IOT BASED STOLEN VEHICLE MONITORING SYSTEM

A PROJECT REPORT

Submitted by

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Under the guidance of
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Jaskeerat Singh

Akshit Singh

ABSTRACT

The current transportation system is not ready to adapt to the growing problem of stolen vehicles. This paper aims to propose a stolen vehicle monitoring system that uses vehicle-mounted RFID tags for STOLEN VEHICLE DETECTION. This paper uses a technique to take care of the issue of stolen vehicles using a database of the last known location of the vehicle and cross reference the owner's information present in the system. Our system provides an easy platform to improve the maintenance of the database of stolen vehicles that the management system gathers. This information from various traffic light intersections is collected and problem area lanes are red lit in case of a stolen vehicle is detected using an RFID tag reader. The Arduino board is connected to so as to establish a connection to the local server where the mysql database will be hosted from. The final information of the vehicle can be sent to the owner and the concerned authorities.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

GPS Global Positioning System

GSM Global System for Mobile

IOT Internet of Things

LED Light Emitting Diode

RFID Radio Frequency Identification

UART universal asynchronous receive transmitter

CHAPTER 1

INTRODUCTION

Internet of Things (IOT) states that soon all the physical devices will be interworking and be connected via the internet. As the interworking of these devices with the network gets more prominent by each passing day, these interworking devices can integrate themselves with other devices to successfully carry out the tasks. The operation of the technology like self-driving cars is increasing sharply and is being talked about as the next big thing in the industry. This change in the industry requires a method to keep account of all the cars which are working autonomously on the streets. The figure 1.1 gives the idea of the proposed implementation in the real world. A traffic system typically consists of

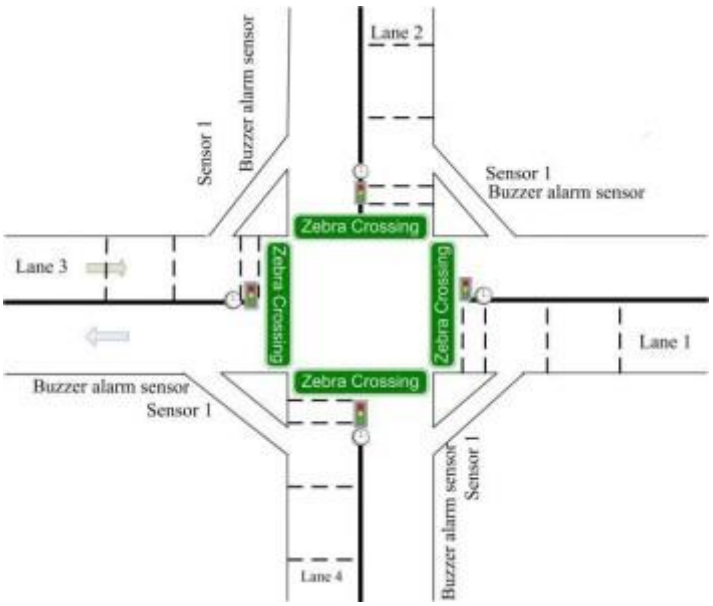

Figure 1.1: Proposed Implementation

four lanes. This vehicle monitoring system can be found in private vehicles as a vehicle monitoring and updating system. Police officials can follow the information and updates given by the monitoring system to easily locate the vicinity in which the stolen vehicle was last seen. Generally, this system is meant to locate customer-owned vehicles which makes it easier for the police officials to roughly track the area in which the vehicle is present.

Vehicle monitoring systems are popular in privately owned vehicles as loss prevention, management, and retrieval device. The authorities will first check if any gps is available or not. If the gps is available, then we will check the gps reading. If the gps is not available, the authority will look at the rfid database. Police can simply follow the regular updates given by the database system and locate the area in which the stolen vehicle was last seen. This will certainly reduce the area of search in which the vehicle is present. There are several components such as RFID tag and scanner, Arduino, local Database through various applications like phpMyAdmin served through a xampp server.

CHAPTER 2

PROBLEM DEFINITION

The problem statement of the proposed project is that if the vehicle has been stolen, the owner will not be able to track their vehicle using the traditional methods as they are not efficient and do not produce results. They will have no idea where to look for the vehicle and the chance of getting back their vehicle will be very minuscule. In 2015, the country reported 211 million registered motor vehicles with a major portion of these vehicles registered in the metropolitan area. It makes the tracking of the vehicle very hard

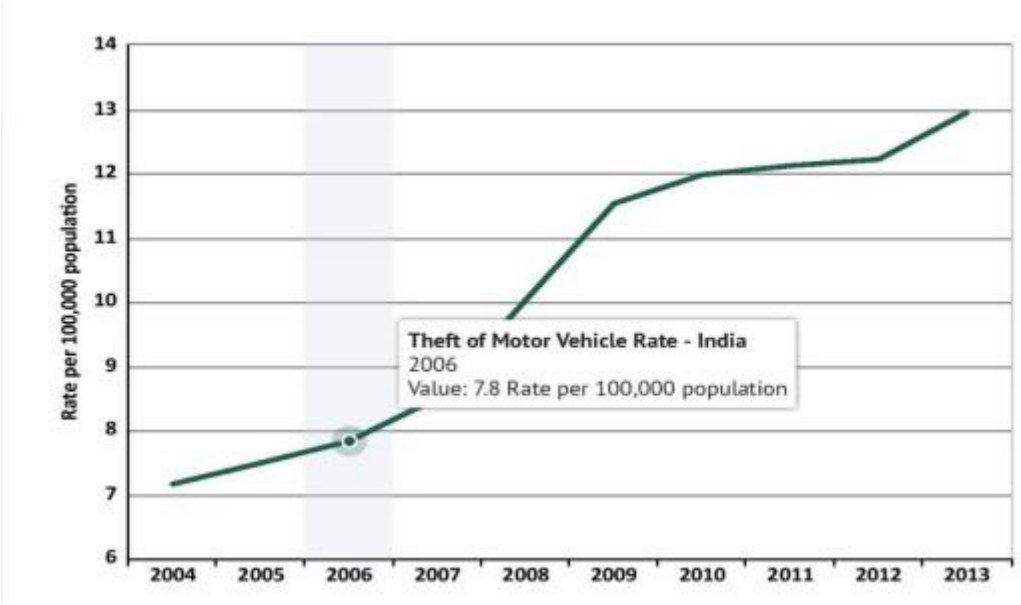

Figure 2.1: Graph suggesting rise in theft over the years

when no evidence is available to track the vehicle. So, this system will help track and give regular updates about the movement of the vehicles to the authority. The proposed system works on the principle that once the vehicle has been reported stolen and a FIR has been lodged, the RFID tag number will be stored in a database with the owner's current contact information on which the messages will be sent in case the vehicle's tag number is read. This database where the information about the stolen vehicle is stored is hosted on the local server. When the RFID tag is read for a stolen vehicle then the information is first checked with the database. If there is a match with one of the entries in the database, then

a notification of the address of the junction is forwarded to the owner and the concerned authorities and the LED or lights of the junction are changed to red and the nearest local police will be notified.

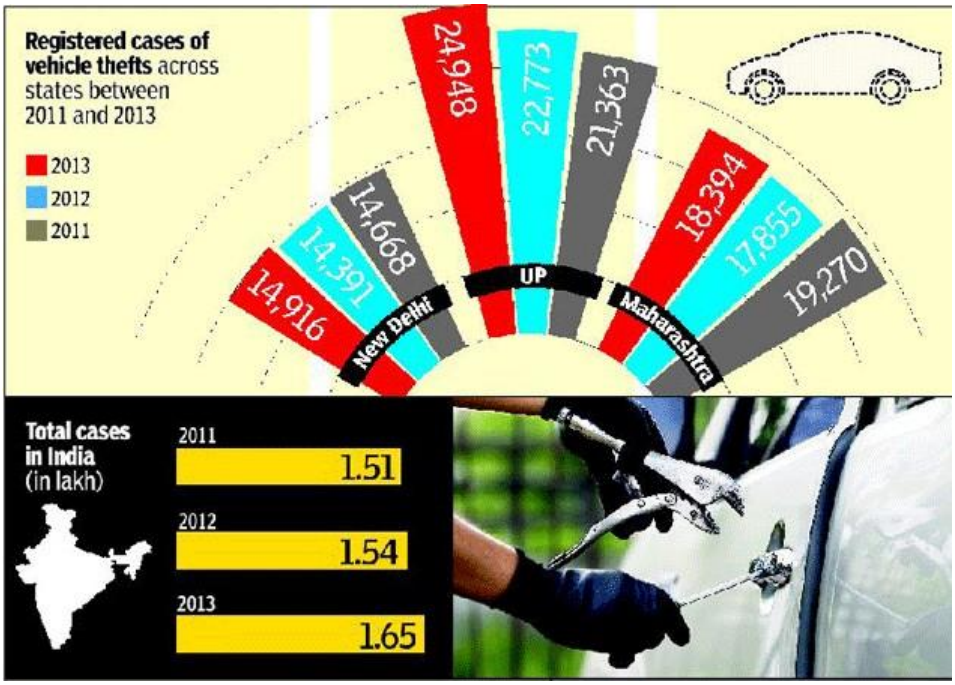

Figure 2.2: Theft in big cities

CHAPTER 3

LITERATURE SURVEY

This section will contain information regarding the projects which has attempted to tackle the problem previously or is using technology through which inspiration is gained and some part is implemented in this project.

3.1 GPS and GSM Implementation

Maurya et al. (2012)

Kunal Maurya, Mandeep Singh, and Neelu Jain made a device which can installed at a secure location in the vehicle such that it will help the owner in keeping track of the vehicle's location. It uses both GPS and GSM modules to locate the location and transfer the information. The major drawback of this system is the ease with which the GPS can be disabled by removing the power source to the gps or removing the whole panel.

3.2 Signal monitoring using vehicle count

Janahan et al. (2018)

Senthil Kumar and Kumar Narayanan proposed a model that helps maintain the timing interval between the traffic signal at an intersection. This system depends on the amount of vehicles present on the road. The proposed device will be able to decide the timing when the the systems signal will be used which is the count of the number of vehicles. The major drawback of this system is the unknown long wait time for the other users waiting on the different intersection even if an emergency vehicle is waiting on that intersection.

3.3 System for emergency vehicles

Avadhani and Vanjale (2017)

Aditi Avadhani proposed a framework that has been intended to remove the weakness in the movement of the traffic system by doing system analysis. The framework gives data about road/street blockage and also gives the ability to control the stream of traffic and help maintain a system for emergency vehicles to practice crisis exit. This system gives solution based on the premise of analysing the traffic and giving the best suggestion of a route which can be followed in the future. But this does not give any real time help to the user.

3.4 Data analysis to provide future predictions

Javaid et al. (2018)

Sabeen Javaid, Ali Sufian proposed a system that takes various different input parameters from cameras/sensors and then calculate the traffic density which will be used to manage the traffic lights. A.I. will be used to make prediction about the traffic pattern for the future to minimize traffic jams. RFIDs are also used to give more priority to the vehicles such as ambulances and fire brigade at the time of traffic congestion. It does not give any real-time advantage and rather is made to provide predictions to streamline future congestion.

3.5 System based upon road density

Talukder et al. (2017)

Mehal Zaman Talukder and Sheikh Shadab Towqir proposed a device where inputs and sensors are implemented with the Raspberry Pi. This is done so as to change the lanes of an intersection based on count of vehicles on the road with real-time action ability. The decision to greenlight a particular intersection depends upon the density of vehicles on the road. The major drawback of this system is the long wait time for the other users on the intersection.

3.6 Location Update Accuracy using Zigbee modules

Amutha and Ponnavaikko (2009)

To improve the accuracy of location tracking, in this paper the mechanism of Zigbee is used in addition to GPS. The Markov chain algorithm is used to increase the accuracy. They first noted the Normal Human steps and then noted the Blind human walking steps. They incorporated these with the help of Markov chain algorithm.This was used to provide stepwise locattion updates. There was a need for an increase in the accuracy so as to provide the blind users a device for finding a path without any obstacles. Here the GPS works as a source of location data which can help by preventing accidents.

3.7 Improving GPS Accuracy For Land Vehicle Navigation System

Venkatraman et al. (2010)

The paper talks about how the different Terrain, high rise buildings, and dense forest cover can block the penetration of GPS signals to the antenna receiver. While some advances have been made in improving the sensitivity of GPS receivers or developing techniques such as assisted GPS that gives permission to a GPS receiver to use attenuated signals but it does not forgo of the issue that the antenna of a conventional GPS receiver must have a direct line of sight with the satellites revolving around the earth. In urban regions, it might not be possible to maintain a line of sight with the satellites and hence will not be able to get a possible position fix. This problem can also persist when the vehicle is moving through tunnels or parking garages as no line of sight will be maintained between the satellite and the gps antenna. To maintain the accuracy of navigation a novel particle filter (PF) for sensor fusion is proposed.

3.8 Sensor Based Dead Rockening for land vehicle navigation system

Naren (2009)

The paper states that The Extended Kalman filter (EKF) is used for sensor fusion in the land vehicle navigation system. In place of EKF, a novel particle filter for sensor fusion is proposed and the sampling of the particle filter shows better performances when compared to EKF. the different Terrain, high rise buildings, and dense forest cover can block the penetration of GPS signals to the antenna receiver. In urban regions, it might not be possible to maintain a line of sight with the satellites and hence will not be able to get a possible position fix. In the absence of the GPS, the historical GPS data can be combined with sensors to provide continuous navigation in even the most challenging environments, with the possibility of the modified particle filter algorithm to avoid dead reckoning for land vehicle navigation system.

