Implementing Smart Control of Emergency Vehicle Using Image Processing

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Abstract: The common reason for traffic congestion is due to poor traffic prioritization, where there are situations some lane have less traffic than the other and the equal green signal duration for both affect the wastage of resources and drives are stressed. The aim of this project is control traffic signals with the help of surveillance camera present at the junction points. The frames of the traffics obtained from the camera through continuous video processing. To determine the ambulance, an image from the camera is used to detect the ambulance letter from the vehicle. According to the result obtained from the camera, the time for respective green signal is given which varies time to time. But when an emergency vehicle such as an ambulance is detected, the current green lane will become red and the counter display will show an ambulance symbol, after a few seconds the lane having the ambulance will be allowed. In case if there are two ambulances detected in the junction point, the ambulance which is nearer to the signal get the priority first. Successful implementation of our research will result in faster clearance of traffic and improvement in the transportation of emergency vehicles.

Keywords: Surveillance camera, Sound sensor, RFID (Radio frequency identification is a technique).

I. INTRODUCTION

Road transport is one of the primitive modes of transport in many parts of the world today. The number of vehicles using the road is increasing exponentially every day. Traffic lights are the signaling devices that are placed on the intersection points and used to control the flow of Traffic on the road.

In 1868,the traffic lights only installed in London and today these have installed in most cities around the world Most of the traffic lights around the world follow a predetermined timing circuit. Sometime the vehicles on the red light side have to wait for green signal even through there is little or no traffic. It results in the loss of valuable time. Traffic control at intersections is a matter of concern in large cities. Several attempts have been made to make traffic lights sequence dynamic so that these traffic lights operate according to the current volume of the traffic .Due to this reason, traffic congestion in urban areas is becoming unavoidable these days. Inefficient management of traffic causes wastage of invaluable time, pollution, wastage of fuel, cost of transportation and stress etc. but more importantly emergency vehicles like ambulance get stuck in traffic. reader on the road intersections, Radio frequency identification is a technique that uses the radio waves to identify the object uniquely, RFID is a technique that is widely used in the various application areas like medical science, commerce, security, Electronic toll. Traffic lights play an important role in the traffic management. The existing traffic lights follow the predetermined sequence. So these lights are called static traffic lights. These traffic lights are not capable to count the number of vehicles and the priority of the vehicles on intersection point. As a result some vehicles have to wait

even there is no traffic on the other side. The vehicles like Ambulance and Fire Brigade are also stuck in traffic and waste their valuable time. An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it.

Many conflicts will occur and which is not easy to handle .

II. RELATED WORK

1. Traffic Light Control in Non-stationary Environments based on Multi Agent Q-Leaning

Multi-agent systems have gained significant importance because of the modern ability to model and solve complex real-world problems. Multi-agent systems provide mechanisms for communication, cooperation, and coordination of the agents. In the individual traffic control is modeled by coordinated intelligent agents. The agents coordinate among themselves based on the information received from each other to control the network. Traditional reinforcement learning research assumes that the environment is stationary and its dynamics are always fixed. Since traffic flow patterns change dynamically over the time.

DRAWBACKS:
- Agent is used as a subfield.
- It is not acting a real traffic network as a stationary environment.

2. Traffic Light Priority Control for Emergency Vehicle Using RFID

Traffic congestion and transportation delay on urban arterials are increasing worldwide. Therefore it is practically important to develop, verify and validate simple yet powerful models that help in designing and improving the safety and efficiency of transportation. It is a significant issue to control traffic lights in road–vehicle systems. The main reason is that traffic signals are used to manage conflicting requirements for the use of road space – often at road junctions – by allocating the right side of a way to different sets of mutually compatible traffic movements during distinct time intervals.

DRAWBACKS:
- Traffic congestion will occur on the roads.

3. RFID and GPS based Automatic Lane Clearance System for Ambulance

The problem of ambulance getting stuck in a traffic jam can be addressed by Gps ensuring that the lane in which the ambulance is travelling is cleared. That is, the arrival of the ambulance is to be communicated to the nearest traffic signal, so that it can turn the light to green and hence clear the traffic. However, all the ambulances will not be carrying emergency cases. Hence, the traffic clearing system, if done for all the ambulances, will certainly pose a traffic problem. To overcome this difficulty, we propose to make a system combining RFID (Radio Frequency Identification) .The Radio Frequency Identification (RFID) usually refers a whole system, which usually contains three main parts: The RFID tag, RFID Reader, and the Application. RFID tag refers to small electronic devices that consist of a small chip and an antenna. The chip typically is capable of carrying some kind of information depending on applications. The RFID readers, also called interrogators, are used to recognize the presence of nearby RFID tags.

