Internet of things:
Intelligent Traffic Mointoring System

Tushar Mehrotra
Assistant Profressor
CCSIT, TMU
Mordabad, India

Gaurav Singh Rajput
Assistant Profressor
CCSIT, TMU
Mordabad, India

Janvi Jain
Student
CCSIT,TMU
Ambha, India

Tanisha Jain
Student
CCSIT,TMU
Agra, India

Abstract— This proposal is proposed to introduce a device that will help in improving the current traffic conditions and reducing traffic pressure. With the help of this IoT (internet of things) device, it can find out the current traffic conditions, traffic flow and can also notify the upcoming traffic flow. choose the optimal travel route. hence, the system can regulate, monitor and control a moving vehicle and has a number of benefits. such as improving traffic conditions, reducing traffic congestion and management costs, high reliability, and traffic safety.

Keywords—IOT, algorithims , sensors , mangement , image identification, traffic

I. INTRODUCTION (*HEADING 1*)

The need for urban transport monitoring in modern transport is increasing day by day as private cars become popular in the infrastructure of the world's smart cities. These traffic problems are traffic jams and accidents that usually cause significant loss of time, property damage, damage to humanity, financial loss , most importantly, environmental pollution. To avoid such circumstances or problems, we must work on traffic management. To overcome this control, we need a smart device that will solve the problem of our traffic system.

This proposal is proposed to introduce a device that will help in improving thecurrent traffic conditions and reducing traffic pressure. With the help of this IoT (internet of things) device, it can find out the current traffic conditions, traffic flow and can also notify the upcoming traffic flow. choose the optimal travel route. hence, the system can regulate, monitor and control a moving vehicle and has a number of benefits. such as improving traffic conditions, reducing traffic congestion and management costs, high reliability, and traffic safety.

Summary information so that they can correctly detect traffic. These IOT devices will make us familiar with the information, aggregation, integration, and support process, and it analyzes all classes of traffic information in a large area automatically and in a big way.These IOT devices are facilitated by an internet connection so you can easily identify and manage the sensors.

The aim of this paper is to present a framework for the collection of real-time traffic information and an IOT-based surveillance architecture with wireless communication. The main objective of this proposal (traffic monitoring system) is to develop a good infrastructure of metropolitan cities.

Therefore, modern traffic management is evolving towards an intelligent transport system based on IOT.

II. IOT (INTERNET OF THINGS)

The phrase "Internet of Things", also referred as IOT, was created from two words, that is, the utmost word is "Internet" or the coming wordis "Things". In addition to serving millions ofusers around the world, the Internet is an interconnected system of interconnected computer networks based on the standard Internet protocol suite (TCP/IP). It is a network of networks made up of millions of local or global private, public, academic, commercial and governmental networks connected by a wide range of electronic, wireless and optical networking technologies. A distinguishable object or person in the real world is what you see when you arrive there.

IOT is one of the wizards of information technology. With the IOT, the real things of the world become meaningful and intelligent. Internet of things looks to unite all over the world in a common infrastructure that is not only the day tocontrol its environment, but also to inform its IOT devices must have the following components such as : Tunnels and Bridges and traffic lights.

The Internet of Things was originally inspired by members of the RFID community, which refers to the ability to find information about a tagged object to browse the internet or a voice in the database that corresponds to thetechnology of a particular function. Internet of Things (IoT) has enabled users to transport physical objects in cyber space. This is made possible by variousidentification technologies such as NFC, RFID and 2D codes, which have made it possible to identify and reference physicalobjects on the Internet [18]. IoT that integrates with sensor technology and radio frequency technology, the ubiquitous network based on hardware resources available on the Internet, the set of content objects on the Internet. also a new wave of IT Industry because of the application of computer fields, communication networks and roamingtechnology.

The other major component of internet of things are storing, processing, cloud, data modeling and communication technologies. The other wireless technology company based on internet of things are used to build wireless local area network(wi-fi), wireless metropolitan area network(WI- MAX), wireless wide area network (3G,4G) and wirelesspersonal area network (Bluetooth) which is very useful to all of us.

III. Related Work

While working on this paper we havereviewed certain papers related to the traffic monitoring system. We have studied research, the solution to the problem, incorporative ideas, and the problem of our traffic monitoring system in those papers. Now in this section, we are going to describe briefly the work of these research papers.

