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AUTOMATED TRAFFIC LIGHT CONTROL SYSTEM USING ARTIFICIAL INTELLIGENCE: A REVIEW

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***Abstract*-Real time traffic controlling involves detecting vehicle density on four lanes and calculating the time required for each lane to minimize the traffic congestion and also to assign the time for each red, green and yellow signals. The real time traffic controlling helps for smart mobility and efficient time utility in clearing traffic. If a junction of four roads with predetermined traffic signals can be considered it leads to wastage of time because the time assigned to each lane cannot be changed based on the density of vehicles, even though there were no vehicles in one particular lane but still the time allotted for that lane can be continued and vehicles might increase on other junctions. Determined traffic signals and old infrastructure of roads leads to traffic congestion and sufficient time utility in clearing the traffic becomes a challenge. The main contribution of our work is to compare the different methodologies that were proposed for real traffic control and to produce a new methodology to minimize the challenges that are facing in traffic clearance.**

***Index Terms:* congestion, Density, Realtime, Monitoring.**

I. INTRODUCTION:

Nowadays due to increasing vehicle usage, traffic jams are also increasing and it is very important to provide smart mobility especially in urban areas. Smart mobility is possible through real time density monitoring and assigning time for each traffic signal. Here the real time vehicle density can be counted using python and open CV (computer vision) where real time operations can be performed through simple programs.

Fig: Traffic Congestion

II. LITERATURE REVIEW:

1.TRAFFIC CONTROL SYSTEM USING INFRARED TECHNOLOGY:

Anam Firdous and Team [4] proposed IR [Infrared rays] Technology in which there are two sensors IR transmitter and IR receiver, whenever the vehicle crosses the line where the IR receiver is placed, based on the light reflected from them the vehicles are detected and counted. Based on the vehicles count the Arduino Uno [AT MEGA 328] reads the data from the sensors and assigns timing to each signal light. This method of using IR Sensors is useful in implementing efficient traffic clearance in high density traffic areas and for more than one lane. It requires low power consumption because Renewable energy is used to power Arduino Uno by using Solar panels. The only challenge that they were faced with was that IR sensors only work for fewer distances and vehicle count is not accurate.

Priyadarshini and team [9] proposed a system of changing the time delays based on the vehicular density. Multiple IR Transceivers placed on each side of the road and the information of vehicle count obtained from the IR sensors is sent to the Microcontroller which is interfaced by traffic lights, LCD (Liquid crystal Display) and IR sensors. The microcontroller (ARDUINO MEGA 2560) is used for assigning time delays. The practical implementation of this method is not yet developed.

Soma Bhattacharya and team [1] used IR Sensors and microcontroller 8051 to provide automation in traffic signal time allocation. The 8-bit microcontroller consists of 128 bytes of RAM and 4k bytes of ROM and 4 input and output ports for Interfacing. For efficient results the IR sensors can be replaced with Image sensors or Imager to control the huge vehicles. Imager is used for both analog and digital electronic devices which provide accurate results.

2.EDGE DETECTION BASED TRAFFIC CONTROL SYSTEM:

Belinda Chong and the team [2] uses Edge detection for detecting the vehicles, they mentioned five edge detection methodologies such as Robert's filter, Sobel filter, log filter, Canny filter and Active Contour filter. Among the five filters, the Canny filter can be mentioned as the best detector. Robert Edge detection unable to detect the edges that are multiplied by 45 degrees and it is not symmetrical. Sobel detector is much slower to compute as compared to the Roberts edge operator. Laplacian (log) Edge operator is used for the Smoothed images and it is not efficient. The main process involved in this methodology is the RGB image is converted to grayscale and edge detection can be done. Robert, Sobel detectors, Image dilation, Image matching and Time allocation.

