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Traffic Organizer Based on Density of Vehicles

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ABSTRACT

The project is aimed to design an automatic density based traffic signal system, which reduces the waiting time in signal and clear the traffic jam in easier way. Nowadays most of cities facing lot of traffic jams in signal and they need to wait a lot. Sometimes it went to hours of time. To solve this problem, the proposed method wasdesigned using Raspberry Pi. If there are four lane's and one lane having most of the vehicle's and other lane's having only having few vehicles then , when the signal is turned green the vehicles cross the signal within few seconds on less density lanes, remaining time is getting waste. Higher density lanes take more amount of time to pass the vehicles. To overcome this problem the proposed method was designed.This is achieved by camera module connected with Raspberry Pi. Vehicles count had been calculated using camera module on each sides of signal. When the density is calculated, higher count of vehicle which belongs to the corresponding lane's signal light have to be turned on in green color, with the help of the modules of the project. Camera module can capture the distinct vehicle's presence and sends the information to the microcontroller. All the sides of the lane's vehicle counthas been calculated individually and send to microcontroller and find the optimized solution for the traffic system.

Keywords: Raspberry Pi, density, Traffic

1.Introduction

In today's high-speed life, mooring has become a serious problem in our daily activities. Because a lot of man-hours are wasted on signals, this reduces the productivity of individuals and thus the productivity of society.The chaotic congestions are caused by a large number of vehicles, insufficient infrastructure, and thus an irrational distribution of the signaling system. It indirectly contributes to the increase in pollution levels because, in most cases, engines are left running, consuming vast amounts of natural resources in the form of gasoline and diesel with no discernible benefit.As a result, in order to solve these issues or at least minimize them to a meaningful level, newer schemes must be introduced by incorporating sensor-based automation techniques in this field of traffic signaling system.In the most cities in the world, Holdup may be a serious issue and it is time to shift to an automatic system with decision-making skills in more manual or fixed timer mode[1-5]. Today's traffic signaling system is a time-based system that can make ineffective if one lane is in operation. Framework was created for a smart control system in order to optimize this problem. Higher traffic densities on one side of the junction also require longer green time compared with straight forward times.As a result,suggest a mechanism in which the basic quantity

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of green light and red light is allocated based on the density of traffic present at that point. This is accomplished by utilizing the Camera module. Once the density has been determined, the microcontroller is used to assign the glowing time of the green light.The output of the camera module on the side of the road is captured and the data sent to the micro-controller deciding how long the flank is open and when the signal lights are changed.Image processing is a technique which is used to extract the information from the image which are needed for our operation.In this type of processing method, the input is given as image format and theoutput in the format of image or input image's characteristics or input image's features.

This paper contains the following sections as: describes the Methodology of the proposed system, system flow , discussed about the results and discussion and conclusion of the work.

2. METHODOLOGY OF THE PROPOSED SYSTEM

When the signal cameras are turned on, it will capture the vehicles and counts the vehicle's count for separate roads. Based on high density, high density road lane will move first. With respective to the count, signal countdown will be decided. After the highest road lane moved, then, remaining sides will be arranged in descending order. Then one by one, it will be processed. Signal countdown will vary each time according to density of the vehicles.Figure 1shows the block diagram of Traffic Organizer,

The System will propose the following modules

- Uses camera module for tracking vehicle.
- The distance range is dynamic.
- The number of vehicles can be counted.
- The vehicle can be specified.
- More efficient than existing system.