1. In paper [1] the author have discussed to applied RFID technology. Which is detected by the readers through the antenna. They recorded the average speed of the vehicle on every street in the city and find the shortest route of the city using **Dijkstra's algorithm.** Andtheir system is also capable of detecting stolen cars, toll collection, and traffic taxes.[1]

2. This article is the closest study to our research article. In this paper[2] the author have discussed to applied image processing techniques along with computer vision technique. They author have introduced a new method to reduce the traffic road. Their system determines the number of vehicles on each road and, based on the calculations, assigns the waiting time (red light) and travel time (green light) to the users.[2]

3. The author has introduced a system to not only avoid collision of traffic but also to avoid the accident. Author have discussed to use vehicle-to-infrastructure(V21). Communication and a fizzy-based algorithm that keeps each vehicle's safe and comfortable distance and speed adjustment for collision avoidance and better traffic flow has been developed.[3]

4. In paper [11]the author has proposed the architecture of the traffic transportation system on the big data platform. Author have also discussed the key feature of their system, traffic flow calculation, average road speed calculation, vehicle route request, control and control of fake vehicles.[4]

5. In this paper, the author has introduced the active RFID tagwhich automatically reads the no of vehicles on the particular road and also reads the whole information of the vehicle throughelectronic tags installed on the vehicles. The architecture of thissystem involves active electronic tags and reading equipment(readers and antennas), the monitoring base station deployment, the two-layered network construction, and the monitoring software. It worked upon the two algorithms: anti-interference protocol and data clearing algorithm. Lastly have analyzed the effectiveness and efficiency of the system.[5]

6. Another similar work that can be seen is introduced in this paperwhich is based on a vision-based intelligent traffic monitoring system that manages the traffic jam near the traffic light. An efficient and simple algorithm is used to calculate the number ofvehicles on the various traffic system so that the traffic at traffic signals can be managed efficiently. The work uses the video cameras that were installed on the traffic signals to accurately count the no of cars and for this, they used the region of the interest-based method. further, it also contributes to new schemes of thenew traffic signaling intelligence.[6]

7. In this paper, the author have introduced the design and architecture of the intelligent transport system based on Big data platform. And the author have discussed the key technologies of ITS which includes: calculation ofaverage speed of the vehicle, controlling and checking the fake vehicles, calculation of bay onetraffic.[7]

8. This article is based on the structure of the operating system and the structure of the integrated road management system. this system uses the combination of sensor networksand works upon two algorithms which include:

   - A low level image processing sysem that performs the task of license plate recognization as well as feature extraction via change detection**.**
   - High – Level schemes based on MPEG-7 annotation schemes used as the information processing framework that performs the idendification and event representation procedures.

Paper	Problem Statement	Algorithim	Disadvantage
"Intelligent Traffic Management System"	Constraints and variations in traffic flow. GPS, digital cameras, and radar sensors did not prove to be very useful in traffic management.	**Dijkstra's algorithm**	1) It does blind searches, so takes a long time to process 2) This usually leads to acycl graphs and cannot determir the shortest path.
Intelligent Traffic Management with Wireless Sensor Networks	It is expensive and requires a lot of maintenance to use vehicles support technologies such as wired sensors, inductive loops, and surveillance cameras. Furthermore, the accuracy of these devices is also affected by environmental conditions.	Systems that are adaptive to traffic flow and use a wirelesssensor network for signal control.	Since WSNs often span a lar area, it is possible for an attacker to gain access to them via many sensors node on the network. In addition security risks, the nature of WSNs introduces practical concerns with their deployment
An Intelligent V2I-Based Traffic Management System	In recent years, advanced driver assist systems (ADAS) have proven to be an ideal tool for improving safety on the road as well as reducing pollution and traffic jams, with the goal of greener and more efficient driving. There are additional elements to consider in common driving environments, including other vehicles, pedestrians, emergency vehicles, motorbikes, cyclists, etc.	Author have discussed to use vehicle-to-infrastructure(V21) .communication and a fizzy-based algorithm	It is unable to perceive AI as just neural system designs For the approval and verification of a fuzzy information-based framewo extensive equipment testing required
Intelligent traffic management at intersections	The growth of urban populations leads to the increase in vehicles, and	It uses the algorithm	The main disadvantage of th algorithm is that it does not

IV. Problem Statement

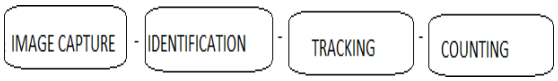
The daily use of private vehicles causes the problem of traffic jams, especially in metropolises. With thisincrease in traffic, even the traffic jams face many problems such as lost time, frustration, delay of workers and much more. With the problem of traffic jams, there are also many cases of car theft, traffic accidents and accidents in these cities. It will be very difficult for the investigating authorities and thepolice to track down these vehicles.Therefore, these problems need to be controlled to ensure the smooth flow of traffic on the roads. withoutcreating problems for citizens. We need a suitable solution that can help our traffic police to properlycontrol traffic without difficulty.

V. Methdology

Because there are many ways to control traffic on the road, but in this article, we use a vehicle detection method with image processing with the help of computer vision algorithims and edge detection.

