SURVEY ON VEHICLE DETECTION AND RECOGNITION

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Abstract: The number of vehicles/traffic increases exponentially on a daily basis. Due to this, terrible congestion problems in cities are observed. Road congestion eventually results in slow motion, which increases travel time. Infrastructure growth is slower compared to vehicle growth due to space and cost constraints, which is why the system of identification/control of vehicles is recognized worldwide. Detection of objects is a difficult problem in the application of computer vision and image processing. So, video surveillance is gaining importance in this challenge. Certain applications such as improving congestion in traffic, providing Very Important vehicle priority, detecting the stolen vehicle, etc. requires automatic identification /control of vehicles. Hence, as a small step towards this proposed model, the idea is to lead the background subtraction in accurate detection along with the usage of hardware, like RFID sensors and Arduino and good quality camera.

IndexTerms **-** Vehicle spotting, Vehicle Priority, RFID, Background subtraction, Recognition and Identification of Vehicle, Arduino.

I. INTRODUCTION

Vehicle detection and recognition is a vital but challenging task because the image of a vehicle is disturbed and affected by many factors. First, the number of vehicle types is growing with a new car model that is promoted regularly. And then there are many similarities between some models of the vehicle. Finally, there are also significant differences between vehicles images due to differences in the environment on the road, weather, lighting, and used cameras. RFID system is used in different countries for different types of areas, such as parking, toll collection, and presence of employees. RFID is still used to examine and control the safety of the security personnel themselves. The application provides barriers to patrol the guard.

Radio Frequency Identification (RFID) is a technology that makes a radio frequency to merge an electromagnetic spectrum to identify a person, thing or an animal. It consists of three components: transceiver, antenna, and transponder known as a marker. Radio frequency signals are transmitted using an antenna that activates the transponder. As soon as the transponder (tag) is activated, it sends an information signal back to the antenna. This data tells the programmable logic controller to perform an action that generates the access gateway to connect to the database for the monetary transaction.

The RFID reader communicates with the Arduino via SPI protocol. It operates at a frequency of 13.56 MHz The labels are based on the Mikron Fare Collection system (MIFARE) that is an NKSP (Next Experience) Semiconductor - Trademark Chip Series used in Non-Contact Smart Cards and Scroll Cards protocol and have 1kb of memory. They contain a microchip which performs various arithmetic operations.

The Arduino/Genuino Uno is a microcontroller based on the ATmega328P. It contains 14 digital input/output pins, 6 analog inputs, 16MHz quartz crystal, Universal Serial Board connection, power connector, in-circuit serial programming header and reset button. It embeds everything needed to support microcontrollers; just connect to start the computer using a USB cable or to connect it using the AC-to-DC adapter or the battery. Uno symbolizes one in Italian and was selected to mark the launch of Arduino software (Integrated Development Environment) 1.0. The reference versions were Uno Panel and version 1.0 of Arduino Software (IDE). The Arduino has evolved into recent versions.

In background subtraction, the name suggests that it is a pre-image technique in which the current image or image in the foreground is obtained from Pixels per Pixel. The Pixel may be in the foreground or background computed by comparing the threshold values. To reduce object noise, some image processing algorithms are used to improve the quality of the detected object. Background subtraction and frame differentiation can together increase the speed of the detection process and solve the problem of light occlusion.

In this paper, Section 2 is devoted to a review of the literature on previous work and, ultimately, section 3 concludes this article.

II. LITERATURE SURVEY

[1] Introduces processing method that is divided into two stages: vehicle spotting and vehicle recognition. First, the machine learning algorithm based on characteristics similar to those of Haar and the Ada Boost algorithm is used to train a classifier to detect vehicles in the input image, which allows finding an image of interest (ROI) for recognition. Then additional training is conducted using the Principle Component Analysis classifier to learn how to recognize samples of various types of vehicles.

[2]Surveys traffic supervision at roundabouts. It studies the difference between system setup and vehicle detection, tracking and all directional vision based supervision of roadside systems and various technologies integrated in the vehicle itself. In the recent past, all directional cameras along with human set parameters are used in roadside systems however it faces challenges in

automation. In vehicles integrated with technologies, Light Detection and Ranging and Radar and stereophonic systems are used which is an ongoing survey. In recent literature on lateral systems, vehicle tracking is mainly based on rare features that combine with the Kanade-Lucas-Tomasi population algorithm. In addition, movements, modeling and prior knowledge of the scene are needed to accurately group the characteristics and correctly classify the participants in the traffic. In the case of vehicle application, the first goal is to detect and track the vehicle forward or close. Signals of movement are mainly used with various optical stream adaptations. When the vehicle is detected, it is usually followed by generic Bayes algorithms, in particular, Kalman's and particle filters. In recent literature optimized optical catadioptrical camera and fish-eye optics are used in all directional vision.

