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REAL-TIME VEHICLE DETECTION, TRACKING AND COUNTING USING DEEP LEARNING AND YOLO BASED DETECTORS

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Abstract: In most cities across the world, traffic congestion is a serious issue that has turned into a nightmare for the locals. It is brought on by signal delays, improper traffic light timing, etc. Traffic light delays are hard-coded and traffic has no bearing on it. Consequently, there is a growing need for systematic quick automatic systems to optimize traffic control. The majority of city traffic is starting to seriously interfere with daily living. Thus, many strategies are considered in order to control the traffic. We apply techniques from image processing in our system to calculate the traffic density. Every road needs to have cameras installed; these cameras are always monitoring the flow of traffic on that specific route. Whereby data is processed to identify traffic density, notify the relevant department, and trigger automatic completion of the required actions. In addition to easing the traffic congestion, we also implemented a Yolo-based module for ambulance feasibility, allowing the ambulance to manage the traffic light in the designated region.

Index Terms - Computer Vision; Traffic-flow; Open CV; Vehicle Detection; Vehicle Track; Vehicle Count.

I. INTRODUCTION

The Indian city management system is made up of a number of interconnected structures, many of which are crucial to traffic control. It can also be said to be one of the main features of a smart city. The world is constantly and extremely quickly changing. development needs to keep going in this direction. Contrarily, modern transportation does not offer people a convenient means of transit. Intense and irritated drivers delay arriving at work or home, waste gasoline, incur wear and tear on their vehicles, or even become enraged on the road due to traffic bottlenecks. Moreover, an increasing population directly contributes to an increase in traffic-related problems including speeding, collisions, hit-and-run incidents, and so forth. Long-lasting traffic congestion might lead to criminal activity. In big cities, incidents like cell phone stealing at traffic lights also happen. Thus, intelligent traffic management has emerged as a basic requirement for a developed society. Intelligent and flexible traffic control systems are currently chosen over fixed time methods in the majority of emerging nations. The majority of the monitoring for this kind of traffic control is done by servers and systems under central control. In light of this, the Internet of Things—which has shown its value in practically

every aspect of our everyday lives—can be viewed as a tool for traffic management via a central server. The quantity of vehicles going through a narrow path lengths of time before the traffic flow control station in our proposed task can get information from the active traffic jam points. To manage car entry, the timely data collected for the city's traffic jam node can be sent via the internet and cloud. Our plan is to use OpenCV's image processing apps to count cars in real time. Our plan requires very little infrastructure and may be executed at a low cost. As a result, the suggested solution makes use of Intelligent Image Processing and the Internet of Things to control traffic on both local and centralized servers. Initially, the actual In the suggested approach, real-time video data is obtained for metropolitan Indian environments. After splitting it into frames, binary transformation, noise reduction, and blob identification, the count is approximated using the recommended automobile counting technique. For those in charge of traffic control and management in real time, statistical representations of traffic data can also be helpful. It might also be helpful for planning for the future. After that, the acquired vehicle count is provided to a controlling station employing an online database that is updated in real time.

