ABSTRACT

Recently, car parking space is one of the hard tasks in modern-day traits. area operation and supervision of vehicle area is now a demandable area of study. searching for an unfilled parking space in overfilled visitors is a time-consuming manner. the prevailing to be had parking area popularity techniques are not robust or worldwide for photos took from one-of-a-kind photographic digicam lookouts. final results of a right parking space in a hectic town is simply a stimulating trouble and public are facing this elaborate on a every day base. the most reason of this observe is to extensively speak the previous research of vehicle parking area recognition and equivalence them from modified factors. to conquer these problems, we suggest a aircraft-primarily based method which adopts an operational three-D parking lot characteristic such as abundant planar aspects. The aircraft-based totally three-D segment model performs a key element in conduct inter-item occlusion and point of view alteration. however, to relieve the interference of unpredictable illumination deviations and sun shades, we endorse a aircraft-based class system. furthermore, by using supplying a Bayesian categorized framework to participate the three-D prototypical with the aircraft-based organisation technique, we methodically infer the space popularity. final, to triumph over the insufficient lighting fixtures within the night-time, we additionally gift a pre-processing step to improve picture excellence. The investigational consequences expression that the deliberate framework can comprehend strong locating of car parking places in each sunlight hours and night-time.

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CHAPTER 1

INTRODUCTION

Traffic light posts are positioned at road intersections and pedestrian crossings. Traffic light posts blink the light Signals after a certain time period which is not a complete systematic system as it cannot solve the traffic problems fully. Thus traffic jams take place. Lack of trained traffic police officers and old manual traffic light control system made this problem worse in many cities like Dhaka, Chittagong etc. Since the traffic vehicle pressure is not same at every road at the same time, Traffic lights should be controlled by an adaptive system which will detect the traffic conditions and use traffic light signals accordingly. Instead of using electronic sensors embedded in the road our system is based on Video processing which is a form of signal processing and for which the input is a video frame; the output of video processing may be either an image or a set of characteristics or parameters related to the image. Our system will detect vehicles through video frames instead of using any other Mechanism.

A camera will be installed alongside the traffic light. It will capture video sequences of traffic condition on road. This technique will analyze the videos from cameras and count the number of vehicles for each direction and also import to the controller. Then the controller estimates a period of time needed by each path to open and each traffic light to turn on or off based on the number of vehicles in a fixed sequence. It will also be used to monitor the traffic conditions. It can reduce the traffic congestion and avoid the time being wasted by a green light on an empty road. This system is more reliable to detect vehicle presence because it uses actual traffic condition images. This system is intended for country like Bangladesh where traffic policeman can take clever, critical decisions and handle emergencies but with the help of our automatic system they can use preset signal timings to control traffic at intersections because it provides more accurate information for signal decision making.

1.1 Traffic Congestion:

In our proposed model, there will be four cameras in one intersection for a four way road. A CPU will be connected with these cameras which will be responsible for video processing. The RFID will be placed under the road for detection of the car. The hardware's that we will be using are: HD Camera, CPU (For video processing), Microprocessor (For traffic light controlling) and RFID Reader (For vehicle detection) which will be beneath the road. According to Figure 1 a High definition camera placed on poles will observe the vehicular traffic flow continuously on a road. Then using frame by frame Real time video analysis through our developed algorithm, we can detect how much cars are present on the road. Depending on the number of detected vehicles we have developed and implemented a sequential traffic timer system. Microcontroller will detect the signal from CPU and start the sequential traffic light. While the light phase goes from green to red, our microcontroller or arduino will send a signal to CPU and CPU will energize the RFID reader. RIFD reader will detect the car which already has a RFID tag. This information will be transmitted to CPU or the central database. Thus our system will detect the law breakers who move regardless of the red light. According to this automatic traffic system, the traffic light ON/OFF will depend on the number of vehicles on the road. The HD camera will be installed in the traffic light post at a height of 19-25 feet above the road which is illustrated in Figure 2.

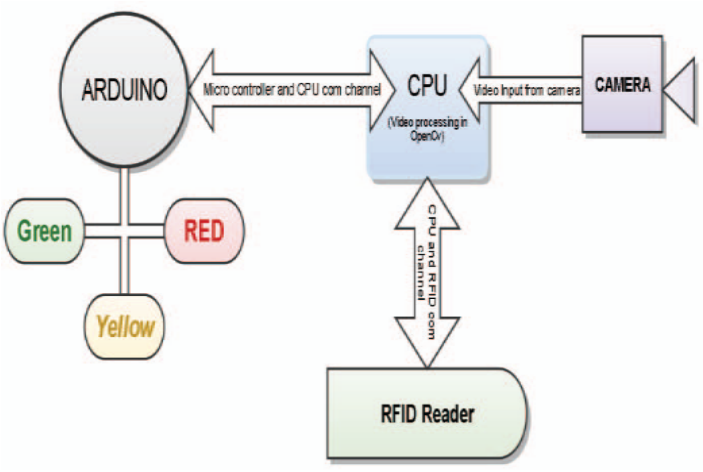


Fig 1.1 Block diagram of the proposed model

This camera will take the live video footage of the road and send it to a computer where video analysis will be done. For a 4 way intersection, CPU will detect each and every car and will count the vehicle number in the road by using our developed algorithm. It will also do the same thing with other road by using another camera. CPU then compares vehicle number of both roads. The road which has more vehicles will get the preference and green light for that road will be on and red signal will be shown automatically to the other road. Traffic lights will be connected to the computer and intelligent system will control the traffic light system. Our project is divided into three parts:

