A Major Project Report

On

AUTO PENALTY COLLECTION USING IOT

Submitted in partial fulfillment of the

Requirements for the award of degree of

Bachelor of Technology

In

Computer Science and Engineering

by

Singireddy Sreeja,
(17H61A05G6)

P. Aditya Kumar,
(17H61A05F9)

B. Shiva Bharath,
(17H61A05C3)

Under the Guidance of

Mr G. Prabhakar Raju,
Assistant Professor

Department of Computer Science and Engineering
ANURAG GROUP OF INSTITUTIONS
(Formerly CVSR College of Engineering)
(An Autonomous Institution, Approved by AICTE and NBA Accredited)
Venkatapur (V), Ghatkesar (M), Medchal(D)., T.S-500088
(2017-2021)

Anurag Group of Institutions
An Autonomous Institution
(Formerly CVSR College of Engineering)
Venkatapur (V), Ghatkesar (M), Ranga Reddy (Dist.)
Ph: 08499953666, 08499963666. www.anurag.edu.in

Department of Computer Science and Engineering

CERTIFICATE

This is to certify that the project entitled **"AUTO PENALTY COLLECTION USING IOT"** being submitted by **Singireddy Sreeja** bearing the Hall Ticket number **17H61A05G6** and **P. Aditya Kumar** bearing the Hall Ticket number **17H61A05F9** and **B. Shiva Bharath** bearing the Hall Ticket number **17H61A05C3** in partial fulfillment of the requirements for the award of the degree of the **Bachelor of Technology** in **Computer Science and Engineering** to **Anurag Group of Institutions (Formerly CVSR College of Engineering)** is a record of bonafide work carried out by them under my guidance and supervision from April 2021 to July 2021.

The results presented in this project have been verified and found to be satisfactory. The results embodied in this project report have not been submitted to any other University for the award of any other degree or diploma.

Internal Guide
Mr. G. Prabhakar Raju,
Assistant Professor

External Examiner

Dr.G.Vishnu Murthy,
Professor and Head, Dept. of CSE

ACKNOWLEDGEMENT

It is our privilege and pleasure to express profound sense of respect, gratitude and indebtedness to our guide **Mr. G. Prabhakar Raju, Assistant Professor**, Dept. of Computer Science and Engineering, Anurag Group of Institutions (Formerly CVSR College of Engineering), for his indefatigable inspiration, guidance, cogent discussion, constructive criticisms and encouragement throughout this dissertation work.

We express our sincere gratitude to **Dr. G.Vishnu Murthy, Professor & Head**, Department of Computer Science and Engineering, Anurag Group of Institutions (Formerly CVSR College of Engineering), for his suggestions, motivations and co-operation for the successful completion of the work.

We extend our sincere thanks to **Dr. V.Vijaya Kumar**, **Dean,** Research and Development, Anurag Group of Institutions, for his encouragement and constant help.

We extend our sincere thanks to **Dr.K.S.Rao, Director**, Anurag Group of Institutions for his encouragement.

Singireddy Sreeja (17H61A05G6)

P. Aditya Kumar (17H61A05F9)

B. Shiva Bharath (17H61A05C3)

DECLARATION

We hereby declare that the project work entitled "**AUTO PENALTY COLLECTION USING IOT**" submitted to the **Anurag Group of Institutions(Formerly CVSR College of Engineering)** in partial fulfillment of the requirements for the award of the degree of **Bachelor of Technology (B.Tech)** in Computer Science and Engineering is a record of an original work done by us under the guidance of **Mr. G. Prabhakar Raju, Assistant Professor** and this project work have not been submitted to any other university for the award of any other degree or diploma.

Singireddy Sreeja (17H61A05G6)

P. Aditya Kumar (17H61A05F9)

B. Shiva Bharath (17H61A05C3)

Date:

ABSTRACT

Today in the 21st century everyone needs everything instantly. We can say that the world is run by smart devices and gadgets which have caused the digital transformation. Well, we all know how easy it is to get a driving license in India. Also, punishment for errant drivers is light. A bribe is all that needs to be given and the rash drivers are free to go. People tend not to follow the traffic rules and signals. Incidentally, India holds the dubious distinction of registering the highest number of road accidents in the world. According to the experts at the National Transportation Planning and Research Centre (NTPRC), the number of accidents for 1000 vehicles in India is 35, while the figure ranges from 4 to 10 in developed countries. Well, there are always solutions and in some ways we are moving towards that. We will use active RFID tags which will be mounted on each individual vehicle to monitor the vehicle's movement and simplify the traffic management and which will apparently decline the accident rates in the country and also will eradicate corruption on the other hand. India is the second most populous country in the world and is a fast growing economy. Because of more population, the growth in the number of vehicles is increasing exponentially day by day. The project aims at designing an intelligent system which helps the traffic department to collect pending previous penalty amounts using RFID and IOT technology. This system identifies the individual vehicles using RFID tags attached to the number plates based on that it will check the pending bills instantly at the junction points and update the status to the webpage automatically. This system also controls traffic lights automatically with respect to fixed time and also detects signal jumps and collects challan instantly using RFID and IOT technology.

CONTENTS

LIST OF FIGURES

LIST OF ABBREVIATIONS

RFID	**Radio Frequency Identification**
IR	**Infrared Sensor**
MATLAB	**Matrix Laboratory**
IDE	**Integrated development environment**
LCD	**Liquid Crystal Display**
LED	**Light Emitting Diode**
USB	**Universal Serial Bus**
MCU	**Microcontroller Unit**
TCP/IP	**Transmission Control Protocol/ Internet Protocol**

1. INTRODUCTION

Governance is a challenge in a country as diverse, vast and rapidly developing as India. India needs a new and latest technology for large-scale transformation and implementation of government plans. While India is among the fastest developing economies in the world, India's equitable growth remains a critical imperative. This project is an attempt in this very direction of e-governance for a country like India with a large population and high density. India’s road network has grown at an annual rate of 4% since 1951. Along with the rural and urban population density the density of roads has risen in India. The rising population has resulted in more vehicles on roads. This has led to a high rate of accidents.

One of the major reasons for the high number of accidents on the road is that traffic rules are violated and not followed. According to a survey, 78% of the accidents happen due to violation of traffic rules by the driver such as speeding, driving under the influence of alcohol or drugs, and hit and run cases. India needs a highly regulated foolproof system of governance to prevent these avoidable accidents and manage the traffic on the roads. A system which makes the people follows the rules and drive safely, without violating any rules. Because of more population the growth in the number of vehicles in India is increasing exponentially day by day. As a result, India is facing terrible road congestion problems in its cities. Also, Indian traffic is non-lane based and chaotic. There are many issues related to increasing traffic such as accidents, numerous types of pollution, time wastage and health related problems. The major reasons for traffic problems are increase in the number of vehicles, violation in the traffic rules, etc. The main objective of the project is to collect penalties for violating traffic rules. So, ultimately it will help in inducing traffic discipline. The Project Mainly emphasizes on creating an automated penalty collection which in turn will reduce corruption as well as accidents happening at traffic signals. Our project provides a wide range of support needed for managing and monitoring traffic penalties.

The project will include deploying RFID tags on the car and RFID readers. The RFID reader will be responsible for detecting the cars violating traffic rules. The RFID tag will have a unique ID’s. So the reader reads the tag and gets to know about the existing challan and balance of that vehicle and accordingly displays a led light.

1.1. MOTIVATION

Traffic signal violations cause frequent accidents. To deal with this problem police departments and our traffic department have lots of solutions for it, such as nowadays we see CCTV cameras, through which whenever any kind of vehicle breaks signal further action is taken. So, whenever violations are made, officers are not able to take proper action against them. There are lots of systems available there. Our system works immediately as nowadays all vehicles have RFID tags with registered users and also only the traffic signals are automated based on time. The Cops have to catch hold errant drivers by themselves, which may injure them as well. Fine is being charged manually which is paid through cash or digitally (with recent transformation). Mostly people don't know the charge for a particular violation, cops may take advantage of fellow drivers and charge them more i.e. like for violating signal may charge 200 instead of 100. In the present system after being caught, the cops may take fewer amounts than the actual fine in the form of a bribe.