CHAPTER 4

INFERENCE AND DISCUSSION

4.1 Inference from literature survey

The major problems are

1. The GPS devices which are installed in the vehicle can simply be removed by disconnecting the wires to the power source.
2. Another major problem is that the GPS cannot work if there is a dense cover or foliage. The gps signals wont be able to reach the antenna as there wont be direct line of sight between the antenna and the satellite.
3. If the implemented system is done based on the vehicle count, then the wait time depends upon the number of vehicles on the road. If there are a large of vehicles on the road, then the wait time for the vehicles on other roads will increase exponentially even if these vehicles are emergency vehicle.
4. The analysis of the data does not provide any immediate solution but helps provide a solution for the future by monitoring the problem areas in the current state. These analysis will look at the problem areas and will take these into consideration while making a decision for the future.
5. AI will monitor and make models for the future to prevent theft and streamline the traffic but does not provide any real time updates. These will look at the past traffic pattern to determine and predictions about the future.
6. The road density system is based on the number of vehicles on the road. Even if there are emergency vehicles on the other road, their wait time will still increase exponentially and they will have to wait till their time comes in the pattern based on the density of the road.
7. Use of physical devices like tablets or any mount devices can simply be removed from the vehicle.
8. The GPS will not work as it is difficult to work under high foliage or with high rise buildings. This is because the signals will not reach the gps antenna as there is not a straight line of sight between the satellite and the gps antenna and hence a more accurate location cannot be obtained.

4.2 Discussion

The vehicle theft monitoring system concentrates on different interconnected systems present on the vehicle and helps monitor the last known position of the vehicle. These types of technologies need to be revised to take precaution against the new security threats. A Radio Frequency Identification based vehicle theft detection system is implemented in the vehicle. An RFID tag will be attached to the vehicle. Two network-connected devices communicate with each other one attached to the vehicle and the other is with the authorities nearest to the current intersection and the database hosted on a maintained phpMyAdmin database. The database will contain information regarding the registry of the vehicle against the ownership details of the vehicle. A stolen checker module is maintained where each vehicle is checked against its stolen status in the database. Here the sensor will read the unique RFID tag of each car. Once a car is identified as the one which is stolen then the local authorities nearest to the intersection will be notified via some form of communication about the last location of the junction where the car is located. The database will store the last known junction address in a column against a car that was reported stolen by the owner. whenever these vehicles with a unique RFID tag are read then that junction address will be stored against in a coloumn, and the notification will be sent to the authorities. But if the vehicle is not found then the message to the local police to check the CCTV cameras is sent.

CHAPTER 5

OBJECTIVES

1. To improve the communication of stolen vehicles to the concerned authorities.
2. Improving the planning techniques to reduce the overall delay which helps us in providing robust and resilient timetables to the traffic board room.
3. To improve the methodology of providing real-time information to traffic controllers.
4. Devising new plans to use the database information much more effectively.
5. It can also be used by goods dispatchers for functions such as tracking of goods, changes in routes, dispatching of items, information regarding the delay, and security.
6. Authorities can follow the regular updates given by the database system and help triangulate the area in which the stolen vehicle is present.
7. Insurance companies need to track the movement of vehicles for reimbursement of insurance.
8. It helps different companies plot and use the location to closely monitor operation status.

CHAPTER 6

CURRENT IMPLEMENTED SYSTEM

The current system for the stolen vehicle system depends upon the owner of the vehicle to go and make a FIR. After the complaint had been lodged, the police start looking at all the possible CCTV cameras to see all the possible places where the vehicle could be seen and placed. Then it is up to the police to make queries and work with the local population to start making rounds of the workshops. If the vehicle is not recovered the vehicle is then added to the NCRB or the National Crime Records Bureau and the owner, as well as the insurance company, is intimated. Once the information is added then it is a matter of time, once the authorities track down the VIN of the vehicle registered to the owner. Once the vehicle is confiscated then after checking the insurance information the vehicle is returned to the owner.

The another implemented system consist of a gps system in which a physical module which might be in the form of a chip powered by cell or a module which becomes on when the vehicle powers on. This module will try to make a line of sight with the satellite. If the satellite comes into the sight a link will be established. The last known location will be updated into the database. If there is a breakage in the line of sight the packages of data will not be received. This breakage of sight can occur due to high rise building or due to dense foliage. If the sight is not maintained then the gps will not remain hot. To again start the service, the line of sight needs to be maintained. This will require some time as the gps again needs to get hot. This time can be anything ranging from 30 sec to 30 min. Every information regarding the gps will be sent. It will depend upon the manufacturer to show a particular data to the user. The data will be shared in the form of NMEA format. The data required will be in the form of GPGGA which can be converted before sending it to the users display.

CHAPTER 7

SCOPE AND PROPOSED SYSTEM

7.1 Scope

The conventional methods are very archaic for reporting real-time problems to the authorities. More economically efficient and hence more effective methods must be developed to deal with the growing problem of vehicle theft. As the number of vehicles keeps on increasing, it is necessary to take useful steps to control the traffic and therefore avoid all types of problems that occur in the notification of the updates to the authority. To provide a means of updating the authority of changes to the database that allows them to use the information stored in the database more effectively. The scope helps by providing a way to catalogue the problems and provide a method to the traffic board to maintain the database of all the stolen vehicles and hence provide a way to communicate the information between the different parties. Regular updates will accumulate information about the last possible location in the database. This will help gather information about the problem areas and help develop ideas to deal with it.

7.2 Proposed system

The proposed system works on the principle that once the vehicle has been reported stolen and a FIR has been lodged, the RFID tag number will be stored in a database. This database where the information about the stolen vehicle is stored is hosted on the local server. When the RFID tag is read for a stolen vehicle then the information is first checked with the database. If there is a match with one of the entries in the database then a notification of the address of the junction is forwarded to the owner and the concerned authorities and the lights of the junction are changed to red. Otherwise, nothing happens and the traffic cars are allowed to move through the junction and the signal of the junction remains green. Finally, a notification to the local police will be forwarded if the vehicle is not spotted in the region for more than 24 hours. In the end, the last known location of the junction where the vehicle's RFID tag was read will be stored in the database which can be used and brought into consideration into the investigation later.

CHAPTER 8

SYSTEM REQUIREMENTS

8.1 Hardware Requirements

A Laptop with a dual core processor and 4gb of memory will be required to compile and run the arduino code while also hosting a MySQL database on the XAMPP Server.

1.A decent Laptop to compile and run arduino

2.Internet connection

3. Arduino Uno

4. RFID RC522 Scanner

5.Ublox Neo-6M GPS

6.LED Lights

7.Buzzer

8.breadboard

9.20 -25 jumper cables

8.2 Software Requirements

8.2.1 Arduino IDE

The Arduino IDE is an application which is used to write codes and upload these codes to the boads which are compatible with arduino. In arduino the codes can be written and compiled in various different languages including Java, C, C++. The arduino ide is free to download from the official arduino website. The arduino ide contains host of libraries which can easily be downloaded and included in the code. It contains a lot of configurations of the boards and different example code which can easily be incorporated in our code.

8.2.2 XAMPP server

Xampp server is used to host the Mysql database on the apache server. Here the database and tables will be hosted and will store the information which are being produced by the RFID scanner. Different querys can be used to produce different kind of output which will depend upon the users requirements. Xammp server is chosen because of the ease by which the database can be hosted and the ease by which it can be manipulated.

8.2.3 Python

Python is a very popular coding language. It easily supports C/C++ integration. We have chosen Python for our project because of the simplicity of the syntax and its tight integration with arduino. Here Python will be used to integrate the output of the serial monitor with the Database such that the output will be stored in the table.

8.2.4 Pyserial

It is an open source packet which is needed to integrate the python version 2.7 and make its ide able to communicate with arduino ide. Here the output of the arduino ide will be transfered to a new window in the python ide. This will be required to interact with the user for input/output.

CHAPTER 9

SYSTEM COMPONENTS

The proposed system consists of two major components: An RFID tag that is mounted on the vehicle and scanners at the various intersections to read the uid of the tag. These RFID scanners transfer data to various data farms that read the data of the RFID tags which are mounted on the vehicles and transmit the signals of each vehicle using RFID reader to a database. The administrators can interact with the system using the locally deployed database connected to the Arduino and alert can simply be notified to the concerned authorities.

9.1 Database

The database is systematic logging and collection of data. It help us in easily manipulating the data. It makes the job of the operand easy. It is a collection of programs and functions which enables its operand to use the database, change the data, represent the data in a tabular format for easy manipulation. It helps to reduce the errors which occur during updating of data and increases the consistency and atomicity of the data. It helps maintain greater data integrity and independence from the different application programs which depend upon the database.

For this setup we are using:

1. Start the Xampp control panel
2. Start the APACHE module
3. Start the MYSQL module
4. Open the browser and log into the localhost
5. Create the new Database
6. Create tables in the Database

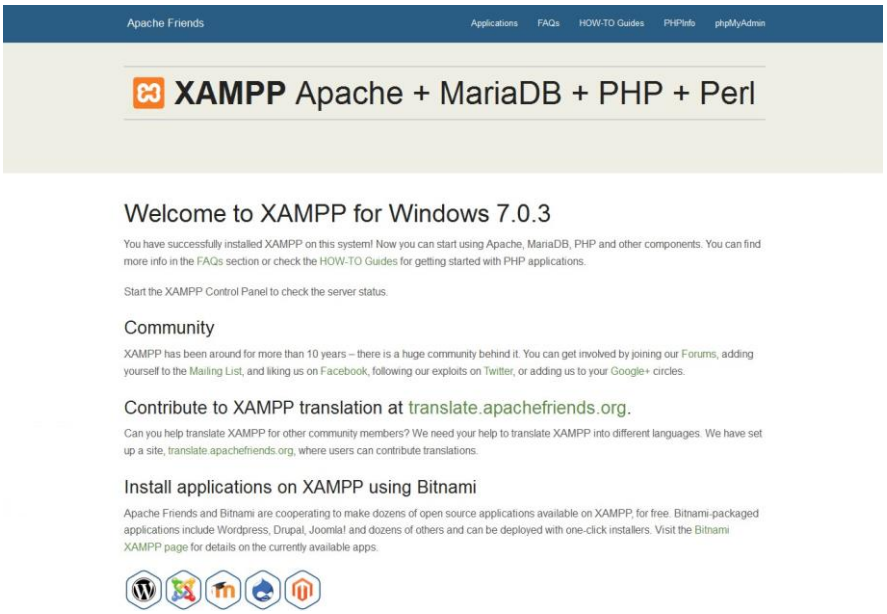

Figure 9.1: XAMPP DATABASE SERVER

9.2 RFID

An RFID system consists of two main components- an RFID tag that is attached to an object whose information needs to be scanned, and an RFID scanner that will share the information which is connected to a database. The RFID tag will generate an electromagnetic field in its omnipresent direction hoping for the reader to catch it which will read the signal and use it to connect to the tag and hence is known as the UART or universal asynchronous receiver transmitter.

The module used in this project is RFID-RC522

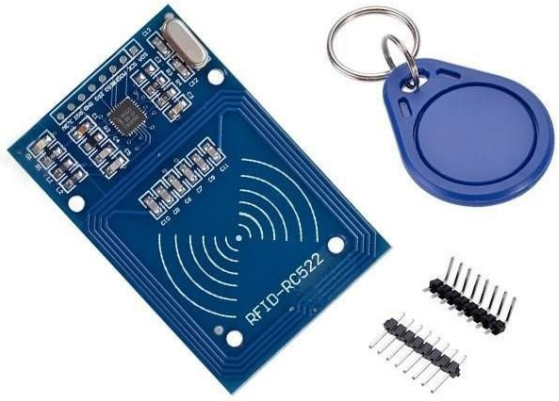

Figure 9.2: RFID Scanner

9.3 Arduino

Arduino is an electronic platform that is used to develop physical projects which the user can themselves program and run. Arduino is made up of a programmable circuit board and an IDE that runs on a computer and will be used to run the code and load the code directly into the physical board. Arduino will be used to interact with different physical objects starting from but not limited to buttons, Wi-Fi, GPS, screens, motors, speakers, ethernet shield, cameras, with a simplified form of c++ and python which are used to upload the code and control the physical board.

In this project Arduino Uno is used as the brains of the project.

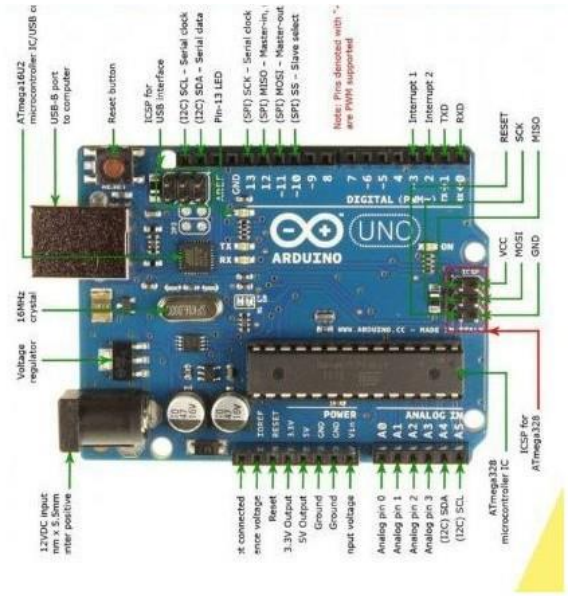

Figure 9.3: Arduino Uno

9.4 GPS

GPS or a global positioning system is a system of about 30 satellites all of which are orbiting the earth. Atleast 4 satellites are visible at any given point. It provides the geolocation and other information to any receiver. It is free to use the gps but requires a straight line of sight with the satallite.

The gps module used in this project will be Ublox Neo-6m

Figure 9.4: GPS

CHAPTER 10

SYSTEM DESIGN

10.1 System architecture

The figure 10.1 shows the working of the project in simple block level implementation.