3.WIRELESS SENSOR NETWORK BASED TRAFFIC CONTROL SYSTEM:

Adil hilmani [3] proposes an automated traffic control system using wireless sensor networks and the proposed system consists of three basic parts :1. parking space management system 2. Traffic light management system and 3. Global Information and Management System. The Sensor nodes that are used for the controlling system are hybrid sensor nodes [sensor and RFID] which are useful to maintain the parking system details available for the drivers, the information that was collected from the sensors sends to the gateways to transfer the information to the global information center to maintain a record for the further purposes. Different types of sensors are used for this process like Magnetic sensor, Light sensors etc. Magnetic sensors are especially used to detect the presence of the vehicle. Wireless Communication is used for better data transfer and different Wireless sensors such as Wi-Fi, Bluetooth, ZigBee are used and cluster topology as a wireless network topology which provides single and multiple hopping for data transfer and mainly used for long distance communication. For the simulation process they used a cup carbon simulator and this method can be easily implemented on the open street maps like google Maps, the script language used in this Simulator is Sen script. The simulated results are compared between 40%,60%and 80% traffic density, the performance and quality of the system is measured. Mobile app was also developed and the future work mentioned as providing pre-booking slots for parking etc.

4.TRAFFIC CONTROL SYSTEM USING PIC MICROCONTROLLER AND INFRARED SENSORS:

Linga gouda and his team [7] proposed three approaches for their work; those are :1. To provide authority to ambulances to pass without any delay ,2. To allow smooth passage of vehicles and providing priority for police vehicles and VIP vehicles,3. Controlling traffic density scenario. To Implement the three schemes smoothly IR Sensors, LED, PIC Microcontroller,16/2 LCD display are used and the different sensors that are used in this process are Smoke Sensor, Infrared sensor and Radio frequency sensors.IR Sensors are used to detect the vehicles and RF sensors are used to detect the RFID (Radio Frequency Identification Device) tag for identifying the VIP vehicles, Ambulances, Police vehicles. This project can be improved by providing an off facility to the Sensors whenever there are no vehicles on the road and through this system the details of the patient can be sent to the nearby hospital to arrange all the requirements to provide Immediate treatment for the patient.

Inam Ullah khan and team [5] proposed a methodology to reduce the traffic congestion by using IR sensors, LED,89C51 Microcontroller, and Display. In this Methodologies the information that is gathered from the sensors sent to the Microcontroller decides the time required for each lane to clear the traffic and the signal lights are interfaced with that microcontroller and proper operation can be executed. The Future Scope that is mentioned through the paper is data that can be collected and analysed for better results.

5.AUTOMATIC TRAFFIC CONTROL SYSTEM USING CAMERA SENSOR AND EMBEDDED SYSTEM:

Febrin Rachmadi and team [10] proposed a methodology using Camera Sensor and Embedded System. In this method the Camera sensor is used to Capture the vehicular density and the information that is obtained from the camera sensor is given to the traffic light engine. The Traffic light Engine is used for vehicle detection and counting and the time delay calculation can be done by this block. The traffic signals that are interfaced with the traffic engine block provides controlling for the traffic signals. This system is Implemented by using a Beagle

board and AVR microcontroller. The accuracy that was obtained by this process is 96.5% and this accuracy is dependent on the weather and camera viewpoints. The main drawback of this method is accuracy might decrease in bad weather conditions.

6.AUTOMATIC TRAFFIC CONTROL SYSTEM USING RFID TECHNOLOGY:

Ninand Lanke and team [6] proposed a System consisting of RFID controller and RFID Tag for vehicle detection which uses Radio frequencies for transferring of data. RFID Tags are of two types:1. Active tags and 2.Passive Tags. Active RFID Tags include batteries within it and passive tags do not consist of any batteries. Vehicle identification and Counting can be done through the RFID Tags and algorithm is used to assign the time delays. The Major applications of this Methodology are :1. Automatic billing and toll charges 2. Automatic traffic congestion 3. Detection of speed violation. The drawback of this System is high cost for Implementation and Environment dependent.

7.AUTOMATIC TRAFFIC CONTROL SYSTEM USING REAL TIME MONITORING:

Neena MK and team [8] proposed the advanced technology of Video Processing System through which the Real time traffic is accurately measured. Computer Vision is used to produce accurate results and it is also used to monitor the patient's conditions whenever an ambulance is passed through the lane.

IV.FUTURE WORK:

Finally, another proposal for future work would be the creation of an electronic device equipped with several sensors located in public vehicles, such as Police vehicles and Ambulances, so that in emergency situations, such vehicles would issue priority request messages to the management centre, which in turn is very exclusive.

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