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Traffic Control using Computer Vision

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Abstract: Now a days traffic density on the streets increasing around the world tremendously . It causes several problems on the day to day life of people. As we know that it is the era of speed, so that nobody wants to wait for a long time at any cost. Everybody prefers to low traffic density streets. This proposed system introduced a vehicle density-based traffic control system to avoid above issues. This problem can be resolved by controlling the traffic density on the roads. This system introduces a new method to control vehicle density by controlling the traffic lights using Image processing. Vehicle density is measured using predefined classifiers available in image processing. If the measured density is above the normal density (threshold value) it passes an indication to the microcontroller which controls the projector and thereby we can give appropriate traffic signal to display.

Keywords: Computer vision, Traffic density, Arduino uno, Open CV

I. INTRODUCTION

One important application of computer vision is traffic monitoring and control. Here we are presenting a system for detection of moving vehicles approaching an intersection or in an highway by camera in the context of traffic light control systems. As the system is dedicated to outdoor applications, efficient and robust vehicle detection under various weather and illumination conditions is examined. To deal with these ever changing conditions, vehicle detection relies on motion segmentation and color mapping to achieve feature space segmentation. Experimental results using real outdoor sequences of images demonstrate the system's robustness under various environmental conditions. It detects the number of vehicles on each road and depending on the vehicles load on each road, this system assigns optimized amount of waiting time (red signal light) and running time (green signal light). This system is a fully automated system that can replace the conventional pre-determined fixed-time based traffic system with a dynamically managed traffic system. It can also detect vehicle condition on road and auto-adjust the system according to the changing road conditions which makes the system intelligent. The designed system can help solving traffic problems in busy cities to a great extent by saving a significant amount of man-hours that get lost waiting on jammed roads. This research focuses on factors, low-cost image processing and traffic load balancing. Moreover we are also replacing the conventional traffic light system with a more efficient system using LCD projector. This computer vision technology can be used to reduce the traffic congestion and also helps to detect people who are not wearing helmets to a extent.

II. LITERATURE SURVEY

In[1], Traffic signals are essential to guarantee safe driving at road intersections. However, they disturb and reduce the traffic fluency due to the queue delay at each traffic flow. In this work, we introduce an Intelligent Traffic Light Controlling (ITLC) algorithm. This algorithm considers the real-time traffic characteristics of each traffic flow that intends to cross the road intersection of interest, whilst scheduling the time phases of each traffic light. The introduced algorithm aims at increasing the traffic fluency by decreasing the waiting time of travelling vehicles at the signalized road intersections. Moreover, it aims to increase the number of vehicles crossing the road intersection per second. In modern life we have to face with many problems one of which is traffic congestion becoming more serious day after day. Traffic flow determination can play a principle role in gathering information about them. This data is used to establish censorious flow time periods such as the effect of large vehicle, specific part on vehicular traffic flow and providing a factual record of traffic volume trends. This recorded information also useful for process the better traffic in terms of periodic time of traffic lights. There are many routes to count the number of vehicles passed in a particular time, and can give judgment of traffic flow. Now a day's camera-based systems are better choices for tracing the vehicles data. This project focuses on a firmware-based novel technique for vehicle detection. This approach detects the vehicles in the source image, and applies an existing identifier for each of the vehicle. Later it classifies each vehicle on its vehicle-type group and counts them all by individually. The developed approach was implemented in a firmware

platform which results is better accuracy, high reliability and less errors. Traffic lights play a very significant role in traffic control and regulation on a daily basis. Using MATLAB the density of the roads is determined and the micro controller changes the duration of green light given for each road as per the output after image processing. The traffic lights used in India are basically pre-timed wherein the time of each lane to have a green signal is fixed. In a four lane traffic signal one lane is given a green signal at a time. Thus, the traffic light allows the vehicles of all lanes to pass in a sequence. So, the traffic can advance in either straight direction or turn by 90 degrees as shown in Fig.1. So even if the traffic density in a particular lane is the least, it has to wait unnecessarily for a long time and when it gets the green signal it unnecessarily makes other lanes wait for even longer duration. In this system we are going to implement crowd based traffic light signal, lane will be get open on the basis of crowd at the desired lane.It is identified by the capturing the vehicle crowd images in the lane and identifying the number of vehicles in that desired lane. P reprocessing :- Pre-processing is a common name for operations with images at the lowest level of abstraction both input and output are intensity images. The aim of pre-processing is an improvement of the image data that suppresses unwanted distortions or enhances some image features important for further processing. Background Subtraction:- Background subtraction, also known as foreground detection, is a technique in the fields of image processing and computer vision wherein an image's foreground is extracted for further processing (object recognition etc.). Background subtraction is a widely used approach for detecting moving objects in videos from static cameras. The rationale in the approach is that of detecting the moving objects from the difference between the current frame and a reference frame, often called "background image", or "background model". Background subtraction is mostly done if the image in question is a part of a video stream. Background subtraction provides important cues for numerous applications in computer vision, for example surveillance tracking or human poses estimation.