1.2. PROBLEM DEFINITION

Due to the increase in traffic problems we see so many cases of breaking red signals daily, so to overcome this problem we have developed a system entitled as "Auto Penalty Collection System using IOT". The purpose of the project is to track the penalties imposed for traffic signal violations correctly captured using Cameras with use of RFID tag and IR sensor and deduct them then and there. There is a website also for maintaining the data, which is accessible anytime. Thus, our system would prove helpful for the traffic management officers to successfully track all traffic signals issues in the best suitable and desired manner

1.3. OBJECTIVE OF THE PROJECT

Proposed system ensures of creating smart environment which includes: Automatic fine collection, completely legal cash flow without any bribes, Detection of vehicles violating traffic signals by means of RFID tags. The system will make people oblige to the traffic rules which will induce road discipline among people, apparently the accidents at the traffic signals will decrease substantially

2. LITERATURE SURVEY

A detailed survey of existing projects and models was done to arrive on a foolproof and successful model. The paper [1] discusses an electronic governance model of electronic challan and traffic penalty system using an integrated existing method of penalty in India. A similar approach is followed by [2] which implements the model using an automatic challan system using MATLAB .The model captures the image of the vehicle and extracts the number plate of the vehicle which breaches the traffic law. The model further processes to generate an automatic E-Challan which can be directly paid by the driver at RTO office or can avail other online payments also. The project mainly focuses on the individual data extraction from multiple databases. The paper [3] discusses traffic violation detection using computer vision. The model extracts the license plate using a new deep learning network structure which is used to detect and locate the license plate automatically. The vehicle is detected and the information of the owner is extracted. The information is used to generate an E-Challan and an instant appropriate fine message is sent to the owner. Implementation of the whole model is very efficient and requires very less human intervention. A new approach is suggested by [4] using a pin code suggesting an innovative e-challan application using encoding and decoding of the pin code.

3. ANALYSIS

Analysis of the project is one of the most important phases of the project. The activity in this phase is to study the existing system and other is to understand the requirements and domain of the system. Both the activities have equal priorities but the first activity serves as a basis of given functional specifications and successful design.

3.1. EXISTING SYSTEMS

Existing methods include imposing challan based on e-challan system which is a computer-generated challan used by the Traffic Police and is being issued to all the traffic defaulters in India which works. An e-Challan is nothing but an electronically generated challan with the help of Electronic Challan System Three months after the e-challan system was introduced to collect fines for traffic violations in the city, the Mumbai Police's Twitter handle has received a flood of complaints about errors in the system, along with queries about how it works. Several complaints pertaining to e-challans being sent to persons who do not own the vehicles hauled up for violating traffic rules. This, police officers say, could be because the ownership of the vehicle may have passed hands without the current owner's mobile number being updated, or mobile phone companies may have assigned a registered mobile number to a new customer who is not connected to the linked vehicle. Another concern raised by motorists is that in cases in which a vehicle owner's mobile number is not registered or updated with the police, the owner does not get to know about e-challans being issued against the vehicle's registration number. The owner may be unaware about e-challans issued against his or her vehicle, unless they proactively check for violations listed against their vehicle on the Mumbai Traffic Police website. And also much time is given to pay those e-challans which is not that effective as well. Completely legal cash flow without any bribes cannot be guaranteed.

3.2. PROPOSED SYSTEM

To counter the problems of the existing system, we will use active RFID tags which will be mounted on each individual vehicle to monitor the vehicle's movement and simplify the traffic management and which will apparently decline the accident rates in the country and also will eradicate corruption on the other hand. The proposed system that consist a RFID tag will be deployed on the car which will be having a unique ID's. 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 the help of the system. When any vehicle violates the traffic signal RFID reader will read the RFID tag on that vehicle.

3.3. SOFTWARE REQUIREMENTS

3.3.1 PURPOSE

A challan is an official paper that is issued to the motor vehicle driver who violates the traffic rules and regulations in India. When a traffic challan is being issued in your name it implies that you are responsible to pay the penalty depending on the type of offence made by you as per the Motor Vehicles Act, 1988. The traffic police department has the right to issue a challan to any driver who does not follow the traffic rulebooks while driving. With the increasing number of accidents in India as traffic guidelines are not getting followed, challan has become quite a common concept. Therefore, keeping in mind the necessity of adhering to the traffic rule, to make sure that a driver does not violate any traffic rule and also to safeguard the security and safety of others on the road, traffic challan has been brought into the picture.

3.3.2 SCOPE

RFID (Radio Frequency Identification) is an automatic identification method consisting of several components such as tags, tag readers, edge servers, middleware,

and application software. Among these the three important components are RFID tag (also known as transponder), RFID reader (also known as transceiver or interrogator) and software for data processing. 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 using IoT”.This shows all the system of handling traffic signal rule breakers with latest technologies. 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.

3.3.3 OVERALL DESCRIPTION

According to a survey, 78% of the accidents happen due to violation of traffic rules by the driver such as speeding,driving under the influence of alcohol or drugs, and hit and run cases. India needs a highly regulated foolproof system of governance to prevent these avoidable accidents and manage the traffic on the roads. A system which makes the people follows the rules and drive safely, without violating any rules. Because of more population the growth in the number of vehicles in India is increasing exponentially day by day. As a result, India is facing terrible road congestion problems in its cities. Also, Indian traffic is non-lane based and chaotic. There are many issues related to increasing traffic such as accidents, numerous types of pollution, time wastage and health related problems. The major reasons for traffic problems are increase in the number of vehicles, violation in the traffic rules, etc. The main objective of the project is to collect penalties for violating traffic rules. So, ultimately it will help in inducing traffic discipline. The Project Mainly emphasizes on creating an automated penalty collection which in turn will reduce corruption as well as an accident happening at traffic signals. Our project provides a wide range of support needed for managing and monitoring traffic penalties. The project will include deploying RFID tags on the car and RFID readers. The RFID reader will be responsible for detecting the cars violating traffic rules. The RFID tag will have a unique ID’s .The reader reads the tag and gets to know about the existing challan and balance of that vehicle and accordingly displays an led light.

4. DESIGN

4.1. UML DIAGRAMS

The Unified Modeling Language (UML) is a standard language for drawing software blue-prints. The UML is a language used for

a. Visualizing,

b. Specifying,

c. Constructing,

d. Artifacts documentation.

The UML is a language which provides vocabulary and the rules for combining words in that vocabulary for the purpose of communication. A modeling language is a language whose vocabulary and the rules on the conceptual and physical representation of a system. Modeling yields an understanding of a system.

4.1.1 USE CASE DIAGRAM

A utilization case chart in the Unified Modeling Language (UML) is a sort of social definition characterized by way of and crafted from use-case research. Its motivation is to display a graphical diagram of the usefulness given by way of a framework regarding acting artists, their goals, and any conditions between the ones usage cases. The main aim of the use case diagram is to illustrate what framework capacities are carried out from which performer.