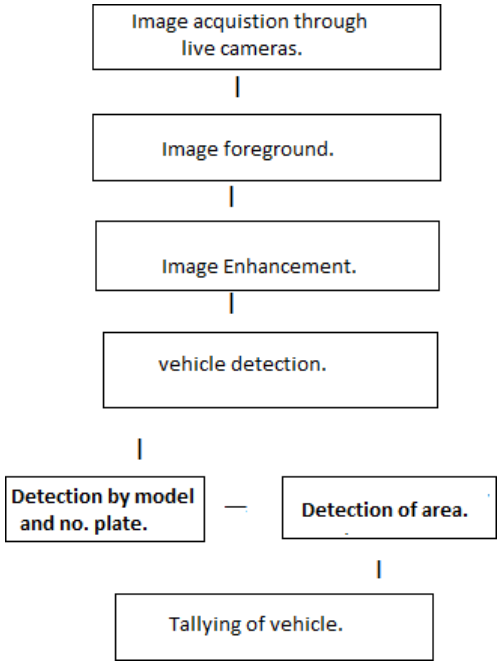
- **OVERVIEW OF THE VECHICLE DETECTION**

Overview of the entire method refers to the whole process. Firstly we will get input frame then all the operations will be performed on that input and required output will be generated.



- **FLOWCHART**

Flowchart of the software

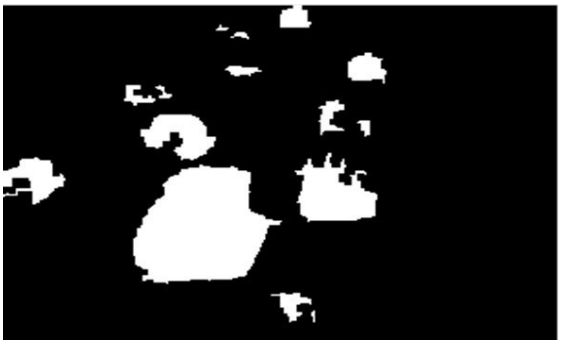


- **CAPTURE IMAGE**

Images will be generated from the camera every 10 seconds. The two images to be obtained are the foreground image of the traffic (helping to identify the vehicle model) and the background image of the camera (helping to identify the vehicle number).

- **IMAGE ENHANCEMENT**

Image enhancement refers to the process of emphasizing certain information of an image and toning down or removing unnecessary information based on specific needs. Elimination of noise when shooting images through the camera for easy further image analysis Fig2.



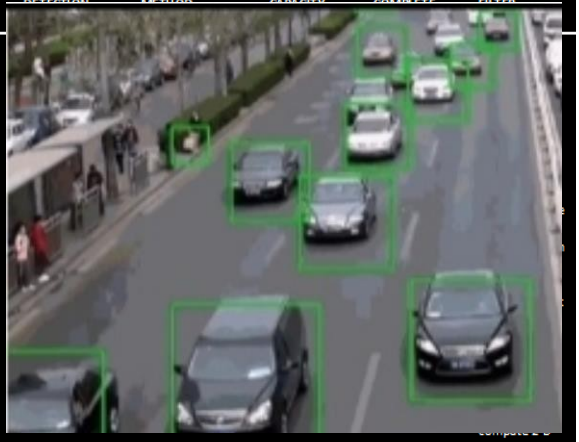
- **FOREGROUND DETECTION**

The foreground detection process applied to the image captured by the camera applies the edge detection Canny algorithm to the image captured by the camera, whose main purpose is to detect changes in the image sequence.

- **EDGE DETECTION ALGORITHIM**

There are further edge detection algorithm whichwe can use in traffic monitoring system. These algorithm areas follows-

ALGORITHMS	EDGE DETECTION	POLYMORPHIC METHOD	PAYLOAD CAPACITY	TIME COMPLETE	METHOD/ FILTER
Prewith algorithm					
Sobel algorithm					
Robert Algorithm					spatial gradient measurement on an image. / Robert filter.
Laplacian Algorithm	Laplacian of Gaussian.	BW=edge(I,'Laplacian')	low	0.16	It uses only one kernel. it calculate order derivatives in a single pass. / Laplacian filter
Canny Algorithm	Gaussian technique	BW=edge(I,'Canny')	Very high	0.30	Canny is generally most complex which smooth the image to reduce noise. / Gaussian filter



But the algorithm used in this system is Cannyedge detection algorithm:-

Canny edge detection algorithm can be divided into 5 different parts Image acquisition with live cameras Image Enhancement Image Modeland Plate less Foreground Vehicle Detection Area Detection Determining the tool steps to be applied in image acquisition via the camera:

1. Gaussian filter is applied to smooth the imageand image will be reduced into grey scale. Theequation for a Gaussian filter kernel of size (2k+1)×(2k+1) is given by:

$$H_{ij} = \frac{1}{2\pi\sigma^2} \exp\left(-\frac{(i-(k+1))^2 + (j-(k+1))^2}{2\sigma^2}\right); 1 \le i, j \le (2k+1)$$

2. After that intensity gradient of the image isdetermined with the help of required formula

$$\mathbf{G} = \sqrt{\mathbf{G}_x^{\,2} + \mathbf{G}_y^{\,2}}$$

$$\mathbf{\Theta} = \operatorname{atan2}(\mathbf{G}_y, \mathbf{G}_x),$$

:

3. Non-maximum suppression will be applied onthe previous image.

a. If the round gradient angle is 0° (i.e. the edge is north south), the point will be considered on the edge if the gradient size is larger in thepixels in the east and west directions..

