

# “Team Aztecs”

Project Name: LogiTtraffic



IoT based Deep Learning Powered Traffic Management Solution

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# **Problem Statement:**

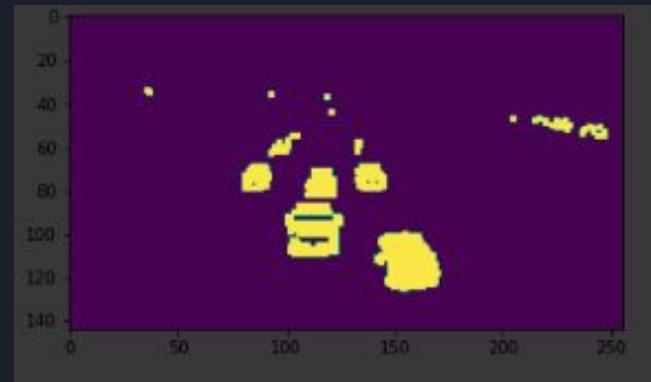
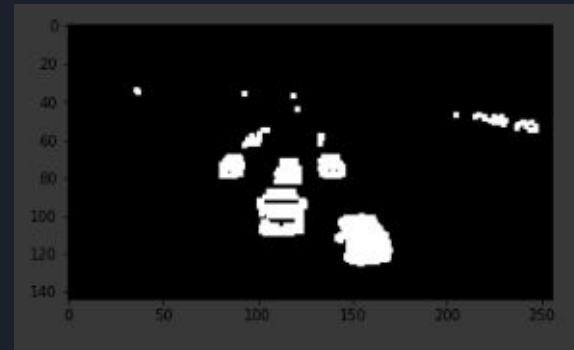
- 01** **Traffic Management :** Traffic management includes accident management, crime detection and mishap management. The management will optimize the traffic and will regulate traffic across the region in real time by using mathematical models.
  
- 02** **Theft Detection and Overspeeders Identification :** We aim at recovering stolen vehicles along with identification of the thief. Outlaws who commit crimes of overspeeding are also to be caught.



# Idea

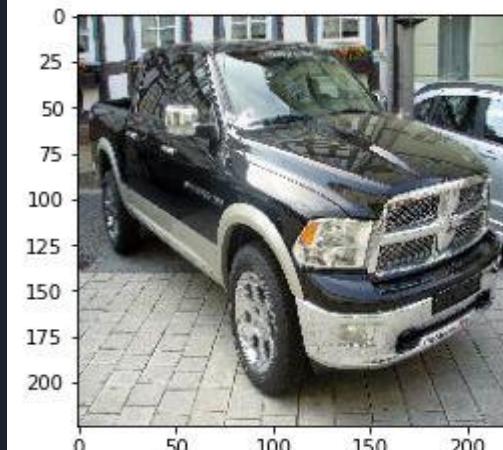
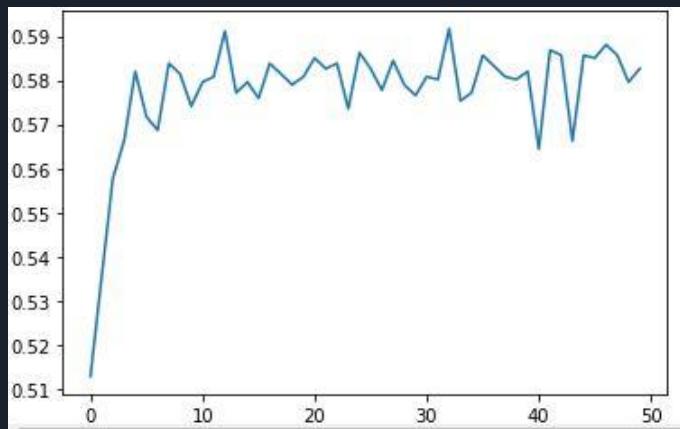
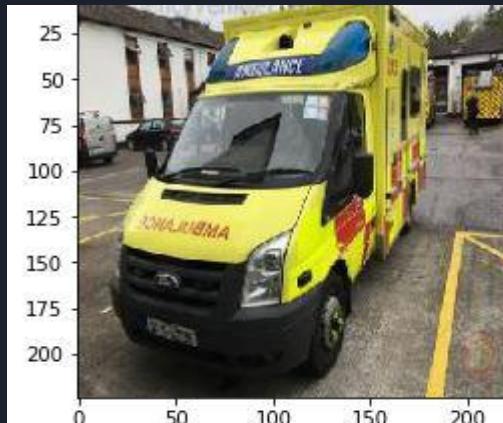
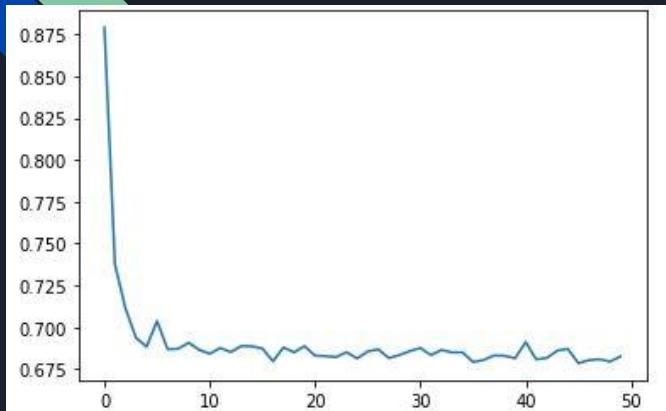
- LogiTtraffic shall utilise the data generated by Surveillance Cameras and Internet of Vehicles to forecast short-term traffic densities and speeds and the same system shall prove instrumental in recovering stolen vehicles along with identifying the thief.
- The system shall have its further applications in identifying traffic law withholders and at the same time recognizing emergency vehicles for efficient traffic management.
- We further plan to extend this project as a Video Analytics based system which utilizes Deep Reinforcement Learning and other state-of-the-art approaches for traffic management in chaotic atmosphere.