DRAWBACKS:
- Gps signal not communicate lase of emergence case traffic signal.

III. SCOPE OF RESULTS

To design and develop smart traffic congestion management system that performs the functions like detecting the arrival of an emergency vehicle and warns the vehicles to clear the way. Detects the traffic congestion between junctions separated by a distance of 1km and transmits its status to the neighboring traffic signals.

IV. PROPOSED METHODOLOY AND DISCUSSION

The common reason for traffic congestion is due to poor traffic prioritization, where there are situations some lane have less traffic than other and the equal green signal duration for both affect the wastage of resources and drivers are stressed. The aim of this project is to control traffic signals with the help of surveillance camera present at the junction point. The frames of the traffics obtained from the camera through continuous video processing. To determine the ambulance, an image from the camera is used to detect the ambulance an image from the camera is used to detect the ambulance letter from the vehicle. According to the result obtained from the emergency vehicles.

- Communication between the emergency vehicle and the traffic light signal controller is achieved through transceivers and GPS.
- RFID and GPS based automatic lane clearance system for the ambulance.
- Reduces delay in arrival time of the ambulance

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camera, the time for respective green signal is given which various time to time. But when an emergency veehicle such as an ambulance is detected, priority is given for latter lane.The time for which each lane will be green is shown in the display of the individual down counter.In case,if an ambulance is detected, the current greeen lane willl become red and the counter diisplay will shown an allowed.In Case if there are two ambuulance is detected in the junction,the ambulance which is nearer to the signal get the priority first.Successful implementation of our research will result in faster clearence of trraffic and improvement in the transportation of

Advantages of the proposed system

- Reduces traffic congestion
- No human intervention is needed at the traffic junctions

- RFID helps to distinguish between the emergency and non-emergency cases.

Traffic signal with RFID reader
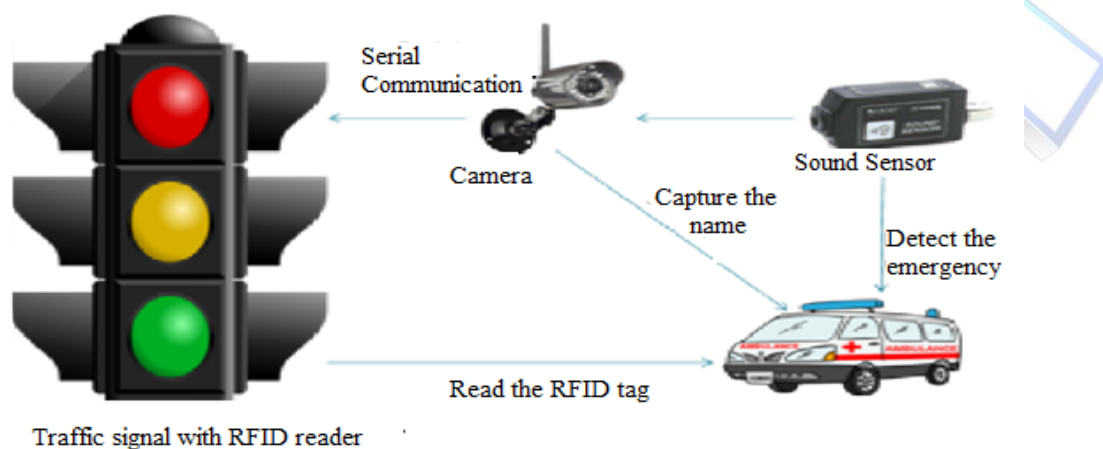
V. EXPERIMENTAL RESULTS

- Vehicle detection
- Negative sample
- Positive sample
- Emergency vehicle clearance
- Microcontroller(PIC16f877A)

Vehicle detection

The PI camera surveys the traffic congestion at a junction and this is given to the controller. An easy way to perform vehicle detection is by using Haar cascades. The general idea is to describe an object as a cascade of simple feature classifiers organized into several stages. The classification of images is based on value of simple basic features. Features are used instead of simple raw pixel values generally because they can act to encode ad-hoc domain knowledge but also, in this particular case, because they are much faster to process. These basic features are enhanced by utilizing also 45 degree rotated features thus significantly enhancing the expressional power of the learning system and consequently improving the performance of the object detection system.