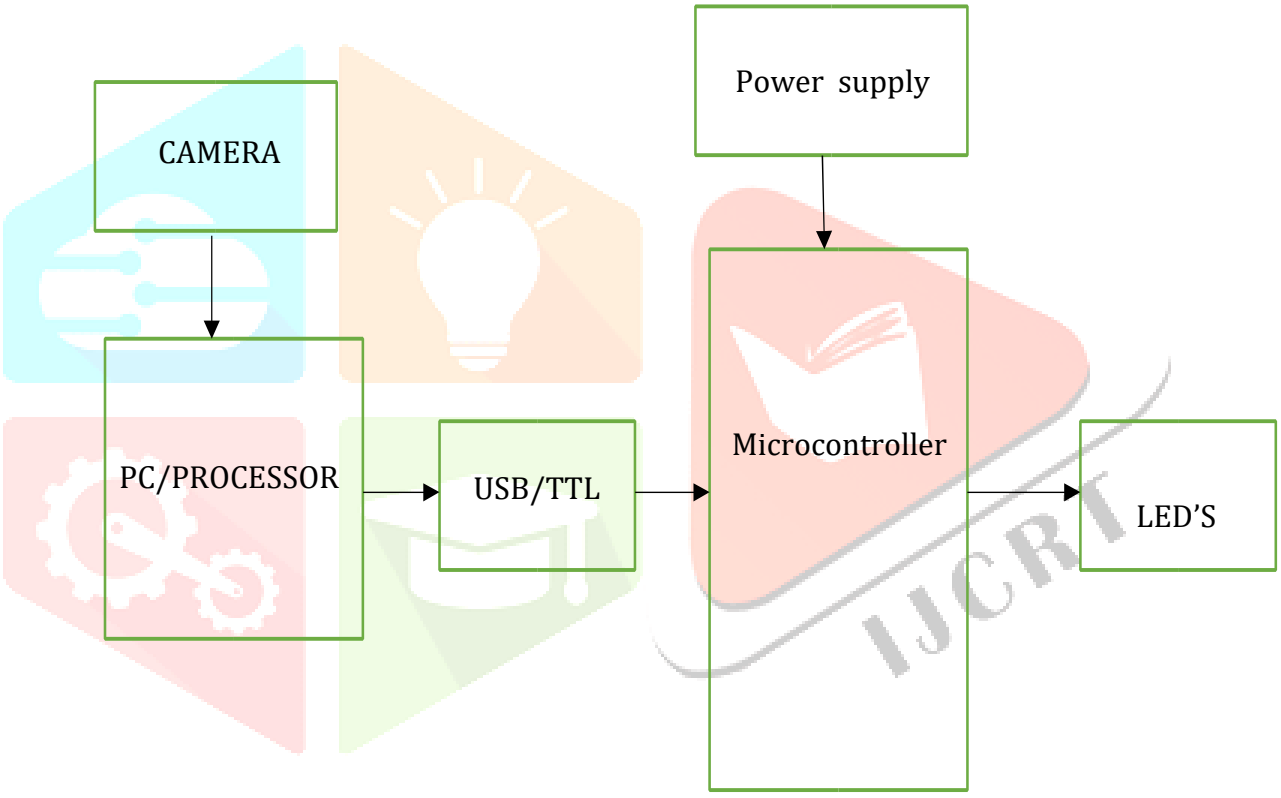

Figure 1: Block Diagram

- CAMERA: A device for recording visual images in the form of photographs, film, or video signals.
- PROCESSOR: A processor (CPU) is the logic circuitry that responds to and processes the basic instructions that drive a computer.
- USB/TTL: USB, in full universal serial bus, technology used to connect computers with peripheral devices.
- MICROCONTROLLER: Any of a type of miniature electronic device that contains the arithmetic, logic, and control circuitry necessary to perform the functions of a digital computer's central processing unit.
- POWER SUPPLY: A power supply is a device that converts one voltage to another more convenient voltage while delivering power.

Figure 2: Original video frame

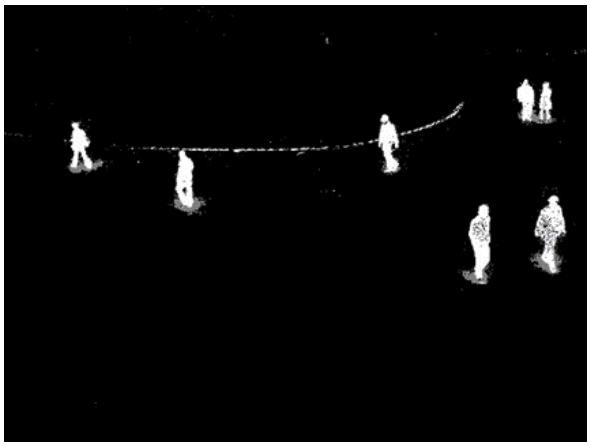

Figure 3: Background subtracted video frame

We have to capture live stream with camera. Open CV provides a very simple interface to this. To capture a video, you need to create a Video Capture object. Its argument can be either the device index or the name of a video file. Device index is just the number to specify which camera. Normally one camera will be connected. Background Subtraction has several use cases in everyday life, It is being used for object segmentation, security enhancement, pedestrian tracking, counting the number of visitors, number of vehicles in traffic etc. It is able to learn and identify the foreground mask. As the name suggests, it is able to subtract or eliminate the background portion in an image. Its output is a binary segmented image which essentially gives information about the non-stationary objects in the image.