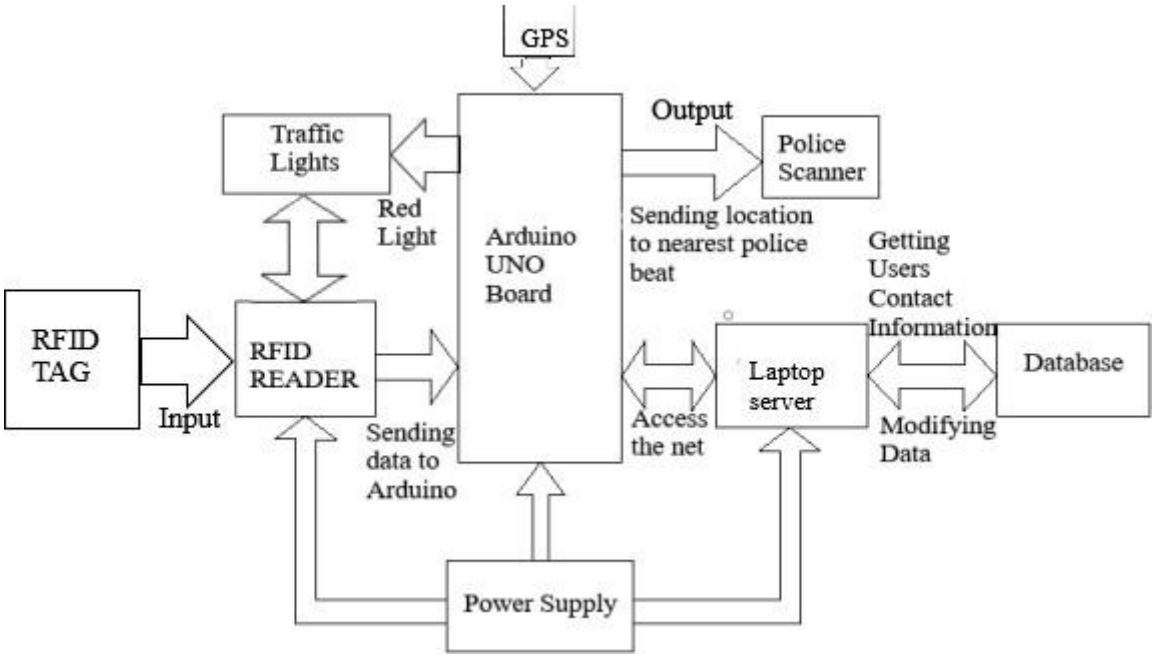

Figure 10.1: System Architecture

Explanation

1. The main system consists of the Arduino uno board. This will serve as the brain of the project.
2. To this arduino board one RFID reader will be connected to a 3.3V.
3. This reader will read the input from the RFID tag and the information read will be passed to the arduino board.
4. The data read will be stored in the database using a python script which will connect the serial monitor output to the MySQL database.
5. The database will save this information in the XAMPP server hosting the mysql server.
6. In contrast to this a gsm module to show the comparison will be running. For this a clear line of sight needs to be maintained between the antenna and the satellite.
7. The gsm module will show the real life location of the vehicle.
8. All the modules can be powered with a single source like a laptop with a USB giving a constant supply.
9. Based on the input of the RFID, the action of the lights and buzzer can be manipulated based on the readings of the sensor.
10. The output will be stored in the MySQL database and different query's can be used to get particular output.
11. The output saved in the table can be sent to the authorities.

10.2 Flow of the project

The figure 10.2 shows the flow of the project through different cases.

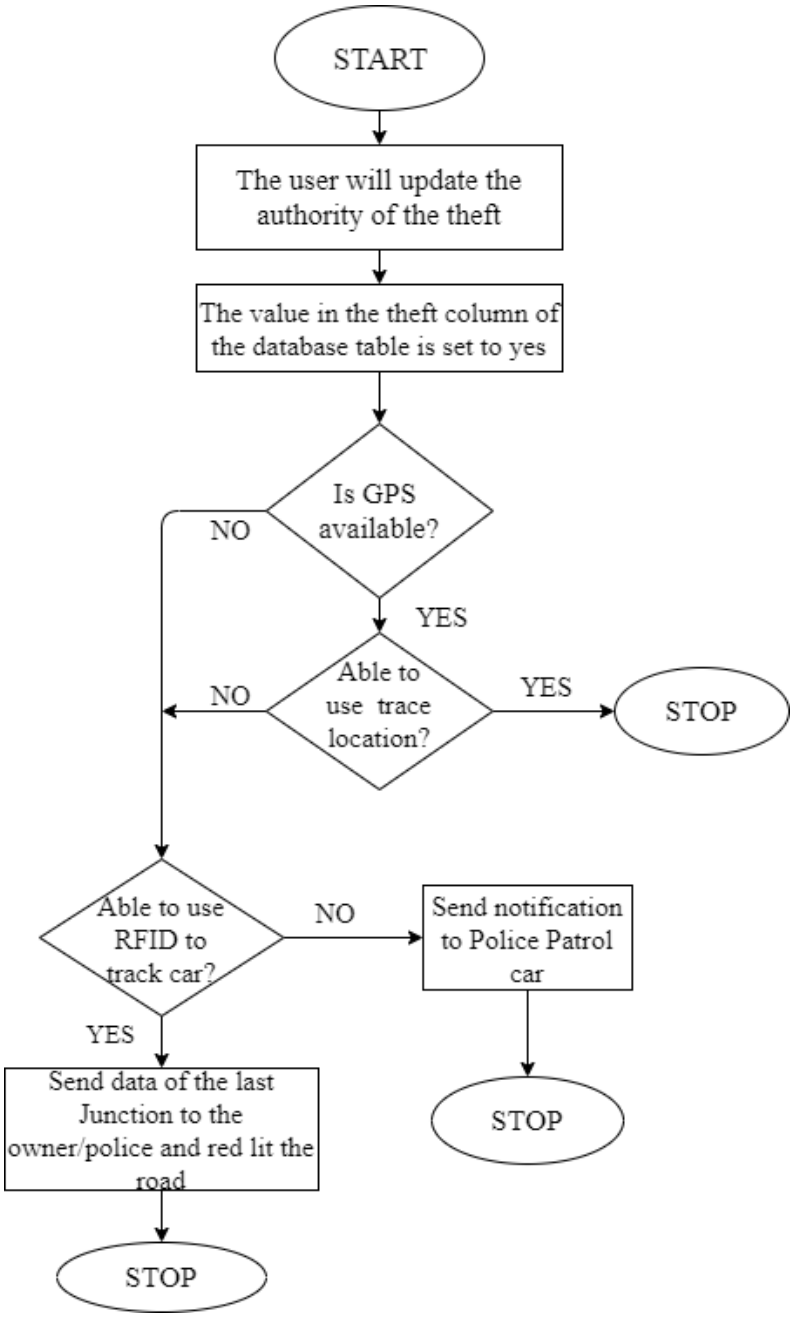

Figure 10.2: Flow of the project

Steps of the project

1. At the start the user will make an update to the authorities of the theft.
2. The authorities will log the owners information in the database.
3. First it will be checked if the gps is available.
4. If yes then we can use the it to trace the location.
5. If no then we can use the RFID database to track the last known location of the car.
6. If we are not able to use the RFID then send the notification to the nearest police patrol car.
7. If yes then send the last junctions location to the owner and to the authorities.
8. If the vehicle is detected then red lit the road.
9. After this the process will stop.

10.3 Table of comparison

Table 10.1: **Comparison between GPS and RFID**

S no.	Global Positioning System(GPS)	Radio frequency identification(RFID)
1	Uses signal from low-power satellite signals	Uses RF Signals
2	Signal processors are power hungry	Works with low power as well
3	A lot of power is used during Data transmission	Transmission of data requires less power
4	Requires use of battery	Low use of battery
5	Expensive even when bought in large numbers	Inexpensive when bought in large numbers
6	Long range	Short range
7	Medium to Large in size	Size depends upon application
8	Large amount of latency	Very low Latency
9	Accuracy increases with price	Moderate accuracy
10	Satellite and mobile GPS	Active and Passive RFID
11	Need data connection	Does not need data connection
12	Can be encrypted and secure	Always encrypted and secure
13	Can provide alerts at regular intervals	Alerts depend upon scanner
14	Real Time Tracking	No Real Time Tracking
15	Two way communication	Only one way communication

10.4 System Integration

10.4.1 PIN Connection Diagram

The figure 10.3 shows the connection between different modules.

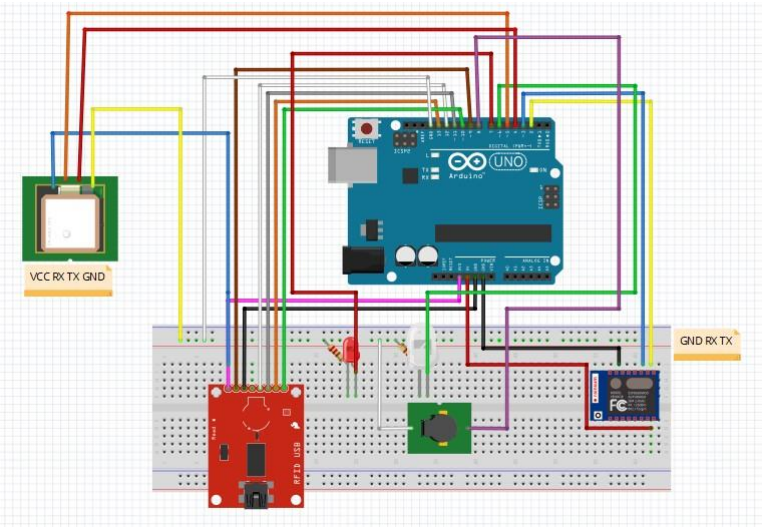

Figure 10.3: Pin connection diagram

10.4.2 Physical Connection Model

The figure 10.4 shows the different physical modules interconnected to show the end result.

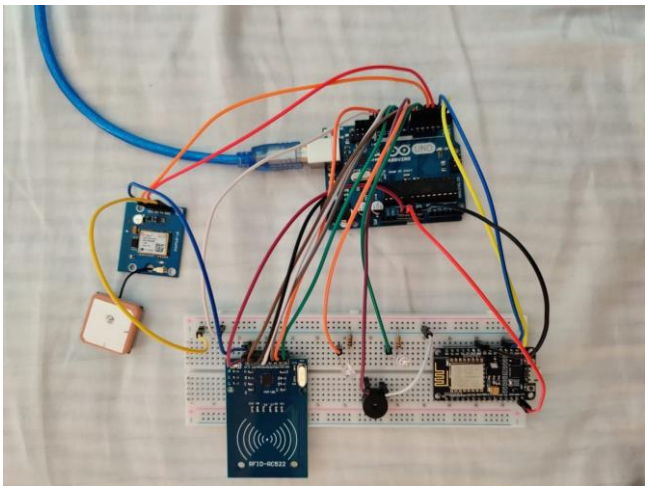

Figure 10.4: Physical connection model

10.4.3 PIN Connection Table

Table 10.2: **Pin connection between Arduino and RFID Scanner**

Arduino	RFID
3.3V	3.3V
9	RST
GND	GND
10	SDA
13	SCK
11	MOSI
12	MISO

Table 10.3: **Pin connection between Arduino and GPS**

GPS	Arduino
VCC	5V
RX	4
TX	3
GND	GND

Table 10.4: **Pin connection between Arduino and Light/Buzzer**

Light	Arduino
+ve RED	7
-ve RED	GND
+ve BLUE	6
-ve BLUE	GND
+ve Buzzer	8
-ve Buzzer	GND
negative side rail	GND

CHAPTER 11

CODING AND TESTING

11.1 RFID Arduino code

Listing 11.1: RFID Arduino code

```
#include <SPI.h>
#include<MFRC522.h>
#include <Ethernet.h>
#define card 3
MFRC522 rfid(10,9);
MFRC522::MIFARE_Key k;
byte arr[3][4]={
  {147,232,113,12},
  {151,94,80,84},
  {199,124,138,98}
};
byte t[3][3];
byte a;
int b=0;
int red = 7;
int blue = 6;
int buzzer = 8;

void setup() {

 Serial.begin(9600);
pinMode(blue,OUTPUT);
pinMode(red,OUTPUT);
```

```
pinMode(buzzer,OUTPUT);

Serial.println("please␣wait");
  SPI.begin();
  rfid.PCD_Init();
  for(byte a=0;a<6;a++)
  {
  }
     Serial.println("a␣Card␣is␣required␣-␣");
}

void loop()
{int n=0;

  if(!rfid.PICC_IsNewCardPresent())
  return;
  if(!rfid.PICC_ReadCardSerial())
  return;

  for(a=0;a<4;a++)
  {
   t[0][a]=rfid.uid.uidByte[a];
  }

   for(a=0;a<3;a++)
  {
          if(arr[a][0]==t[0][0])
          {
            if(arr[a][1]==t[0][1])
            {
              if(arr[a][2]==t[0][2])
              {
```

```
                if(arr[a][3]==t[0][3])
                {
                  Serial.println("Card␣detected:");
                  for(int c=0;c<4;c++)
                  {
                    Serial.print(rfid.uid.uidByte[c]);
                  }
  digitalWrite(red,HIGH);
  digitalWrite(buzzer,HIGH);
  delay(1000);
  digitalWrite(buzzer,LOW);
  digitalWrite(red,LOW);

                  send();
                  b=0;

rfidmethods();
return;
                }}}}
   else
   {b++;
    if(b==card)
    {
      Serial.println("Card␣has␣been␣connected:");
      for(int c=0;c<4;c++)
        {
          Serial.print(rfid.uid.uidByte[c]);
        }
   digitalWrite(blue,HIGH);
   delay(2000);
   digitalWrite(blue,LOW);
```

```
      Serial.print("␣");
      send();
      b=0;
    }
   }
  }
  rfidmethods();
 }

Void rfidmethods()
{
  rfid.PICC_HaltA();
  rfid.PCD_StopCrypto1();

}

 void Send()
 {
    if(b!=3)
    {
      Serial.print("Stolen");
    }
    else
    {
      Serial.print("Not_Stolen");
    }
 }
```

