meters (300 feet) or more.

The use of embedded technology has been implemented in traffic light control, as per the traffic light control whenever ambulance reached to traffic road, it has to wait for the clearance of traffic and for clearing traffic it takes a several minutes. If the case patient will not get treatment in proper time to reduce this hazard. By making use of IoT scenario, it is possible to clear the traffic by sending

message to the signal board hence ambulance can reach the hospital without delay in time .and without wasting

time for the clearance of traffic load, By making use of Embedded and IoT we can develop a model to clear the traffic while ambulance coming in the path..Then we have prepared the detection of the theft vehicle with help of IOT and with embedded system.The IOT with the help of GPS will help to locate our vehicle and we can track the accurate location.

The **Internet of things (IoT)** is the internetworking of physical devices, vehicles (also referred to as "connected devices" and "smart devices"), buildings, and other items—embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. In 2013 the Global Standards Initiative on Internet of Things (IoT-GSI) defined the IoT as "the infrastructure of the information society." The IoT allows objects to be sensed and/or controlled remotely across existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit in addition to reduced human intervention

II. LITERATURE SURVEY

Traffic congestion is a major problem in cities of developing Countries like India. Growth in urban population and the middle-class segment contribute significantly to the rising



Figure1: Traffic in metropolitan cities

number of vehicles in the cities. Congestion on roads eventually results in slow moving traffic, which increases the time of travel, thus stands-out as one of the major issues in metropolitan cities. The green wave system was discussed which was used to provide clearance to any emergency vehicle by turning all the red lights to green on the path of the emergency vehicle, hence providing a complete green wave to the desired vehicle. A 'green wave' is the synchronization of the green phase of traffic signals. With a 'green wave' setup, a vehicle passing through a green signal will continue to receive green signals as it travels down the road. In addition to the green wave path, the system will

track a stolen vehicle when it passes through a traffic light. Advantage of the system is that GPS inside the vehicle does not require additional power. The biggest disadvantage of green waves is that, when the wave is disturbed, the disturbance can cause traffic problems that can be exacerbated by the synchronization. The use of RFID distinguishes between the emergency and non-emergency cases, thus preventing unnecessary traffic congestion. The communication between the ambulance and Traffic signal post is done through the transceivers and GPS. The system is fully automated and requires no human intervention at the traffic junctions. The disadvantage of this system is it needs all the information about the starting point, end point of the travel. It may not work, if the ambulance needs to take another route for some reasons or if the starting point is not known in advance. Traffic is a critical issue of transportation system in most of all the cities of Countries. This is especially true for Countries like India and China, where the population is increasing at higher rate as show in figure 1.

III. EXISTING WORK

In our existing system ,an intelligent traffic control system is used which turns the signal in the path of the ambulance to green as well as estimate the congestion in the signal junction and sends it to ambulance through GSM so that the driver can decide whether he should take that path or not. The same system is also used to detect stolen vehicle. The RFID tag of the stolen vehicle should be saved in the database so that when it is detected in any signal junction an SMS is sent to the control room. Here, each emergency vehicle contains ZigBee transmitter module and the ZigBee 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 ZigBee transmitter to the ZigBee receiver. It will make the traffic light to change to green. Once the ambulance passes through, the receiver no longer receives the ZigBee signal and the traffic light is turned to red. 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.

Here each vehicle is equipped with 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 determine the congestion volume. Accordingly, it sets the green light duration for that path. The disadvantage of this paper is that it can't predict the location of the theft vehicle and by using zigbee it may lead to circuit complexity

IV. PROPOSED WORK

For solving the current problem section, we have implemented the Intelligent Traffic control System.

This system consists of two sections.

In the first part we are detecting the emergency vehicle passing through the specified path. This is practically implemented using RFID reader, RFID tag. The RFID reader connected to ARDUINO UNO reads the tag positioned in the emergency vehicle. Initially the traffic signal works normally. When an emergency vehicle crosses the path the RFID tag positioned at the emergency vehicle, driven by the antenna that enables to

electromagnetic power from the RFID reader.

The RFID reader detects the ID and transmits the information through wireless communication .Only when the frequency matches between the RFID READER and the RFID TAG ,the arrival of the emergency vehicle is detected and this information is given from the microcontroller (ARDUINO UNO) to the control room. In this way, the traffic signal changes from red light to green light.

On the other hand, the theft of the stolen vehicle can be implemented.

In this part for detecting the stolen vehicle we will use GPS, IOT module(ESP8266),ARDUINO UNO.