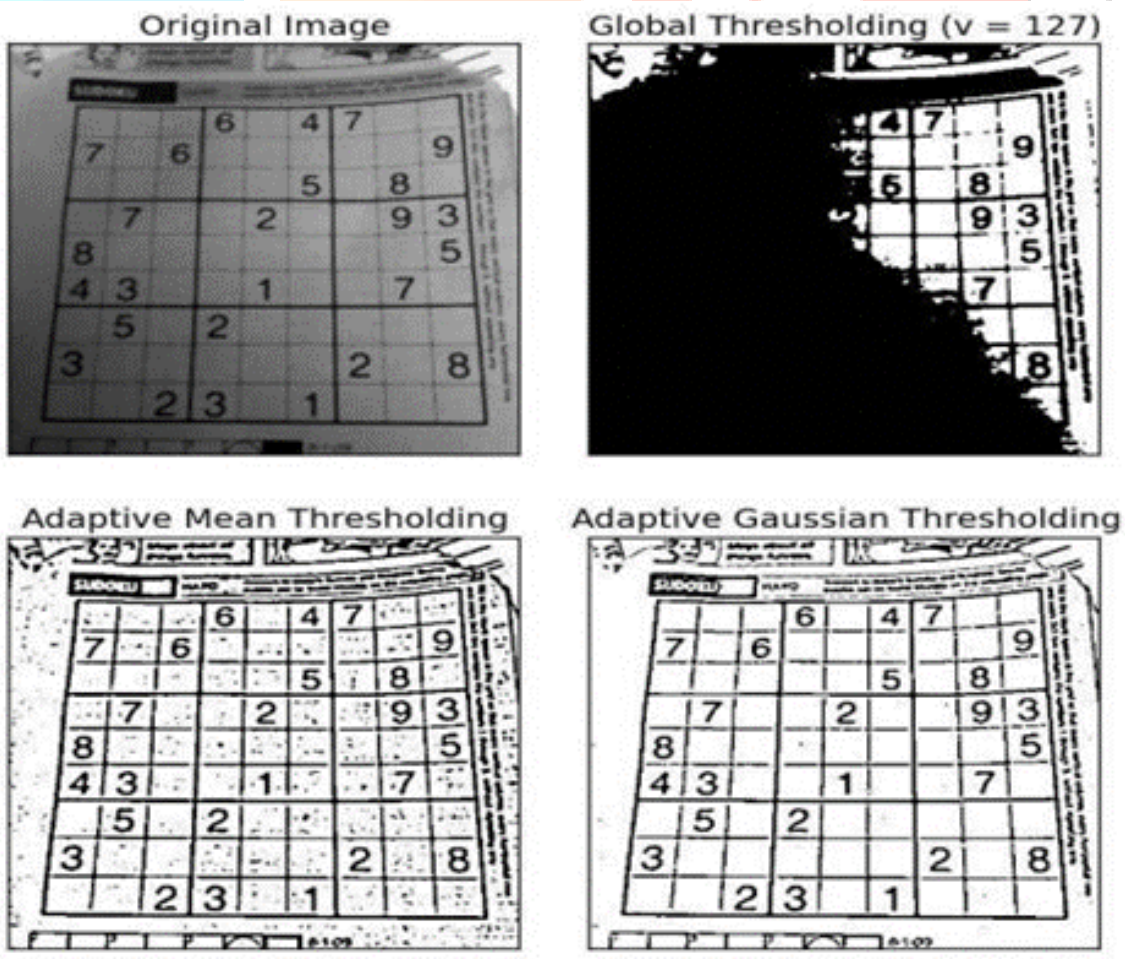

Figure 4: Gaussian filtering and Thresholding

In this approach, instead of a box filter consisting of equal filter coefficients, a Gaussian kernel is used. Gaussian filtering is highly effective in removing Gaussian noise from the image. If pixel value is greater than a threshold value, it is assigned one value (may be white), else it is assigned another value (may be black).

II. LITERATURE REVIEW

L. P. J. Rani, M. K. Kumar, et al.,[1] have given a major objective of the extend is to make activity administration system work powerfully utilizing Web of Things, Infrared sensor and Picture Handling in arrange to make activity system work proficiently. Activity administration robotization frameworks in the advertise points to computerized the activity lights, works on a intermittent plan to control the light (red/yellow/green) employments different innovations like GSM, NFC centers on the essential operation of an electrical switch. Our extend arrange to give a robotized IR-sense based arrangement that makes activity signals to move the lights (red/yellow/green) powerfully. We arrange on implementing the extend for one intersection "Proof-of-Concept" for this paper, which incorporates activity lights, IR sensors, Wi-Fi transmitter and Raspberry Pi microcontroller. The detected information assembled from IR sensor is transmitted by the Wi-Fi transmitter which is gotten by the raspberry-pi controller. Based on this compilation it dynamically shifts time of the ruddy flag and the client gets an insinuation of status of the flag on his way. The Raspberry Pi controller works as a central comfort, it decides which sideways of the street flag is to get open or near. The central support accumulates all the information from sensors and stores it in the cloud which underwear activity status to a portable gadget. The objective of our venture is to build an robotized activity administration framework, capable of dispersing time on getting flag from the Infrared sensors. Activity administration mechanization systems in the showcase points to computerized the activity lights, works on a occasional plan to move the light (red/yellow/green) employments different advances like GSM(Global framework for Versatile Communication), NFC(Near Field Communication)etc., centers on the essential operation of an electrical switch. By utilizing this sort of framework, there is a major negative mark of holding up for long time in the flag. The side with less tally of vehicles or no-vehicles is part the same time as the other sides with more swarmed vehicles, thus clearing way for long blockage close the flag zone. On the other side, by utilizing the strategy of energetic activity there is gigantic chance of getting this congestion to an conclusion or making it less difficult for the street clients.

T. e. a. Osman, et al.,[2] have presented a comprehensive review of one of the byproducts of the rampage of technological development, advancement and modernization is Traffic Jam. Nowadays, it is a very common phenomenon in our daily lives. This is specially a huge problem in congested cities like Dhaka where traffic jam is actually one of the larger social problems. A study has found that people yearly lose 8.15 million hours, 40 percent of which are working hours –in traffic jams [1]. In cities of developing countries like Bangladesh, traffic is mainly controlled by two ways. One way is to use traffic lights and change the lights at a pre-determined fixed time intervals and in the other way traffic polices do the work manually. Both of them are wasteful processes. Sometimes in a cross-section of roads (junction) we see that one side has lower congestion than the other side, but as the lights are changing at fixed time intervals, the jam on the road which has higher congestion keeps getting worse. On the other hand, most of the traffic polices are unaware of the situation at places away from him/her. It is also very hard to look at every side of a junction constantly by one person and decide correctly how to guide the traffic. However in developed countries, automation has been introduced in traffic management. At present, there are two available approach to control traffic. One is by sensing vehicles with pressure plates on road and the other one is by using RFID tags on number plates and placing RFID readers on road. Both methods are very expensive to implement when the traffic jam is very long. Another approach is surveillance camera based traffic system where traffic is monitored and manually controlled from a control room. In this case real-time image analysis is applied on the live video footage to aid the personals in the control room with traffic observation. This is the most adopted method for

traffic controlling these days. In our research we are proposing a better solution to this problem. Using computers' visual ability and analytical capability we have built a system which can decide which road needs to be cleared quickly and dynamically change the time intervals and changing the signal accordingly and automatically. In our research we have constructed a complete, fully automated and intelligent traffic management and control system for road intersections.

