Intelligent Traffic Control System Based on Artificial Intelligent

JEEVEN S
Department of Computer Science and Engineering
Government College of Engineering – Dharmapuri.
jeevencs@gmail.com

KUMARESAN K
Department of Computer Science and Engineering
Government College of Engineering – Dharmapuri.
kumaresank2000@gmail.com

MANOKARAN M
Department of Computer Science and Engineering
Government College of Engineering – Dharmapuri
Manokar.mb@gmail.com

RAJAMANI S
Department of Computer Science and Engineering
Government College of Engineering – Dharmapuri
rajamanisrj@gmail.com

Abstract:

Now a day's vehicles are increase day to day. Since we are using fixed timing in traffic control system, so many people are wasting their time and fuel in traffic signal, some road have many vehicles and some road remains idea .So we have develop a intelligent traffic control system based on real time traffic density on road. This can be achieved by applying background subtraction algorithm which is present in openCV, to count the number of vehicle in the lane by subtract the background from the video frame. Traffic signal time will be adjusted depend on the vehicle count. We also give first preference for emergency vehicles, when any emergency vehicle arrival automatically the signal turn on to green using RFID reader and RFID tag.

Keywords: Artificial Intelligent, openCV, background subtraction, RFID

I. Introduction:

Increase in traffic are common in developed city now a day it may causes traffic congestion and traffic jam, to avoid this sophisticated condition traffic signal were introduced but all signal have common and predefine fixed signal timing for all road so people face many troubles in that case. Let take a example if any ambulance or fire vehicle arrival to signal at any critical situation if there is more traffic or many vehicle are waiting for green signal then human life will be totally at risk. Some time there will be green signal for ideal road at that same time the vehicle in busy lane wants to wait for green signal. To rectify this condition many smart traffic system were design using some sensor

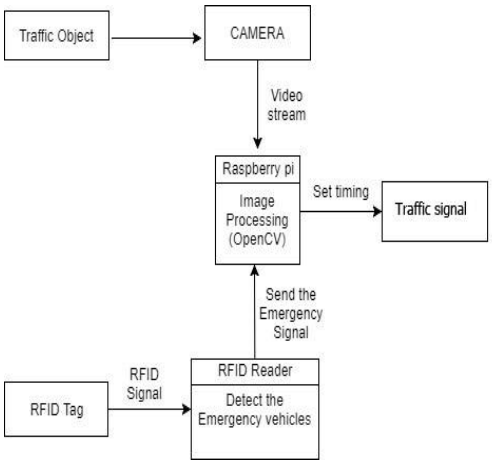
Our main aim is to adjust the signal timing depends upon the density of the road and give first preference to the emergency vehicle when they are arrival .By using raspberry pi this system design will be a compact one. In this a camera module is connected to the raspberry pi board though that a live video stream of the road will be capture and send to the raspberry pi, the video frame will be processed their by frame by frame and find the density road and also the number of vehicle count will be send to the traffic signal system to increase or to decrease the time delay of the signal. By using this system the vehicle no need to waste their time in traffic signal. The signal timing are adjust depend upon count of the vehicle we include RFID tag to the emergency vehicle when they enter into the that particular region the RFID that placed near the signal will detect the tag and it automatically change the signal to green

The paper is organized as follows: section II explains the system overview Section III Proposed System Section IV discusses about Design Components of the system Finally Section V gives the conclusion and future scope of the project

II. System Overview:

This section deals with what are the components that we are used and how they are connected between them. Camera module is connected to the raspberry pi board to get the live video stream ,then the video is processed and get the vehicle count and send to the signal system to adjust the timing and the RFID reader is connected to the GPIO pin in raspberry pi

it will send the signal to switch on the green signal when it read the RFID tag.



