International Journal of Research in Engineering, Science and Management
Volume-1, Issue-10, October-2018
www.ijresm.com | ISSN (Online): 2581-5792

Ambulance Detection by Image Processing Using PLC: Colour and Sound Based Approach

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***Abstract*—Now-a-days, Traffic is most irritable for on road traveler's .And also most importantly patients could not reached the hospitals for certain time for our treatment. So, that this journal that describes how to reduce the time delay of ambulance to reach hospitals. We are fixing the sound detector in front and back of the signals when the ambulance reaches the first sound detector then to send the signal for traffic light controller changes into green. Then, the ambulance crossing the line, here we are fixing the image detector to detect the ambulance and the after 3 sec delay the light changes into amber and after ONE sec delay it changes into red.**

***Index Terms*— Ambulance Detector, Image Detector, PLC**

I. Introduction

In road side emergency vehicles (like ambulance any type of police and any type of emergency vehicles .here the visual alarm providing by sensing the emergency vehicles. then emergency vehicle (ambulance) siren sound can be heard but some traffic people not react that so that we choosing that the this type of approach to automatically changing the traffic signal into green. Fire sirens can also be mounted on or near government buildings, on tall structures such as water towers, as well as in systems where several sirens are distributed around a town for better sound coverage. Its distinct tone of urgency, high sound pressure level (123 dB at 10 feet) and square sound waves account for its effectiveness. Architecture 16 bits Program memory 144 KB RAM 8192 bytes Max CPU speed 120 MHz Internal oscillator 7.37 MHz, 512 kHz (with PLL 4x, 8x, 16x). Display as the interface. For signal processing, programmable logic controller and drivers. The microphone was covered by a plastic shade in order to avoid wind and rain. This equipment was driven by DC 5 volts supplied from battery. The siren sound of ambulance has two characteristics. One is that the sound has two different frequencies and the other is that each tone periodically sounds on and off. Using FFT, these two characteristics can be converted into numerical values. In first step, the input signal is sound pressure sampled by a microphone. It is sampled in the sampling rate of 2,400 Hz and is applied 64 point FFT. Therefore the amplitudes and phases are obtained about each 37.5 Hz bandwidth. In second step, the input signals are numerical values of amplitudes obtained in first step. For each band, the amplitude is sampled in the sampling rate of 2.34 Hz and is applied 16 point FFT. Therefore the amplitudes and phases of amplitude change are obtained about each 0.14 Hz bandwidth.

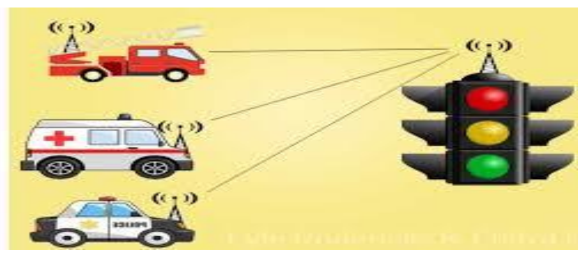

Fig. 1. Emergency vehicles

The Fig. 1, States that the emergency vehicles and to emits the siren sound and the sound to reach the signal receiver to receives the und and to immediate the signal to be opened. By using the obtained numerical values, whether the input sound is siren or not can be determined. The characteristics of ambulance siren sound have three particular relations as shaded areas. These areas have a constant gap of pitch frequency, a same amplitude change frequency, and an opposite phase about the amplitude change. These areas move under the by checking whether this area contains the areas that satisfied.

II. Block Diagram

The human ear has a diaphragm that vibrates when it receives sound (air pressure vibrations) and this vibration is converted to electrical signals that are conveyed to the brain. Using this idea, engineers have created sound sensors like the LEGO NXT sound sensor.

A. Sound Detector

It is used to detect the sound. It is a small board that combines a microphone and some processing circuitry. The sound detector not only provides audio output, but also a binary indication of the presence of sound, and an analog representation of its amplitude.