V. S. A. M. S. D. K. K. Swathi, et al.,[3] have surveyed the current activity flag framework or activity checking is a endless space where WSN can be connected to accumulate data approximately the activity stack on a specific street, incoming activity stream, activity stack at specific period of time (crest hours) and in vehicle prioritization. Remote Sensor Systems conveyed along a street can be utilized to control the activity stack on streets and at activity intersections. Sensors are conveyed on either side of streets at crossing point focuses and in crisis vehicles respectively. These sensors run on both sun powered vitality as well as battery. Amid shinning and sunny conditions these sensors have the capability to draw sun powered vitality from sun light and utilize battery control for working amid night and cloud and foggy condition Consider a situation of exceedingly congested range where numerous vehicles such as individual transport, open transport and crisis vehicles (Emergency vehicle, Fire brigade, VIP cars and other protect vehicles) have to hold up for long for the alter of activity signals at crossing point focuses. Existing activity light frameworks have timers that are set at normal interims. This leads to the wastage of valuable time particularly in case of protect vehicles for crisis conditions. In arrange to control this circumstance, we have proposed awe have proposed a system consisting of two parts: Smart Traffic Light Control System (STLC) and Smart Congestion Avoidance System (SCA) during emergencies. STLC System controls the change of traffic lights at intersection points giving high priority to emergency vehicles. SCA System is a smart traffic routing system that chooses the shortest routes having the least congestions.

Mahesh, et al.,[4] have given a brief, life in the metropolitan cities includes quick development from one place to another. Quicker development requires quicker transportation back and hence number of vehicles are expanding day by day and putting nonstop weight on the activity stream of the cities. Activity flow ought to be overseen in arrange to keep pace with the advancement of those cities. We have as of now proposed and actualized an web based genuine time bi-directional activity administration bolster framework [1][2][3][4][5]. Decision making of that framework requires different data counting street and vehicle related data, and several natural properties. A few of that data can be collected from different open information websites. However, their scope is restricted to city level. In expansion, location/area based assemble data at an instant is vital for exact TMS choice making framework. Besides, vehicle related data (speed) collection requires building inserted gadgets. Gadgets require to communicate among themselves and exchange the acquired data to the TMS framework. Hence, TMS choice making framework will make steering related decision from those information. Web of Things (IoT) is a arrange where inaccessible specialists are interconnected with each other and can be a arrangement for this circumstance. In this investigate work, we are going to propose an IoT based framework and execute it with a few inaccessible specialists with the center essentials of IoT. There are numerous solution models for IoT based TMS. The arrangements are changing in regard to the innovations they utilized. Radio Frequency Recognizable proof (RFID) based IoT is best suited for littler spaces, where the framework is as of now in place to utilize it. RFID requires specialized scanners to perused and transmit information, and particular collectors [6]. In this way, RFID is maintained a strategic distance from from our proposed system.

S. Rane, A. Dubey and T. Parida, et al.,[5] proposed activity is one of the banes of urban life in India. While in created nations, indeed the wealthiest of the wealthy utilize open transport, in India there is a course partition when it comes to utilizing open transport. This has driven to an over the top increment in the number

of private vehicles driving to an expanding number of activity growls [1]. One of the major issue due to increment of vehicles the issues with stopping parts. Vehicle administration at the stopping parts have gotten to be an critical viewpoint for the best utilization of existing stopping range capacity. Wastage of time and fuel at the stopping zone due to increment in vehicle check have ended up a major issue for enormous company like Infosys, Accenture etc who are making multilevel stopping part facility for their workers. It is critical to oversee the vehicular stream productively for the best utilization of existing stopping part capacity. Due to stopping part issue at top hours, human schedule too got exasperates. For example, if there is a individual who needs to stop his/her car, at that point they ought to discover stopping area which is time consuming. In that circumstance, disgraceful stopping parcel administration can inconvenience them a part. One circumstance can be that the individual will not discover any position to stop vehicle, though stopping is accessible. So, it is exceptionally critical to design an cleverly stopping framework to control and oversee vehicles at stopping effectively [4-5]. The most prevalent reason of activity clog at stopping is an wasteful controlling which influences the activity stream. For example, expect a circumstance where stopping is accessible in stopping part and individuals cannot discover that area since the stopping parcel is enormous, at that point this is the squander of accessible assets and is wasteful. This happens since early coming individuals stop their vehicle where ever they need to. By considering the over illustration if legitimate number of vehicle is kept up and checked at that point individuals require not to pointlessly discover the stopping position, and this might fathom the problem.