Normally when the vehicle is parked , we don't use GPS to track .Only when the vehicle has been stolen ,then we detect it using GPS.When the vehicle which has been stolen crosses from one traffic junction to another ,with the help of GPS by knowing the latitude and longitude values we can easily track the vehicle. Only with the help of IoT module we can see the latitude and longitude values on the personal computers or smart phones. The GPS module working principle is, it always transmits serial data in the form of sentences. The longitude and latitude values of the location are contained in the sentence. The main intention here is to find the exact location of the GPS receiver in terms of longitude and latitude

A. ARDUINO

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, 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. **Arduino** is a computer hardware and software company, project, and user community that designs and manufactures microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. The project's products are distributed as open-source hardware and software

B. IOT MODULE ESP8266

ESP8266 (presently ESP8266EX) is a chip with which manufacturers are making wirelessly networkable micro-controller modules. More specifically, ESP8266 is a system-on-a-chip (SoC) with capabilities for 2.4

GHz Wi-Fi , general-purpose input/output (16 GPIO), Inter-Integrated Circuit (I²C), analog-to-digital conversion (10-bit ADC). It employs a 32-bit RISC CPU based on the Tensilica Xtensa LX106 running at 80 MHz (or over clocked to 160 MHz). It has a 64 KB boot ROM, 64 KB instruction RAM and 96 KB data RAM. External flash memory can be accessed through SPI. The **ESP8266** is a low-cost Wi-Fi chip with full TCP/IP stack and MCU (Micro Controller Unit)

C. RFID

An RFID system consists of a reader and one or more tags. The reader antenna is used to transmit radio frequency energy. The tag will then modulate the electro -magnetic waves generated by the reader in order to transmit its data back to the reader. The reader receives the modulated waves and converts into digital data. There are 2 types of tag includes passive and active tags. When radio waves from the reader reach the chips antenna, the energy is converted by the antenna into electricity that can power up the microchip in the tag. The tag is then able to send back any information stored on the tag by reflecting the electromagnetic waves as described. The frequency of RFID system operation, the power of the reader, environmental conditions, physical size of tag antenna and interference from other RF devices.

V. WORKING MODEL

In this model, there are mainly 2 sections as follows.

A. Emergency Vehicle Clearance System:

In the first part we are detecting the emergency vehicle passing through the specified path. This IS practically implemented using RFID reader, RFID tag. The RFID reader connected to ARDUINO UNO reads the tag positioned in the emergency vehicle. Initially the traffic signal works normally. When an emergency vehicle crosses the path the RFID tag positioned at the emergency vehicle get driven by the antenna that enables to receive electromagnetic power from the RFID reader. The RFID reader detects the ID and transmits the information through wireless communication .Only when the frequency matches between the RFID READER and the RFID TAG ,the arrival of the emergency vehicle is detected and this information is given from the microcontroller (ARDUINO UNO) to the control room. In this way, the traffic signal changes from red light to green light.

B. Stolen Vehicle Detection

Normally when the vehicle is parked, we don't use GPS to track the specified path. Only when the vehicle has been stolen, then we detect it using GPS. When the vehicle which has been stolen crosses from one traffic junction to another, with the help of GPS by knowing the latitude and longitude values we can easily track the vehicle. The GPS module working principle is, it always transmits serial data in the form of sentences. The longitude and latitude values of the location are contained in the sentence. The main intention here is to find the exact location of the GPS receiver in terms of longitude and latitude. The GPS module gives the output data in RS232 logic level format. To convert RS232 format into TTL format, a line- converter MAX232 is used. It is connected between GPS module and ARDUINO UNO microcontroller. The values of the location have been displayed on a web page on the personal computer. Only with the help of IoT module we can see the latitude and longitude values on the personal computers or smartphones