# Vehicle Identification



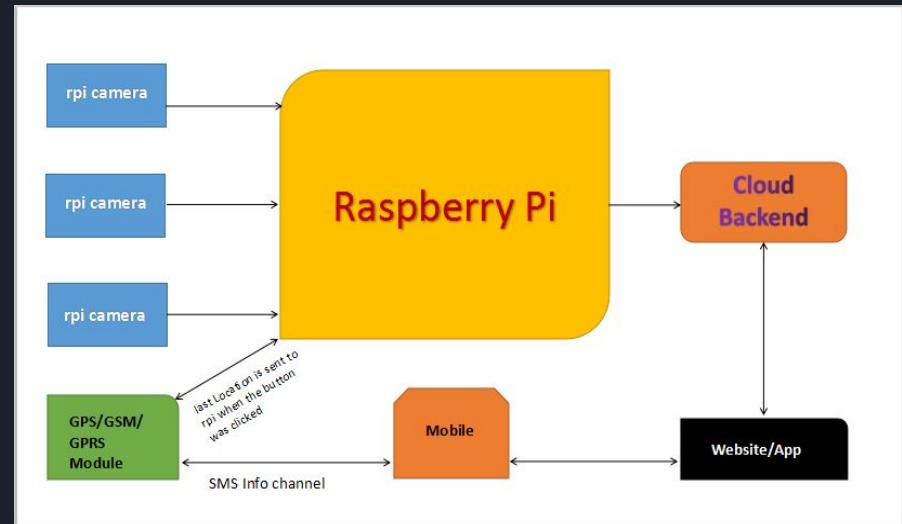
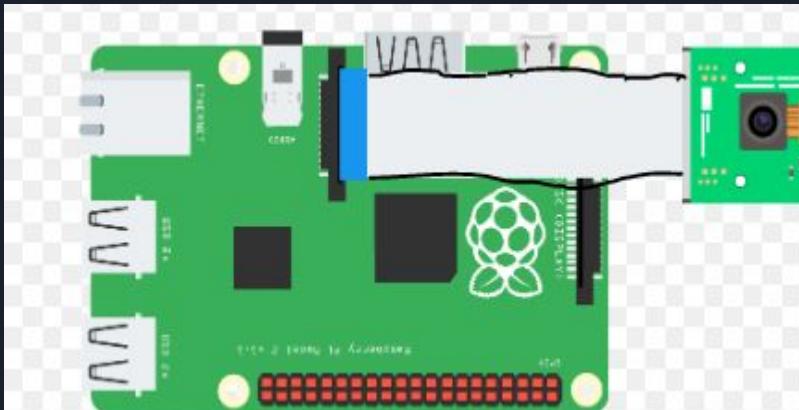
1. Colour Frame
2. Black and White Frame
3. Threshold Image
4. Diluted Image
5. Image Plot Zone

# EMERGENCY VEHICLE CLASSIFICATION



# Circuit-Diagram for IoT

The main Circuit Diagram includes a Rpi 4 model B connected to Camera Serial Interface of Raspberry Pi, allowing us to capture image on user's request.

