Automated Penalty Collection System for Traffic Signal Violation

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Abstract –*Due to increase in traffic problems we see so many cases of breaking red signal daily, so for overcoming this problem we have been developed system entitled as "**Automated Penalty Collection System for Traffic Signal Violation**" using IoT. The purpose of the project is to track the traffic signal violations correctly using Cameras with use of RFID tag and Ultrasonic sensor. There is android application also for maintaining the data, which is accessible from anywhere and anytime. This paper shows all the system of handling traffic signal rule breakers with latest technologies. Whenever there is red light on system works. In existing system there is sms sent on mobile so we are using email notifications*

Thus, our system would prove helpful for the traffic management officers to successfully track all traffic signal issues in the best suitable and desired manner.

Key Words: **RFID, Sensor**, **red light, email, Raspberry Pi, Arduino, signal.**

1. INTRODUCTION

Traffic signal violations causes frequent accidents. To deal with this problem police departments and our traffic department have lots of solutions for it, such as nowdays we see CCTV cameras, Through which whenever any kind of vehicle breaks signal further action is taken. So, whenever violations made, officers not able to take proper action against them. There are lots of system available there. Our system works immediately as nowdays all vehicle have RFID tag with registered users. So when red light is on and vehicle passes the line it automatically sense that and tracking the rule breaker becomes easy for system. The penalty details notification is sent to that user immediately.

There is application by which we can see all the penalties data with that user details. So users are also able to see how charges made for them and by camera there is also picture of their violations.

In case there is no RFID tag, as our old vehicles do not have RFID tags. So here we are using Ultrasonic Sensor, so when vehicle with no RFID tag passes then sensor sense it and camera captures the picture. So the system is useful for tracking all vehicles. Our System includes two main modules Traffic Officers and vehicle owners.

1.1 Traffic Officers

In the Traffic Officers module, they have the authority of view penalty details, view photos, send notifications and also view all the rule breakers list of the day. All the penalties collected or not traffic officers can check all these through application.

1.2 Vehicle Owner:

In the system user module, users have the right to see what kind of penalties assigned to them the image sent by system their registered number all the data.

2. SYSTEM ARCHITECTURE

2.1 Description of Block Diagram:

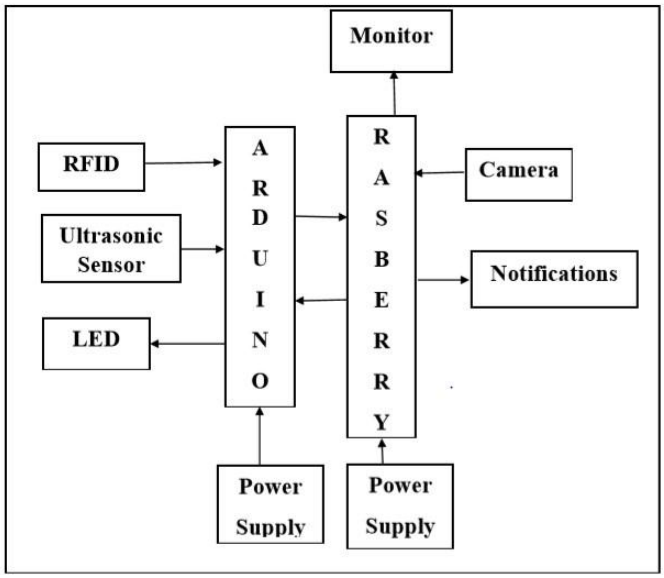

Fig2.1 Block Diagram of System

A DC power supply is given to Arduino and Rasberry both processors, RFID reader, LED and Ultrasonic Sensor are connected to ARDUINO. When the red light is on then the sensors and readers are also on and photo is captured by camera which is connected to raspberry pi and all the data is stored.

2.2 Hardware design

1 Arduino Uno:

The Arduino Uno a microcontroller based on the

ATmega328(datasheet).It has 14 digital input/output pins, a USB connection, a power jack, an ICSP header, and a reset button. Simply connect it to computer with a USB cable or power with it a AC or DC adapter or battery to get started

2 Rasberry Pi 3 Model B+:

The Rasberry Pi 3 Model B+ is the latest product in the Rasberry Pi 3 range, boasting a 64-bit quad core processor running at1.4Ghz, dual-band 2.4Ghz and 5Ghz wireless Lan., Bluetooth 4.2/BLE, Faster Ethernet.