In[2],A vision-based real-time traffic analysis system is presented, which can analyze vehicles in traffic from a traffic video sequence. This paper discusses object detection, and tracking of objects in multiple video frames. The functionalism of traffic analysis using computer vision include vehicle speed estimation, traffic flow direction estimation, traffic density estimation and car colour determination. To detect objects in the traffic flow and to track objects Optical Flow Model and kalman Filtering methods are used in this paper respectively. These algorithms are also used in determining the traffic density, vehicle speed and vehicle colour. Block Matching technique is used to determine the traffic flow estimation. Experimental analysis for colour estimation shows an accuracy of 85.71%. The results of this work culminates in object detection, object tracking, traffic density, vehicle speed, vehicle colour and traffic flow estimation which could be used for applications such as traffic control, security and safety both by government agencies and commercial organizations.

In[3],In today scenario city will try to modify in the form of smart city with better facilities in terms of education, social-economic life, better transportation availability, noise free – Eco-friendly environment availability, and ICT-Information and communication technology enabler for development in the city. In this paper, we are reviewing different work already done or draft by some research in the field of traffic control system – for better monitoring, tracking and managing using a computer vision system. Nowadays, most of the city installed with C.C.T.V. – camera for monitoring the traffic related activity. The Currently Indian government is trying to develop smart cities and already announces 3 stages, in which nearly 60 cities are selected. In the near future the list of the smart cities will further Smart city infrastructure divided along 4 parts as shown in increase from rapidly system available with required availability developing Challenges This less Gujarat within or paper congestion to resource algorithms under traffic etc. reach First further the – Currently, smart Ahmadabad list management to last one of avail goes for displayed few city traffic place solving on many better mainly years.

In[4],An increased population growth rate leads to create traffic congestion. This have been a serious problem faced by almost all areas worldwide, affecting an environmental, economic and ecological sectors .Conventional traffic system could not evaluate gigantic traffic concentration in very effective modes, also it is time consuming system where waiting time is identical for unlike masses. SWARM is based on adaptive, collective, decentralized, co-ordination, self-organization properties .It is a system in which all nodes or members of system interact with each other to bring about particular task in an intelligent, efficient and in decentralized fashion .It need not to be centralized .It is non-hack able system. Swarm is preeminent option to handle tasks which are intricate adequate to perform congestion avoidance, traffic flow improvement. Till now swarm technology was used in field of robotic, computer science, telecommunication. This paper briefly covers implementation of swarm technology in traffic signal with the help of distributed, adaptive, self-organization, multi-agent approach such that each signal will interact with one another. This paper is concentrating on different Biological algorithms which are used for implementation of the system. Now a day, traffic is a huge problem in everyone’s life because the numbers of vehicles are increases & the urbanization & population growth is also increases. Everyone should reach their destination in short time. In day today life, the number of accidents happens on a road are also increases more & more. So, it is very important to make intelligent traffic control system in the future to avoid the accidents & to control the traffic on the road. So that, we make our system intelligent using swarm technology. Swarm technology is a system which is based on the real time applications & the members of the group are communicating with each other to achieve specific task. Natural examples of swarm technology are ant colonies, schooling of fishes, etc. Swarm technology includes artificial intelligence of machine or software in which they make the human’s day to day life much easier. Swarm is a system which performs a particular

task using collective behaviour since from few years, swarm technology is been used for only robot implementation which performs the task using Nano bots.