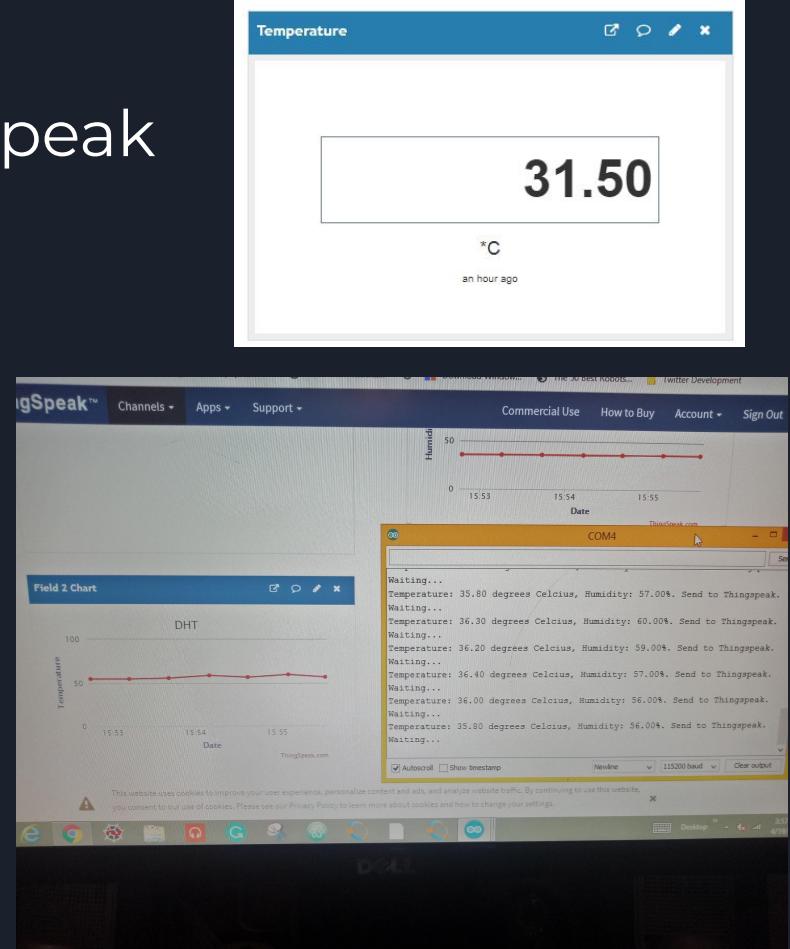
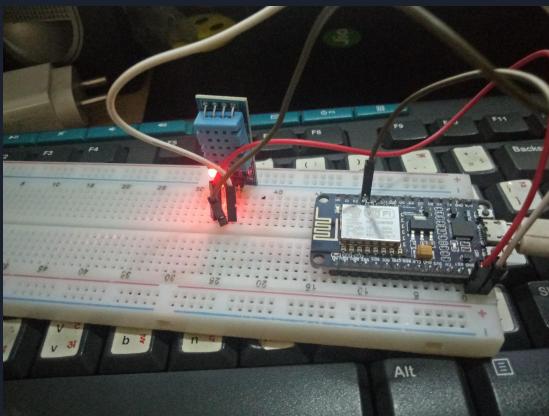


```
from picamera import PiCamera  
from time import sleep  
  
camera = PiCamera()  
camera.start_preview()  
sleep(5)  
camera.capture('/tmp/picture.jpg')  
camera.stop_preview()
```

```
1 from google.cloud import storage  
2 from firebase import firebase  
3 import os  
4 os.environ["GOOGLE_APPLICATION_CREDENTIALS"]=""  
5 firebase = firebase.FirebaseApplication('<your firebase database path>')  
6 client = storage.Client()  
7 bucket = client.get_bucket('<your firebase storage path>')  
8 # posting to firebase storage  
9 imageBlob = bucket.blob("/")  
10 # imagePath = [os.path.join(self.path,f) for f in os.listdir(self.path)]  
11 imagePath = "<local_path>/image.png"  
12 imageBlob = bucket.blob("<image_name>")  
13 imageBlob.upload_from_filename(imagePath)
```

# Real-Time Data Log on Dashboard using ThingSpeak

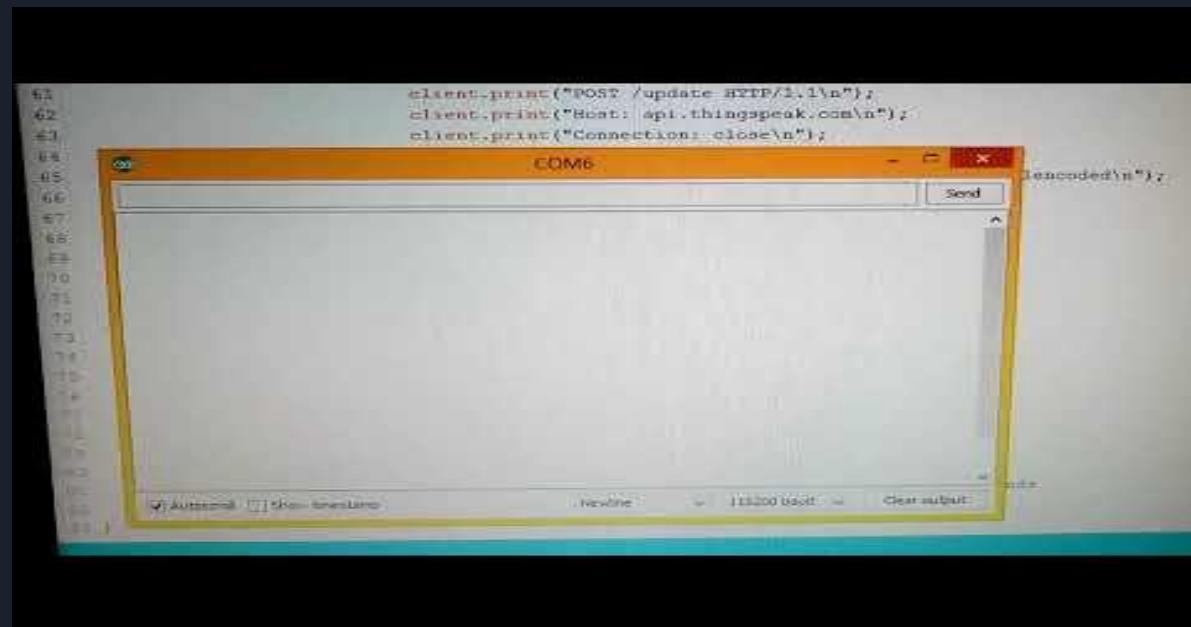
ThingSpeak is an IoT Based Platform allowing you to stream and Chart Out Real-Time data on the Webpage