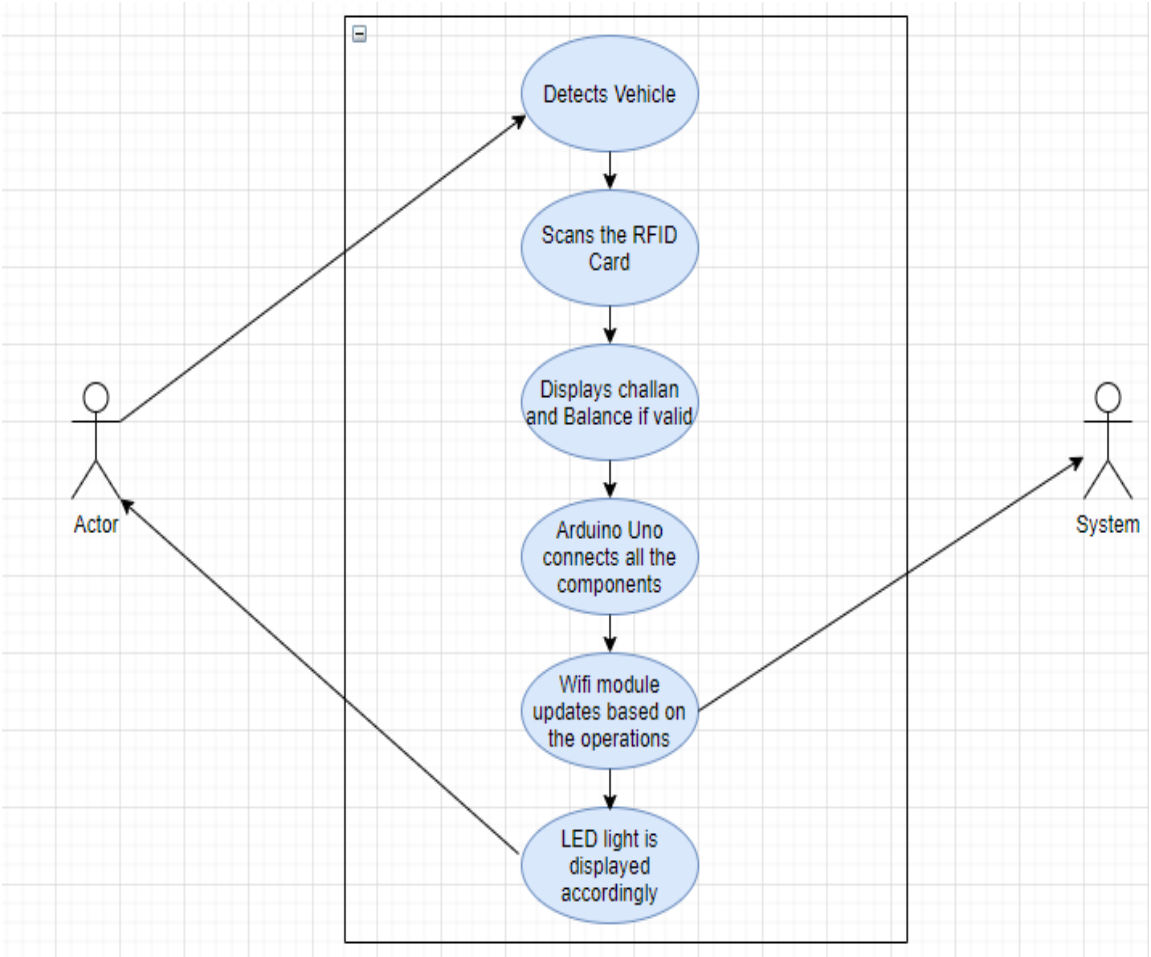

Fig. 4.1.1 Use Case Diagram

4.1.2 SEQUENCE DIAGRAM

A sequence diagram is the most commonly used interaction diagram. An interaction diagram is used to show the interactive behavior of a system. We use different types of interaction diagrams to capture various features and aspects of interaction in a system.

A sequence diagram simply depicts interaction between objects in a sequential order i.e. the order in which these interactions take place. In sequence diagram there are different notations like actor, lifelines, messages etc.

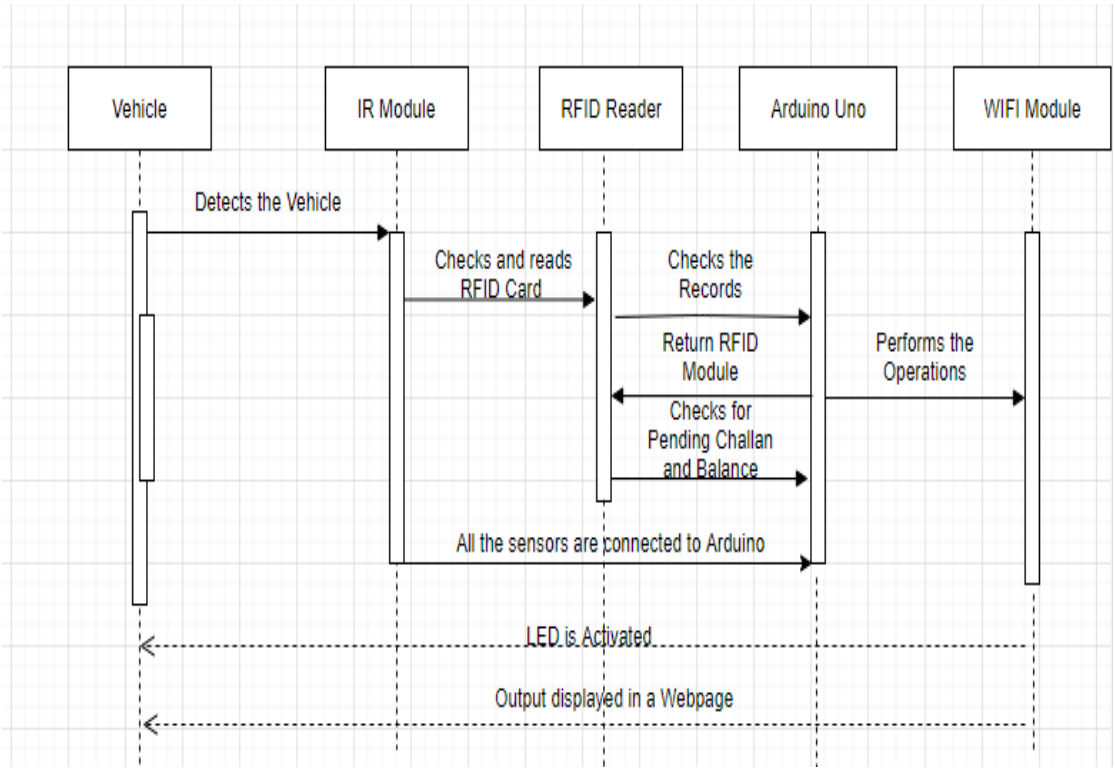

Fig. 4.1.2. Sequence diagram

4.1.3 ACTIVITY DIAGRAM

An Activity diagram portrays the control flow from a start point to a finish point showing the various decision paths that exist while the activity is being executed.

We use Activity Diagrams to illustrate the flow of control in a system and refer to the steps involved in the execution of a use case. We model sequential and concurrent activities using activity diagrams. So, we basically depict workflows visually using an activity diagram. An activity diagram focuses on the condition of flow and the sequence in which it happens. We describe or depict what causes a particular event using an activitydiagram.