11.2 GPS Arduino code

Listing 11.2: GPS Arduino code

```
#include <TinyGPS++.h>
#include <SoftwareSerial.h>
TinyGPSPlus gps;
SoftwareSerial ss(5,4);

void setup()
{
  Serial.begin(115200);
  ss.begin(115200);
}

void loop()
{
  while (ss.available() > 0)
    if (gps.encode(ss.read()))
      In();

  if (millis() > 5000 && gps.charsProcessed() < 10)
  {
    Serial.println("No␣GPS␣detected:␣check␣wiring.");
    while(true);
  }
}


//To show Location
void In()
{
  Serial.println("Current␣Location:␣");
```

```
  if (gps.location.isValid())
  {
    Serial.print("Latitude:␣" +gps.location.lat() +",␣Longitude:"+
  }
  else
  {
    Serial.println("INVALID");
  }


//To show Date
  Serial.print("Date:␣");
  if (gps.date.isValid())
  {
    Serial.print(gps.date.day() + "/" +
gps.date.month()+"/"
 gps.date.year());
  }
  else
  {
    Serial.println("INVALID");
  }


//To show time
  Serial.print("Time:␣");
if (gps.time.isValid())
  {
    if(gps.time.minute() <= 29)
    {
    Serial.print((gps.time.hour() + 5)+
":"+
```

```
(gps.time.minute() + 30 )+
":" +
 gps.time.second());
    }
    else
{
Serial.print((gps.time.hour() + 6)+
":"+
(gps.time.minute() - 30 )+
":" +
gps.time.second());
    }
  }
  else
  {
    Serial.println("INVALID");
  }
Serial.println("---------------------------------");
delay(5000);
}
```

11.3 Python SQL Connection

Listing 11.3: Python MySQL connection

```
import serial
import MySQLdb
import time

dbConn = MySQLdb.connect("localhost","user","","rfiddatabase") or die
k = dbConn.cursor()

dev = 'COM3'
try:
  print "Trying...",dev
  arduino = serial.Serial(dev, 115200)
except:
  print "Failed␣to␣connect␣on",dev
while True:
    time.sleep(1)
    try:
        d=arduino.readline()
        print d
        pieces=d.split("␣")
        try:
            j=dbConn.cursor()
            j.execute("""INSERT␣INTO␣intersection1␣(ID,INTERSECTION_A
            dbConn.commit()
            cursor.close()
            print "failed␣to␣insert␣data"
        finally:
            j.close()
    except:
        print "waiting␣and␣prcocessing"
```

11.4 Database setup

1. Download and setup the XAMPP server
2. Start MYSQL module from the XAMPP control panel
3. Start Apache module from the XAMPP control panel
4. Go to Localhost or 127.0.0.1 on any local browser
5. Select new database option from the menu
6. Create the database as - rfiddatabase
7. Select new table option in the created database
8. Create the table -intersection1
9. Select the number of columns in the created table
10. Give name to all the columns and select the Datatype
11. The different fields will be:ID, intersectionAddress, RfidNumber, Status, Nearest-Police, Time
12. Click ok
13. Create the table - stolenvehicleinfo
14. Select the number of columns in the created table
15. Give name to all the columns and select the Datatype
16. The different fields will be:OwnerName, ContactInfo, RfidNumber, VehicleNumber, Status
17. Write SQL commands to join the table and get the output
18. Run the Python script after running the arduino code
19. This will connect the Serial ouput monitor with the database
20. To get a particular output we can write any query by selecting a particular table.
21. Click on 'Refresh' to update the database

11.5 MySQL Query

Listing 11.4: SQL Query

```
SELECT a.OWNER_NAME,
a.CONTACT_INFO,
a.VEHICLE_NUMBER,
a.RFID_NUMBER,
i.STATUS,
i.INTERSECTION_ADDRESS,
i.NEAREST_POLICE,
i.TIME
FROM intersection1 i
JOIN availablevehicleinfo a
where i.RFID_NUMBER = a.RFID_NUMBER
```

CHAPTER 12

RESULT AND OUTPUT

12.1 PHPmyADMIN Database

Open the XAMPP Control Panel

Start the Apahe Module

Start the MySQL Module

Check the Ports

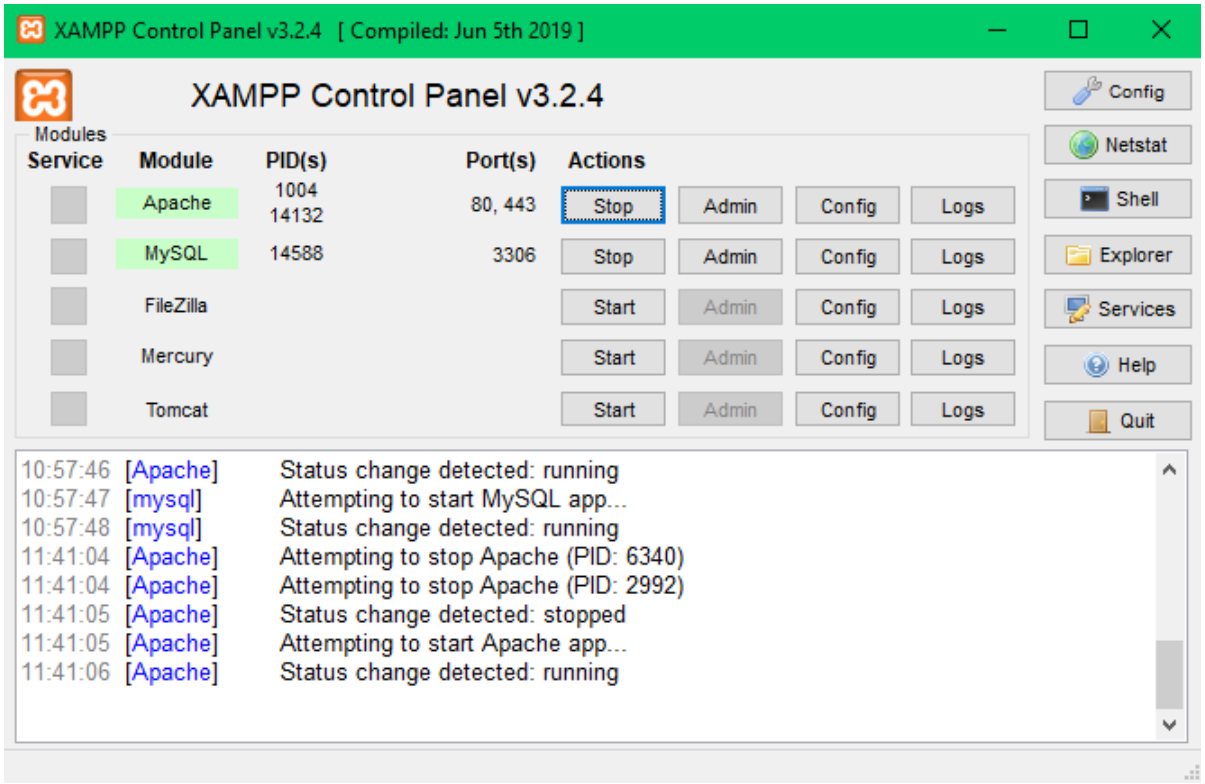

Figure 12.1: xampp control panel

Create the database - **rfiddatabase**

Create the table - **intersection1**

Create different fields like:

1. ID
2. INTERSECTIONADDRESS
3. RFIDNUMBER
4. STATUS
5. NEARESTPOLICE
6. TIME

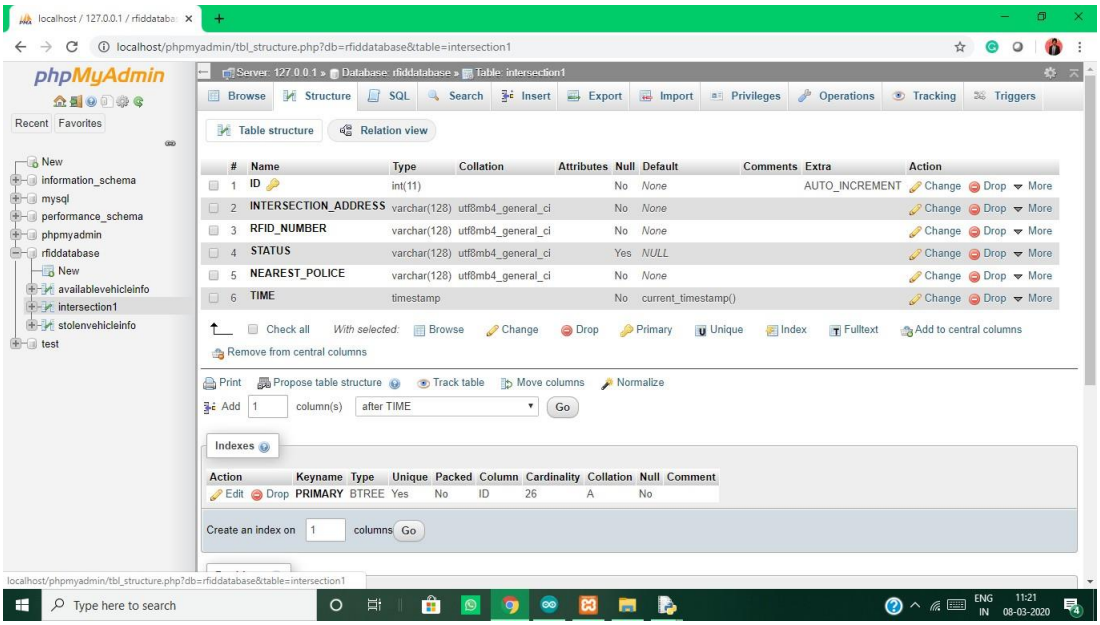

Figure 12.2: Table 1 intersection

Create the table - **stolenvehicleinfo**

Create different fields like:

1. OWNERNAME
2. CONTACTINFO
3. RFIDNUMBER
4. VEHICLENUMBER
5. STATUS

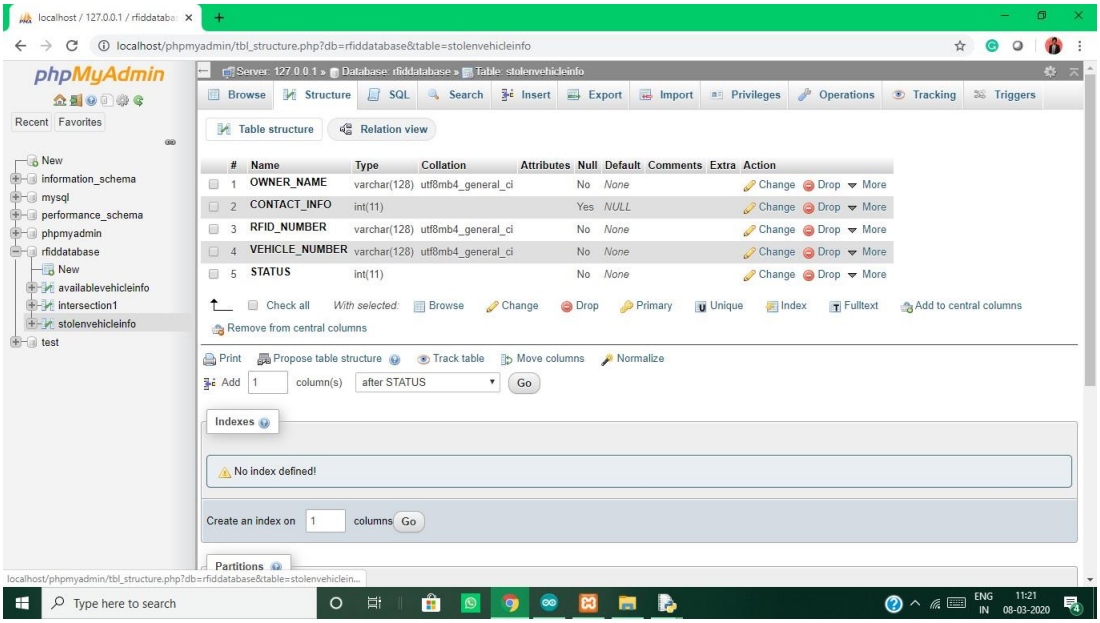

Figure 12.3: Table 2 Stolen vehicle info

The result window in fig 12.4 gives the output of different RFID numbers of all the vehicles crossing the intersection.

We need to click on ’Refresh’ if the tags are used and the changes are not updated in the database. We can use any query to get a particular desired output.

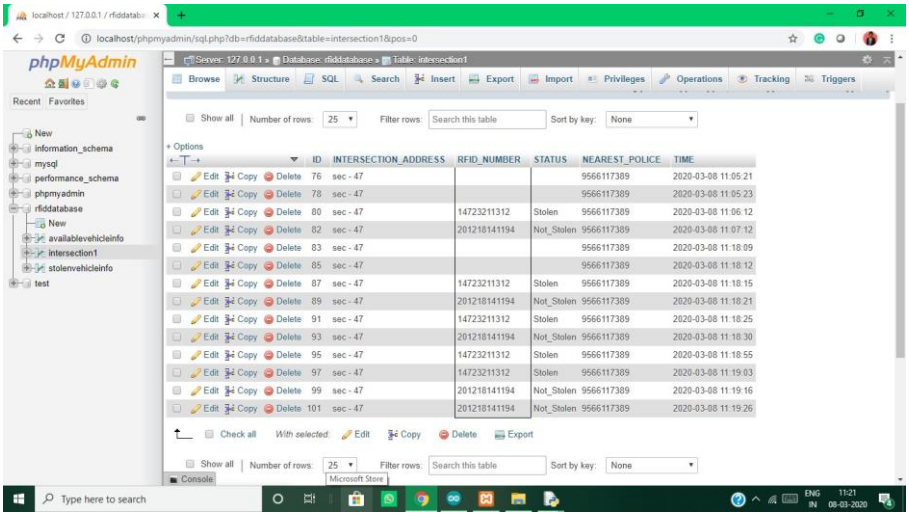

Figure 12.4: Database output storage

```
SELECT a.OWNER_NAME,
a.CONTACT_INFO,
a.VEHICLE_NUMBER,
a.RFID_NUMBER,
i.STATUS,
i.INTERSECTION_ADDRESS,
i.NEAREST_POLICE,
i.TIME
FROM intersection1 i
JOIN availablevehicleinfo a
where i.RFID_NUMBER = a.RFID_NUMBER
```

12.2 GPS output

At first, The gps will take some time to get a connection between gps antenna and the satellite. This time can be anywhere between 30 sec to 30 min. This will be known as the time for the gps to get hot.