B. Specifications

1. Operating Voltage – 5V / 3.3V
2. Can detect sound / noise etc
3. Sensing element is a condenser mic

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4. Has a on board amplifier and gain adjustment
5. Digital Output

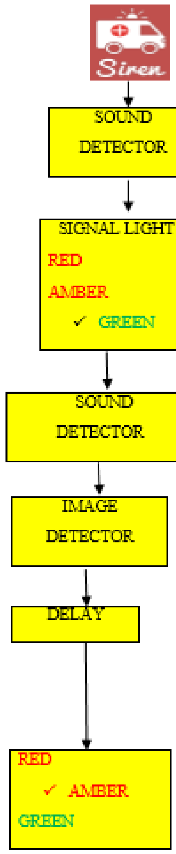

Fig. 2. Block diagram

C. Image Detector

An image recognition algorithm (a.k.a an image classifier) takes an image (or a patch of an image) as input and outputs what the image contains. In other words, the output is a class label (e.g. Ambulance). How does an image recognition algorithm know the contents of an image? Well, you have to train the algorithm to learn the differences between different classes. If you want to find vehicle in images, you need to train an image recognition algorithm with thousands of images of vehicles and thousands of images of backgrounds that do not contain cats. Needless to say, this algorithm can only understand. The implementation you choose depends on the objective of the algorithm in the first. For example, the first step is converting an image into data that can be used to train and, of course, run analysis on. To save computation complexity, I might convert an image into a matrix of grayscale floats because my analysis has no use for color (rgb). So instead of having three matrices per image to analyze (oned red, one blue, one green), I now only have one. Each float in my grayscale matrix ranges from 0-1 (0 == white, 1 == black). At this point, it's clear that I could apply basically anything to run my analysis. Commonly, we are looking for edges that we can use to form shapes. While in grayscale, an edge can be found by noticing how sharp a change is between three pixels. So an edge like:

Pixel (25, 25): 0.3
Pixel (25, 26): 1
Pixel (25, 27): 0.8

Notice the sharp change between the first and second pixel. We could use this drastic change of grayscale density to detect that an edge exists along pixel (25, 26). (Note: the numbers in parenthesis correspond to indices of our matrix, and the resulting value is our grayscale.)Alright, let's talk about a real world example. Let's say I want to detect ambulance in images. Let's also say I want to only detect ambulance.

Fig. 3. Ambulance in traffic

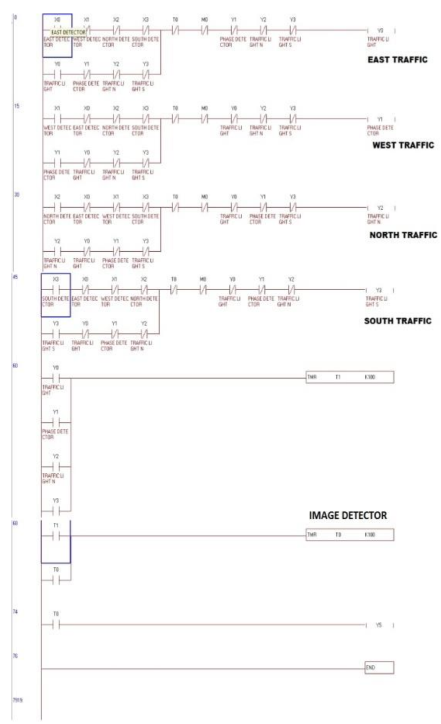

Fig. 4. PLC Ladder logic Diagram

III. PLC LADDER LOGIC DIAGRAM

The ambulance will be entered in east side Firstly sound detector will be indicated as the x_0 is placed on the east side of the road. When the sound detector detects the siren sound the east side of the signal will change into and the green and the other side of the signals will carries the red signal. Here the Two is mentioned to the image detector. If the vehicles crossed the image detector it gets capture and observes the images and detect the ambulance after some delay the other north, west, south gets works normally.

The y_1 is the output rung to the east traffic signal.y_2 is the output rung to the west traffic signal.Y_3 is the output rung to the north traffic signal.Y_4 is the output rung to the south traffic signal.

IV. Conclusion

In the system too it will create a emergency vehicle like (ambulance,police)of help to sound detector detects the siren sound .In general by using a PLC generated a ladder logic diagram it is possible to gone the separate lane in the traffic signal. The particular oriented colour so that the vehicle under observation can be captured. Therefore with the combined effort of background image subtraction and color detection, we will capture the ambulance by a bounding box over it to ensure better visibility and detection. This system in the coming time can lead to much better improvements over the existing systems. In the coming time where pedestrian security and efficient traffic management would be crucial issues such system.

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