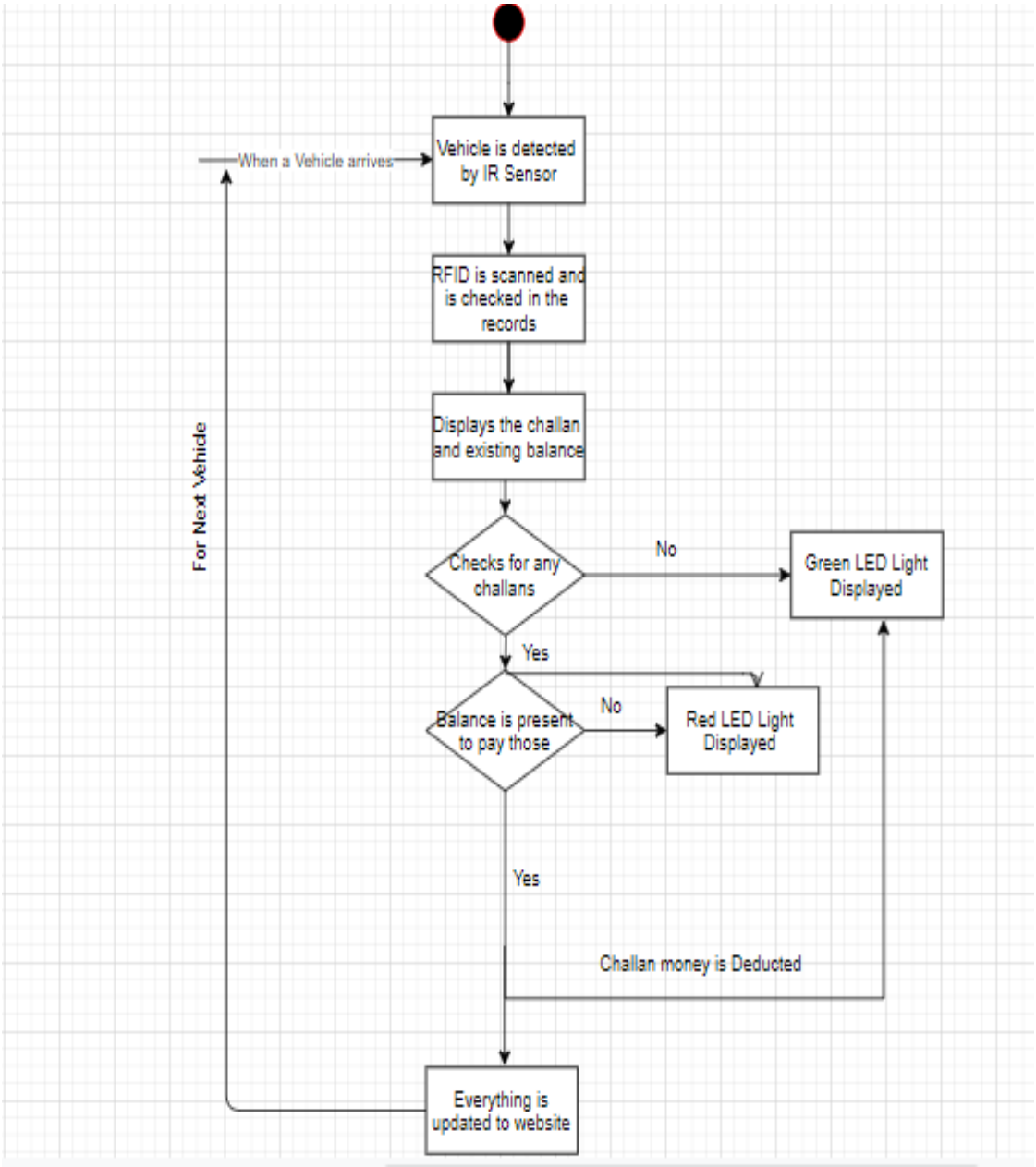

Fig. 4.1.3 Activity Diagram

5. IMPLEMENTATION

In this Project, we will be using RFID Technology for detecting the existing challans and vehicles respectively and display them onto a webpage as well which will classify the information even more clearly whether the person has any existing unpaid challans or has no dues. The approach we will be using for this IOT project is as follows:

Step 1 – Firstly the IR Sensor detects the vehicle that has arrived and that is the time when it asks to show the RFID tag of that vehicle

Step 2 – The RFID Tag of the vehicle is shown.

Step 3 – The RFID Tag is then read by the RFID Reader. It first validates if the tag is a valid one and then checks for its data.

Step 4 – If there is challan and also enough balance to pay that challan, the challan will be automatically deducted from balance and the updated values will be reflected on the webpage and green led light will be displayed accordingly depicting that the vehicle can go.

Step 5 – If there is challan but not sufficient balance to clear the challan then red led light will be displayed.

Step 6 – If there is no challan at the first place then green led light is displayed depicting there are no dues and the vehicle can leave.

Step 7 – The same process is repeated for every vehicle.

Step 8 – At each step of the process the values will be reflected and updated on the webpage as well which is connected using the wifi module and can be referred for much clear understanding.

5.2. DESCRIPTION OF HARDWARE USED

5.2.1ARDUINO UNO

Fig.5.2.1 Arduino Uno

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P (datasheet). It has14 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.. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again."Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards. You can find here your board warranty informations.You can find in the Getting Started section all the information you need to

configure your board, use the Arduino Software (IDE), and start tinker with coding and electronics.

5.2.2 POWER SUPPLY

All digital circuits require regulated power supply. In this article we are going to learn how to get a regulated positive supply from the mains supply.

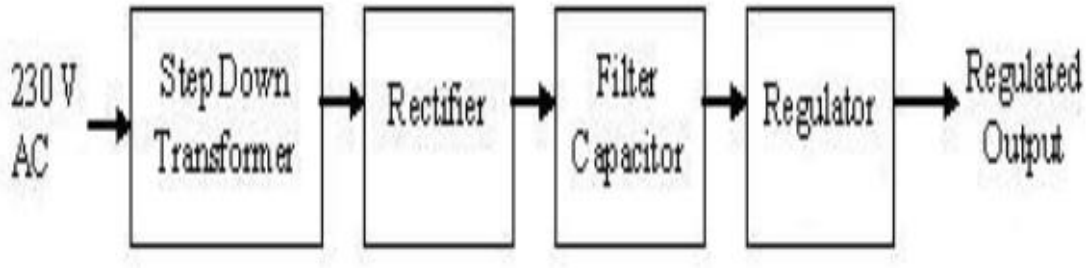

Fig 5.2.2 Regulated Power Supply Block Diagram

5.2.3 RFID

Radio-frequency identification (RFID) is the wireless use of electromagnetic fields to transfer data, for the purposes of automatically identifying and tracking tags attached to objects. The tags contain electronically stored information. An RFID system comprises of three components: an antenna, transceiver (often combined into one reader) and a transponder (the tag). The RFID component on the tags has two parts: a microchip that stores and processes information, and an antenna to receive and transmit a signal. To read the information encoded on a tag, a two- way radio transmitter-receiver called a reader emits a signal to the tag using an antenna. The tag responds with the information written in its memory bank. The reader will then transmit the read results to an RFID computer program.

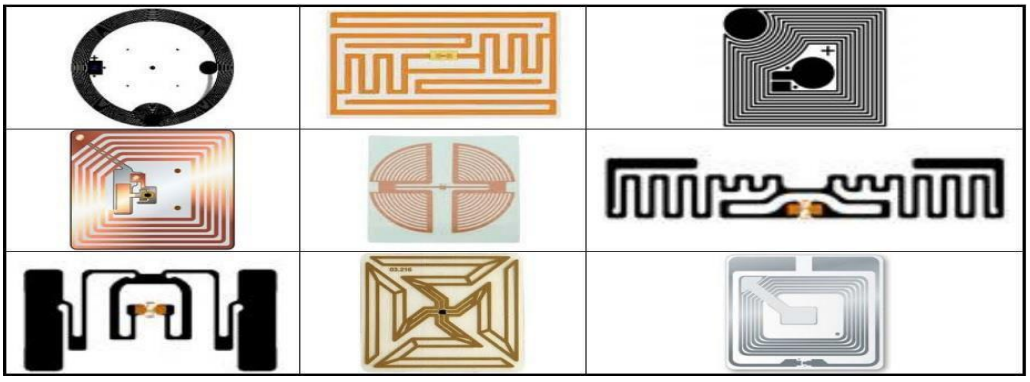

Fig.5.2.3.1 RFID Transponder/Tags

Tag Classifications

RFID tags are classified into three categories

i.Active Tag

Has its own battery that is used to broadcast signals over great distances. Usually bigger in size and capable of carrying more information

ii. Passive Tag

No inbuilt power source. The signal from the RFID reader creates an electromagnetic field that powers the tag. Much cheaper.

iii. Semi-Passive Tags

Equipped with an onboard battery that drives the chip's circuitry but power for communication of the signal is derived from the reader's electromagnetic field as in the case of passive tags.