III. Proposed System:

The proposed system is to deals with the as the existing system have the predefine signal timing and some have use the sensor we proposed with the live time image processing to count the vehicle and depend upon the count the signal want to be adjusted, either increase or to decrease the timing and give first preference to emergency vehicle

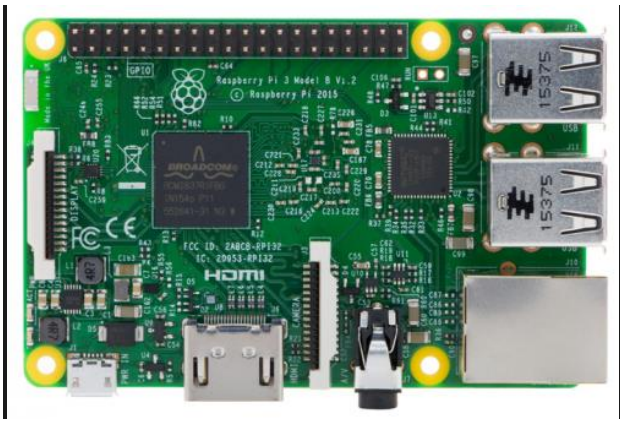
The proposed system distinctly consist of four units

1) Live video streaming.
2) Background Subtraction.
3) Erosion and Dilation.
4) RFID tag & reader

IV. Design Components:

1) Live video streaming.

In this we have used raspberry pi 3 model B is a tine computer with load of more specification like quad-core 64-bit ARM cortex A53 clocked at 1.2 GHz. This put the pi 3 roughly 50% faster than the pi2. Compares to the pi 2, the RAM remains the same- 1GB of LPDDR2-900 SDRAM, and the graphics capabilities provided by the video core IV GPU, are the same as they ever were. As the leaked FCC docs will tell you, the pi 3 now include on-board 802.11n Wi-Fi and Bluetooth 4.0. Wi-Fi, wireless keyboards, and wireless mice now work out of the box and there are four output port one is for display HDMA port second one is Audio jack third is USB and the finally it as 40 GPIO(general purpose for input and output) pins .



This board has a SD card slot on its back side to put the bootable SD card loaded with raspbian OS

Pi camera:

The raspberry pi has a ribbon cable camera slot in that pi camera is installed and enable the camera module using sudo raspi-config

Features

- 5MP sensor
- Wider image, capable of 2592x1944 stills, 1080p30 video
- 1080p video supported
- CSI
- Size: 25 x 20 x 9 mm

The camera consists of a small (25mm by 20mm by 9mm) circuit board, which connects to the Raspberry Pi's Camera Serial Interface (CSI) bus connector via a flexible ribbon cable. The camera's image sensor has a fixed focus a native resolution of five megapixels and lens Pi camera module can be used to take high-definition video stream by using this camera module we can able to take live streaming of the traffic object

2) Background Subtraction.

The background subtraction is an algorithm in opencv (open computer vision), its main aimed at real-time computer vision and it is a open source contain many library file. Originally developed by Intel in 1999, it was later supported by Willow Garage and is now maintained by Itseez. OpenCV supports the deep learning framework the main contributors to the project included a number of optimization experts in Intel Russia, as well as Intel's Performance Library Team. In the early days of OpenCV, the goals of the project were described as:

- Advance vision research by providing not only open but also optimized code for basic vision infrastructure. No more reinventing the wheel.
- Disseminate vision knowledge by providing a common infrastructure that developers could build on, so that code would be more readily readable and transferable.
- Advance vision-based commercial applications by making portable, performance-optimized code available for free – with a license that did not require code to be open or free itself.

The first alpha version of OpenCV was released to the public at the IEEE Conference on Computer Vision and Pattern Recognition in 2000, and five betas were released between 2001 and 2005. The first 1.0 version was released in 2006. A version 1.1 "pre-release" was released in October 2008.The second major release of the OpenCV was in October 2009. OpenCV 2 includes major changes to the C++ interface, aiming at easier, more type-safe patterns, new functions, and better implementations for existing ones in terms of performance (especially on multi-core systems). Official releases now occur every six months and development is now done by an independent Russian team supported by commercial corporations

Background subtraction (BS) is a common and widely used technique for generation a foreground mask (namely a binary image containing the pixels belonging to moving objects in the scene) by using static cameras. Background subtraction is mostly done if the image in question is a part of a video stream. As the name suggests, BS calculates the foreground mask performing a subtraction between the current frame and a background model, containing the static part of the scene or, more in general, everything that can be considered as background given the characteristics of the observed scene.

Background Modeling consists of two main steps

1. Background Initialization
2. Background Update

In this two steps first step, initial model of the background is computed, while in the second step that model is updated in order to adapt to possible changes in the scene.

3) Erosion and Dilation.