In[5],this paper have an abstract as traffic jam has become a common problem in the major cities all over the world. Our capital city Dhaka is no exception. Numbers of people are being victim of traffic jam each day. The main causes of such situation are more cars on the street, poor traffic management and lack of proper infrastructure. In this paper, we propose a dynamic traffic control system by measuring the traffic density at the intersections by real time video feeds and image processing. We used MOG algorithm for background subtraction method and for foreground detection to keep the count of the cars in each lane. The traffic lights at the intersections will change dynamically according to the conditions of traffic that will be detected from the video feeds.

In[6], here the present existing frameworks do dominant the traffic becomes major issue owe to fast increase in vehicles and conjointly owing to giant time lag between the traffic lights. So, so as to improve the downside, I am going to opt for the effective traffic lights system using Density technique. This paper illustrate you how to manage traffic density. During this scheme, the sensing are adopted to live traffic substantially. we rearrange one LDR sensing element for each one road; these Light Dependent resistors sensors forever the traffic thereon specific roadway. of these LDR sensors are interfaced with micro controller. Supported controller & Sensors recognize traffic after that traffic system has been controlled.

In[7], here the number of road users constantly increases; vehicle population also increased to an extreme level. So the traffic problem causes major time delay and more issues. So, we are in need to find better solution for traffic control. There are several types of traffic control system; we focus on optimization of traffic light controller in a city using image processing. To overcome this problem, this proposed system contains camera and micro controller to process image and measures density of traffic and the traffic controller changes signal timing automatically based on the traffic density at junction and the cameras are mounted on roadside respectively. This project is to design a density based dynamic traffic control system. The number of vehicles passing on road is get counted by micro controller. The micro controller takes decision based on different vehicles count, and updates the traffic light delays as a result. The traffic light is situated at a certain distance away from the camera system. In the proposed system, we measure the traffic density using image processing by mat lab and ARM processor to control the traffic signal.

In[8],this project has been designed to develop a dynamic implementation road signal based on density. The sync signal automatically switches to detecting traffic density at the intersection. Traffic congestion is a serious problem in many large cities around the world and has become a nightmare for travellers in these cities. This project is implemented by placing IR transmitters , receivers ,micro controllers and led at a 4 way junction. The conventional traffic light system is based on the concept of fixed time assigned to each side of the joint that cannot be varied by varying traffic density. The tie times assigned are fixed. Sometimes a higher traffic density on one side of the joint requires a longer time than the standard green time allocated. The project featured with an Arduino Uno with interface sensors automatically switches the synchronization of the union to accommodate the movement of the vehicles gently avoiding unnecessary waiting times at the intersection. The sensors used in this project are infrared proximity sensors in the sight line configuration through the loads to detect the traffic light density. The vehicle density is measured in a number of sectors based on the times assigned as a result. In addition, the project can be improved by synchronizing all traffic nodes in the city by creating a network between them. The network can be wired or wireless. This synchronization will greatly reduce traffic congestion.

In[9], Automatic detecting and counting vehicles in unsupervised video on highways is a very challenging problem in computer vision with important practical applications such as to monitor activities at traffic intersections for detecting congestion, and then predict the traffic of which assists in regulating traffic. Manually reviewing the large amount of data they generate is often impractical [44]. H.S. Mohana [45-47] et.al., developed a new approach in detecting and counting vehicles in day environment by using real time traffic flux through differential techniques. Counting object pixel and background pixel in a frame leads to the traffic flux estimation. The basic idea used is variation in the traffic flux density due to presence of vehicle in the scene. In this paper a simple differential algorithm is designed and tested with vehicle detection and counting application. Traffic flux estimation will play vital role in implementing vehicle detection and counting scheme. Real time dynamic scene analysis has become very important aspect as the increase in video analysis. The technique developed is having simple statistical background. Dynamic selection of images from the sequence is implemented successfully in order to reduce the computation time. The designed technique are evaluated such a 20 different video sequences and weighed thoroughly with simple confidence measures. To make the design illumination invariant, a section of the background is taken as reference, which will not be affected by the traffic flow. Threshold is fixed and used to discriminate the low, medium and high traffic flux.