[3] Proposes and evaluates a video analytics system to identify incidents and collect traffic data based on video quality, weather conditions, and light. With an increase of 1000 kbps, the accuracy of bitrates of input videos was above 80.4%. It was found that many false alarms are often activated by sunlight, vehicle headlights, raindrops, snow, etc. due to its reflection, which greatly influenced the image quality. In the context of improved quality and ideal video quality, total detection accuracy was 77.3% and 78.6%. High- quality videos are on the Mean Absolute Percentage Error Traffic Account page and have long been at 7.8% and 12.0%, in unusual circumstances. The MAPE values in the precipitate were 3.5 and 16.1% at the lateral sides, and the MAPE factory data were 27.1 and 36.2%. The effect of the camera is the high accuracy of the Video Analytics power when the camera is set to the recommended height or higher. It is very important that the camera is used with VA, but can only be customized for the application. Depending on the camera's geometric layout, zoom level, and angle, one camera may not support all users and needs. For example, a camera set to an optimizer irradiation device is unable to detect human trafficking incidents and or collect traffic data. For more accurate data traffic collection, consider capturing Video Analytics with cameras, rather than using Pan Tilt Zoom cameras that are often different from traffic. During the trial period, they often noticed that the test bed cameras differed from their preset position, which exacerbated the accuracy of the system. Therefore, it is necessary to define the working rules to ensure that each camera returns to the preset positions after each use.

[4] The basic idea of the proposed system is the effective application of surveillance systems using image processing techniques. Steps for smart surveillance system are video Recording, extracting frames from the Video Input, applying Gaussian Blur by the Gaussian Blur Method, applies a blur of an image that is also known as Gaussian Smoothing. This is a Gaussian matrix calculation used to smooth or blur the image to reduce image noise. After the Gaussian function is applied, the system is divided into two parts, Abandoned Object Detection and Human Blob Detection. In abandoned object detection, doubtful objects are recognized with background subtraction, Thresholding and blob detection is carried out. In human blob detection, conversion of Red Blue Green to lightness and color dimension and Thresholding is carried out. The main and only disadvantage of this system is that, when changing the background, the background needs to be updated.

[5] Presents an intelligent flow control system that allows emergency vehicles to travel. Each vehicle has a special RFID tag (located in a strategic location) that prevents removal or destruction. RFID readers, NSK EDK-125-TTL and PIC16F877A systems are used to read RFID tags attached to the vehicle. It calculates the number of vehicles that travel on a particular route for a certain period of time. It also defines the net traffic bottleneck and thus adjusts the green light time. Automatically checking traffic on the route based on traffic density has retained the manual efforts of policemen. Because the whole system is automated, it requires much less human intervention.

[6] Introduces both RFID (Radio Frequency Identification) and Number Plate Recognition (NPR) systems for vehicle identification and control. Identifying License Plates (NPR) is an authentically embedded system that often recognizes the vehicle license plate. Crossing systems are only used to identify the vehicle. Identification of the license plate number (NPR) and control system is carried out by the combination of image processing and RFID and is used for vehicle identification and authentication. The selected text is then used for authentication and RFID information is used for verification. For the recognition and verification of vehicle, image processing techniques like image capture, convert to binary form, segmentation, generating pattern and matching is used. The working of both modules is parallel. The challenge of it lies in the recognition of characters.

[7] Presents a machine-driven aggregation of vehicle (traffic) performance to control a system that is widely used to avoid the vehicle, ambulance, and stolen vehicle detection. Each transport vehicle has a radio frequency identification (RFID) tag that determines the vehicle's aggregation signal (traffic). The RFID reader is counting on vehicles that travel on a given route for a specified period of time. Based on the number of vehicles, if the vehicle density (traffic) aggregation was detected by an infrared sensor, the green light is turned on and the vehicles are transmitted in a uniform manner. If the RFID reader reads the stolen vehicle, the police message is sent immediately to control room with Global System for Mobile Communication subscriber identification module 300. In addition, if a hospital wagon is through ZigBee and Atmega328 according to the way the message is passed, as indicated by the vehicle (traffic), it transmits the information to the vehicle's resources (traffic) to turn the controller on to green light. The Atmega328 micro-current is directly connected to each of the vascular components and acts as a central point.

[8]Presents three main objectives and they are detecting vehicle over speeding, using a paint- mark for marking them and providing an economical, simple system. In this, the ultrasonic sensor detects transient vehicles and sends data to the Arduino. It then reviews Arduino and responds to a pistol with an electromagnetic valve through a relay mechanism. Arduino is programmed to provide more accurate results. It also states that the prototype system can effectively spot and mark soaring speedsters. The result shows that this innovative new technology will increase the reliability of the security system Road transport. By implementing these functions in real time, accidents upto 70% can be avoided.

[9] Introduces a system in which a unique RFID tag identifier is provided for each vehicle, and the identity of each vehicle is entered into the police database. The RFID reader reads the label values, and this value is provided by the Raspberry Pi processor. RFID can be provided for vehicle theft by selecting details with any browser that serves as a Raspberry Pi input. Raspberry Pi compares the details of already stored RFID tags with dynamic tags. If they match, a snapshot of the vehicle is taken and sent to a

specific mailbox. The camera is connected to the Raspberry Pi processor. The Raspberry Pi processor stores image data on an SD card (hard disk).It uses the Internet of Things and RFID which interconnects various smart devices adding security to the concept of vehicle theft.

III. CONCLUSIONS

One of the biggest problems is the proper organization of traffic which is increasing rapidly. Due to this, people driving vehicles are facing delay in day to day lives. To resolve this problem, this research article evaluates many of the previous articles and attempts to analyze them in detail to get and realize the scope of improvement. This uses hardware devices such as RFID, Arduino Uno along with cloud and Background subtraction for detection and recognition thus helping in the proper management of vehicles.

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