H. O. Al-Sakran, et al.,[6] have given a brief, In later a long time ubiquity of private engine vehicles is getting urban activity more and more swarmed. As result activity observing is getting to be one of critical issues in huge smart-city foundation all over the world. A few of these concerns are activity blockage and mishaps that as a rule cause a critical squander of time, property harm and natural contamination. Any sort of congestion on streets eventually leads to money related misfortunes. In this manner, there is an critical require to make strides activity management. The appearance of the Web of Things (IoT) gives a unused drift for cleverly activity development. This investigate proposes to utilize the IoT, operator and other advances to make strides activity conditions and diminish the activity weight. Data created by activity IoT and collected on all streets can be displayed to travelers and other clients. Through collected real-time activity information, the framework can recognize current activity operation, activity stream conditions and can foresee the future activity stream. The framework may issue a few most recent real time activity data that makes a difference drivers choosing ideal courses. Hence, the framework can accurately administrate, screen and control moving vehicles. Building an shrewdly activity framework based on IoT has a number of benefits such change of activity conditions, decrease the activity stick and administration costs, tall reliability, activity security and autonomy of climate conditions [1, 2]. Such activity IoT must incorporate each element of activity such as streets, bridges, burrows, activity signals, vehicles, and indeed drivers. All these things will be associated to the web for helpful distinguishing proof and administration through sensor gadgets, such as RFID devices, infrared sensors, worldwide situating frameworks, laser scanners.

M. R. Rahman and S. Akhter, et al.,[7] have given a brief In 2000, BBC detailed that contamination due to road activity is to be faulted for the passing of tens of thousands each year over Europe [1]. Another investigate published in The Lancet Restorative Diary evaluated that 6% of passings in a few nations in Europe were due to air contamination; where half of these passings (around 20,000) were connected to harmful exhaust transmitted from vehicles stuck in activity [2]. In 2007, MSNBC detailed a U.S. consider expressing that activity contamination is influencing children who live near active streets by anticipating their lungs from creating appropriately [3]. The activity stick issue is shockingly an on-going ancient issue that is not appearing any signs of enhancement. This issue is coming about in discuss contamination, sound contamination, mischances, late entry at goal etc. This paper points to help the activity framework to diminish

the traffic stick and make a more maintainable environment. Over the time distinctive arrangements have been proposed to solve the activity stick issue. The arrangements change in their center technology[4][5][6][7][8][9]; as a few of them utilize Infrared sensors, CCTV cameras and picture preparing, GSM and cellular towers, RFID entryways, Sound sensors etc.

M. R. Rahman, and S. Akhter, et al.,[8] proposed a unused moo taken a toll, adaptable, viable, and secure internet based activity administration framework with genuine time bi-directional communication was proposed and implemented (in [1][2][3][4]) to help and diminish the activity circumstance. To decide the energetic street weights in TMS, four (4) diverse natural properties - rain drop, temperature, wind, and mugginess are considered. Rainfall is one of the most persuasive climate traits to decide the street blockage in metro city, as the road portions are submerged due to the overwhelming downpours, and makes slower activity developments. The warm discharged from the motors, air-conditioners of the activity stacked vehicles, may raise the generally temperature of the zone. Hence, the current temperature makes a difference to classify activity clog status of a specific street fragment. Blasts of wind have direct impact on street security and that pushes to slower vehicle development. In expansion, temperature, wind and humidity have coordinate impact to foresee the future precipitation in a specific zone. Top hour is one of the most influential properties to cause activity clog in metro cities. In this way, these four (4) natural properties and peak hour have coordinate or circuitous relationship on activity clog as well as vehicle development and impact to choose them as choice making parameters.

D.J. Sherly, et al.,[9] have given a brief, as the Remote Sensor Systems have innovatively created more quickly and more productively, they have gotten to be the key source for the advancement of IoT. They discover application in nearly all zones counting savvy lattice, savvy transportation frameworks, keen domestic, keen healing centers, and so on. The accomplishment of the over lead to the shrewd city improvement as said by our Indian Prime Minister. The thought of web of things (IoT) was created in parallel to WSNs. The term web of things was devised by Kevin Ashton and alludes to interestingly identifiable objects and their virtual representations in an “internet-like” structure. These objects may extend from colossal buildings, planes, cars, machines, any sort of products, industries, to human creatures, creatures and plants and indeed their particular body parts. One of the major advancements of WSNs will be after they are coordinates with IoT. This paper points to create an shrewdly transportation framework. The future streets will be able to oversee activity blockage much superior than today's systems. It has been envisioned that in a span of around 20 to 30 a long time the existing activity framework would progress to an degree where cars can communicate with each other without any human interaction to control the activity. Subsequently travel may be made smoother and more secure. Sensors would be fitted in cars and these cars will be put on the streets. These would monitor activity and send the data wirelessly to a "central activity control framework," a center that compiles information to bolster back the data to vehicles on the street. For occurrence if there's parcels of activity, the central activity control system would be told and they in turn respond by forcing speed limits that have to be taken after by the vehicles in that clog region. Since millions of cash is went through on activity clog each year, it has been assessed that, by the execution of keen transportation frameworks, the cash went through will get decreased by at slightest 15%.