III. SYSTEM OVERVIEW

A). Software Requirements

i. Library-Open CV: Open CV is written in C++ and its primary interface is in C++, but it still retains a less comprehensive though extensive older C interface. There are bindings in Python, Java and MATLAB/OCTAVE. The API for these interfaces can be found in the online documentation. Wrappers in other languages such as C#, Perl, Ch,

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Haskell and Ruby have been developed to encourage adoption by a wider audience. All of the new developments and algorithms in Open CV are now developed in the C++ interface.If the library finds Intel's Integrated Performance Primitives on the system, it will use these proprietary optimized routines to accelerate itself. A CUDA-based GPU interface has been in progress since September 2010. An OpenCL-based GPU interface has been in progress since October 2012, documentation for version 2.4.13.3 can be found at docs.opencv.org.

ii. IDE - Qt: The meta object compiler, termed moc, is a tool that is run on the sources of a Qt program. It interprets certain macros from the C++ code as annotations, and uses them to generate added C++ code with meta information about the classes used in the program. This meta information is used by Qt to provide programming features not available native in C++: signals and slots, introspection and asynchronous function calls.

B).Hardware Requirements

i. Arduino Uno: The arduino uno is an open_source micro controller broad based on the microchip ATmega328P micro controller and developed by Arduino.c.c. the board is equipped with sets of digital and analog input /output pins that may be interfaced to various expansion board(shields) and other circuits. The board ha 14 digital pins ,6 analog pins ,and programmable with the arduino IDE (integrated development environment) via a type B USB cable .it can be powered by a USB cable or by a an external 9 volt battery,through it accepts voltages between 7 to 20 vots .it is also similar to the arduino nano and lenonardo.

ii. Bluetooth: It is a wireless technology standard for exchanging data over short distances using short-wavelength UHF radio waves in the ISM band from 2.400 to 2.485 GHz from fixed and mobile devices, and building personal Area Networks (PANs). It was originally conceived as a wireless alternative to RS-232 data cables. Bluetooth is managed by the Bluetooth Special Interest Group (SIG), which has more than 30,000 member companies in the areas of telecommunication, computing, networking, and consumer electronics. The IEEE standardized Bluetooth as IEEE 802.15.1, but no longer maintains the standard. The Bluetooth SIG oversees development of the specification, manages the qualification program, and protects the trademarks. A manufacturer must meet Bluetooth SIG standards to market it as a Bluetooth device. A network of patents apply to the technology, which are licensed to individual qualifying devices.

iii. LCD projector: It is a type of video projector for displaying video, images or computer data on a screen or other flat surface. It is a modern equivalent of the slide projector or overhead projector. To display images, LCD (liquid-crystal display) projectors typically send light from a metal-halide lamp through a prism or series of dichroic filters that separates light to three polysilicon panels – one each for the red, green and blue components of the video signal. As polarized light passes through the panels (combination of polarize, LCD panel and analyzer), individual pixels can be opened to allow light to pass or closed to block the light. The combination of open and closed pixels can produce a wide range of colors and shades in the projected image.

C)Block Diagram

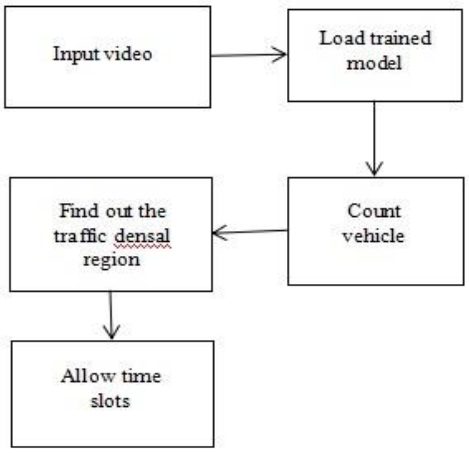

Fig 1 : Vehicle detection

i.Vehicle Detection: This system detects the vehicle moving through the road. The below given block diagram describes the process of vehicle detection. First the primary process is the feeding of input video. This input video is then given to the next stage which loads the trained model. This trained model then helps in determining the count of

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the vehicle. Now we get a count of the vehicle. As a next stage we are going to find out the traffic densal region. After getting the most densal region, now as the final stage we are allowing time slots.