1.2 Algorithm for Traffic Detection

1.2.1Smart Traffic Light Management System

1.2.2 Law Enforcement by RFID Reader

These parts will be discussed in the following sections.

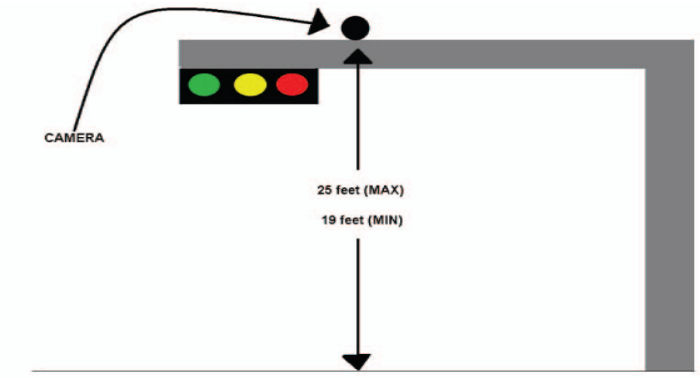


Fig 1.2 Appropriate Height for Camera placement

Algorithm for Traffic Detection

Car detection by video processing is the most important process to implement our project. Video processing will be done by using Open CV (OC) instead of MATLAB for its faster processing. Installed camera will send the output to the main

server computer that will analysis that video and give its after analyzing result to the microcontroller. The vehicles are detected with the help of OC and camera.

Here first the vehicles are detected by some car models in xml file. Figure 4 depicted the result of the code. By using Cascade Classifier we have created haar cascade. It was trained in that xml file with some rickshaw model. Then we have subtracted the background and the shadow by Background Subtraction (BS) with the help of BGS library. Another technique that we have used is Blob detection for better detection. We have filtered the video frames by area, circularity, convexity and inertia.

There can be limit of counting vehicles for a segment of road and that will be given by the user. When the given amount of vehicles are detected which are standing on a jam, it prompts a message to the user. Then it changes the camera and works in the same way for other segments of the road. Finally it makes decision after calculating the jam situation. 4 cameras will be installed in every lane in 4 lane intersection. All 4 cameras will send its data to the main computer and computer will send it to microcontroller. The microcontroller will follow some mechanism to decide which traffic light will be on/off in the road. The mechanism is described in later part of this paper.

Fig 1.2.1 Car and Vehicle Detection

Car detection procedures and steps are shown bellow in the flowchart.

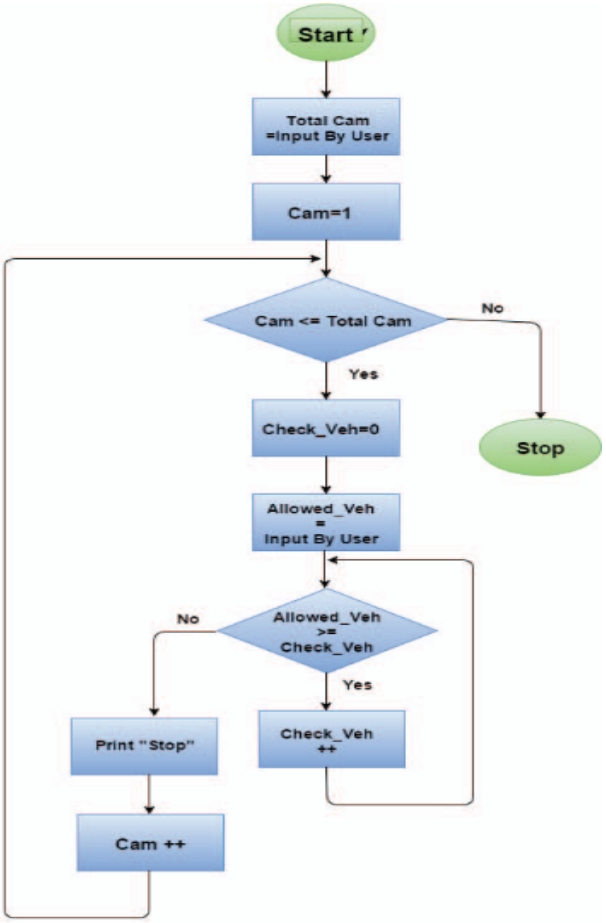


Fig 1.2.2 Flowchart of Car Detection Process.

