TRAFFIC MANAGEMENT SYSTEM

Introduction:

- Internet of Things (IoT)-enabled intelligent traffic management system can solve pertinent issues by leveraging technologies like wireless connectivity & intelligent sensors. With cities worldwide experiencing ongoing population growth it results in stressed municipal infrastructure. And the problem of traffic congestion across smart cities is continuously increasing.
- This increasing growth in cities leads to the demand to meet sustainability goals while evaluating traffic management strategies. This Integrating innovative traffic technology helps achieve phenomenal cost savings in smart cities' infrastructure expenses while improving system reliability.

Project Objectives:

1.Iot sensor Network:

- The sensors used in intelligent traffic monitoring systems can be on-road sensors or in-vehicle sensors. The on-road traffic sensors can be again classified into two types: intrusive and non-intrusive. The intrusive sensors are paved on the road and are costly compared to non-intrusive sensors.
- PRS is a portable roadside sensor for vehicle detection, counting, classification, and speed estimation . PRS uses a magnetic sensor for vehicle detection. The single PCB board of PRS contains two magnetic sensors (HMC2003)
- LCTS is another low-speed congested traffic sensor node with a magnetic sensor specifically for a single lane road . The sensor node is designed using magnetic sensor HMC5883L.
- The iVCCS is an intelligent vehicle counting and classification sensor. the node also contains a sound sensor and four infrared sensors.

CPIUS is the combined passive infrared and ultrasonic sensors (CPIUS) for vehicle classification and speed estimation . The measurements from passive infrared sensors and ultrasonic sensors are used for vehicle classification.

TENSORS

- A tensor pattern which is an extension of matrix is introduced into modeling the traffic data for the first time, which can give full play to traffic spatial–temporal information and preserve the multi-way nature of traffic data. To estimate the missing value, a tensor decomposition based Imputation method has been developed. This approach not only inherits the advantages of imputation methods based on matrix pattern for estimating missing points, but also well mines the multi-dimensional inherent correlation of traffic data

CAMERAS

- Modern traffic incident management systems (TIMs) are powered by: Connected CCTV cameras with HD footage Computer vision capabilities for image detection and recognition Edge chips for local video processing, which reduces latency Cloud connectivity + GPS-based communication to receive updates