ii. Helmet detection

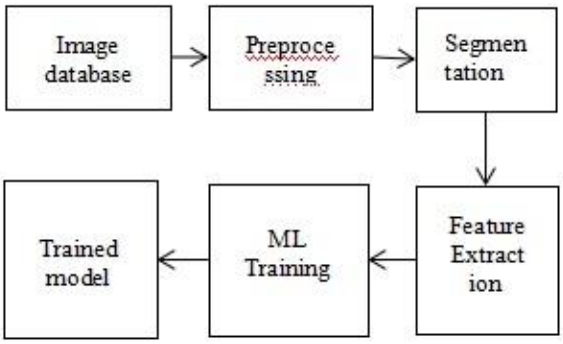

Fig 2 : Training

In the case of helmet detection, as a first stage, i.e., the training stage, we should collect all the image database available to us. Then it should undergo the preprocessing stage where it processes all the input data given to it. Next stage is the segmentation. In this stage the already preprocessed image will now undergo segmentation where it is divided into different segments for processing. After the segmentation phase it now undergo feature extraction, which itself is a selection process in which only the needed parts are selected. Now we have the image after the feature extraction. This input is then feed into ML training for training purposes. After certain ML processes it is given to the trained model and as a result we will obtain the final trained model.

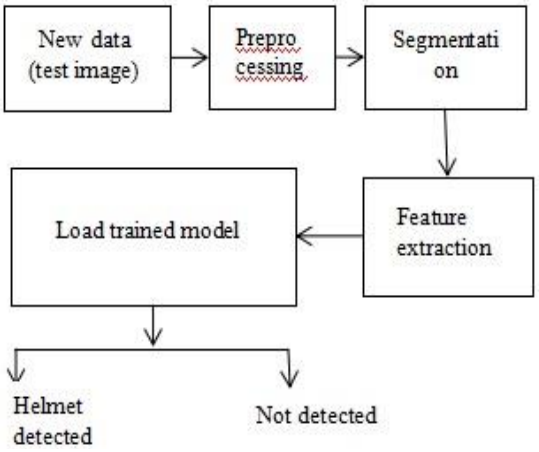

Fig 3 : Testing

In the testing phase, as shown in the above diagram, new data is fed as the input to the preprocessing stage in which it undergoes certain cleaning and processing techniques. After the preprocessing stage it will as usual undergo segmentation. After segmentation it undergoes the feature extraction process and the output of it is loaded to training model. From the below trained model, we will determine whether the helmet should be detected or not detected. This is the training/ validation phase of helmet detection. From the loaded trained model we will know that the helmet can be detected or not detected.

IV. METHODOLOGY

Now a days traffic density on the streets increasing around the world tremendously . It causes several problems on the day to day life of people. As we know that it is the era of speed, so that nobody wants to wait for a long time at any cost. Everybody prefers to low traffic density streets. This proposed system introduced a vehicle density-based traffic control system to avoid above issues. This problem can be resolved by controlling the traffic density on the roads. This system introduces a new method to control vehicle density by controlling the traffic lights using Image processing. Vehicle density is measured using predefined classifiers available in image processing. If the measured density is above the normal density (threshold value) it passes an indication to the micro controller which controls the projector and thereby we can give appropriate traffic signal to LCD display.

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Machine learning is an application of Artificial Intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves. The process of learning begins with observations or data, such as examples, direct experience, or instruction, in order to look for patterns in data and make better decisions in the future based on the examples that we provide. The primary aim is to allow the computers learn automatically without human intervention or assistance and adjust actions accordingly. Machine learning algorithms are often categorized as supervised or unsupervised. This system uses open CV as a software, and uses the concept of image processing. It is used to detecting the density of traffic on road and according to the density we are controlling the traffic. The language used here is C++ and python. Since we are using Open CV the entire cost of the project is minimized, easy setup, good accuracy and speed. There for the traffic signaling system become automatic using image processing through Open CV. Machine learning is used to teach system. Input (picture of vehicles) is given to training models. System will identify vehicles through machine learning . After identifying the vehicles , it counts the number and according to the density a dynamic timing is set.

Arduino Uno is used in our project to transfer signal from Bluetooth, interrupt such as ambulance, fire force. It is used in our project as it is simple to use and it is an open source board which means that all the design specification, schematics, and software library are available openly for all users. It is user friendly and easy to use . It has less cost than raspberry pie. Arduino Uno has a set of input and output pins ,i.e. 14 digital and 6 analogue pin. In case of both Bluetooth and Arduino Uno ,state and enable pin is not used .RX of Bluetooth is connected with TX of Arduino Uno and vise versa. Ground is connected to ground. Bluetooth is used here to identify the emergency vehicles such as ambulance. Once the emergency vehicle is near the signal, the person driving can send a command to Bluetooth there by guiding the traffic signal to change accordingly. Bluetooth is connected with Arduino Uno to pass the interact message, one's emergency vehicle is near the signal.