1.3 Smart Traffic Light Management System

Smart traffic light system working procedure can be divided into two parts.

1.3.1 Camera Placing Calculation

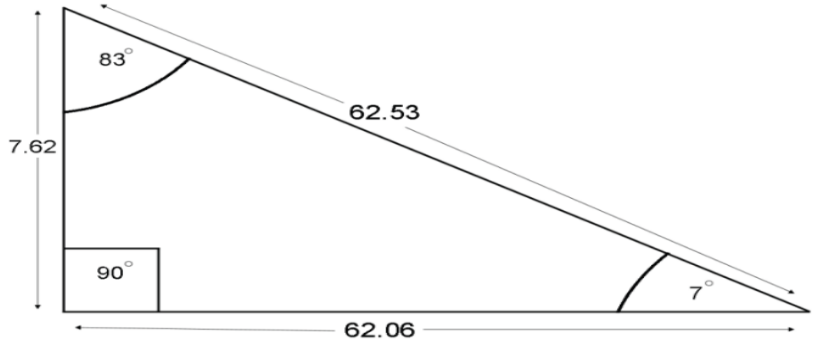
1.3.2 Traffic Light Controlling Mechanism

Camera Placing Calculation*:*

Car detection is the primary work of the system. For detecting car or any other vehicle, Camera placement is very important for better vehicle detection and accuracy. Perfect height and angle for camera yield high accuracy for car detection, by ensuring the most area coverage. The higher the camera coverage is, the better decision this system will make. According to proposed project, we will set up a camera in the Light post. The height has to be in a certain range so that the software could detect car and detect as many car as possible in a road. After Taking samples from various heights, we calculated that when the camera's height is in range

between 19 feet to 25 it gives us the best result. So camera's height should not exceed 25 feet otherwise there will be problem to detect car for the software. Any kind of obstacle must not come in front of camera so; it should be placed in such region where clear line of sight is available.

Our goal is to get more than 40 cars in the frame. By this arrangement we can get coverage of 62.06 meter. Now we need to calculate how many cars could be possible to detect in
that road within our coverage. Average length of a sedan car is approximately 4.5 meter; so,

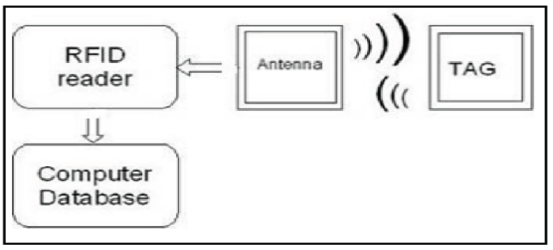


Camera placing calculation

1.4 Traffic light controlling mechanism*:*

As we are working with a four way intersection, for the time being, we will break this down for just one road only. For each road we will check twice for traffic. We have shown before that we can cover almost 50 cars (48.2 cars to be exact) with our camera for a specific road. So we will put a threshold value of 48 cars, means if our video processor could detect 48 cars then the OC will send a specific string in our com port of arduino. Microcontroller will keep checking if there is the string or not. This will lead us to two situations. If arduino could detect the string in its com port it will consider the road is crowded which is situation 1. If arduino could not detect the string in its com port then that will be situation 2 which indicates the road is not so crowded. For situation 1 (Table 1) (When a road reaches its car threshold value) we will turn the green light on this light will be turned on for 60 seconds. After passing the Assigned 60 second the OC will check again for the traffic. For situation

him according to law. RFID reader detection zone area radius should not exceed more than 1 meter otherwise it could detect legally parked car also. It will be better if the radius of the RFID detection zone is lengthwise. So according to these conditions of this project, it will be best if we use High frequency (HF) RFID. More than one RFID can be placed beneath the road for wide road.



Block Diagram of Vehicle detection Control System

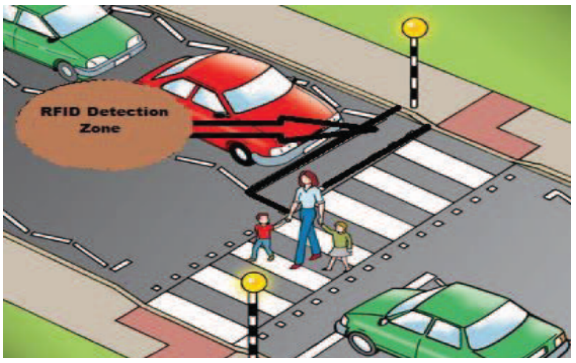


Fig 1.5 RFID Reader Detection

1.6 Background and context

The middleware as a key component of the RFID system

RFID technology is classified as a wireless automatic identification and data capture (AIDC). A basic RFID system is composed of a tag containing a microprocessor, a reader and its antennas, and a computer equipped with a middleware program, in which business rules are configured (Asif and Mandviwalla, 2005). The tag generally attached to a product communicates through radio frequencies with the reader's antennas. The reader sends the location and unique