

# Raspberry Pi Traffic Density Observation Associate Controlling System

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**ABSTRACT**—this paper explains a Raspberry Pi controlled Traffic Density monitoring system. Raspberry Pi is a single board computer which can be effectively used for multi-functionalities. Here is the one of the ways of using this for multiple purposes. It is used for traffic surveillance purpose where the traffic is continuously monitored and viewed through live streaming. In addition to this, it is used for detecting the traffic density and gives the traffic report to the travelers. Here we are monitoring the traffic based upon the density of the vehicles on each side the time period for that side changes automatically, for eg : If the density is low on a particular side the time period for that side is normal, if the density is medium the time period for that side will automatically increases ,if the density is high the time period will automatically increase compared to normal density , after finishing the time period the signal will pass to other junction .Here time period means time given to green light to glow to that particular side The density of vehicles of each side can be identified through using IR sensors Traffic for each side can be monitored by live streaming for this we are using a usb camera interfaced to pi3 , by rotate camera 360 degrees , one step 90 degrees In raspberry pi3 are a great choice for traffic sensing because it is equipped with a variety of sensors such as Wi-Fi, L293D,IR sensors ,DC gear motor, Camera and microphone. These sensors can be exploited to collect traffic data. This traffic report is updated periodically and displayed on the screens installed at the public places.

**Keywords:** Raspberry Pi; Traffic Density; Live Streaming; Traffic Surveillance; IR sensors; l293d driver; DC gear motor, Web Page, wifi.

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## I.INTRODUCTION

India is an expansive nation and around the globe India is second most crowded nation and quickly developing economy, In the present life we need to confront various types of issue one of which is expanding measure of vehicles it progresses toward becoming increment in activity and disarray. Framework development in India and development in number of vehicles isn't equivalent; due to huge populace speed of increment in no of vehicles is significantly quicker than foundation development. Streets limit and collaboration along the streets (cross-streets/intersections) are not competent to deal with higher number of vehicles.

At show the quantity of vehicles is expanding step by step expanding the activity clog on the streets which prompts mishaps, hopping off the movement flag. It should be lessened according to the vehicles which are accessible on street paths.

The activity reconnaissance process assumes an exceptionally vital part in finding the casualty who caused the movement deterrent driving an approach to improvement of activity observation which is finished utilizing Raspberry Pi instead of utilizing regular techniques. The introduced Raspberry Pi framework gives live gushing of the checked movement in a specific range. This strategy is adjusted by considering alternate favorable circumstances that goes along utilizing Raspberry Pi. Alongside live gushing, this framework enables the camera to recognize the activity thickness in the encompassing spots. This adds an extra preferred standpoint to our framework by at the same time doing another assignment without intruding on the principle undertaking[2].

It accumulates the data about measurable conveyance of activity over the land territory which is under reconnaissance and stores it in a database. To let the clients (traveller's) know the data about movement thickness, show screens set will be those open spots and there will be a site which is uncommonly intended to demonstrate the activity smallness in a Specific place.

In this way individuals will know about the movement ahead of time and change their way to achieve their goal in time.

## II. Raspberry Pi

Raspberry Pi [1] (shown in Fig. 1) is a credit card sized single board computer. This board is cost effective when compared to an actual computer; uses power rating of 5V, 700mA and it weighs not more than 50g. It comes in 3 variants of Model 1 A+, Model 1 B+ and Model 2 B. It is also available as Compute Module Development Kit, which is handy device for industrial applications and has more flexibility.