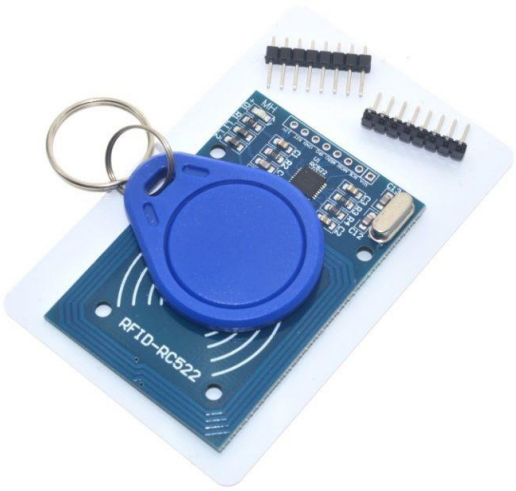
Erosion and Dilation are two common operation come under morphology operation it apply a *structuring element* to an input image and generate an output image. These techniques will remove the noise. Isolation of individual elements and joining disparate elements in an image. In dilation the pixel element original image is one if at least one pixel under the kernel is one. Erosion operation is the sister of dilation, erosion get thinner of the object in that image. In this operation when pixel element in the original image is '1' if at least one pixel under the kernel is '1'. It increases the white region in the image or size of foreground object increases. In cases like noise removal, erosion is followed by dilation. Because, erosion removes white noises, but it also shrinks our object. So we dilate it. Since noise is gone, they won't come back, but our object area increases. The erosion operator takes two pieces of data as inputs. The first is the image which is to be eroded. The second is a (usually small) set of coordinate points known as a structuring element (also known as a kernel) It is this structuring element that determines the precise effect of the erosion on the input image.

By using erosion and dilation it will remove the unwanted small noise from the video stream which is other than vehicle like human. The objects which are all come in this operation will not take for count.

4) RFID tag & reader:

Radio- frequency identification (RFID) use electromagnetic fields to automatically identify and track tags attached to objects. The tags contain electronically stored information. Two-way radio transmitter-receivers called interrogators or readers send a signal to the tag and read its response. Signaling between the reader and the tag is done in several different incompatible ways, depending on the frequency band used by the tag.

In our project we use RFID to give first preferences for emergency vehicle when they arrive near to signal it automatically turn on to green signal until the vehicle cross the lane .RFID tag will be kept in the vehicle when it read by the RFID reader the emergency alert will send to the traffic signal to change the signal light to green



V.Conclusion & Future Scope:

Traffic congestion are most common issue faced in Indian road .We develop a intelligent traffic control system to set the traffic signal timing depend on real time traffic density of the road using image processing (opencv) signal time will be adjust either increase or decrease depend upon the vehicle count the RFID is used to switch on the green signal when the emergency vehicle come near to the traffic signal

In future work this live video stream will be update to the cloud storage using mobile application any one can able to get the traffic information, by know this status we can avoid the traffic and we can select the better route so reach our destination

References:

[1] Sabya sanchi kanojia, “Real –time Traffic light control and Congestion avoidance system”, International Journal of Engineering Research and Applications (IJERA), pp.925-929, Vol. 2, Issue 2,Mar-Apr 2015 .

[2] Georgios Vigos, Markos Papageorgioua, Yibing Wangb, “Real-time estimation of vehicle-count within signalized links”, Journal of Transportation Research Part C: Emerging Technologies, Volume 16, Issue 1, pp.18–35, February 2014.

[3] Celil Ozkurt, et al. Automatic Traffic Density Estimation And Vehicle Classification For Traffic Surveillance Systems Using Neural Networks. Mathematical and Computational Applications, Vol. 14, No. 3, pp. 187- 196, 2012.

[4] Wisnu Jatmiko, et.al,” Detection and Counting of Vehicles Based on Video Processing In Distributed Traffic System”, International Conference on Advance Computer Science and Information System 2010.

[5] Papageorgiou M., Diakaki C., Dinopoulou V., Kotsialos, A.,“Review of road traffic control strategies”, Proceedings of IEEE, Vol. 91, Issue 12, pp. 2043-2067, November 2004.

[6] LIST G.F., CETIN M.: ‘Modeling traffic signal control using Petri nets’, IEEE Trans. Intelligent Transport. Syst., 2004, 5, pp. 177–187

[7] Elisabeth ILIE-ZUDOR “The RFID Technology and Its Current Applications”, MITIP 2006, ISBN 963 86586 5 7, pp.29-36