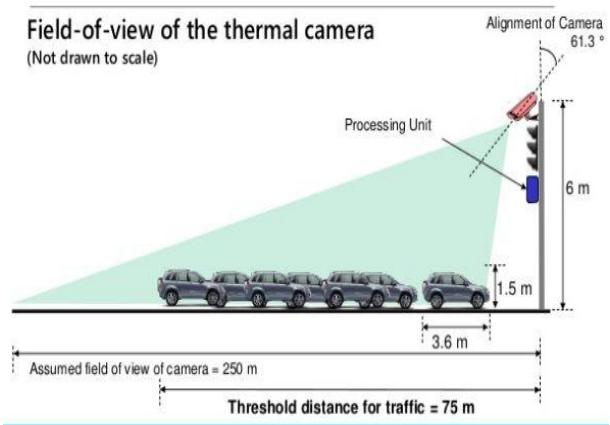

Fig 4: critical distance

LCD projector is used in our project as 3D projectors and hologram are high costly. LCD projector is used to display the traffic signal. It works likes a 3D projector or hologram. It can also display advertisement along with signals (red, green, yellow lights). Count downs can also be displayed on it. Artificial neural network algorithm is used for vehicle detection .ANN is inspired for biological neural network . It has 3 layer input , hidden , output layer. it operates dynamic traffic signals. Inputs of ANN is features of vehicles. Back propagation is also used here.

Library - OpenCV : OpenCV is written in C++ and its primary interface is in C++, but it still retains a less comprehensive though extensive older C interface. There are bindings in Python, Java and MATLAB/OCTAVE. All of the new developments and algorithms in OpenCV are now developed in the C++ interface. An OpenCL-based GPU interface has been in progress since October 2012, documentation for version 2.4.13.3 can be found at docs.opencv.org.
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It is used in our project to transfer signal from and to Bluetooth, to find interrupt such as ambulance, fire force. It is used in our project as it is simple to use and it is an open source board which means that all the design specification, schematics, and software library are available openly for all users. It is user friendly and easy to use. It is less costly than raspberry pie.

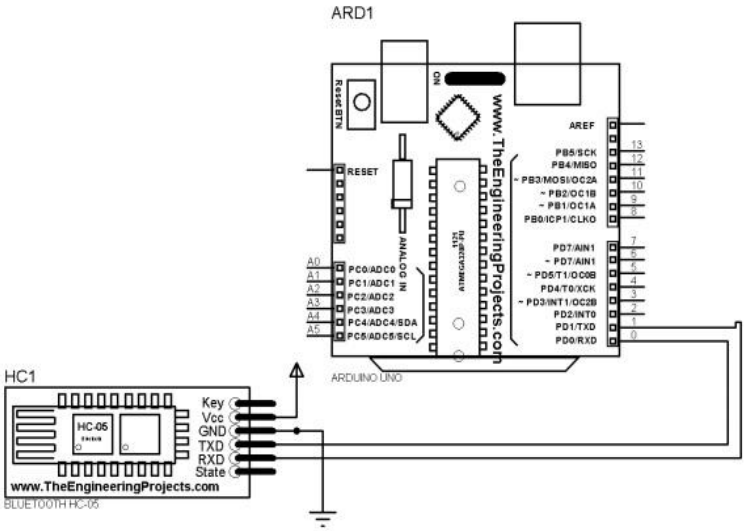

Fig 5: Arduino uno

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Artificial neural networks: ANN or connectionist systems are computing systems vaguely inspired by the biological neural networks that constitute animal brains. The neural network itself is not an algorithm, but rather a framework for many different machine learning algorithms to work together and process complex data inputs. An ANN is based on a collection of connected units or nodes called artificial neurons, which loosely model the neurons in a biological brain. Each connection, like the synapses in a biological brain, can transmit a signal from one artificial neuron to another. An artificial neuron that receives a signal can process it and then signal additional artificial neurons connected to it. In common ANN implementations, the signal at a connection between artificial neurons is a real number, and the output of each artificial neuron is computed by some non-linear function of the sum of its inputs. The connections between artificial neurons are called 'edges'. Artificial neurons and edges typically have a weight that adjusts as learning

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proceeds. The weight increases or decreases the strength of the signal at a connection. ANN algorithm is used in our project for object detection such as vehicles. it is suitable to search huge data streams and locating both simple and complex pattern. it operates dynamic traffic signals. Inputs of ANN is features of vehicles. Back propagation is also used here.