L. Lu, et al.,[10] displayed the WISE-IoT engineering does not straightforwardly fulfill the over vertical showcase requirements. It is in any case a adaptable and versatile engineering that bolsters plug and play capabilities, and supports numerous capacities over a wide assortment of utilize cases is inalienably important and valuable. Advantech proposes the WISE-IoT design, which incorporates numerous angles, counting the SaaS, PaaS for Cloud benefit, and moreover allows engineers to oversee, screen, get to and handle information from IoT gadgets, the network between the server-gateway or door sensor, and the WISE-

agents and program on the gadgets. The WISE-IoT engineering that Advantech proposes can bolster ARM/x86 frameworks without being particular to a set of innovations; it is profoundly integrated with the most prevalent open source ventures and advances. We too give the APIs and source codes to offer assistance the engineer to effectively execute more and more IoT gadgets in the field as well as edge/ door environments.

III. Problem Identification

In most cities across the world, traffic congestion is a serious issue that has turned into a nightmare for the locals. It is brought on by signal delays, improper traffic light timing, etc. Traffic light delays are hard-coded and traffic has no bearing on it. Consequently, there is a growing need for systematic quick automatic systems to optimize traffic control. The majority of city traffic is starting to seriously interfere with daily living. Thus, many strategies are considered in order to control the traffic.

3.1 Existing system

The current setup records video using a Raspberry Pi and monitors users using a popular platform called Linux server. When something moves inside the observed region, the method records a video using a Raspberry Pi. With the help of the Histogram equalization technique, the suggested system effectively separates the vehicles from the fluctuations in the surrounding environment and enhances low-resolution videos to preserve resolution uniformity and noise reduction. Subsequently, using the particle filter technique, the background subtraction algorithm aids in object detection and tracking. The threshold used to count tracked vehicles varies depending on the size of the vehicle and the area.

3.2 Proposed System

We apply techniques from image processing in our system to calculate the traffic density. Every road needs to have cameras installed; these cameras are always monitoring the flow of traffic on that specific route. Every one of these cameras is connected to the system where Data is processed to determine traffic density, notify the relevant department, and initiate automatic action when needed. In addition to lessening traffic, we also deploy a LoRa-based module for ambulance feasibility, enabling the ambulance to control traffic lights in the designated region.

IV. Methodology

The automatic counting of automobiles passing via a selected location will be achieved by image processing techniques. capturing live video of traffic flow on a route with a camera system. Following the acquisition of the footage via To work with this data, a portable microprocessor processing machine and camera were utilized. Lastly, following the set average number of vehicles per time. The central control system received the same input from the same processing system. The full explanation of how the job will be done is provided in the next two subsections.

4.1 Vehicle counting using image processing

Following the acquisition of the video footage from the camera system, Open CV software was used to process the data on a CPU. the process of processing an image to determine how many cars are traveling through a certain area of interest. The synopsis of actions taken is supplied below: The process of extracting individual frames from the video sequence is the first step.

• A Gaussian filter was applied to the foreground image in order to decrease noise. Moreover, a morphological operation of closure was used to appropriately envelop the image's objects.

• The processed image was then transformed to binary form, where a threshold value determined whether to convert each pixel's value to "1" or "0." Utilizing the OTSU bimodal threshold technique, this cutoff point.

The binary threshold image is created because it makes it simpler to identify object contours in this type of image.

4.2 Transmission of information for traffic management system using internet

There are four steps in the internet communication process between the camera guided processing system and the final user server system.

• Vehicle fetching every second Count Information taken from Open CV A variable that was updated at the end of each predetermined time interval included the average value of the vehicles that were present during the relevant time interval.

• Python-based IoT Cloud Microprocessor Interface: Next, we need a server and a portable microprocessor system with an internet connection in order to transfer processed information to the control room remotely. We have employed IoT cloud for the server. The processor or controller must be compatible for us to use the IoT cloud Server Time Database. We'll utilize the Python language to achieve this.

• Connecting to the Internet of Things (IoT) (Real-Time Database): Connecting to our database came next, following interface. We have built a new database on the IoT cloud for that purpose. Next, use to connect this to the database Use Python to retrieve credentials (API keys, or Application Programming Interface), and the End Point URL, or Universal Resource Locator.

• Data transmission of vehicle counts to Real Time Cloud: Our job was to remotely deliver car count data to the server after establishing a connection to the database. To do that, we used the internet to send our vehicle count data—obtained from Open CV—to an IoT cloud via Python and the Time Stamp. After the data has been sent utilizing the aforementioned procedures, the process repeats itself once per second to give the capturing system's monitoring details continually. The outcomes of the labor completed and the final product.

4.3 Vehicle detection and tracking

The vision system relies on a series of image sequences captured by a camera to process input data. These images encompass the frontal area of the vehicle, exhibiting the road, nearby foliage, structures like bridges, and other vehicles within proximity. Its primary objective revolves around distinguishing cars within the images from various moving and stationary objects, categorizing them specifically as cars. However, this task poses considerable challenges due to the dynamically evolving scenery of the road and the diverse lighting conditions dictated by weather and time of day, factors that remain unpredictable. Identifying vehicles that seemingly emerge abruptly within the visual field adds another layer of complexity.

Differentiating vehicles from the myriad of elements within the images, each with distinct speeds, dimensions, and stylistic variations, requires sophisticated analysis. Initially, the system employs motion analysis across numerous consecutive image frames to detect passing automobiles. It then utilizes an adaptive feature-based approach to discern the relative mobility between the detected cars and the camera-equipped vehicle, especially crucial for identifying distant vehicles, which often exhibit relatively minimal visual cues.