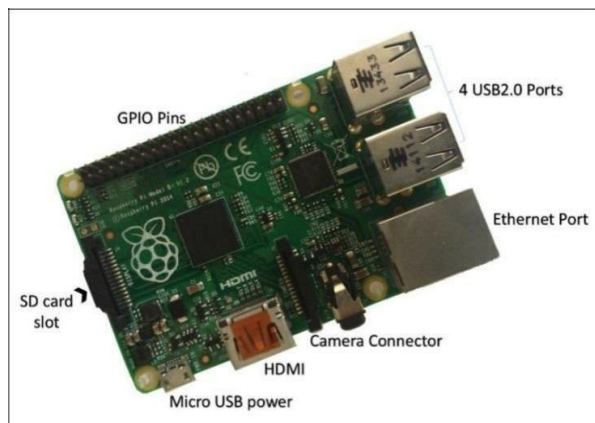


Fig.1. Raspberry Pi 1 B+ Board

It normally works on ARM11 processor at 700MHz recurrence with 512MB RAM. It runs the working frameworks like Noobs, Rapsbain and so forth which is introduced on the SD card. It has 1 Camera connector to interface with the camera module. Embellishments like Keyboard, Mouse and USB Wi-Fi dongle can be associated through 4 USB 2.0 ports. Ethernet availability through RJ45 port, 3.5mm Audio Port with low commotion control supply can be connected up. It can be associated with LCD/LED screen, Televisions and projectors to show the data through HDMI port. The sensors, switches and control of LED's are finished by 40 GPIO pins. By all these inserted on a solitary board, Raspberry Pi isn't quite recently restricted to single utilize, it can be of wide use as indicated by the application.

All in all Raspberry Pi is utilized as a multi-reason single board chip. It is utilized for Traffic reconnaissance [2], tallying up activity thickness utilizing Computer Vision and show it on screens.

## III. System Design

The primary point of the framework is to gauge the activity thickness and movement reconnaissance. This is finished by utilizing Computer Vision [3]. PC Vision [4] is the change of information from a still or camcorder either into a choice or another portrayal. Open CV is an open source PC vision library. The framework comprises of Raspberry Pi, Camera, Advertising screens. As of now specified Raspberry Pi is a small scale PC, it is introduced with OpenCV module [5]. Camera is interfaced with the Raspberry Pi through USB port. Promoting screen is interfaced through HDMI link of Raspberry Pi (as appeared in Fig. 2).

In the wake of finishing all establishments, the framework is mounted in the best place that fits the reason. The framework is fueled on. Camera ceaselessly screens the vehicles going out and about and tallies every vehicle which is finished utilizing a bit of code written in python [6]. This tally is given to database alongside the camera id. The subtle elements will be put away in database. The activity thickness of a specific street will be appeared on the screen by recovering information from database.

The impact of thickness if appeared in changed hues like red for higher thickness or green for low thickness activity.

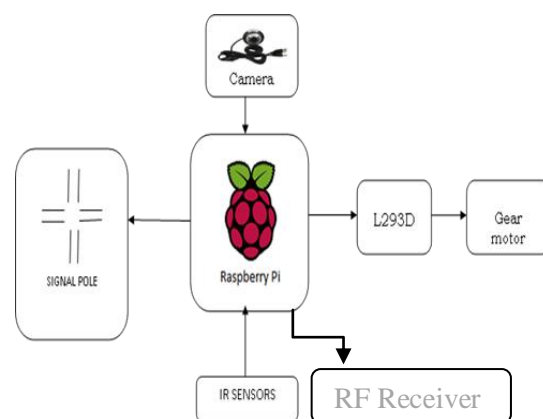


Fig.2. System Design 1

As the camera that is introduced, consistently screens the vehicles; this observing can be recorded and give live gushing by the utilization of Raspberry Pi. With the goal that any infringement from the typical standards happens, it can be effectively seen and the individual who damaged the guidelines can be rebuffed or fined appropriately. In this manner by recording the vehicle movement and live communicating it to control room fills our need of activity reconnaissance.

The advanced screen which is utilized for showing the consequences of activity thickness is additionally utilized for promoting purposes. Screen can be apportioned with the goal that some part for movement thickness showing and different parts for publicizing from which one can make benefit.

#### IV. ALGORITHM

The System Design OpenCV [7] runs substantially speedier than comparable projects written in MatLab (if it's not sufficiently quick, you can make it quicker by improving the source code). For instance, we may compose a little program to identify individuals' grins in a succession of video outlines. In MatLab, we would normally get 3-4 outlines examined every second. In OpenCV, we would get no less than 30fps, bringing about ongoing identification. The other real preferred standpoint is OpenCV being an open source and keeping in mind that MatLab is authorized and costly. In this framework, we utilize OpenCV with python coding for picture handling like question distinguishing proof, Segmentation and acknowledgment in a basic and viable way.