YOLO : YOLO or You Only Look Once Without getting much into details (I would like to create another story about the details on how it works), I want to focus on the different implementations and how to use them. YOLO (You Only Look Once**)** uses deep learning and convolutional neural networks (CNN) for object detection, it stands out from its "competitors" because, as the name indicates it only needs to "see" each image once. This allows YOLO to be one of the fastest detection algorithms (naturally sacrificing some accuracy). YOLO can detect objects in real time (up to 30 FPS).To carry out the detection, the image is divided in a grid of SxS . Each one of the cells will predict N possible "bounding boxes" and the level of certainty (or probability) of each one of them (image at the center), this means SxSxN boxes are calculated. The vast majority of these boxes will have a very low probability, that's why the algorithm proceeds to delete the boxes that are below a certain threshold of minimum probability. The remaining boxes are passed through a "non-max suppression" that will eliminate possible duplicate objects and thus only leave the most exact of them.

V. RESULTS AND COMPARISONS

In our system we have successfully implemented the vehicle detection and helmet detection using image processing and machine learning methods. This system uses open CV as a software, and uses the concept of image processing. It is used to detecting the density of traffic on road and according to the density we are controlling the traffic. The language used here is C++ and python. Since we are using Open CV the entire cost of the project is minimized, easy setup, good accuracy and speed. There for the traffic signaling system become automatic using image processing through Open CV. Machine learning is used to teach system. Input (picture of vehicles) is given to training models. System will identify vehicles through machine learning . After identifying the vehicles , it counts the number and according to the density a dynamic timing is set.

The below given is the final output image of helmet detection detected in the road.

Fig 6: Helmet detection

The next given image shows the vehicle detection occuring in a road and thereby taking the count of vehicles.

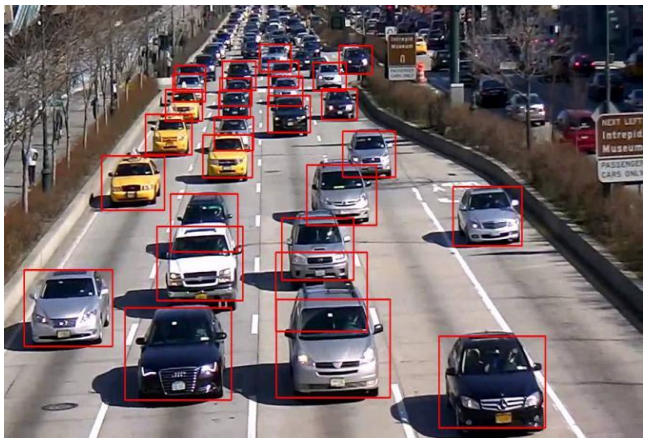

Fig 7: Vehicle detection.

VI. CONCLUSION AND FUTURE WORKS

We divided our thesis work into two parts. At first, we have successfully detected moving vehicles from a video input. We discussed our work step by step in this paper. We briefly described the functions which are necessary for real-time computer vision. However, due to inadequate datasets of the variant vehicles in Bangladesh, we could not approach the SVM method which could yield more accurate result. We managed to collect dataset of other countries which didn't work on the video sample we used, due to different model of cars. The next part was about dynamic traffic control. Number of cars in specific region will calculated by the difference of entering and leaving vehicles. Then we calculate the density at any intersection point by dividing the number of cars in that lane by the length and width of the lane. We set a logic for controlling the traffic signals by setting some rules. While working in the detection part, we noticed detecting vehicles at night was not very accurate. Our system can detect object when there is sufficient amount of light. We are looking forward to fix the problem in future. Priority was given to emergency vehicles. We plan to provide separate priority for emergency vehicles in future. In order to get better result, our future work includes, collecting datasets and models of all type of vehicles. Once they are collected we can train the model to give better detection capability.

The future work in this project may be on number plate recognition, detection of speed. we can use 3Dprojecters or hologram to display the traffic signal. So that we can easily identify the signal and violations in traffics can be easy identified. We can also include advertisement of holograms.