Immediate recognition of vehicles from a single or a couple of photos proves exceedingly challenging, particularly in less cooperative environments lacking adequate brightness contrast between the vehicles and the background. Therefore, the system adopts a strategy of analyzing multiple image frames and leveraging its tracking capabilities to identify vehicles that may not be immediately detectable. By iteratively analyzing successive frames and employing tracking mechanisms, the system can effectively identify and track vehicles, thereby enhancing its overall performance and reliability in real-world scenarios.

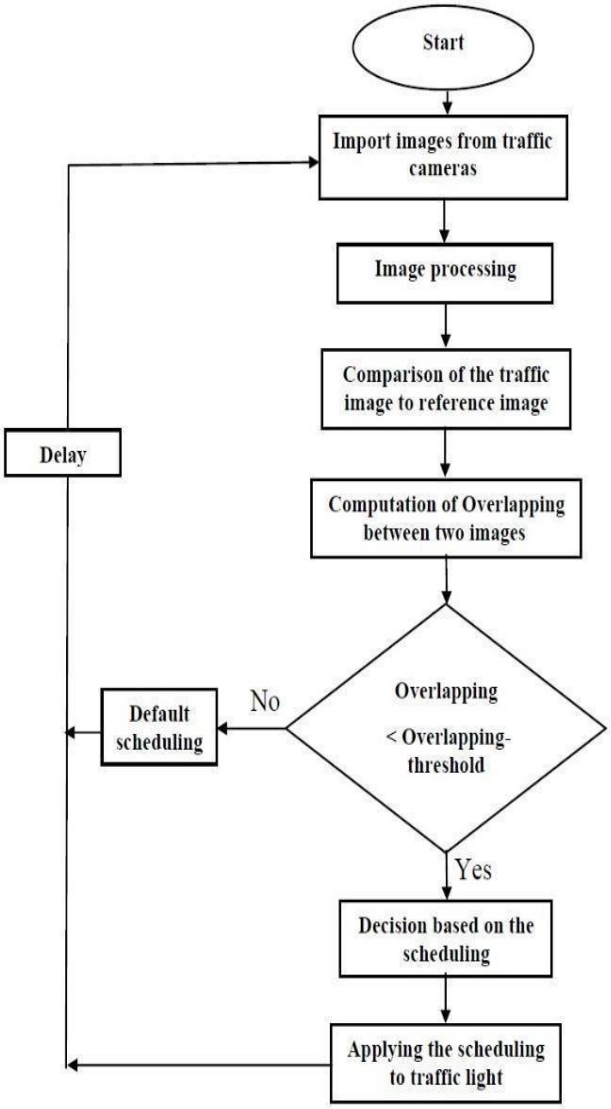

Figure 5: Flowchart of the proposed model using image processing

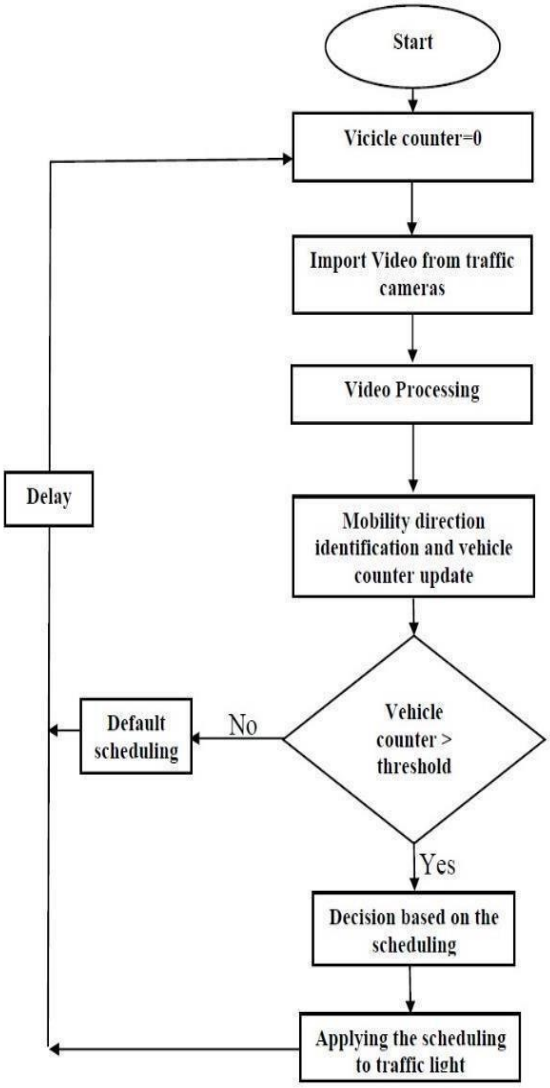

Figure 6: Flow chart of the proposed model using video processing

V. CONCLUSION

The vision system uses image sequences captured by a camera as its input data. The photos display the area in front of the vehicle, including the road, nearby trees, bridges, and other vehicles. The system's main function is to differentiate distinguish the cars in the pictures from other moving and stationary items and identify them as cars. This is a difficult endeavor because the road's constantly shifting scenery and the different lighting conditions that vary depending on the weather and time of day are unknown in advance. It can be challenging to identify cars that appear out of nowhere. Vehicles that are vehicles