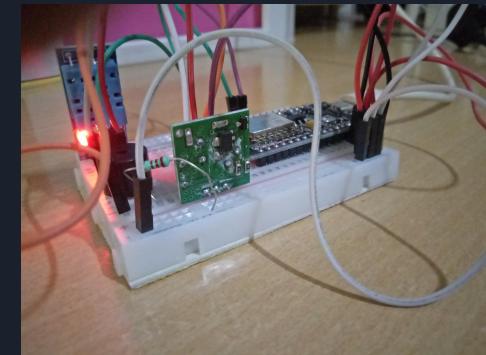
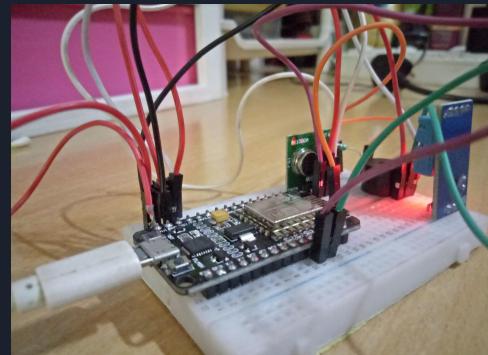
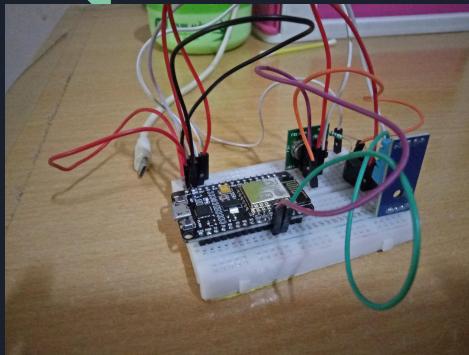
# Sending Temperature data

Similarly we can measure rpm using IR Tachometer made using Arduino and send data over ThingSpeak. Sorry for this inconvenience due to lack of hardware

1. [YouTube](#)
2. [ThingSpeak](#)



# Our Current Hardware Setup

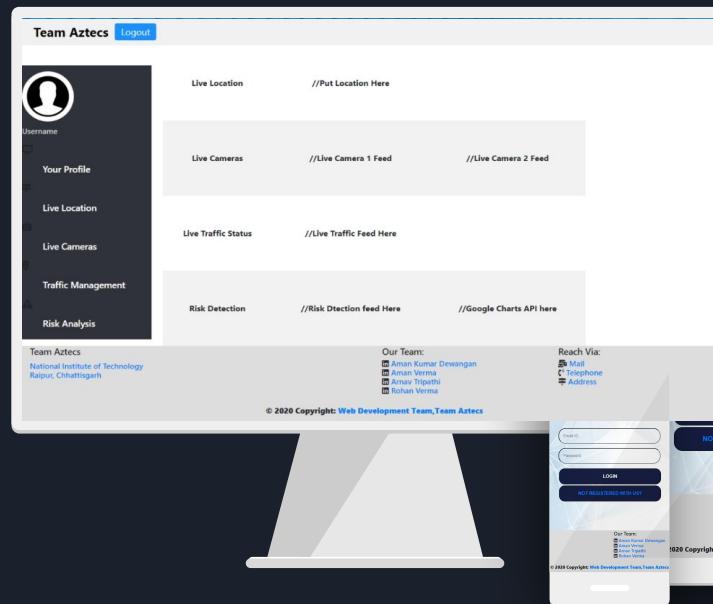


- The black micro-controller is ESP8266 nodeMCU (1.0) sending live data to the Thingspeak backend. The green PCB FS1000A is a 433 MHz transmitter being used as jammer, which gets initiated as soon as the user clicks on the theft button over the website. The blue object is digital humidity temperature sensor, providing the surrounding humidity and temperature which can be seen in the humidity and temperature column of website.
- The sensors used here are not up to industrial standards and hence, are just used for prototyping.