RFID TAGS

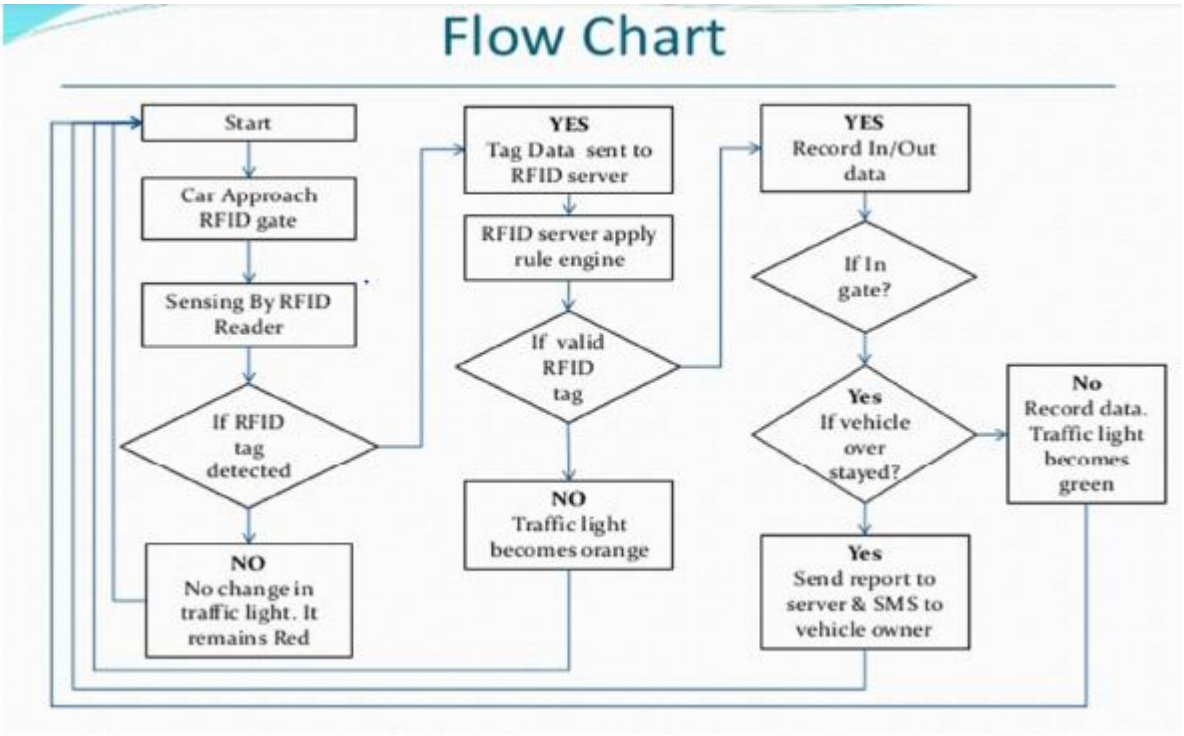
- Here are various problems of traditional vehicle monitoring system in different conditions, such as license plate is blocked. Therefore, it is not easy for prosecuted the offender by the police force due to the different traffic situations. Thus, a new method is that combining those to achieve the traffic violation detection system, and RFID technology is used to aid some main functions. In this study, it is assumed that all the noise factor which affected RFID system is ignored and all the data get from the RFID system should be appropriated.
- It is aimed that recording the RFID tag's sensitivity signal within a small range for the use of getting the data of the vehicles when it violates from a simulated real road situation. Since a real-time transportation situation has been simulated, RFID tags as an electronic license plate, a fixed camera is being set for vehicles monitoring and RFID reader place above the road for receiving the vehicle's data through the tags and using OpenCV for motion detection of vehicles in the traffic violation detection.

- Thus, it can be prosecuted the offender by the police force due to the different traffic situation. The reader used in this study is RF-CODE 433 MHz M250. RF Code tags sent the radio frequency messages to the reader. The maximum range is 45 meters when the tags are being sensed, more than 100 tags are read per second.

RFID Tags Sensitivity Range Quantity

Working: Place the automatic self-control model car with RFID tags is attached on the top in the corridor of Industrial Laboratory
of the University of Macau, as shown in Fig. 3. For more accurate data, it is necessary to place the model car on the road on the
same starting point. Once the vehicles reach the end of the road model and then repeat the same operations of getting the RFID tag's data. Then the RFID tags sensitivity range between the start and the end of the road model can be obtained.

SOFTWARE IMPLEMENTATION:



Software implementation

Program:

```
from flask import Flask
from flask import request
import RPi.GPIO as GPIO
app = Flask(_name_)

GPIO.setmode(GPIO.BOARD)
chan_list = [16,18,22]
GPIO.setup(chan_list, GPIO.OUT)
GPIO.output(chan_list, 0)

@app.route("/ha-api")
def api():
    cmd = int(request.args.get('cmd', ''))
    scope = request.args.get('scope', '')

    # TODO: Hash with colors and pins to clean this all up
    if scope == "all":
        GPIO.output(chan_list, cmd)
    elif scope == "red":
        GPIO.setup(chan_list[0], GPIO.OUT)
        GPIO.output(chan_list[0], cmd)
    elif scope == "yellow":
        GPIO.setup(chan_list[1], GPIO.OUT)
        GPIO.output(chan_list[1], cmd)
```

```
    elif scope == "green":
        GPIO.setup(chan_list[2], GPIO.OUT)
        GPIO.output(chan_list[2], cmd)
    else:
        print("Don't know what happened")
    return "Great success".
```

Conclusion:

Smart traffic management system has given the best results to with waiting & travelling time of a passenger has been reduced and emergency vehicles can move without obstacles or barriers. The pollution rate can be reduced by implementing this smart traffic management system in all prime locations. The suggested traffic management system can be implemented in all metropolitan cities as it is most suitable and reliable for the day.