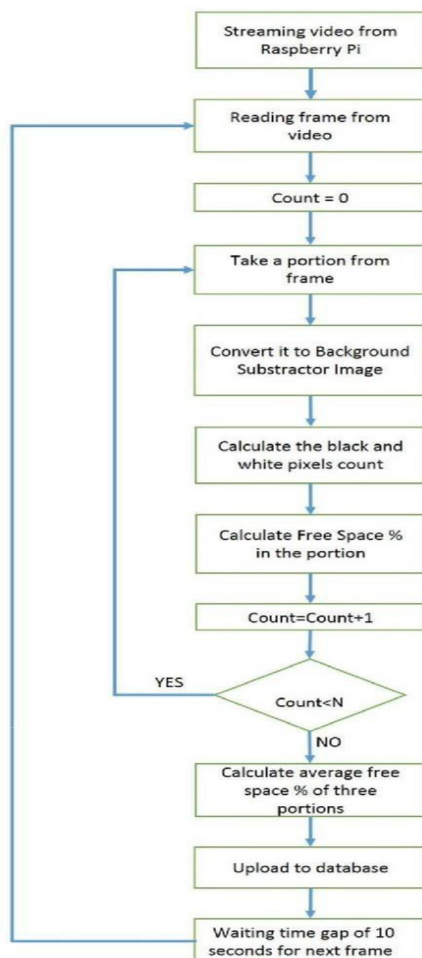


Fig. 3. Flowchart 1

Algorithm: (Traffic reconnaissance) In Raspberry Pi, a python program is composed for movement observing and picture handling procedure called foundation subtraction [5] utilizing OpenCV[4].

Finish arrangement of car movement control System Separated in Following Seven Stages:

1. Picture Acquisition
2. Picture Pre-Processing
3. Morphological Processing
4. Blob Analysis
5. Tally Density (No of Vehicles)
6. Discover vehicle Emergency or Not
7. Send Signal.

**Picture Acquisition:** Image of the vehicle is caught utilizing camcorder and exchanged to the picture preparing framework in Open CV.

**Pre-preparing:** Acquired picture is improved utilizing difference and splendor upgrade strategies.

**Greyscale transformation:** It includes change of shading picture into a dark picture. The technique depends on various shading change. As per the R, G, B esteem in the picture, it ascertains the estimation of dim esteem, and gets the dim picture in the meantime.

**Picture Binarization:** Greyscale picture is changed over into high contrast picture i.e. paired picture utilizing thresholding operation.

**Activity Density Calculation:** By applying Morphological sifting and Blob investigation on the double picture number of vehicles will be check and contrast and Traffic thickness limit.

**Distinguish Ambulance:** By utilizing Binary picture, Morphological sifting, and Blob examination rescue vehicle will be identified.

**Send rescue vehicle flag to the Raspberry pi:** The distinguished emergency vehicle is send to Raspberry pi through serial port.

Stream of Proposed System:

- A) Camera: Continuously record activity video.
- B) Read Image: Take one casing for each second from video utilizing picture preparing.
- C) Image Subtraction: In framework we as of now spare foundation picture without vehicles (Initial Condition) and subtracts current picture of activity from foundation picture.

## D) Convert Image to Binary:

- Creates highly contrasting picture.
- Vehicle=White. Background= Black

## E) Morphological Processing:

- It Performs Image Filtering.
- Uses 2 forms -

Open: Remove White specks other than vehicle.

Close: Remove Black specks other than back ground.

## F) Blob Analysis:-

- a. Checks current thickness of vehicle.
- b. Checks labels on vehicle assuming any.

## G) Find Vehicle Emergency or not:-

- a. Confirm crisis vehicle is available or not.
- b. In the event that present at that point creates Green flag.
- c. If not then check number of vehicles and Produces

More noteworthy thickness path = green flag, and other path = Red.