Negative sample:

Negative samples are taken from arbitrary images. These image must not contain detected objects. Negative samples are enumerated in a special file. It is a text file in which each line contains an image filename (relative to the directory of the description file) of negative sample image. This file must be created manually. Note that negative samples and sample images are also called background samples or background samples images, and are used interchangeably in this document. Described the Images may be of different sizes. But each image should be larger than a training window size, because these images are used to subsample negative image to the training size.

Positive sample:

Positive samples are created by open cv-create samples utility. They may be created from a single image with object or from a collection of previously marked up images. A large dataset of positive samples before you give it to the mentioned utility, because it only applies perspective transformation.
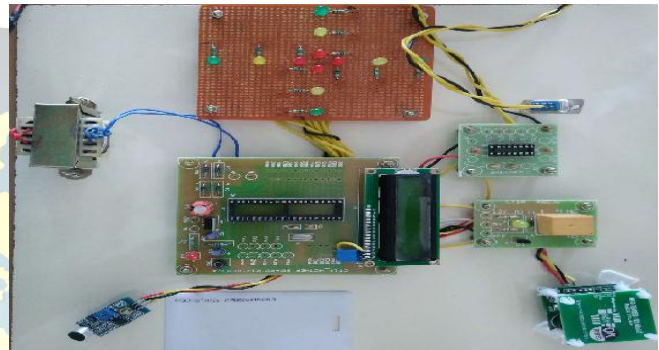

Fig.1. block diagram

Emergency vehicle clearance

The emergency vehicle is done by using PIC transmitter module and the PIC receiver will be implemented at the traffic junction. The buzzer will be switched ON when the vehicle is used for emergency purpose. This will send the signal through the PIC transmitter to the PIC receiver. It will make the traffic light to change to green. Once the ambulance passes through, the receiver no longer receives the PIC signal and the traffic light is turned tored
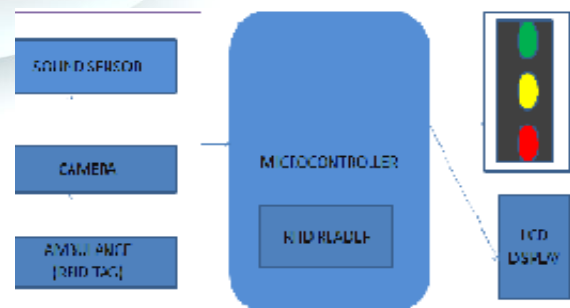

Fig.2. Emergency vehicle clearance

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Microcontroller (PIC16F877A)

Peripheral Interface Control (PIC) 16F series has a lot of advantages as compared to other series. It executes each instruction in less than 200 nanoseconds. It has 40 pins and send UINs. At the junction, it is easy to store large number of emergency vehicles. Before switching to green, it should satisfy all the conditions. Simple interrupt option gives the advantage like jump from one loop to another loop. It is easy to switch any time. It consumes less power and operates by vehicle battery itself without any extra hardware.
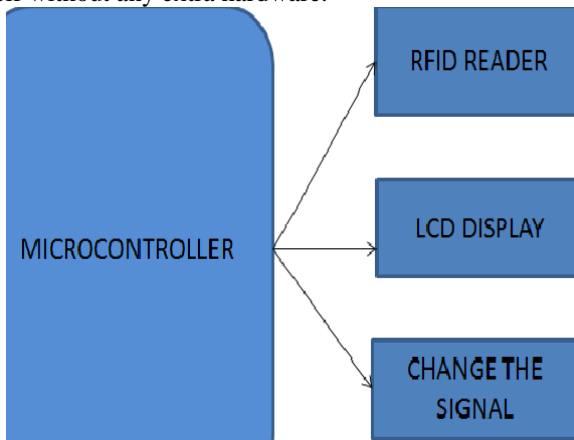

Fig.3. Microcontroller (PIC16F877A)

VI. CONCLUSION

In this project, a method for estimating the traffic using Image Processing is presented. This is done by using the camera images captured from the highway and videos taken are converted to the image sequences. Each image is processed separately and the number of cars has been counted. If the number of cars exceeds a specific threshold, warning of heavy traffic will be shown automatically. The advantages of this new method include such benefits as use of image processing over sensors, low cost, easy setup and relatively good accuracy and speed. Because this method has been implemented using Image Processing and Mat lab software, production costs are low while achieving high speed and accuracy.

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