and trucks appear at somewhat varied speeds, dimensions, and styles. Initially, we will explain how numerous consecutive image frames' motion information is analyzed to identify passing automobiles. Next, we explain how distant cars, which typically display relatively little. An adaptive feature-based technique can identify the relative mobility between them and the camera-assisted car. However, immediate recognition from one or two photos is exceedingly challenging and only functions reliably in cooperative environments (e.g., sufficient brightness contrast between the vehicles and background). Consequently, our system analyzes multiple image frames and uses its tracking skills to identify cars if an object cannot be identified right away.

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Figure 7: Sample video frame

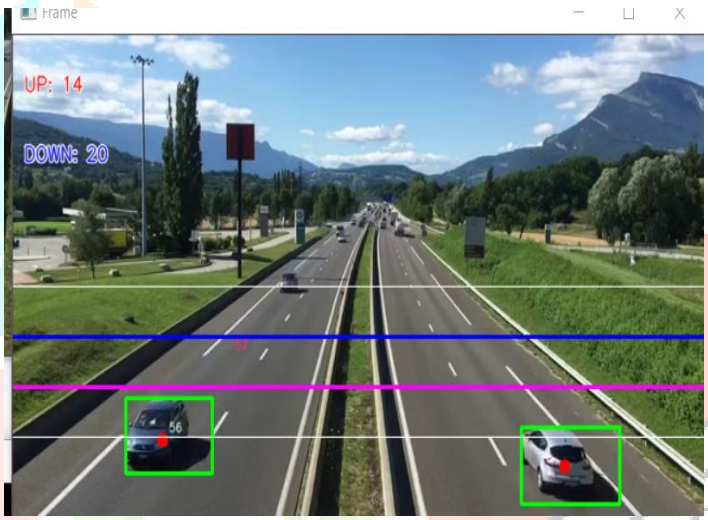

Figure 8: UP And DOWN vehicle count frame

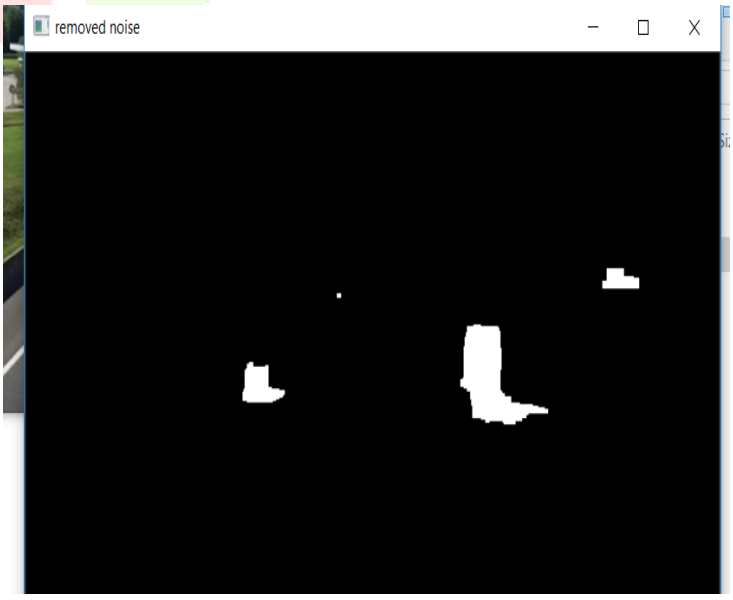

Figure 9: Background Substraction Video frame

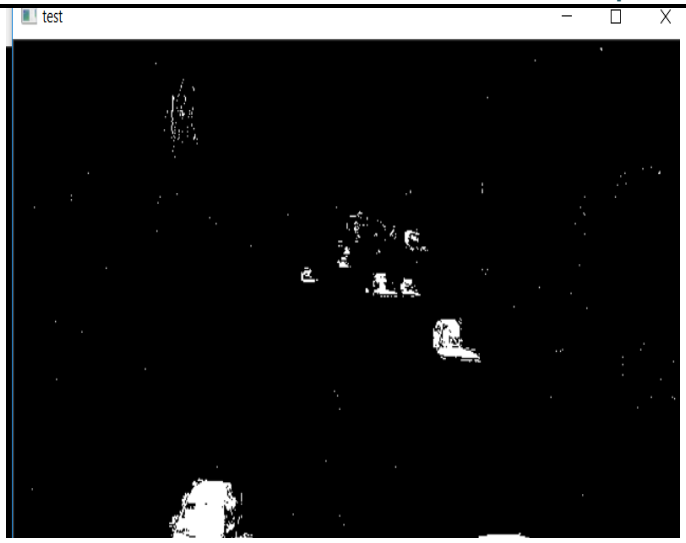

Figure 10: Thresholding Frequency

VI. Future Enhancements

In the future, real-time traffic condition detection on traffic footage is planned. This can be accomplished by using the traffic situation on each frame and the video splitting technique. Video traffic identification in real time is highly significant in the study for underdeveloped nations such as India.

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