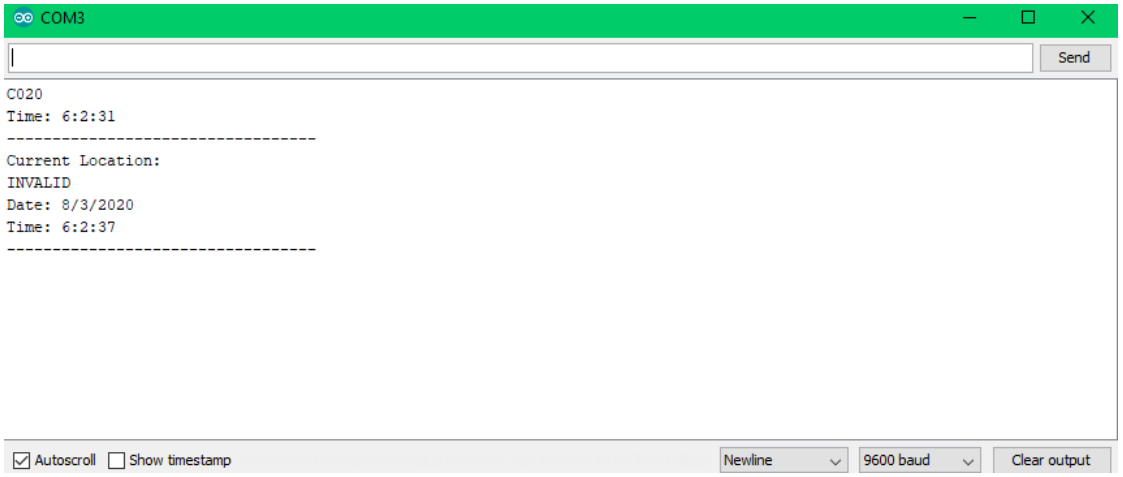

Figure 12.5: GPS Connection

Now the GPS will give the location to the user every 10 sec. This location will never be exact and will be in the radius of +15m to -15m. If the line of sight is broken between the gps antenna and the satellite then the location will not be updated.

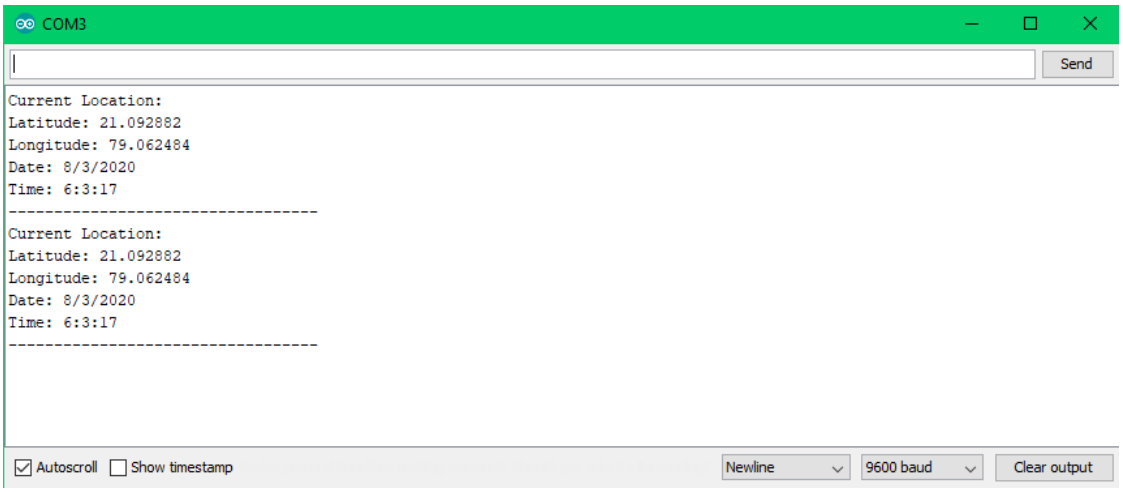

Figure 12.6: GPS location

12.3 Python user input/output

The python will connect the output of the serial monitor to the Database.

Every user dialogue will be shown in the python shell.

It will also show whether the system is connected or not

It will check the arduinos connection to the server laptop at the particular port.

First it will check if the database is responding and connected to the Python script.

At the end it will prompt the user to connect a card.

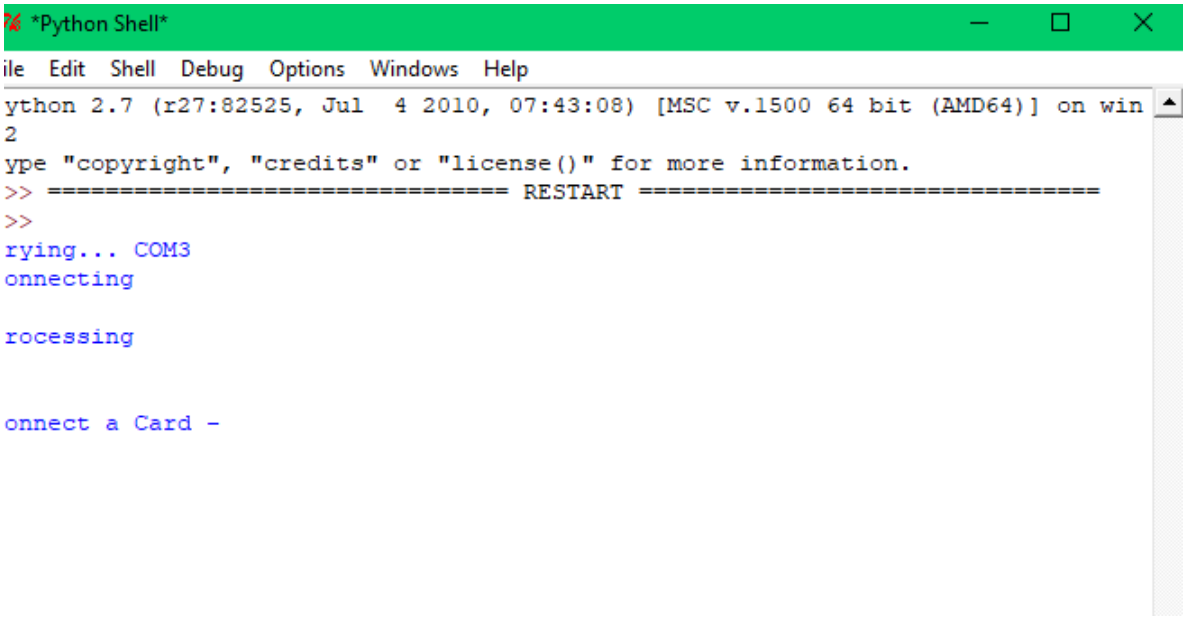

Figure 12.7: User input and connection

The output will be shown in a new window which will show whether the RFID tag is stolen or not

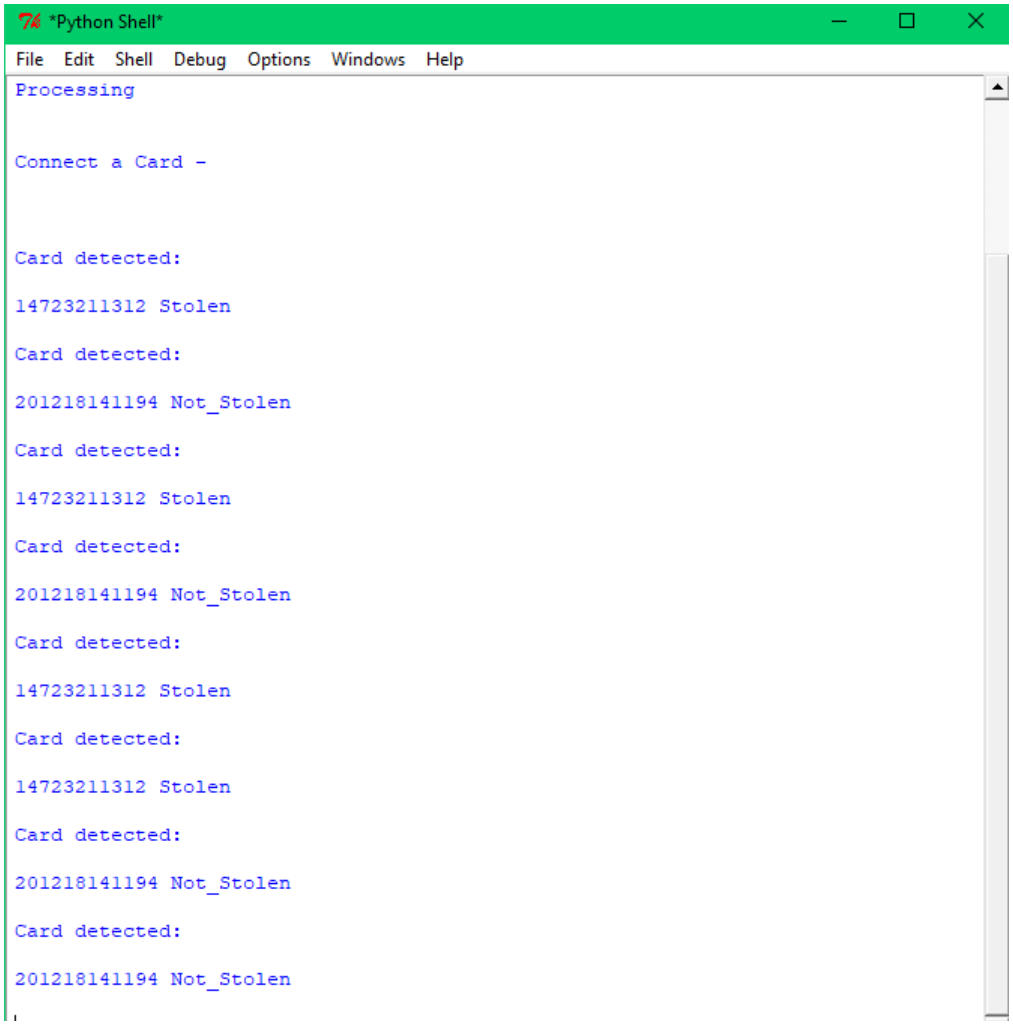

Figure 12.8: Output

12.4 Physical output

The BLUE light in fig 12.9 specifies that the vehicle is not stolen and hence no action needs to be taken.

In the database the information will be upadated as the current RFID tag and NOT-STOLEN.

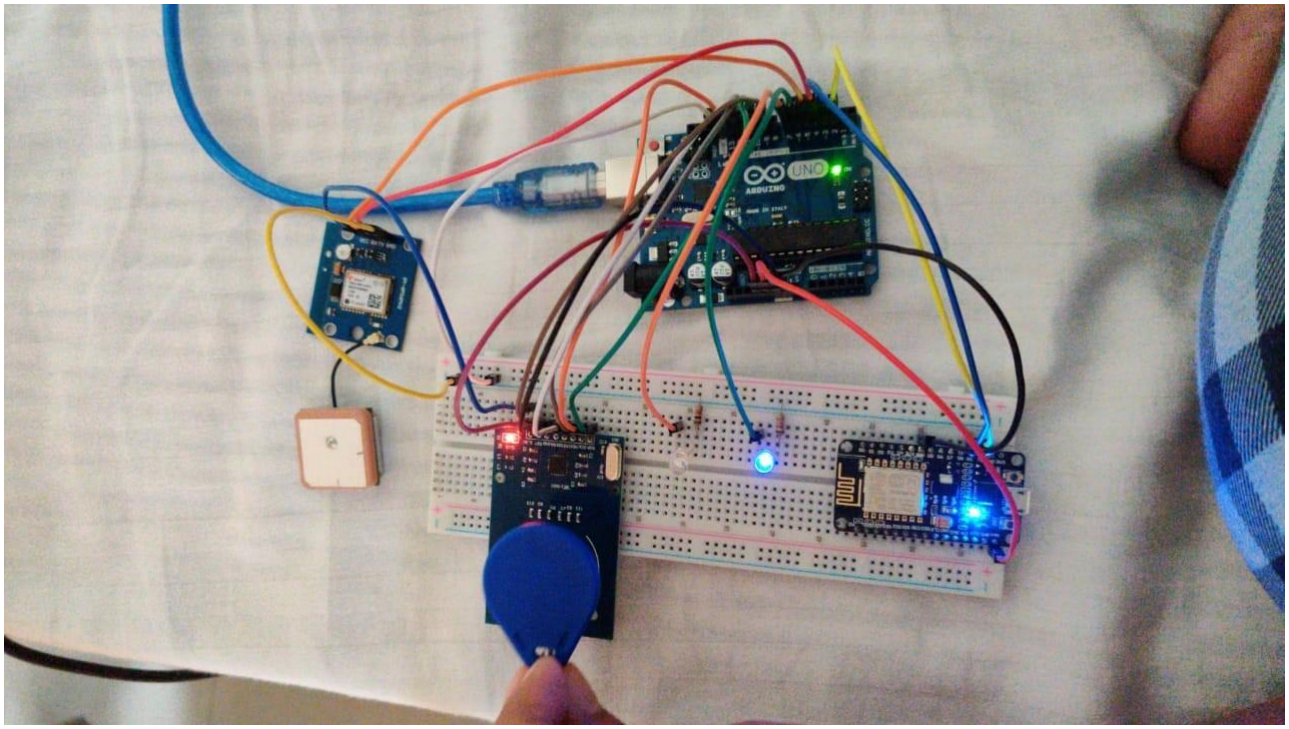

Figure 12.9: Blue light specifies vehicle not stolen

The RED light in fig 12.10 specifies that the vehicle is stolen and an action needs to be taken.