# Website

We aim to provide users with concise, efficient and interactive interface to move through tabs and pages. For this purpose we are showing Real Time GPS Location, alongwith temperature of braking system which can report any failure when required.

## Dashboard



**QUICK TIP**  
We will show user real-time data of GPS Location, Live Camera feed and Owner Profile along with Traffic Prediction on Dashboard



 Email ID Password[LOGIN](#)[NOT REGISTERED WITH US?](#)

Team Aztecs

National Institute of Technology  
Raipur, Chhattisgarh

Our Team:

[Aman Kumar Dewangan](#)  
 [Aman Verma](#)  
 [Arnav Tripathi](#)  
 [Rohan Verma](#)

Reach Via:

[Mail](#)  
 [Telephone](#)  
 [Address](#)



Username

Your Profile

Live Location

Live Cameras

Traffic Management

Risk Analysis

Live Location

//Put Location Here

Live Cameras

//Live Camera 1 Feed

//Live Camera 2 Feed

Live Traffic Status

//Live Traffic Feed Here

Risk Detection

//Risk Detection feed Here

//Google Charts API here

Team Aztecs

National Institute of Technology  
Raipur, Chhattisgarh

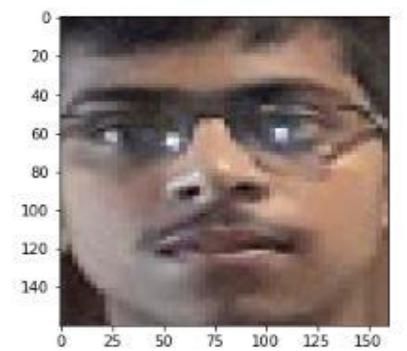
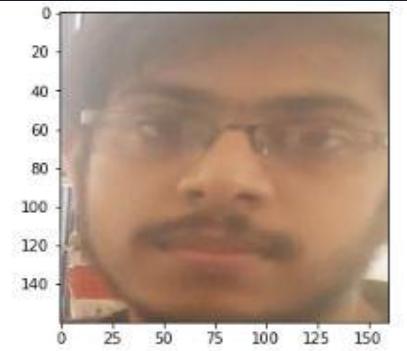
Our Team:

- [Aman Kumar Dewangan](#)
- [Aman Verma](#)
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- [Rohan Verma](#)

Reach Via:

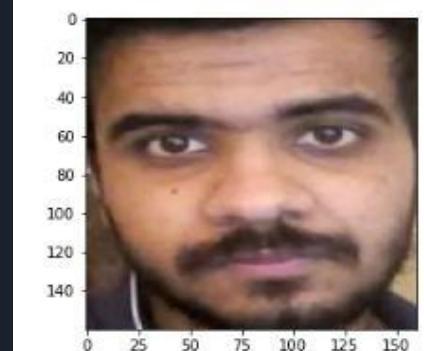
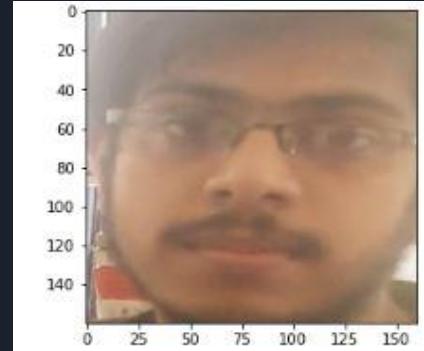
- [Mail](#)
- [Telephone](#)
- [Address](#)