Working of RFID

A RFID system is made up of two parts: a tag and a reader. RFID tags are embedded with a transmitter and a receiver. The RFID component on the tags have two parts: a microchip that stores and processes information, and an antenna to receive and transmit a signal to read the information encoded on a tag, a two-way radio transmitter-receiver called a reader emits a signal to the tag using an antenna. The tag responds with the information written in its memory bank. The reader will then transmit the read results to an RFID computer program.

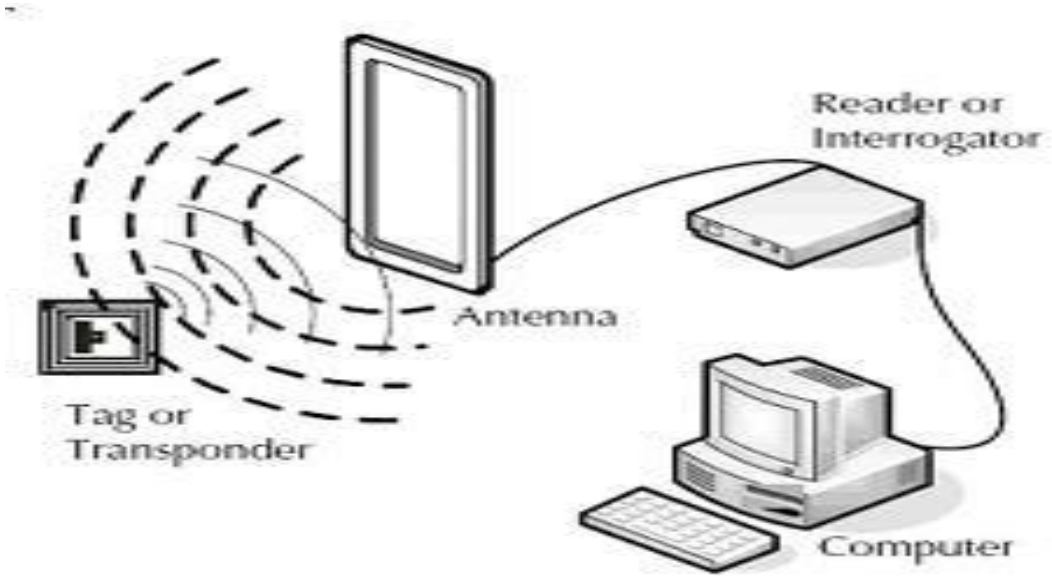

Fig.5.2.3.2 Working Of RFID

5.2.4 IR SENSOR

IR sensor is an electronic device that emits the light in order to sense some object of the surroundings. An IR Sensor can measure the heat of an object as well as detects the motion. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation. These types of radiations are invisible to our eyes, but infrared sensor can detect these radiations.
Monitoring vehicles by infrared sensors is one of the most sensible methods while considering that the system is mainly aimed at large and medium-sized parking lots, and ultrasonic sensors are very sensitive to temperature changes and extreme air.

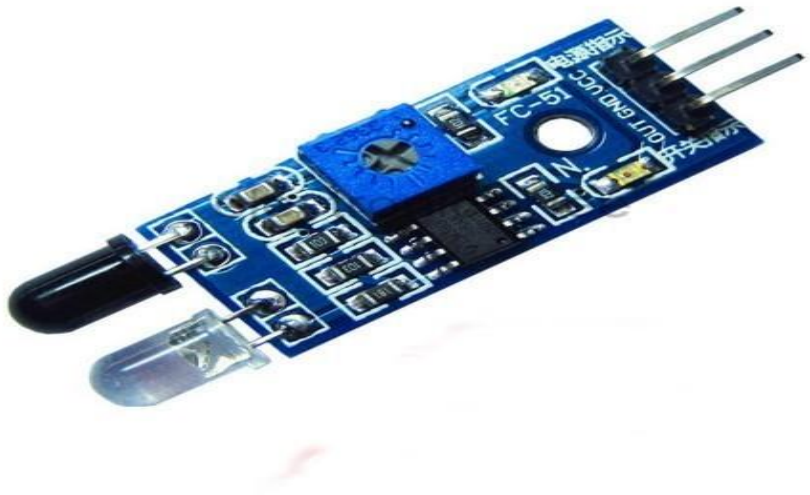

Fig.5.2.4 IR Sensor

5.2.5 LIGHT EMITTING DIODE (LED)

A light emitting diode (LED) is a two-lead semiconductor light source. It is a p-n Junction diode, which emits light when activated. When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the color of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor.
An LED is often small in area (less than 1 mm^2) and integrated optical components may be used to shape its radiation pattern.

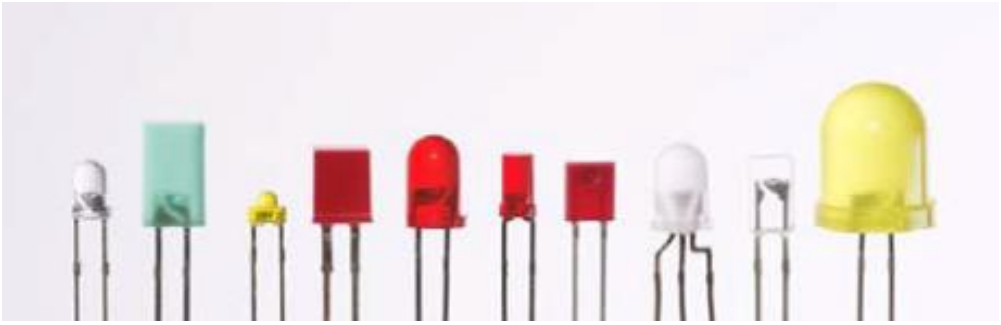

Fig.5.2.5 Light Emitting Diodes

5.2.6 ESP 8266 WIFI MODULE

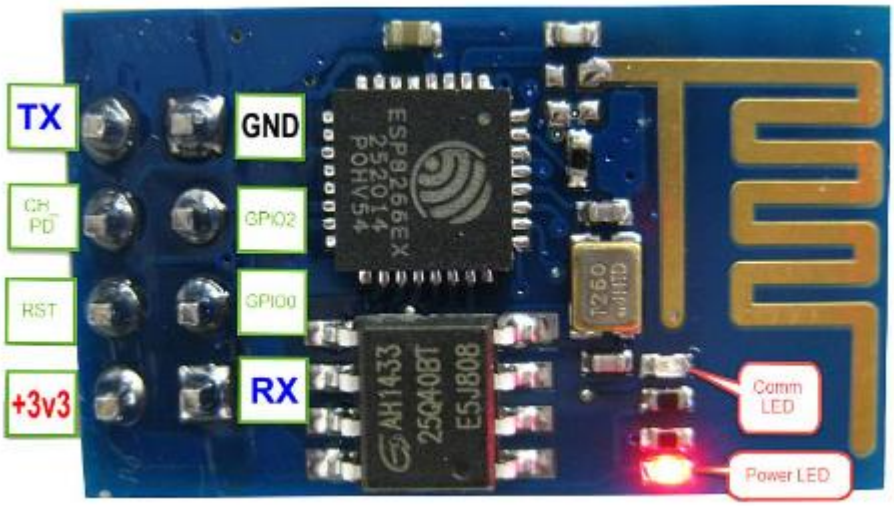

Fig.5.2.6 Wifi Module

The ESP8266 is a low-cost Wi-Fi chip with full TCP/IP stack and MCU (Micro Controller Unit) capability produced by Shanghai-based Chinese manufacturer, The chip first came to the attention of western makers in August 2014 with the ESP-01 module, made by a third-party manufacturer, AI-Thinker. This small module allows microcontrollers to connect to a Wi-Fi network and make simple TCP/IP connections using Hayes-style commands. However, at the time there was almost no English-language documentation on the chip and the commands it accepted. The very low price and the fact that there were very few external components on the module which suggests that it could eventually be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate the Chinese documentation.