REFERENCES

[1]. Shi, Y.Q. and Yang, X.G. (2013) The Public Transportation System of High Quality in Taiwan. 2013 IEEE Eleventh International Symposium on Autonomous Decentralized Systems (ISADS), Mexico City, 6-8 March 2013, 1-6. https://doi.org/10.1109/ISADS.2013.6513426.
[2]. Tarnoff, P.J., Bullock, D.M., Young, S.E., et al. (2009) Continuing Evolution of Travel Time Data Information Collection and Processing. Transportation Research Board Annual Meeting, Washington, 11-15 January 2009, Paper #09-2030.
[3]. Prem Kumar, V., Barath, V. and Prashanth, K. (2013) Object Counting and Density Calculation Using MATLAB.
[4]. Lillywhite, K., Lee, D.J., Tippetts, B. and Archibald, J. (2013) A Feature Construction Method for General Object Recognition. Pattern Recognition, 46, 3300. https://doi.org/10.1016/j.patcog.2013.06.002
[5]. Gamer, J.E., Lee, C.E. and Huang, L.R. (1990) Center for Transportation Research, the University of Texas at Austin. Infrared Detectors for Counting, Classifying, and Weighing Vehicles, 3-10-88/0-1162.
[6]. Niksaz, P. (2012)Automatic Traffic Estimation using Image Processing. International Conference on Image, Vision & Computing, Iran, V50.11.
[7]. Cai, Chen, Yang Wang, and Glenn Geers. "Vehicle-to infrastructure communication-based adaptive traffic signal control."IET Intelligent Transport Systems 7.3, pp. 351-360, 2013.
[8]. L. Vanajakshi, "Centre of Excellence in Urban Transport IIT Madras Synthesis Report on ITS Including Issues and Challenges in India," pp. 1-58 December 2010.
[9]. T. Roor, "Intelligent Transportation System in India - A Review," January, 2016.
[10]. C. Lan and G. Chang, "A Traffic Signal Optimization Model for Intersections Experiencing Heavy Scooter – Vehicle Mixed Traffic Flows," vol. 16, no. 4, pp. 1771–1783, 2015.
[11]. M. Lv, L. Chen, X. Wu, and G. Chen, "A road congestion detection system using undedicated mobile phones." IEEE Transactions on Intelligent Transportation Systems", vol. 16, no. 6, pp. 3060–3072, 2015.
[12]. Ministry of Transport, Intelligent Transport Systems Technology Action Plan 2014-18, May. 2014.
[13]. Shirazi, Mohammad Shokrolah, and Brendan Tran Morris. "Vision based turning movement monitoring: count, speed & waiting time estimation." IEEE Intelligent Transportation Systems Magazine 8.1, pp. 23-34, 2016
[14]. P. Y. P. Singh and U. P. Bijnor, "Analysis and Designing of Proposed Intelligent Road Traffic Congestion Control System with Image Mosaicking Technique," International Journal of IT, Engineering and Applied Sciences Research (IJIEASR) vol. 2, no. 4, pp. 27–31, 2013.
[15]. Tettamanti, Tamás., "Advanced Methods for Measurement and Control in Urban Road Traffic Networks," 2013.
[16]. I. Arel, C. Liu, T. Urbanik, and A. G. Kohls, "Reinforcement learning-based multi-agent system for network traffic signal control," IET Intell. Transp. Syst., vol. 4, no. 2, p. 128, 2010.
[17]. A. Menon, R. Sinha, D. Ediga, I. Technology, and O. A. Road, "IMPLEMENTATION OF INTERNET OF THINGS IN BUS TRANSPORT SYSTEM OF SINGAPORE ", 2013.
[18]. J. Park, Y. L. Murphey, R. McGee, J. G. Kristinsson, M. L. Kuang, and A. M. Phillips, "Intelligent trip modeling for the prediction of an origin-destination traveling speed profile," IEEE Trans. Intell. Transp. Syst., vol. 15, no. 3, pp. 1039–1053, 2014.
[19]. S. K. Shukla and A. Agrawal, "Present and Future Perspective on Optimization of Road Network Management," vol. 22, no. 2, pp. 64–67, 2015.
[20]. C. Chen, D. Zhang, N. Li, and Z. H. Zhou, "B-planner: Planning bidirectional night bus routes using large-scale taxi GPS traces," IEEE Trans. Intell. Transp. Syst., vol. 15, no. 4, pp. 1451–1465, 2014.