# SIAMESE NETWORK BASED FACE RECOGNITION



Distance Between Images 7.5624046  
Same Faces

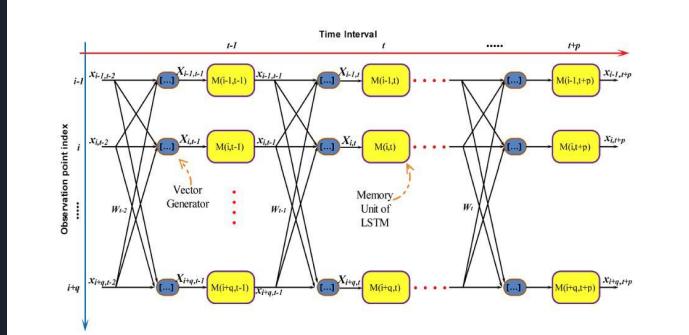
DEEP LEARNING  
BASED ONE SHOT  
LEARNING  
SIAMESE  
NETWORK



Distance Between Images 9.458351  
Different Faces

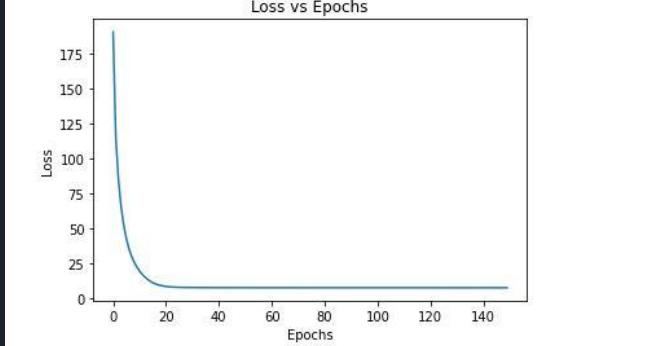
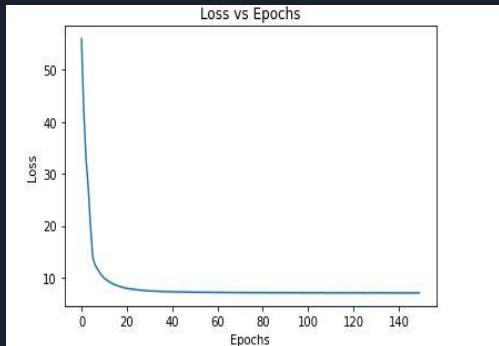
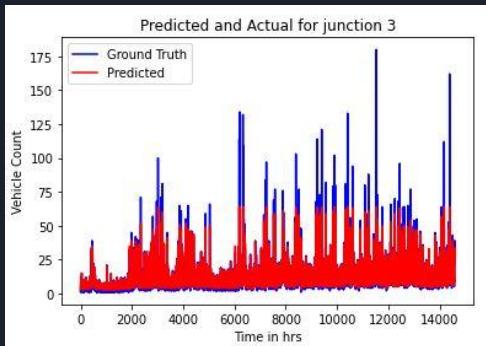
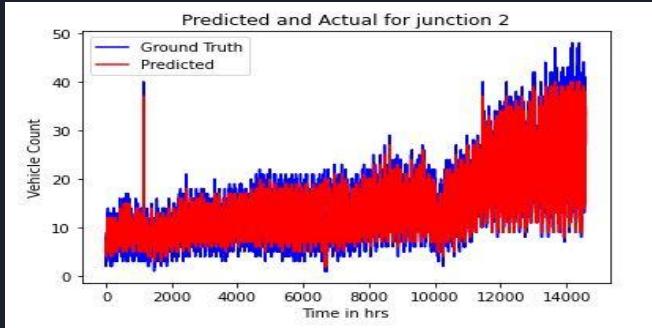
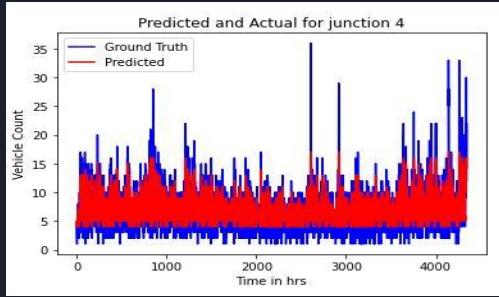
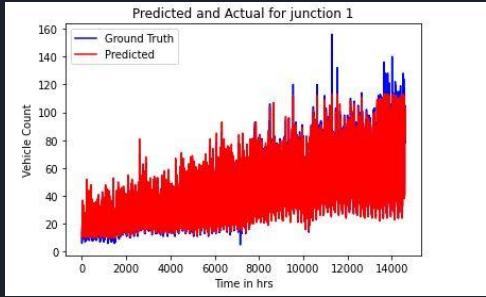
# Deep Learning Model for Traffic Density and Vehicle Count Prediction

Computer Vision Based :- We will be using deep learning algorithms to identify vehicle count in multiple traffic observation points. We shall be using CNNs over YOLO algorithm to achieve the same.