3 Ultrasonic ranging module HC - SR04:

Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. The basic principle of work: (1) Using IO trigger for at least 10us high level signal, (2) The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back. (3) IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning. Test distance = (high level timevelocity of sound (340M/S)/2.

4 EM-18 RFID Reader:

The EM-18 RFID Reader module operating at 125kHz is an inexpensive solution for RFID based application. The Reader module comes with an on-chip antenna and can be powered up with a 5V power supply. Power-up the module and connect the transmit pin of the module to receive pin of your microcontroller. Show your card within the reading distance and the card number is thrown at the output. Optionally the module can be configured for output.

5 Raspberry Pi Camera:

The high-definition 5MP camera delivers outstanding photos but can also shoot video, ideal for drones or a CCTV project. The lightweight camera module allows for it to be used in more practical roles, such as a hidden camera or even a camera for a Pi-phone. This Raspberry Pi Camera Module is a custom designed add-on for Raspberry Pi. It attaches to Raspberry Pi by way of one of the two small sockets on the board upper surface. This interface uses the dedicated CSI interface, which was designed especially for interfacing to cameras. The CSI bus is capable of extremely high data rates, and it exclusively carries pixel data. It connects to Raspberry Pi by way of a short flexible ribbon cable.

3. PROPOSED WORK

The proposal mainly discusses the use of system for taking proper action against traffic signal violations at correct time an accordingly. So, the officers can easily do their work with help of system, When any vehicle will violate the traffic signal RFID reader will reads the RFID tag on that vehicle, but in some situation RFID tags are not available on some vehicles so in that situation sensor are present inside the road for sense the vehicle. Also camera are present their for capture images of violated vehicles. When multiple vehicles are break the signal at a time then will automatically capture image of that all vehicles and send to the nearest traffic police further work will be done manually.

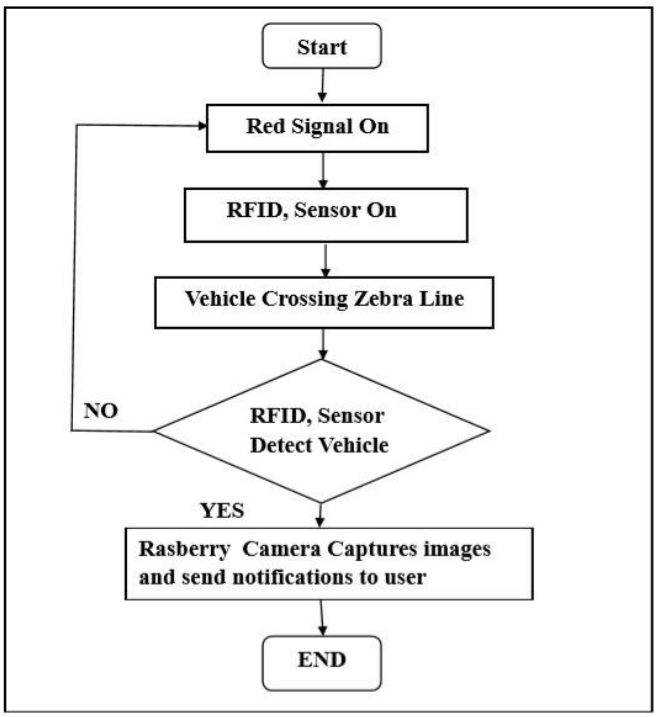

Fig 3.1: Flow Chart for Working of the System

4. CONCLUSION

In this way system will automatically incur penalty for violation of traffic rules and in turn will lead to a disciplined traffic in our country. It will help in minimizing many problems related to traffic which brings disturbance to the whole system and will help in reducing number of accidents; traffic jam which consumes our precious time. In our system we are monitoring the traffic only at the signal poles but it could also be useful in monitoring the no entry area, one way routes etc. System is time saving and quick. Application designed for "Automated Penalty System for Traffic Signal Voilations" is very user friendly, time saving, efforts saving application. The application work efficiently and helps traffic system management to reduce their manual work and time.

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