In the database the information will be upadated as the current RFID tag and STOLEN.

The buzzer will also produce a sound which will help the authorities.

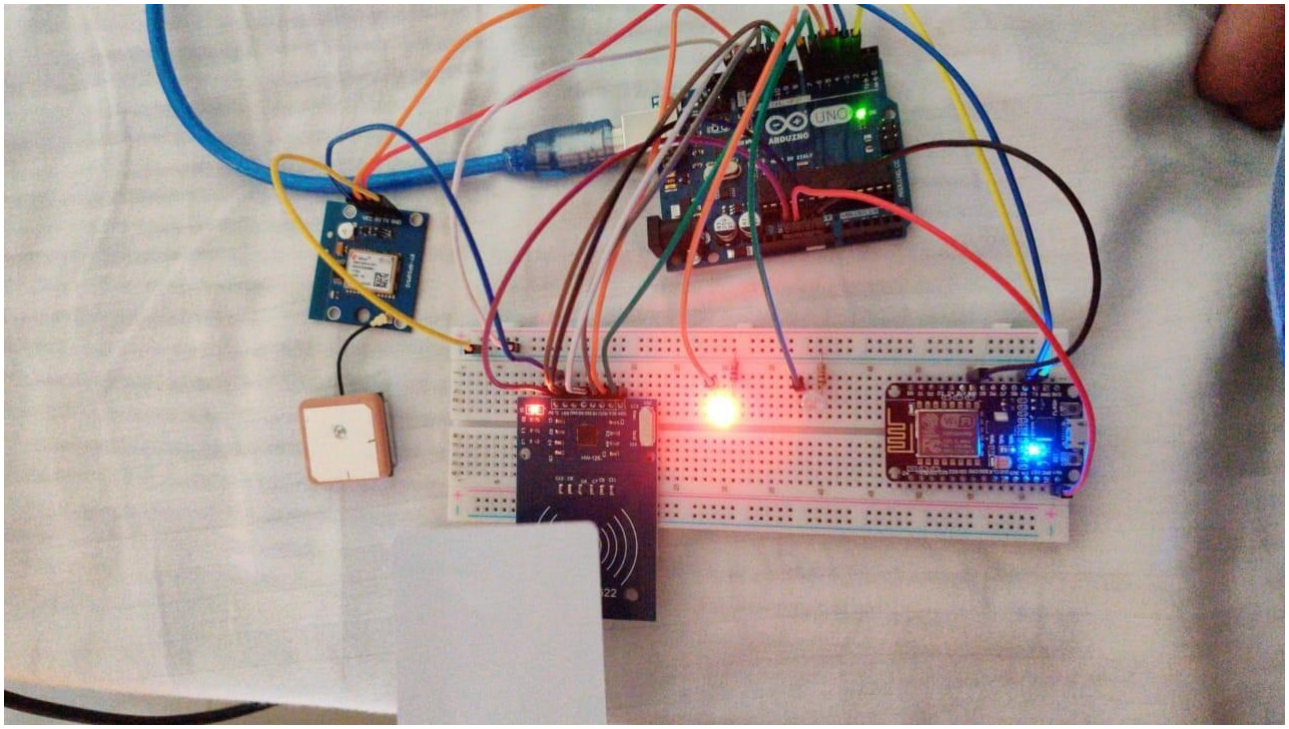

Figure 12.10: Red light and buzzer sound specifies vehicle stolen

CHAPTER 13

CONCLUSION

The proposed paper discusses the growth of the urban population in the cities and its effect on traffic congestion and theft in cities. The recent strides in the technologies have paved the way to break the lock and make it easy to steal a vehicle. Therefore, a system that lets the owner monitor the vehicle at any time and live to stream the vehicle's location and update it periodically has become a real necessity. An efficient system is proposed with the implementation of Database, GPS, RFID attached to an Arduino, supported by IoT. The architecture of the proposed system is described along with supervised learning which will be used to determine the attributes of the stolen vehicle database and how the data is stored and passed to the concerned authorities. This system if once implemented would, therefore, help the authorities in metropolitan cities by giving timely updates about the last known position of the vehicle, help in the improvement of the database of vehicles and give a way to deal with any misfortunes.

CHAPTER 14

FUTURE ENHANCEMENT

The major enhancements which can be done to this project can include:-

1.Publishing a proprietary app for directly sharing the information to the police.

2.Use of high-cost cameras instead of the scanners.

3.Use of fastags so that a database of information is kept directly with the government.

4.Use of tags that are incorporated in the license plate.

REFERENCES

1. Amutha, B. and Ponnavaikko, M. (2009). “Location update accuracy in human tracking system using zigbee modules.

2. Avadhani, A. and Vanjale, M. (2017). “Iot based dynamic road traffic management for smart cities.” *Journal of Advanced Research in Dynamical and Control Systems*.

3. Dukare, S. S., Patil, D. A., and Rane, K. P. (2015). “Vehicle tracking, monitoring and alerting system.” *International Journal of Computer Applications*, 119(10), 39–44.

4. Janahan, S. K., Veeramanickam, M. R., Arun, S., Narayanan, K., Anandan, R., and Parvez, S. J. (2018). “Iot based smart traffic signal monitoring system using vehicles counts.” *International Journal of Engineering and Technology*.

5. Javaid, S., Sufian, A., Pervaiz, S., and Tanveer, M. (2018). “Smart traffic management system using internet of things. 393–398.

6. K.Kanimozhi, D.Mukesh, and M.Ashok (2017). “An iot based approach for vehicle theft detection.” *Global Research and Development Journal for Engineering*.

7. Maurya, K., Singh, M., and Jain, N. (2012). “Real time vehicle tracking system using gsm and gps technology-an anti-theft tracking system.” *International Journal of Electronics and Computer Science Engineering. ISSN*, 22771956, V1N3–1103.

8. Nagmode, V. S. and Rajbhoj, S. M. (2017). “An iot platform for vehicle traffic monitoring system and controlling system based on priority.” *2017 International Conference on Computing, Communication, Control and Automation (ICCUBEA)*. 1–5.

9. Naren, J. (2009). “Sensor – based dead rockening for land vehicle navigation system.” *International Journal of Recent Trends in Engineering*, Volume - 1, 231–234.

10. Talukder, M. Z., Towqir, S. S., and andHasan U. Zaman, A. R. R. (2017). “An iot based automated traffic control system with real-time update capability.” *IEEE*.

11. Tanna, P., Preeti, K., and Shubha, N. (2010). “Instant theft alert and tracking system in car.” *International Journal of Computer Applications*, 1.

12. Telang, S. and Terdal, S. (2016). “An internet of things based real time traffic light control to reduce vehicles co2 emissions.” *International Research Journal of Engineering and Technology (IRJET)*.

13. Vardhana, M., Arunkumar, N., Abdulhay, E., and Vishnuprasad, P. V. (2018). “Iot based real time trafic control using cloud computing.” *IEEE*.

14. Venkatraman, K., Karthick, Amutha, B., and Sankar, S. R. (2010). “A hybrid method for improving gps accuracy for land vehicle navigation system.” *INTERACT-2010*. 74–79.

15. Widyantara, I. M. and Elektro, M. I. (2015). “Internet of things for intelligent traffic monitoring system: A case study in denpasar.” *International Journal of Computer Trends and Technology*, 30, 169–173.

APPENDIX A

A.1 Code for RFID-Arduino

```
#include <SPI.h>
#include<MFRC522.h>
#include <Ethernet.h>

#define SS_PIN 10
#define RST_PIN 9
#define No_Of_Card 3


MFRC522 rfid(SS_PIN,RST_PIN);
MFRC522::MIFARE_Key key;
byte id[No_Of_Card][4]={
  {147,232,113,12},
  {151,94,80,84},
  {199,124,138,98}
};
byte id_temp[3][3];
byte i;
int j=0;
int red = 7;
int blue = 6;
int buzzer = 8;

void setup() {

 Serial.begin(9600);
pinMode(blue,OUTPUT);
pinMode(red,OUTPUT);
pinMode(buzzer,OUTPUT);

Serial.println("Connecting");
Serial.println(" ");
  SPI.begin();
  rfid.PCD_Init();
```

```
for(byte i=0;i<6;i++)
{
 key.keyByte[i]=0xFF;
}
   Serial.println("Connect a Card - ");
   Serial.println(" ");
}

void loop()
{int m=0;

if(!rfid.PICC_IsNewCardPresent())
return;
if(!rfid.PICC_ReadCardSerial())
return;

for(i=0;i<4;i++)
{
 id_temp[0][i]=rfid.uid.uidByte[i];
        delay(50);
}

 for(i=0;i<No_Of_Card;i++)
 {
      if(id[i][0]==id_temp[0][0])
      {
       if(id[i][1]==id_temp[0][1])
       {
        if(id[i][2]==id_temp[0][2])
        {
         if(id[i][3]==id_temp[0][3])
         {
           Serial.println("Card detected:");
```

```
          {
           if(id[i][3]==id_temp[0][3])
           {
            Serial.println("Card detected:");
            for(int s=0;s<4;s++)
            {
             Serial.print(rfid.uid.uidByte[s]);
            }
digitalWrite(red,HIGH);
digitalWrite(buzzer,HIGH);
delay(1000);
digitalWrite(buzzer,LOW);
digitalWrite(red,LOW);

             Serial.print(" ");
            Sending_To_db();
            j=0;

                  rfid.PICC_HaltA(); rfid.PCD_StopCrypto1();   return;
          }
         }
        }
       }
 else
 {j++;
 if(j==No_Of_Card)
 {
  Serial.println("Card detected:");
  for(int s=0;s<4;s++)
    {
     Serial.print(rfid.uid.uidByte[s]);
    }
 digitalWrite(blue,HIGH);
 delay(2000);


 digitalWrite(blue,LOW);

   Serial.print(" ");
   Sending_To_db();
   j=0;
 }}}
rfid.PICC_HaltA();
rfid.PCD_StopCrypto1();
}
void Sending_To_db()
{
  if(j!=No_Of_Card)
  {
   Serial.print("Stolen");
   Serial.println(" ");
  }
  else
  {
   Serial.print("Not_Stolen");
   Serial.println(" ");
  }
}
```

A.2 Code for GPS-Arduino

```
#include <TinyGPS++.h>
#include <SoftwareSerial.h>

static const int RXPin = 4, TXPin = 5;
static const uint32_t GPSBaud = 9600;

TinyGPSPlus gps;

SoftwareSerial ss(TXPin,RXPin);

void setup()
{
  Serial.begin(9600);
  ss.begin(GPSBaud);
}

void loop()
{
  while (ss.available() > 0)
    if (gps.encode(ss.read()))
      displayInfo();

  if (millis() > 5000 && gps.charsProcessed() < 10)
  {
    Serial.println(F("No GPS detected: check wiring."));
    while(true);
  }
}


//To show Location
void displayInfo()
{
  Serial.println("Current Location: ");


  if (gps.location.isValid())
  {
    Serial.print("Latitude: ");
    Serial.println(gps.location.lat(), 6);
    Serial.print("Longitude: ");
    Serial.println(gps.location.lng(), 6);
  }
  else
  {
    Serial.println(F("INVALID"));
  }


//To show Date
  Serial.print("Date: ");
  if (gps.date.isValid())
  {
    Serial.print(gps.date.day());
    Serial.print("/");
    Serial.print(gps.date.month());
    Serial.print("/");
    Serial.println(gps.date.year());
  }
  else
  {
    Serial.println("INVALID");
  }


//To show time
  Serial.print("Time: ");
if (gps.time.isValid())
  {
```

```
  Serial.print("Time: ");
if (gps.time.isValid())
  {
   if(gps.time.minute() <= 29)
   {
   Serial.print(gps.time.hour() + 5);
   Serial.print(":");
   Serial.print(gps.time.minute() + 30 );
   Serial.print(":");
   Serial.println(gps.time.second());
   }
   else
   {
   Serial.print(gps.time.hour() +6);
   Serial.print(":");
   Serial.print(gps.time.minute() - 30 );
   Serial.print(":");
   Serial.println(gps.time.second());
   }
  }
  else
  {
   Serial.println("INVALID");
  }
Serial.println("-----------------------------------");
delay(5000);
}
```

A.3 Code for Python SQL

```
import serial
import MySQLdb
import time

#Connection to the database.
dbConn = MySQLdb.connect("localhost","root","","rfiddatabase") or die ("could not connect to database")

#cursor to the database.
cursor = dbConn.cursor()

device = 'COM3'
try:
  print "Trying...",device
  arduino = serial.Serial(device, 9600)
except:
  print "Failed to connect on",device
while True:
    time.sleep(1)
    try:
        data=arduino.readline()
        print data
        pieces=data.split(" ")
        try:
            cursor=dbConn.cursor()
            cursor.execute("""INSERT INTO intersection1 (ID,INTERSECTION_ADDRESS,RFID_NUMBER,STATUS,
NEAREST_POLICE) VALUES (NULL,%s,%s,%s,%s)""", ("sec - 47 ",pieces[0],pieces[1],"9566117389"))
            dbConn.commit()
            cursor.close()
        except MySQLdb.IntegrityError:
            print "failed to insert data"
        finally:
            cursor.close()
    except:
        print "Processing"
```