The ESP8285 is an ESP8266 with 1 MB of built-in flash, allowing for single-chip devices capable of connecting to Wi-Fi.

5.2.7 LCD MODULE

To display interactive messages we are using LCD Module. We examine an intelligent LCD display of two lines, 16 characters per line that is interfaced to the controllers. The protocol (handshaking) for the display is as shown. Whereas D0 to D7th bit is the Data lines, RS, RW and EN pins are the control pins and remaining pins are +5V, -5V and GND to provide supply. Where RS is the Register Select, RW is the Read Write and EN is the Enable pin.

The display contains two internal byte-wide registers, one for commands (RS=0) and the second for characters to be displayed (RS=1). It also contains a user-programmed RAM area (the character RAM) that can be programmed to generate any desired character that can be formed using a dot matrix. To distinguish between these two data areas, the hex command byte 80 will be used to signify that the display RAM address 00h will be chosen.Port1 is used to furnish the command or data type, and ports 3.2 to 3.4 furnish register select and read/write levels. The display takes varying amounts of time to accomplish the functions as listed. LCD bit 7 is monitored for logic high (busy) to ensure the display is overwritten.

Liquid Crystal Display also called as LCD is very helpful in providing user interface as well as for debugging purpose. The most common type of LCD controller is HITACHI 44780 which provides a simple interface between the controller & an LCD. These LCD’s are very simple to interface with the controller as well as are cost effective.

Fig.5.2.7 LCD Display

5.3. INTRODUCTION OF TECHNOLOGIES USED

5.3.1. EMBEDDED C

Embedded C is one of the most popular and most commonly used Programming Languages in the development of Embedded Systems. So, in this article, we will see some of the Basics of Embedded C Program and the Programming Structure of Embedded. Embedded C is perhaps the most popular languages among Embedded Programmers for programming Embedded Systems. There are many popular programming languages like Assembly, BASIC, C++, Python etc. that are often used for developing Embedded Systems but Embedded C remains popular due to its efficiency, less development time and portability.

Embedded C Programming Language, which is widely used in the development of Embedded Systems, is an extension of C Program Language. The Embedded C Programming Language uses the same syntax and semantics of the C Programming Language like main function, declaration of data types, defining variables, loops, functions, statements, etc. The extension in Embedded C from standard C Programming Language include I/O Hardware Addressing, fixed point arithmetic operations, accessing address spaces, etc. Embedded C is basically an extension to the Standard C Programming Language with additional features like Addressing I/O, multiple memory addressing and fixed-point arithmetic, etc.C Programming Language is generally used for developing desktop applications, whereas Embedded C is used in the development of Microcontroller based applications.

Fig. 5.3.1. Embedded C

5.4. SOURCE CODE

```
#include <LiquidCrystal.h>

#include <SoftwareSerial.h>

LiquidCrystal lcd(14,15,16,17,18,19);

SoftwareSerial RfidSerial(2,3);

const int IR = 7;

const int Red_Led = 5;

const int Green_Led = 6;

const int P1_bal = 11;

const int P1_challan = 12;

const int start = 10;

const int P2_bal = 9;

const int P2_challan = 8;

boolean stringComplete=false;

String inputString="";

int n=0;

int bal_a,bal_b,challan_a,challan_b;

void setup()

{

  bal_a=0;

  bal_b=0;

  challan_a=0;

  challan_b=0;
```

```
  Serial.begin(9600);
  RfidSerial.begin(9600);
  lcd.begin(16, 2);
  lcd.setCursor(0, 0);
  lcd.print("   IOT Based  ");
  lcd.setCursor(0, 1);
  lcd.print(" E_Challan SYS");
  delay(3000);
  pinMode(IR, INPUT_PULLUP);//Switch PIN is input with PULLUP
  pinMode(P1_bal, INPUT_PULLUP);
  pinMode(P1_challan, INPUT_PULLUP);
  pinMode(P2_bal, INPUT_PULLUP);
  pinMode(P2_challan, INPUT_PULLUP);
  pinMode(start, INPUT_PULLUP);
  pinMode(Red_Led, OUTPUT);
  pinMode(Green_Led, OUTPUT);
  digitalWrite(Red_Led,HIGH);
  digitalWrite(Green_Led, HIGH);
}
void loop()
{
  lcd.setCursor(0, 0);
  lcd.print("   IOT Based  ")
  lcd.setCursor(0, 1);
```

```
lcd.print(" E_Challan SYS");
delay(1000);
if(digitalRead(start)==LOW)
{
  lcd.clear();
  lcd.setCursor(0, 0);
  lcd.print("Challan/Balance");
  lcd.setCursor(0, 1);
  lcd.print("    UPDATE     ");
  delay(2000);
 updateChallanas();
}
else
UpdateServer();
if(digitalRead(IR)==LOW)
{
  lcd.clear();
  lcd.setCursor(0, 1);
  lcd.print("PLZ Show RFID ");
  lcd.setCursor(0, 1);
  stringComplete=false;
  //inputString="";
  RfidSerialEvent();
  delay(1000);
```

```
  RfidSerialEvent();
}
if(stringComplete)
{
  lcd.setCursor(0, 0);
  lcd.clear();
  if(inputString=="3B00A0707398")
  {
    lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print("HI, welcome P1 ");
    delay(1000);
    if(challan_a==0)
    {
    lcd.setCursor(0, 1);
    lcd.print("   NO DUES  ");
    digitalWrite(Green_Led, LOW);
    delay(2000);
    digitalWrite(Green_Led, HIGH);
    }
    if(challan_a>0)
    {
    lcd.clear();
    lcd.setCursor(0, 0);
```

```
  lcd.print("Your Due: ");
  lcd.print(challan_a);
  digitalWrite(Red_Led,LOW);
  if(challan_a<=bal_a)
    {
    bal_a=bal_a-challan_a;
    challan_a=0;
    lcd.setCursor(0, 1);
    lcd.print("Amount Detected ");
    digitalWrite(Red_Led,HIGH);
    digitalWrite(Green_Led, LOW);
    delay(1000);
    digitalWrite(Green_Led, HIGH);
    }
    else
    {
    lcd.setCursor(0, 1);
    lcd.print("  PLZ Recharge  ");
    delay(1000);
    }
 }
}
else if(inputString=="3B00A0647A85")
{
```

```
lcd.clear();
lcd.setCursor(0, 0);
lcd.print("HI, welcome P2 ");
delay(1000);
if(challan_b==0)
{
lcd.setCursor(0, 1);
lcd.print("   NO DUES  ");
digitalWrite(Green_Led, LOW);
delay(2000);
digitalWrite(Green_Led, HIGH);
}
if(challan_b>0)
{
lcd.clear();
lcd.setCursor(0, 0);
lcd.print("Your Due: ");
lcd.print(challan_b);
if(challan_b<=bal_b)
  {
  bal_b=bal_b-challan_b;
  challan_b=0;
  lcd.setCursor(0, 1);
  lcd.print("Amount Detected ");
```

```
        digitalWrite(Red_Led,HIGH);
        digitalWrite(Green_Led, LOW);
        delay(1000);
        digitalWrite(Green_Led, HIGH);
        }
        else
        {
        lcd.setCursor(0, 1);
        lcd.print("  PLZ Recharge  ");
        digitalWrite(Red_Led,LOW);
        delay(1000);
        digitalWrite(Red_Led,HIGH);
        }
      }
    }
  }
        stringComplete=false;
        inputString="";
}
void UpdateServer()
{
  Serial.print("<h1>E-CHALLAN SYSTEM</h1>");
  Serial.print("<h2>P1_CHALLAN:");
  Serial.print(challan_a);
```

```
  Serial.print("</h2>");
  Serial.print("<h2>P1_BALANCE:");
  Serial.print(bal_a);
  Serial.print("</h2>");
  Serial.print("<h2>P2_CHALLAN:");
  Serial.print(challan_b);
  Serial.print("</h2>");
  Serial.print("<h2>P2_BALANCE:");
  Serial.print(bal_b);
  Serial.print("</h2>");
}
void updateChallanas()
{
  lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print("P1B:");
    lcd.print(bal_a);
    lcd.setCursor(9, 0);
    lcd.print("P1C:");
    lcd.print(challan_a);
    lcd.setCursor(0, 1);
    lcd.print("P2B:");
    lcd.print(bal_b);
    lcd.setCursor(9, 1);
```

```
 lcd.print("P2C:");
 lcd.print(challan_b);
 if(digitalRead(P1_bal)==LOW)
 {
    bal_a+=100;
    delay(500);
 }
 else if(digitalRead(P2_bal)==LOW)
 {
   bal_b+=100;
   delay(500);
 }
else if(digitalRead(P1_challan)==LOW)
 {
    challan_a+=100;
    delay(500);
 }
else if(digitalRead(P2_challan)==LOW)
 {
    challan_b+=100;
    delay(500);
 }
 else
 {
```

```
      lcd.setCursor(0, 0);
      lcd.print("P1B:");
      lcd.print(bal_a);
      lcd.setCursor(9, 0);
      lcd.print("P1C:");
      lcd.print(challan_a);
      lcd.setCursor(0, 1);
      lcd.print("P2B:");
      lcd.print(bal_b);
      lcd.setCursor(9, 1);
      lcd.print("P2C:");
      lcd.print(challan_b);
      }
    }
    lcd.setCursor(0, 0);
    lcd.print("Challan/Balance");
    lcd.setCursor(0, 1);
    lcd.print("UPDATED SUCCESS");
    delay(2000);
    lcd.clear();
}
```