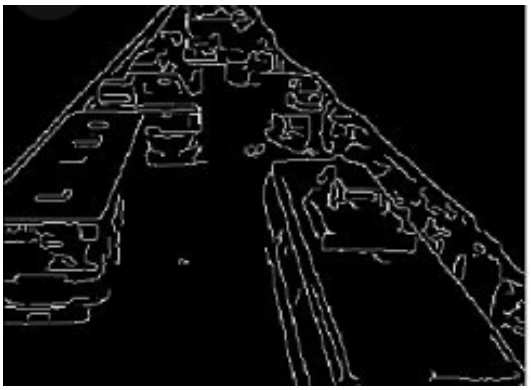
b. The gradient angle will be 90° (right on the east-west edge if the gradient size is greater than the magnitudes in the pixels in the northand south directions).

c. The point is considered an edge if the magnitude of the gradient is greater than the magnitude in the pixels in the north-west andsouth-east direction if the tilt angle is 135 °(ie the edge lies in a north-east-south-west direction).

d. The point will be considered on the edge if the gradient size is greater than themagnitudes pixels in the northwest and southwest directions, for example, the rounded gradient angle is 45° (ie the edge is in the northwest–southeast direction).

4. Double threshold will be applied to determine potential edges. Gradient values between 0.1 and 0.3 identify pixels with weak contrast. In contrast, strong colored pixels have a gradient value greater than 0.33.

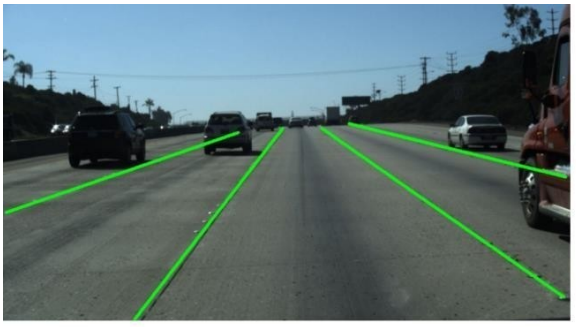
5. Hysteresis applied to the previous image. This method, based on the weak edge pixel and its eight connected neighbors, is used to monitor edge connectivity. If a weak edge point is added to the blob, this weak edge can be flagged for protection.

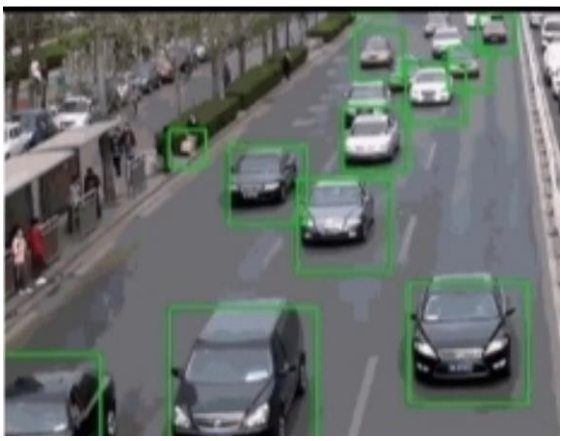


- **VEHICLE DETECTION**

The vehicle object is detected by two step method:-

With the help of foreground image andbackground image , vehicle will be detected on the basis of different models and no. Plate.Fig4.After performing the first step, a specific area of the recognized vehicle is created and that specific area is highlightedto reduce ambiguity Fig3.





- **TALLYING OF THE VEHICLE**

This is the last stage of the paper. It gives the exact count of the vehicle. which is used to reduce the traffic problem in today's world.

FUTURE WORK

To enhance the reliability of the system thefollowing changes can be incorporated:

1. The input frame can be sent in the form of avideo of time duration(20sec).
2. And after this, the video can be divided intotwo frames, every10 sec respectively.
3. After conversion of video input into image input, same operations will be applied for furtherproceed.

CONCLUSION

We introduced image processing with a computerized traffic management system to assure a sophisticated flow of traffic. Given the current situation, it's pretty clear that our roads are not the place, and A solution to keep traffic flowing will make traveling a lot more comfortable. It has been found that the main challenge is to direct traffic from heavily frequented areas to alternativeroutes, to make optimal use of the road space and thus to ensure a smooth flow of traffic.

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