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7	Title of the Dissertation/Project	IoT based stolen vehicle monitoring system
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7	SCOPE AND PROPOSED SYSTEM	0	<1	0
8	SYSTEM REQUIREMENTS AND DESIGN	1	<1	<1
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CHAPTER 15

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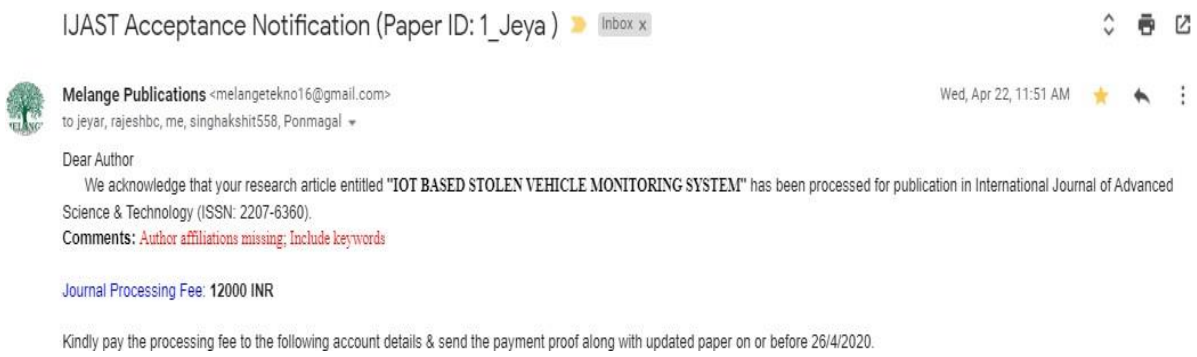

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Iot Based Stolen Vehicle Monitoring System

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Abstract

The current transportation system is not ready to adapt to the growing problem of stolen vehicles. This paper aims to propose a stolen vehicle monitoring system that uses vehicle-mounted RFID tags for STOLEN VEHICLE DETECTION. This paper uses a technique to take care of the issue of stolen vehicles using a database of the last known location of the vehicle and cross-reference the owner's information present in the system. Our system provides an easy platform to improve the maintenance of the database of stolen vehicles that the management system gathers. This information from various traffic light intersections is collected and problem area lanes are red-lit in case of a stolen vehicle is detected using an RFID tag reader. The Arduino board is connected to a GSM module which will be used to establish a connection to the local server where the database will be hosted from. The final information of the vehicle will be sent to the owner and the concerned authorities.

Keywords: *RFID, GPS, GSM*

Introduction

Internet of Things (IoT) is the technology that states that soon all the physical devices will be interworking and be connected via the internet. As the interworking of physical devices with the Internet gets more prominent day by day, these interworking devices can integrate themselves with other devices to successfully carry out the operation. The operation of self-driving cars is rising sharply and is being talked about as the next big thing in the transport industry. This change in the transport ecosystem requires a method to keep account of all the cars which are working autonomously on the streets.

A traffic system typically consists of four lanes. This vehicle monitoring system can be found in private vehicles as a vehicle monitoring and updating system. Police officials can follow the information and updates given by the tracking system to locate the vicinity in which the stolen vehicle was last seen. Generally, this system is meant to locate customer-owned vehicles which makes it easier for the police officials to roughly track the area in which the vehicle is present.

Vehicle monitoring systems are popular in privately owned vehicles as loss prevention, management, and retrieval device. Police can simply follow the regular updates given by the system and locate the area in which the stolen vehicle was last seen.

There are several components such as Wi-Fi mmodule, RFID tag and scanner, Arduino, local Database through various applications like phpMyAdmin served through a xampp server.

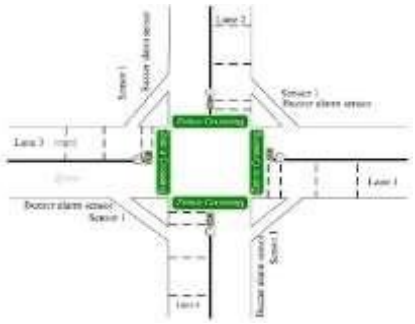

Figure 1. Proposed Implementation

Problem Definition

The problem statement of the proposed project is that if the vehicle has been stolen, the owner will not be able to track their vehicle using the traditional methods as they are not efficient and do not produce

results. They will have no idea where to look for the vehicle and the chance of getting back their vehicle will be very minuscule. In 2015, the country reported 211 million registered motor vehicles with a major portion of these vehicles registered in the metropolitan area.

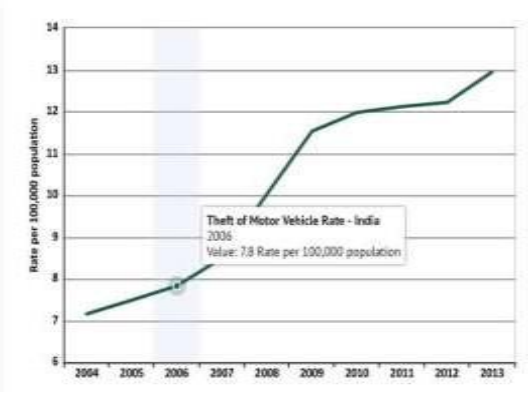

Figure 2. Graph suggesting rise in theft over the years

It makes the tracking of the vehicle very hard when no evidence is available to track the vehicle. So, this system will help track and give regular updates about the movement of the vehicles to the authority. The proposed system works on the principle that once the vehicle has been reported stolen and a FIR has been lodged, the RFID tag number will be stored in a database with the owner's current contact information on which the messages will be sent in case the vehicle's tag number is read. This database where the information about the stolen vehicle is stored is hosted on the local server. when the RFID tag is read for a stolen vehicle then the information is first checked with the database. If there is a match with one of the entries in the database, then a notification of the address of the junction is forwarded to the owner and the concerned authorities and the lights of the junction are changed to red and the nearest local police will be notified.

Objectives

- To improve the communication of stolen vehicles to the concerned authorities.
- Improving the planning techniques to reduce the overall delay which helps us in providing robust and resilient timetables to the traffic board room.
- To improve the methodology of providing real-time information to traffic controllers.
- Devising new plans to use the database information much more effectively.
- It can also be used by goods dispatchers for functions such as tracking of goods, changes in routes, dispatching of items, information regarding the delay, and security.
- Authorities can follow the regular updates given by the database system and help triangulate the area in which the stolen vehicle is present.
- Insurance companies need to track the movement of vehicles for reimbursement of insurance.
- It helps different companies plot and use the location to closely monitor operation status.

Current System

The current system for the stolen vehicle system depends upon the owner of the vehicle to go and make a FIR. After the complaint had been lodged, the police start looking at all the possible CCTV cameras to see all the possible places where the vehicle could be seen and placed. Then it is up to the police to make queries and work with the local population to start making rounds of the workshops. If the vehicle is not recovered the vehicle is then added to the NCRB or the National Crime Records Bureau and the owner, as well as the insurance company, is intimated. Once the information is added then it is a matter of time, once the authorities track down the VIN of the vehicle registered to the owner. Once the vehicle is confiscated then after checking the insurance information the vehicle is returned to the owner.

Scope

The conventional methods are very archaic for reporting real-time problems to the authorities. More economically efficient and hence more effective methods must be developed to deal with the growing problem of vehicle theft. Due to the increase in the number of vehicles, it is necessary to take useful steps to control the traffic and therefore avoid all types of problems that occur in the notification of the updates to the authority. To provide a means of updating the authority of changes to the database that allows them to use the information stored in the database more effectively. The scope helps by providing a way to catalogue the problems and provide a method to the traffic board to maintain the database of all the stolen vehicles and hence provide a way to communicate the information between the different parties. Regular updates will store information about the last location of the vehicle in the database. This will help gather information about the problem areas and help develop ideas to deal with it.

List of Symbols and Abbreviation

IoT	-	Internet of Things
GSM	-	Global System for Mobile
LED	-	Light Emitting Diode
GUI	-	Graphical User Interface
DB	-	Database
RFID	-	Radio Frequency Identification
UART	-	Universal Asynchronous Receiver/Transmitter

Proposed System

The proposed system works on the principle that once the vehicle has been reported stolen and a FIR has been lodged, the RFID tag number will be stored in a database. This database where the information about the stolen vehicle is stored is hosted on the local server. When the RFID tag is read for a stolen vehicle then the information is first checked with the database. If there is a match with one of the entries in the database then a notification of the address of the junction is forwarded to the owner and the concerned authorities and the lights of the junction are changed to red. Otherwise, nothing happens and the traffic cars are allowed to move through the junction and the signal of the junction remains green. Finally, a notification to the local police will be forwarded if the vehicle is not spotted in the region for more than 24 hours. In the end, the last known location of the junction where the vehicle's RFID tag was read will be stored in the database which can be used and brought into consideration into the investigation later.

Flow Diagram

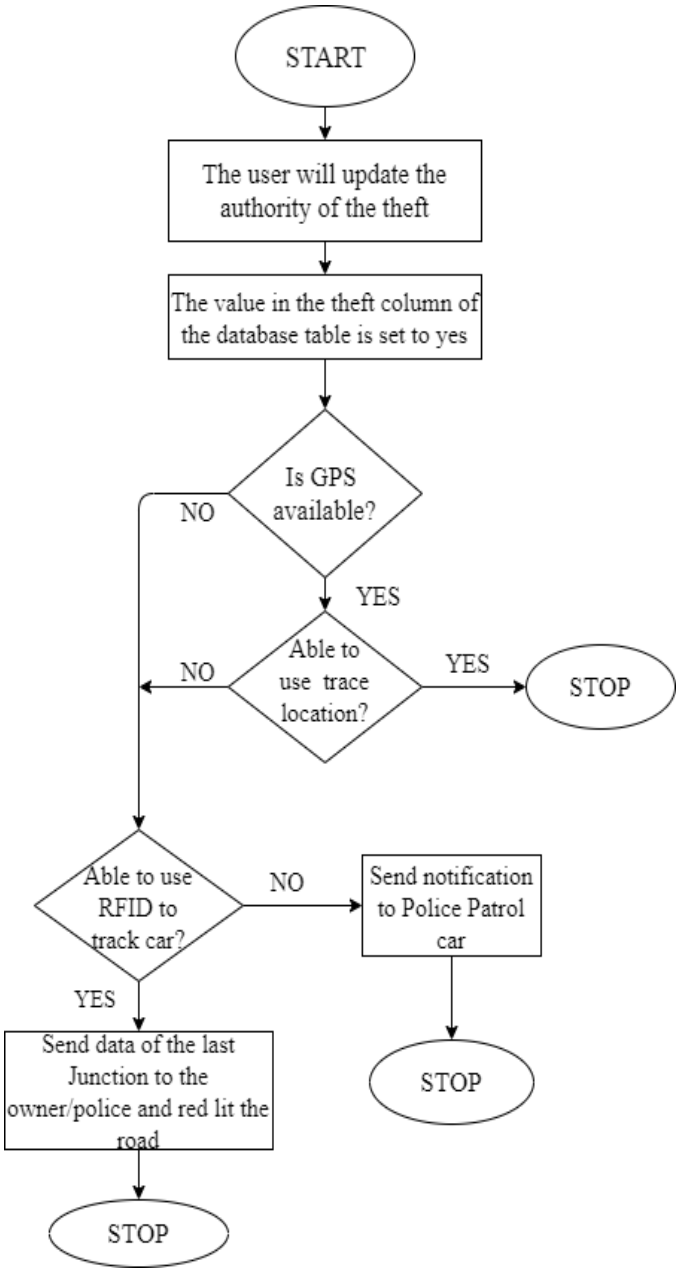

Figure 3. Flow of the project

Components

The proposed system consists of two major components: An RFID tag that is mounted on the vehicle and scanners at the various intersections to read the uid of the tag. These RFID scanners transfer data to various data farms that read the data of the RFID tags which are mounted on the vehicles and transmit the signals of each vehicle using RFID reader to a database using a Wi-Fi module. The administrators can interact with the system using the Wi-Fi module connected to the Arduino and alert can simply be notified to the concerned authorities.

Database

The database is systematic logging and collection of data. It help us in easily manipulating the data. It makes the job of the operand easy. It is a collection of programs and functions which enables its operand

to use the database, change the data, represent the data in a tabular format for easy manipulation. It to reduce the errors which occur during updating of data and increases the consistency and atomicity the data. It helps maintain greater data integrity and independence from the different application programs which depend upon the database.

WIFI Module

A Wi-Fi module that will be attached to an Arduino board is a chip or circuit that will be used to establish communication between a mobile device with a camera sensor and a database system. A modem is an external equipment, whereas the ethernet shield is an internal module that can be integrated within an equipment. It can be an embedded piece of hardware that can fit on an Arduino board.

RFID

An RFID system consists of two main components- an RFID tag that is attached to an object whose information needs to be scanned, and an RFID scanner that will share the information which is connected to a database. The RFID tag will generate an electromagnetic field in its omnipresent direction hoping for the reader to catch it which will read the signal and use it to connect to the tag.

Arduino

Arduino is an electronic platform that is used to develop physical projects which the user can themselves program and run. Arduino is made up of a programmable circuit board and an IDE that on a computer and will be used to compile the code and upload it directly to the physical board. can interact with physical objects starting from but not limited to buttons, Wi-Fi, GPS, screens, speakers, ethernet shield, cameras, with a simplified form of c++ and python which are used to upload the code and control the physical board.

GPS

GPS or a global positioning system is a system of about 30 satellites all of which are orbiting the earth. Atleast 4 satellites are visible at any given point. It provides the geolocation and other information to any receiver. It is free to use the gps but requires a straight line of sight with the satallite.

Related Works

Kunal Maurya, Mandeep Singh, and Neelu Jain devised an electronic device which is installed in a vehicle that enables the owner to track the vehicle's location. It uses both GPS and GSM modules to locate the location and transfer the information.