6. TEST CASES

6.1 TEST CASE

Test case is a set of conditions or variables under which a tester will determine whether a system under test satisfies or not.

S.NO	Test case	Condition	Result
1.	Vehicle	Existing Challan with Sufficient Balance	Green LED Light Displayed Accurate Prediction
2.	Vehicle	Existing Challan with Insufficient Balance	Red LED Light Displayed Accurate Prediction
3.	Vehicle	With Equal Challan and Balance Amount	Green LED Light Displayed Accurate Prediction
4.	Vehicle	No Dues/Challans	Green LED Light Displayed Accurate Prediction
5.	More than one Vehicle	One with existing challan and sufficient balance and another with no challan	Inaccurate Prediction
6.	Vehicles 100m away from the Reader	With No Challan	Inaccurate Prediction

7. SCREENSHOTS

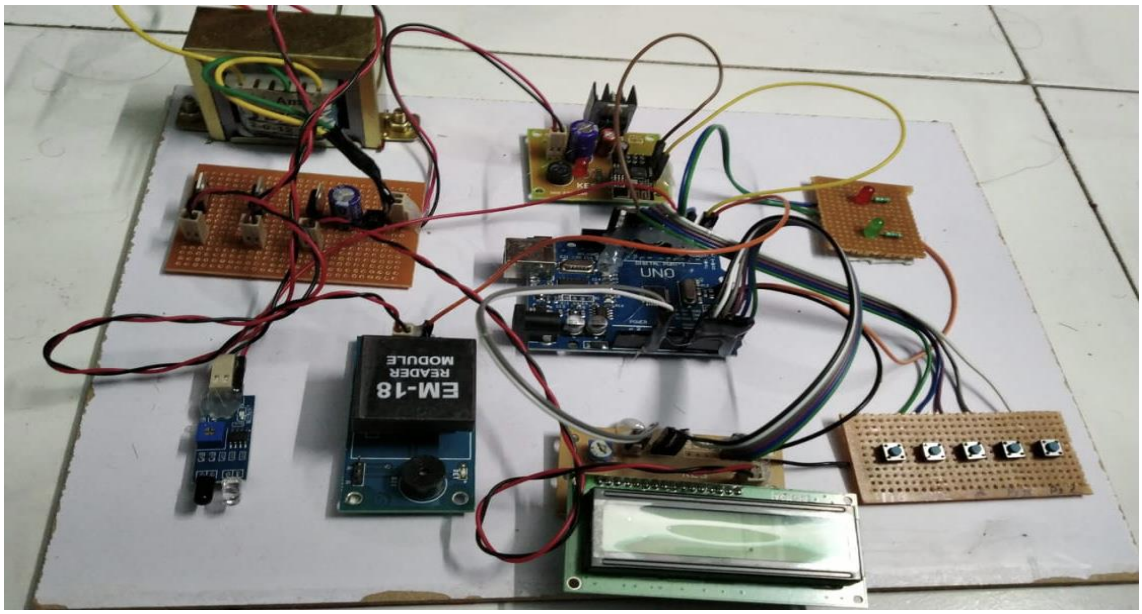

Fig.7.1 Hardware Kit

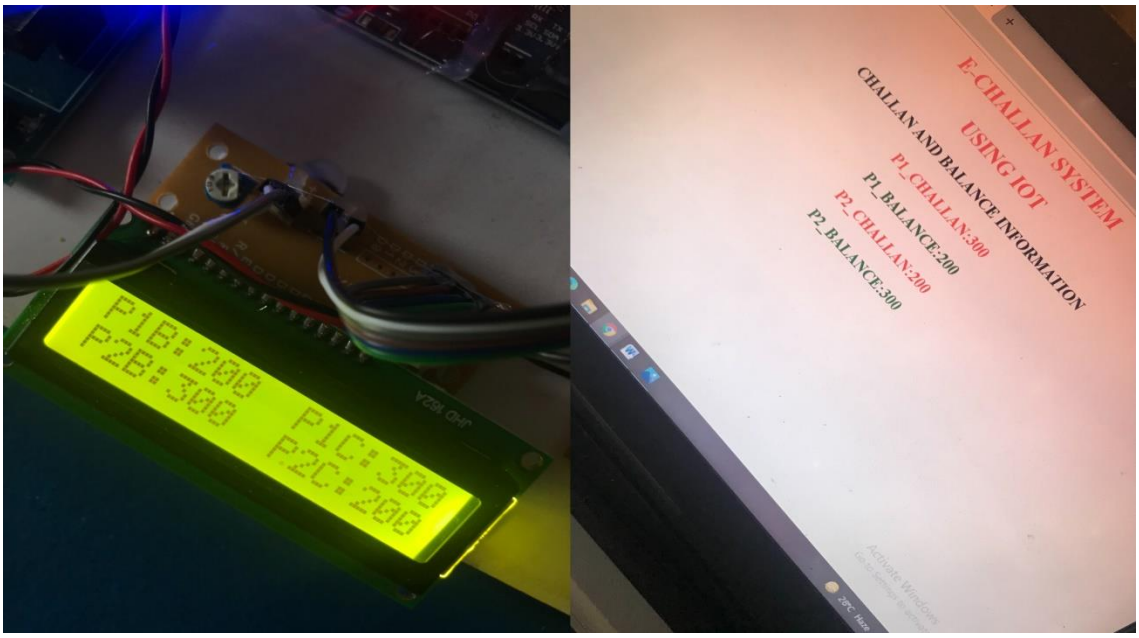

Fig.7.2 Updating Balance and Challan

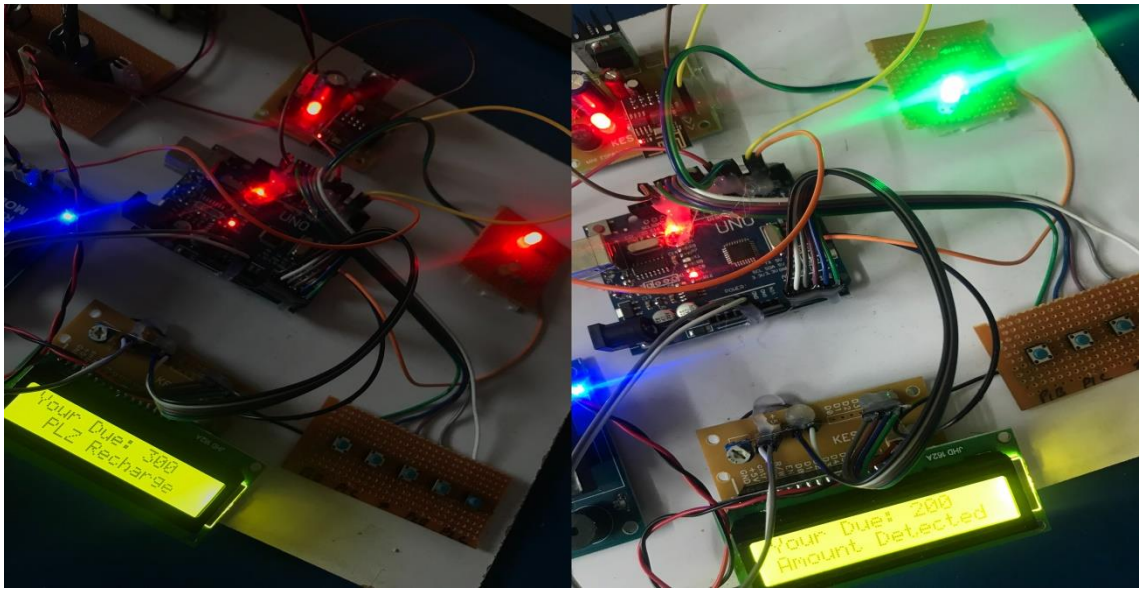

Fig.7.3 Tags of both vehicles read by the Reader and Lights are displayed

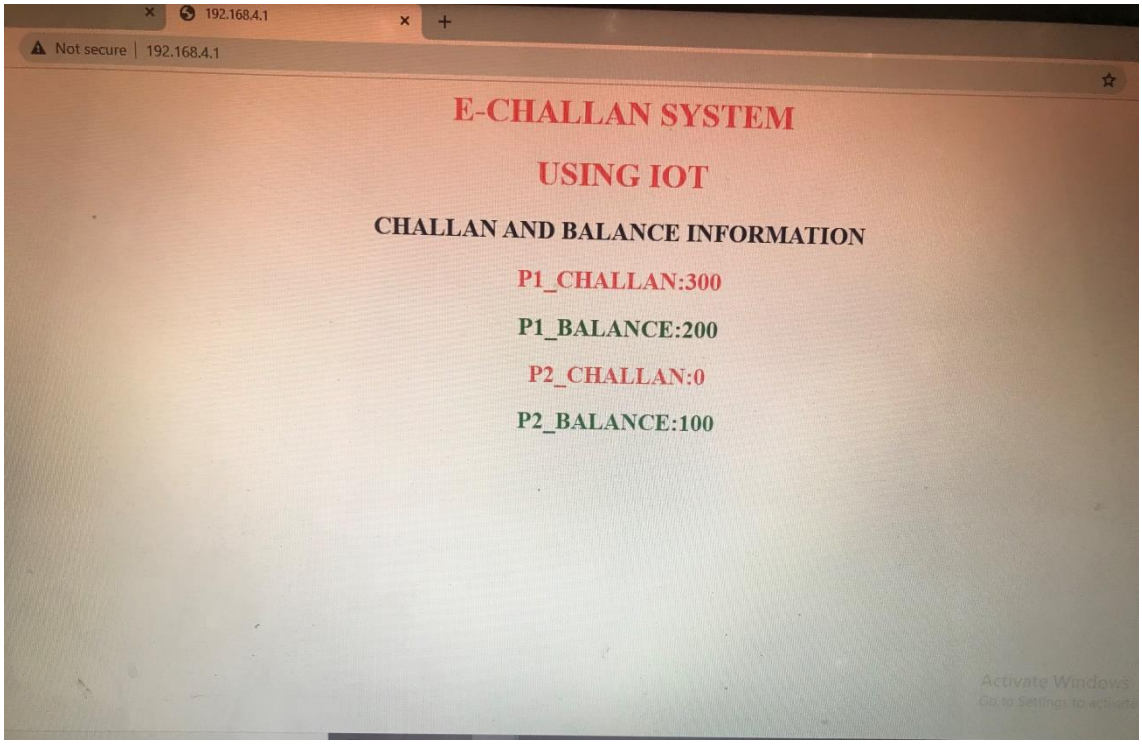

Fig.7.4 Updated values after deduction are reflected on the webpage

8. 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. It is a very user friendly, time saving, effort saving application. The application works efficiently and helps traffic system management to reduce their manual work and time.The project “Advance vehicle detection and Auto Penalty Collection using IOT” has been successfully designed and tested. Integrating features of all the hardware components used have developed it. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit.

9. FUTURE ENHANCEMENT

The presented technique of the project mainly focuses on issue and view or pay challan along with details extraction of balance and challan details. The project can be extended to a full stack functional website in future providing other features such as license creation, RTO vehicle registrations and many more. The system can also