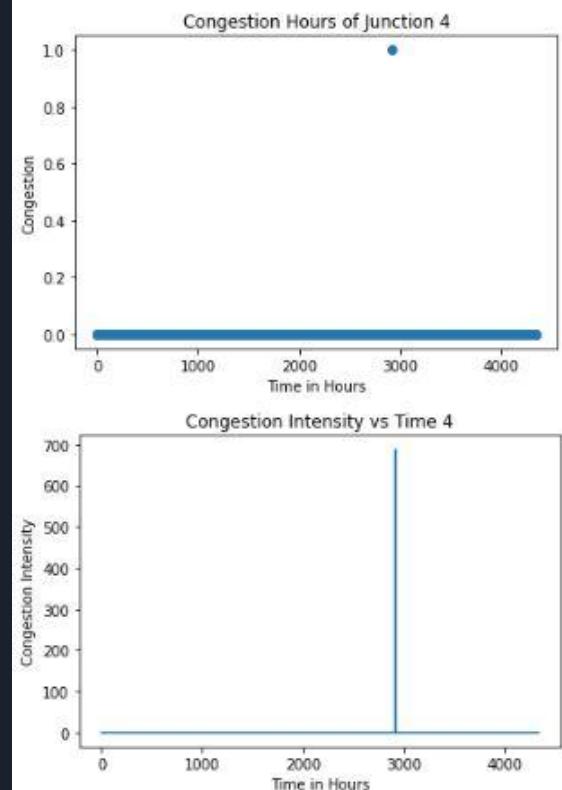
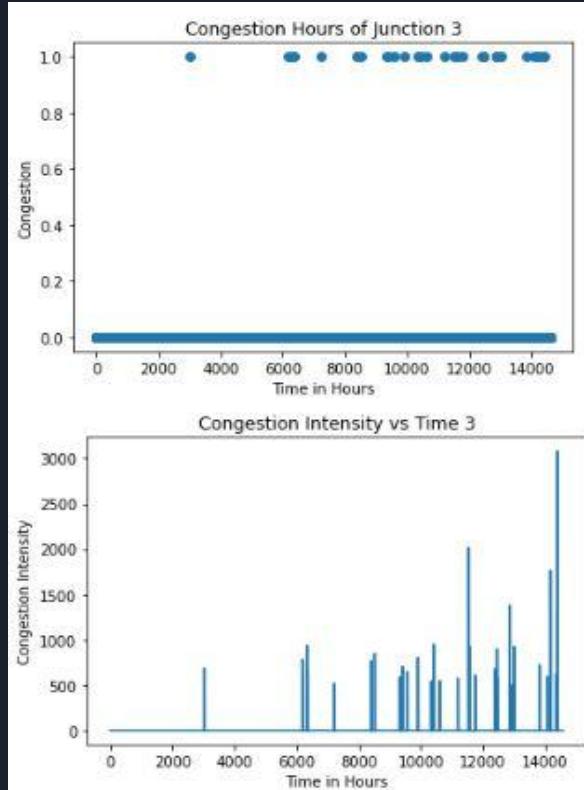
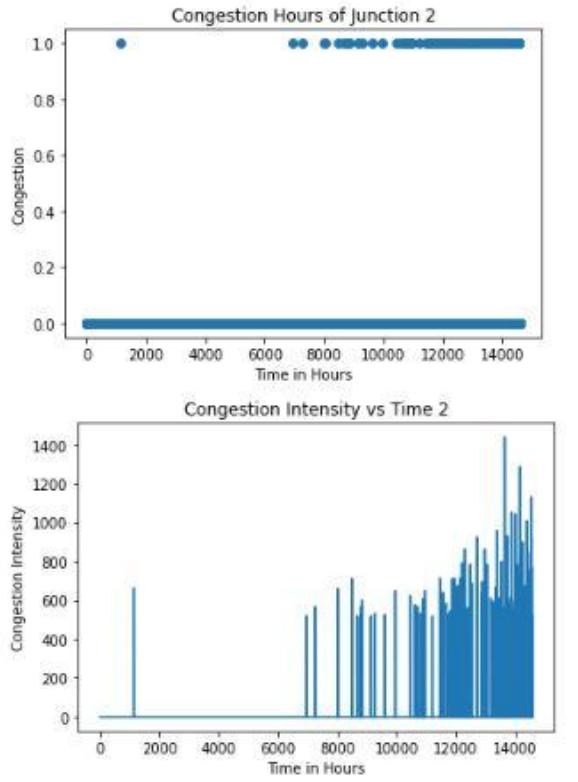


# Traffic Volume Prediction Model

Click on the heading to view the code on google colab  
[Github](#)



# Traffic Congestion Prediction



# B-Model

## **Required hardware:-**

- 1) IR Sensors
- 2) Rpi camera
- 3) Gsm
- 4) Raspberry Pi
- 5) DSB1820 Temp Sensor

## **Patent :**

Needed so that, we have upper hand in the market

## **Access to Traffic Signal:**

This will allow the algorithm to control the flow of traffic on runtime and hence manage the traffic

## **Capital :**

Capital needed for smoothly running the production and marketing process

## **Safety and Insurance :**

Theft vehicle can easily be retrieved and the culprit can easily be caught. As an add on, in case of any attempt to harm the vehicle, can alert the user and hence avoid it from happening.

## **KEY ACTIVITIES:**

### **Theft Detection:**

Live location and photos of the vehicle is being uploaded to the server, via IOT device, once the THEFT button is pressed

### **Accident Management:**

Photos are fetched by the server, involving any accidents caused by user or any incident that harms the vehicle. Later those photos could be retrieved by concerned authorities.

### **Jam Prediction:**

Traffic flow is analyzed by DL algorithms to issue the jam prediction in the area, to inform the user about it's happening in advance.

### **Traffic Management:**

Traffic density is known via a number of active devices in a particular area. Hence, runtime traffic flow can be controlled through deep learning algorithms.