## V. RESULTS

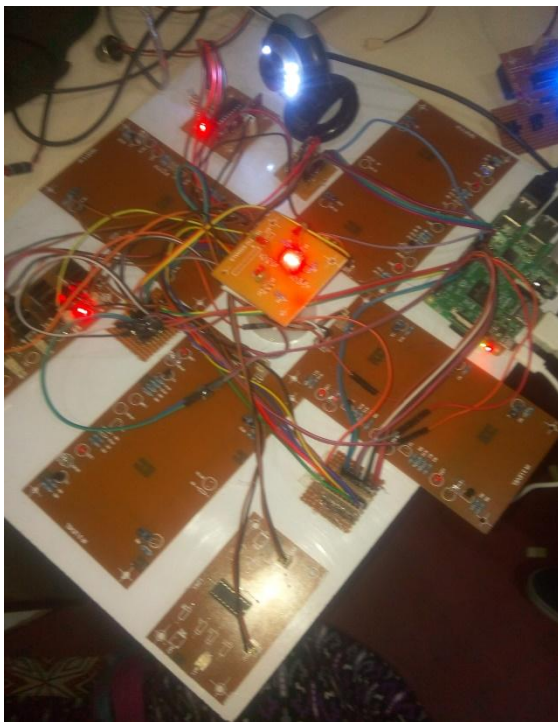


Fig.4.Diagram of traffic density Controlling & Monitoring Equipment

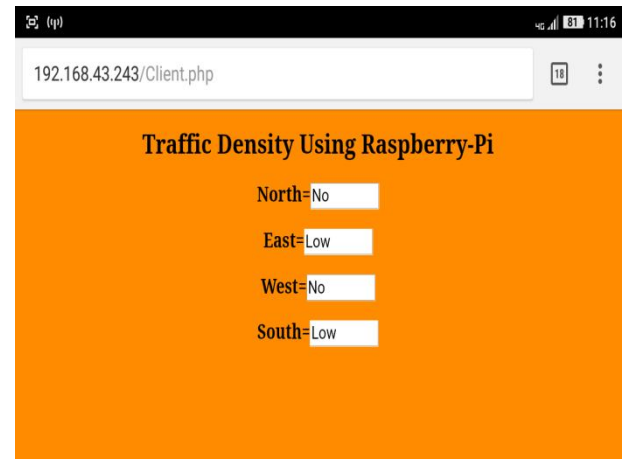


Fig.5.Traffic density is low

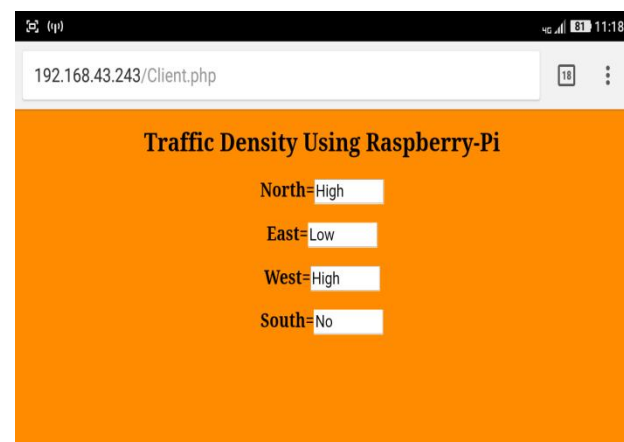


Fig.6.Traffic density is high

## VI.APPLICATIONS

This entire procedure should be possible without utilizing Raspberry Pi. In any case, what we require is an info picture to the Python code that is composed to tally the quantity of vehicle show in that picture. From that the thickness of the activity is discovered and shown on the screens. Essentially, the OpenCV is utilized for live spilling the consistently observed and recorded video. What's more, the notices should likewise be possible through the screens. Here the thing is Raspberry Pi is supplanted with a PC.

This can be additionally executed to get activity refreshes through portable notices by getting to their GPS and propose the general population about most ideal backup way to go utilizing Google's Location Service to their goals relying on the movement power. It can likewise be utilized to switch the activity signals relying on the movement clog. It can likewise be reached out to advise the general population towards the briefest way.

## VII. CONCLUSION

This proposed framework decreases the potential outcomes of congested driving conditions, caused by high red light deferrals and gives the leeway to the crisis vehicle, to a degree and effectively. Here we outlined the framework with the reason to clear the activity as per need. In this framework, we discover the movement thickness utilizing Morphological separating, and Blob examination.

The street with the most elevated need is cleared first. The proposed framework additionally offers significance to the rescue vehicle. On the off chance that any emergency vehicle is holding up in a flag then the specific path is given a higher need and the movement in that path is cleared. Crisis vehicle is identified by utilizing picture handling. At whatever point the crisis vehicle enters the Lane, by utilizing camera picture, Morphological sifting and blob examination recognizes vehicle and sends it to Raspberry pi. Raspberry pi gives the high need to the path with the crisis vehicle and clears that specific path.

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