

LogiTraffic

(IoT Based Industrial Problems: Road Traffic Management)

Introduction

Rapid Modernization has led to increased vehicular density which has resulted in two acute problems : first, heavy traffic congestion and second increased traffic crime rate. These acute problems call for smart traffic management solutions and vigilant surveillance . Hence, we propose LogiTraffic a deep learning powered IOT based system cum web platform to eradicate these issues and mitigate their negative effects upto great extent. LogiTraffic 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.

Team Members:

1. Aman Kumar Dewangan - Electrical - 5th Semester (Team Leader)
2. Aman Verma - Electronics and Communication - 5th Semester
3. Rohan Verma - Metallurgical and Material Science . - 3rd Semester
4. Arnav Tripathi - Electrical - 3rd Semester

Goals

1. **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.
2. **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.

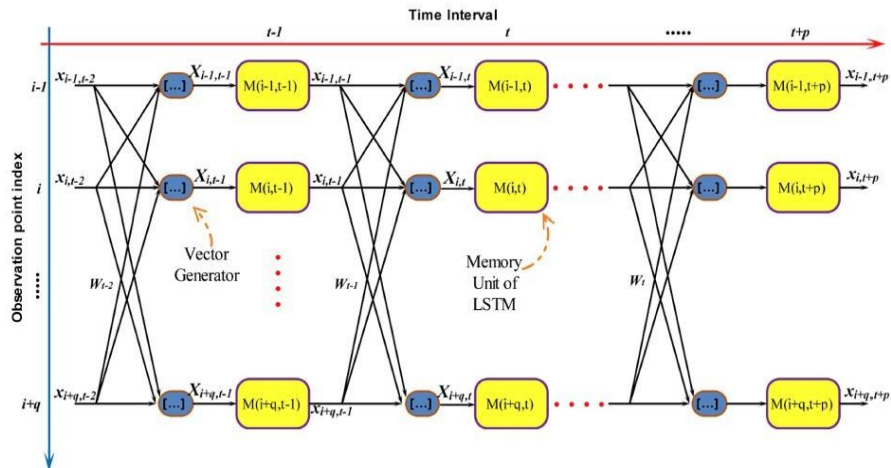
Methodology

Traffic Management : LogiTraffic is a system to fetch data from various cameras, sensors etc and then process the collected data to develop important insights on future traffic density and speed using deep learning time series analysis. We are also detecting emergency vehicles like



ambulances and fire brigades trucks using deep learning algorithm YOLO so as to make their time to reach the destination least. We are using two approaches for collecting data ie. IOT based and Computer Vision based. We describe them as under:-

- IOT Based : We are developing an IOT based device which shall have provision for following things :-
 1. Real Time Location Tracking through GPS which shall allow us to estimate traffic density.
 2. GSM allowing us to access realtime location through sms
 3. Camera at Rear and Front Side of Car
- 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.



Then once the data has been collected us of deep learning based time series modelling on cloud servers will be done to forecast future traffic congestions and traffic speed based on

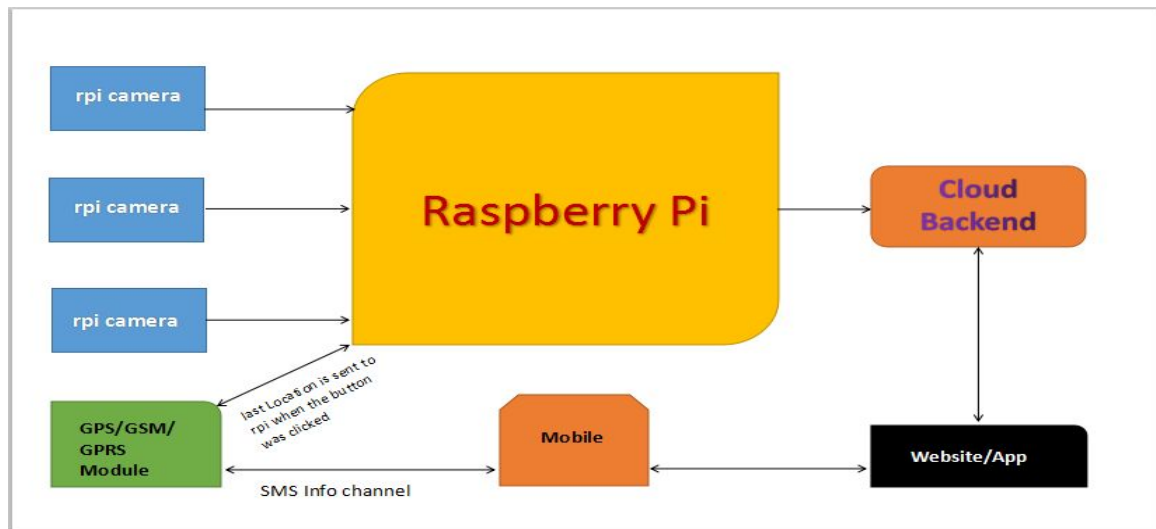


which further modelling of traffic signals will be done so to achieve smooth and fast traffic flow. The system will include use of weather conditions for prediction in future.

Theft Detection and Overspeeder

We plan to have 3 rpi cameras connected to the Raspberry Pi board, which will capture images when a function call for capturing the message is triggered through a JavaScript function on the website.

- In addition to this we have a GPS module connected to RPi to get real time location and GSM Module to communicate information to users on being asked through sms.
- The data on being requested initially gets stored at the backend of the website, which is based on a firestore or firebase.
- We shall be capturing images of the driver and if the vehicle is reported stolen and shall further use Siamese based networks for thief identification using Govt. database.
- For a stolen vehicle if somehow GPS has been disabled we shall capture images of directions boards using front and rear view rpi camera and then identify vehicles current location.
- Using GPS locations along with sequential time we shall identify vehicles which are crossing speed limits.



Hardwares and Softwares to be utilized: -

- Raspberry Pi 4 Model B(Hardware for IoT purpose)
- Raspbian OS
- Rpi Camera(5MP)
- GPS NEO-6
- GPS/GSM/GPRS Module
- Python
- Tensorflow 2.0
- OpenCV
- Micro-controllers
- Firebase
- Django
- SQL
- HTML
- CSS
- JavaScript

Specifications

[Keeping the prototyping purpose in mind amid the COVID19 Pandemic, due to lack of certain facilities we are trying our best to provide the practical implementation, in case we can't present the same, kindly try considering the situation. Moreover the equipment is quite expensive in nature, kindly understand the circumstances and try providing some relaxation.]