A. BLOCK DIAGRAM

FOR STOLEN VEHICLE

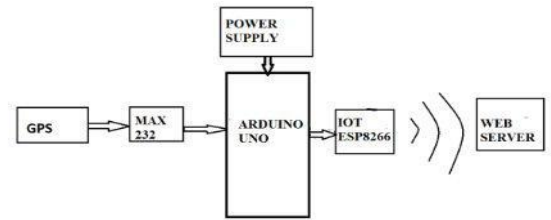


Figure 2: IN VEHICLE

FOR AMBULANCE CLEARANCE



Figure 3: In ambulance section

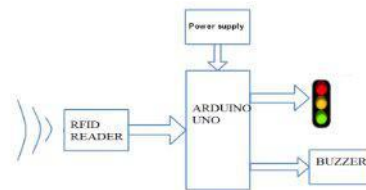


Figure4: in junction

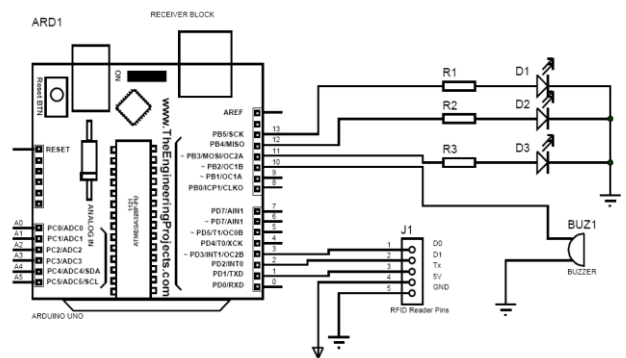


Figure 5: circuit diagram for ambulance clearance

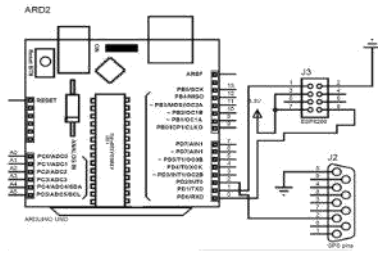


Figure 6:circuit diagram for stolen vehicle

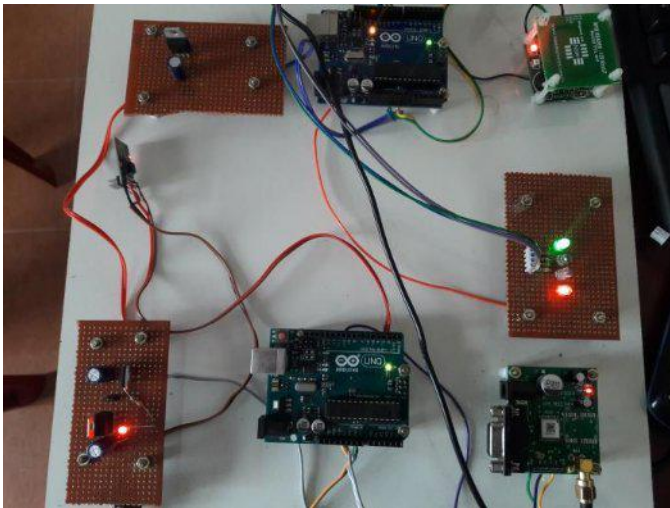


figure 7:Hardware implementation for ambulance clearance

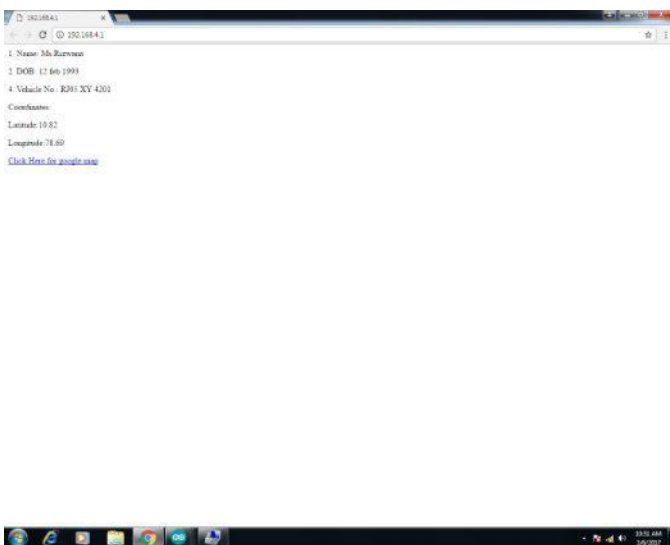


Figure8: output screen for stolen vehicle detection

VI.CONCLUSION

As the entire system is automated it requires very less human intervention. 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. In other part the stolen vehicle will predict the location by the GPS placed inside the vehicle with the help of IOT to see our location in web server.

VII. FUTURE WORK

To this model we shall add the further enhancements for experimental purpose we have used passive RFID TAGS but we shall use Active RFID TAGS FOR longer distance to be covered. For the stolen vehicle detection, the applications can be developed so that the gps tracking will be seen in our smart phones and we shall connect the application to the nearby police station to take the appropriate action.

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