### **Efficiency :**

By jam prediction features, the user gets the upper hand to save his/her time

## **Channels :**

Through the website/app, the user will be able to buy the product. Also, access the required information.

## **Vehicle Owners and Government :**

All the vehicle owner are the customer segment that we will engage. Jam predictions and Traffic management make the city fast, smart, and more efficient. As an add on, theft deduction and accident management reduces the crime rate

## **Costing:**

Hardware = 2800 INR  
Hosting Cost = 10000 INR  
Marketing = 25000 INR

## **Revenue:**

The product rate will be decided to keep the margin in mind but also very reasonable. As the website database grows, it will also generate the ads and hence the revenue. This is an indirect source of income but will increase the margin.



# S.W.O.T ANALYSIS

S

Cost effective || Broad customer segment || Real time data collection with integrated AI || Wide Database || Presence of no major competitor in local market || Indigenous Map APIs

W

Lack of experience(only tech exposure) || Credential security issues || Dependency on government || Will require use of GCP , AWS, or MongoDB for database

O

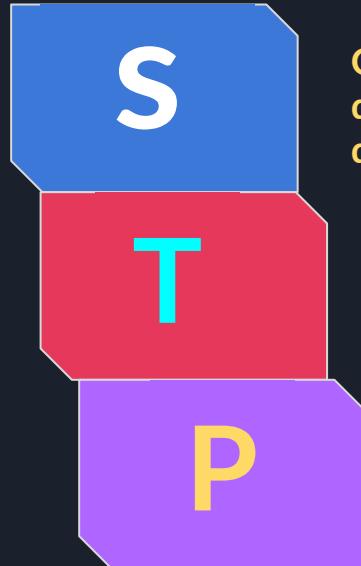
Potential unicorn startup || Map API || Patent || government subsidies || job opportunity for unemployed || Research opportunities || Indigenous

T

Illegal Database intrusion by hackers || Suspected misuse of login credentials || Data fetching failure (may be) || Possible modified advance IoT attacks



## S.T.P ANALYSIS



Government(state.central.global) || Private Companies || Vehicle owners divided on the basis of Indian regional distribution system || Vehicle owners divided on basis of region with higher crime rates

Government(state/district) || Vehicle owners Big cities with high crime rates (initially) || Indian automobile sectors

Government pitchings || Tie ups with indian automobile companies by Patenting the technology || Tie up with insurance companies || Digital marketing || One to One user to product relation

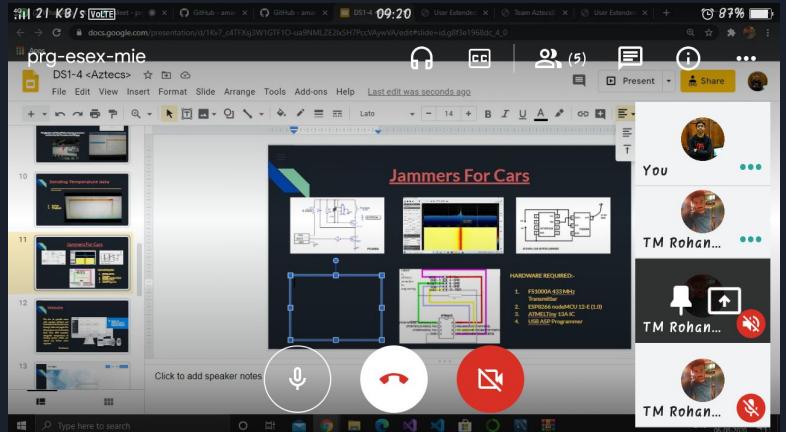


# Future Prospect and Cost- Effectiveness

- Future Prospects involve implementation of Traffic Jam Prediction and Integration of various methods which involve automatic penalising through detection of No. on Car Plates, Introducing Jammers on Car Doors to minimize car theft.
- The Product in itself has a very low production-cost and durable, and easy for anyone to use. The Product brings the Implementation of IoT, AI in the Real World Scenario and Industrial Revolution 4.0.
- The Product has a great Startup Potential and can have a very vast development prospects in coming future with the integration of Augmented Reality into it.
- MG Hector AI based services are quite expensive and exclusive comparative to ours. We will be open to government subsidies and usage of government database further leading to cost reduction.
- Our product would cause reduction in traffic conjunction, tracking of accidental cases, crime rate reduction, reduced vehicle theft and stolen vehicle recovery.

# TEAM INVOLVEMENT

- **Aman Kumar Dewangan (Team Leader - IOT Developer, Hardware Integration)**
- **Aman Verma( Machine Learning Researcher and Developer)**
- **Rohan Verma(Backend Developer and Business Head)**
- **Arnav Tripathi (UI/UX)**
- **CDS Sriram (Machine Learning Researcher and Developer)**
- **Sreeram Muthuyam (IOT Developer)**



# Thank You