Senthil Kumar and Kumar Narayanan proposed a model that helps maintain the timing interval the traffic signal at an intersection. This system purely depends on the number of vehicles on that road. The model will be able to determine the required timing when the inputs to the systems signal which is the vehicle count.

Aditi Avadhani proposed a framework that has been intended to remove the weakness in the of the traffic system by doing system analysis. The framework gives data about road/street blockage also gives the ability to control the stream of traffic and help maintain a system for emergency to practice crisis exit.

Sabeen Javaid, Ali Sufian proposed the system that takes traffic density as input from cameras and sensors, then manages traffic signals. Another algorithm based on Artificial Intelligence is used to predict the traffic density for the future to minimize traffic congestion.RFIDs are also used to emergency vehicles such as ambulances and fire brigade vehicles during a traffic jam.

Mehal Zaman Talukder and Sheikh Shadab Towqir proposed a system where ultrasonic sensors are integrated with the Raspberry Pi to operate the lanes of an intersection based on the density of traffic with real-time update capability.

System Architecture

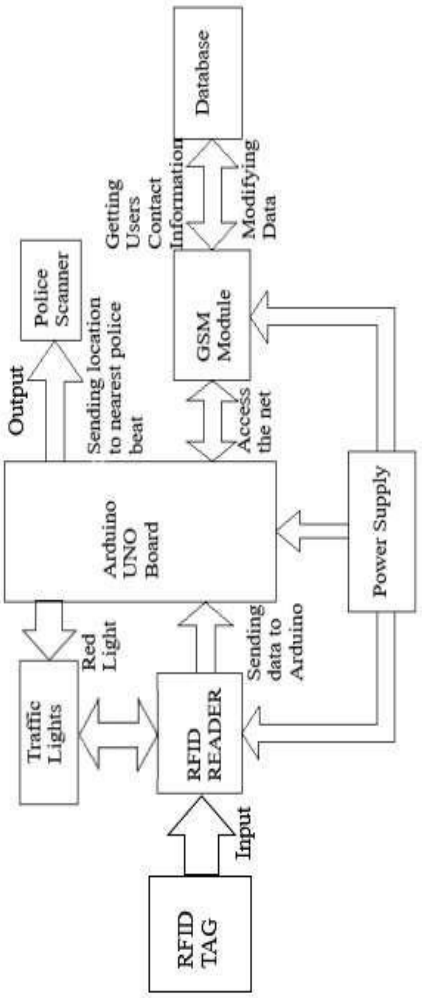

Figure 4. System Architecture

Comparison between GPS and RFID

S no.	GPS	RFID
1	Uses signal from low-power satellite signals	Uses RF Signals
2	Signal processors are power hungry	Works with low power as well
3	Data transmission is power hungry	Data transmission is not very power hungry
4	Requires use of battery	Low use of battery
5	Expensive even when bought in large numbers	Inexpensive when bought in large numbers
6	Long range	Short range
7	Medium to Large in size	Size depends upon application
8	Large amount of latency	Very low Latency
9	Accuracy increases with price	Moderate accuracy
10	Satellite and mobile GPS	Active and Passive RFID
11	Need data connection	Does not need data connection
12	Can be encrypted and secure	Always encrypted and secure

13	Can provide alerts at regular intervals	Alerts depend upon scanner
14	Real Time Tracking	No Real Time Tracking
15	Two way communication	Only one way communication

Results and Discussions

Phpmyadmin Database

Figure 5. XAMPP Control Panel

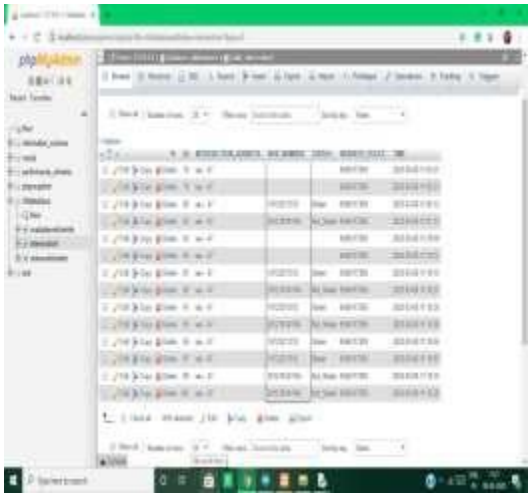

Figure 6. Database output storage

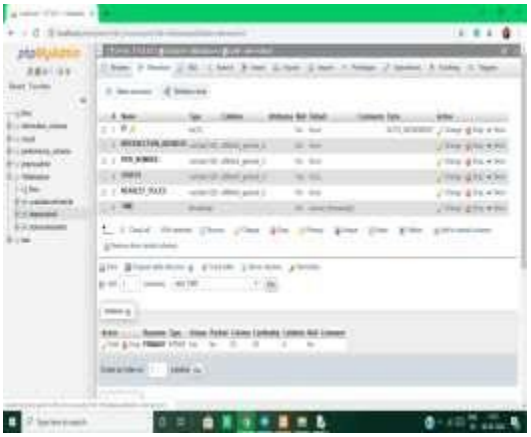

Figure 7. Database table intersection

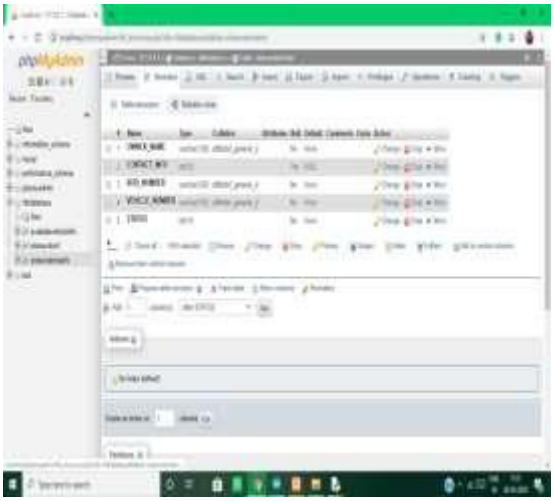

Figure 8. Database table OWNER_INFO

GPS

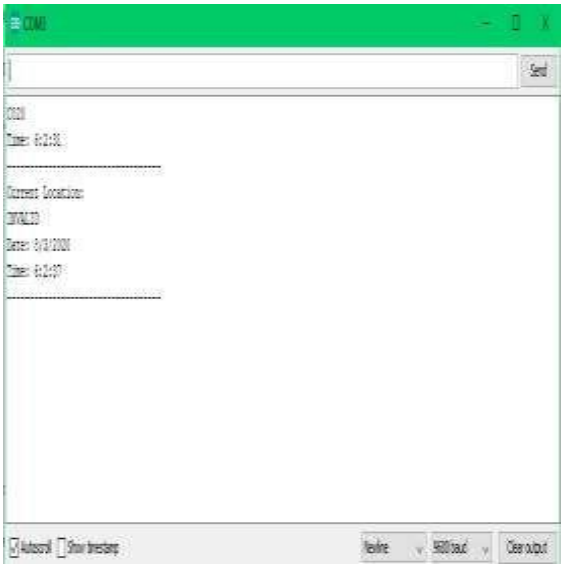

Figure 9. GPS Connection

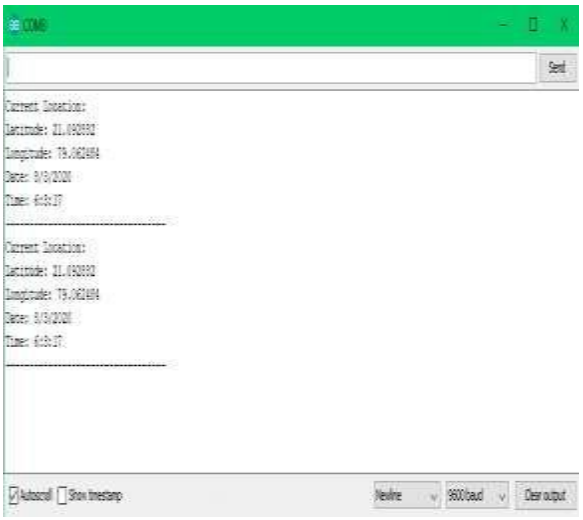

Figure 10. GPS location

Python Script

Figure 11. User input page

Figure 12. Output

Inference and Discussion

The vehicle theft monitoring system concentrates on different interconnected systems present on the vehicle and helps monitor the last known position of the vehicle. These types of technologies need to be revised to take precaution against the new security threats. A Radio Frequency Identification based vehicle theft detection system is implemented in the vehicle. An RFID tag will be attached to the vehicle. Two network-connected devices communicate with each other one attached to the vehicle and the other is with the authorities nearest to the current intersection and the database hosted on a

maintained phpMyAdmin database. The database will contain information regarding the registry of the vehicle against the ownership details of the vehicle. A stolen checker module is maintained where each vehicle is checked against its stolen status in the database. Here the sensor will read the unique RFID tag of each car. Once a car is identified as the one which is stolen then the local authorities nearest to the intersection will be notified via some form of communication about the last location of the junction where the car is located. The database will store the last known junction address in a column against a car that was reported stolen by the owner. whenever these vehicles with a unique RFID tag are read then that junction address will be stored against in a coloumn, and the notification will be sent to the authorities. But if the vehicle is not found then the message to the local police to check the CCTV cameras is sent.

System Integration

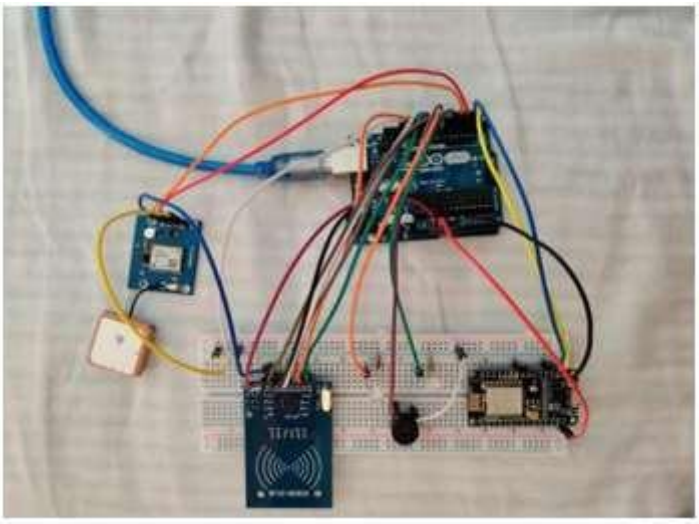

Figure 13. Physical connection model

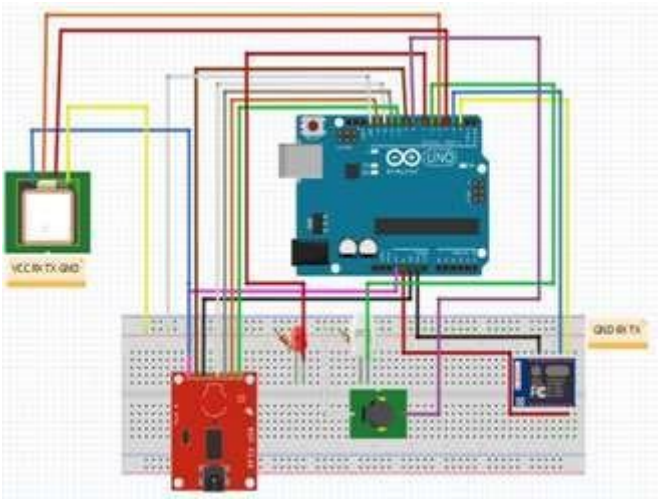

Figure 14. Pin Connection Diagram

Conclusion

The proposed paper discusses the growth of the urban population in the cities and its effect on traffic congestion and theft in cities. The recent strides in the technologies have paved the way to break the lock and make it easy to steal a vehicle. Therefore, a system that lets the owner monitor the vehicle at any time and live to stream the vehicle's location and update it periodically has become a real

necessity. An efficient system is proposed with the implementation of Wi-Fi shield, Database, and RFID attached to an Arduino, supported by IoT. The architecture of the proposed system is described along with supervised learning which will be used to determine the attributes of the stolen vehicle database and how the data is stored and passed to the concerned authorities. This system if once implemented would, therefore, help the authorities in metropolitan cities by giving timely updates about the last known position of the vehicle, help in the improvement of the database of vehicles and give a way to deal with any misfortunes.

References

1. IoT based Online Traffic Congestion Management System - Mr. Thavaseelan. G, V. Vinisha, Vincy Sandra Edwin
2. https://link.springer.com/article/10.1007/s10586-018-2152-9
3. IoT based smart traffic signal monitoring system Veeramanickam, Arun, Kumar Narayanan, Anandan, Shaik Parvez
4. www.researchgate.net/publication/299477431_Internet_of_Things_for_Intelligent_Traffic_Monitoring_System_A_Case_Study_in_Denpasar
5. https://ieeexplore.ieee.org/document/8463825
6. An Internet of Things Based co2 reduction by traffic light control - Irjet.com
7. "www.knoema.com", Survey information and graphical representation of the lost vehicle.
8. "Instant Theft Alert and Tracking System in Car", 2010, Preeti, P.Tanna, Shubha
9. IJCA Volume 1 – No. 21 - 0975-8887.
10. "GPRS and GPS and GSM", International Journal in Computer and Communication Engineering.
11. Amutha, B. and Ponnavaikko, M. (2009). "Location update accuracy in human tracking system using zigbee modules.
12. Venkatraman, K., Karthick, Amutha, B., and Sankar, S. R. (2010). "A hybrid method for improving GPS accuracy for land vehicle navigation system." INTERACT-2010. 74–79.
13. Naren, J. (2009). "Sensor – based dead rockening for land vehicle navigation system."International Journal of Recent Trends in Engineering, Volume - 1, 231–234.