be modified by using the latest technologies as discussed in the literature survey like QRcode and RFID scanner. This will limit human intervention and will result in a more efficient model of the existing system. The future scope also involves introducing RFID sensors or cameras on the roads that detect any kind of traffic rule violation like over speeding, or driving without a helmet etc and automatically generate the penalty of challan and have it delivered to the user, this would remove the middle-man, the traffic police officer from the picture thereby eliminating any chances of corruption or bribery

10. BIBILIOGRAPHY

- R.Sadakale, Avinash Shinde, Rounak Sathe and Prakash Sutar , “Automatic E-Challan Generation For Traffic Violation”, International Journal of Advance Engineering and Research Development(IJAERD), Volume-4, Issue 8, August-2017.

- Santosh Kumar Singh, Anshuman Tyagi, Brijesh Kumar Dubey, “Automatic Number Plate Recognition System for Vehicle Identification using Optical Character Recognition”,International Journal for Research in Applied Science & Engineering technology(IJRASET),Volume-7,Issue IV,Apr-2019.

- R.Shreyas, Pradeep Kumar B V, Adithya H B, Padmaja B, “Dynamic Traffic Rule Violation Monitoring System Using Automatic Number Plate Recognition with SMS Feedback”, IEEE-2017,2017-2nd International Conference on Telecommunication and Networks(TEL-NET 2017).

- Goel, S. K., & Shukla, M. (2018). Enforcement of Automatic Penalty (e-Penalty) to Govern the Traffic Rule Violators in Digitized INDIA Using ICT.In Computational Vision and Bio Inspired Computing (pp. 788-802). Springer, Cham.

- Nigam, U., Akhtar, S., Singh, R., Ahmad, S., Kumar, S.,& Ambikapathy, A. (2019). Automatic Traffic Monitoring and E-Challan Generation Using Matlab. Journal of Control & Instrumentation, 10(1), 9-11.

- Dhage, M. R., Patil, G. V., Mistry, S. J., Tambe, P. N., & Nankar, P. H. (2019, July). Automatic Traffic E-challan Generation Using Computer Vision.