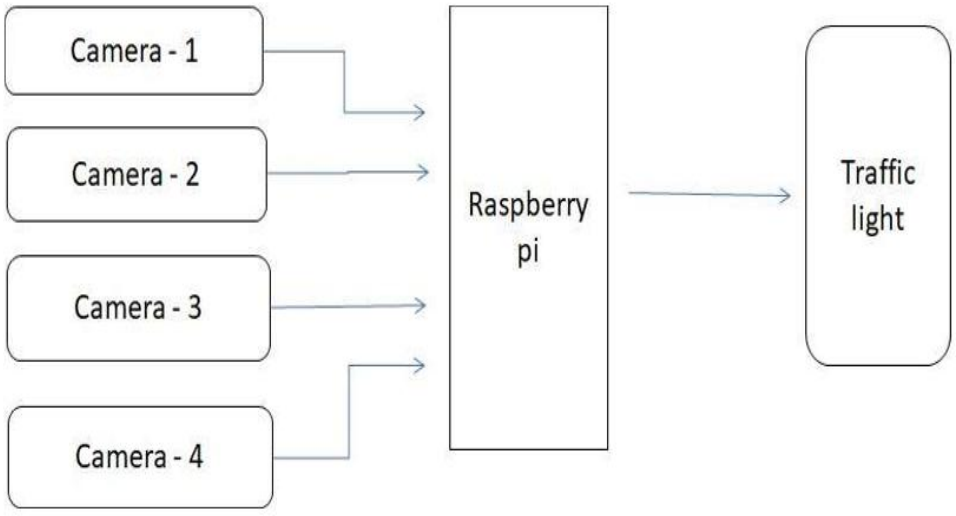

Figure 1Block Diagram of Traffic Organizer.

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a) Raspberry Pi Camera

A app takes frames then holds them in a computerized process. Image or sound recordings are also available in several versions. Furthermore to in any case images catching is normally done using a receiver, using the wired especially combined gadget. A high quality 8 Megapixel Sony IMX219 image sensor intended for a Raspberry Pi add-on board with a fixed focus lens is the Raspberry Pi v2. The camera can hold 3280 x 2464 pixel static images in terms of still images and supports 1080p30, 720p60 and 640x480p90 videos as well.

b) Raspberry Pi

Within the United Kingdom by the Raspberry Pi foundation, Raspberry Pi will be a series of small, single board machines to advance the education of basic engineering in faculties and in developing countries. Trade outside its target marketplace for applications such as AI became much wider than expected in the initial model.It does not include peripherals (for example, mouse and keyboards) or instances. Raspberry Pi is discharged for several decades. All variants have a chip Broadcom system (SoC) with a built-in CPU (Central Process Unit) and an on-chip processing unit that is compatible with ARM (GPU).

Merits of the proposed system

The proposed system has an advantage of the distance range is dynamic and the number of vehicles can be counted accurately and also less human intervention.

3. FLOWCHART OF THE PROPOSED METHOD

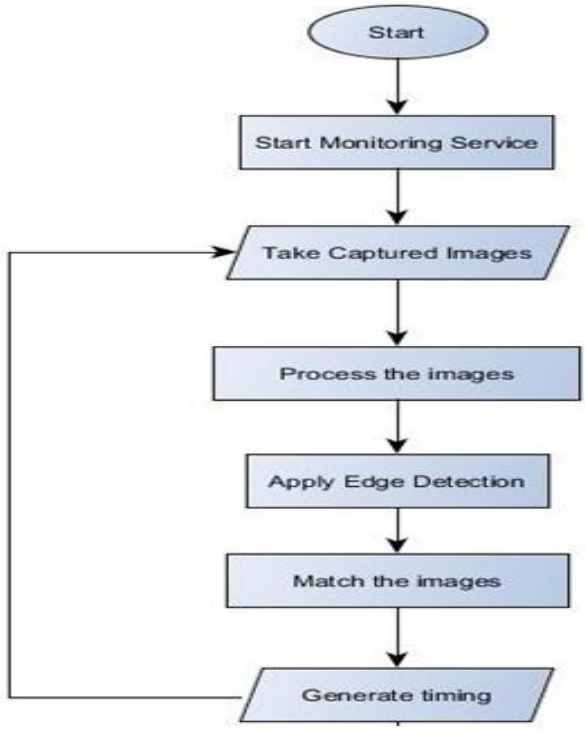

Figure 2**A**lgorithm of the traffic organizer System.

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The first process is to start the monitoring process. A camera module is activated and its starts recoding the lanes, vehicles images will be detected and send to the raspberry Pi then image processing will be done in the next step of the process. To identify the different types of vehicles, we apply the edge detection method, By using this method vehicles count can be counted, Already sample images had been uploaded, to match the vehicles at the signal, Then sample images and real-time images will be matched, According to the density of the vehicles, high-density lane side will be turned to green signal, Timing of the green signal will be based on the density If the density is high, timing will be also high, After the first green signal, again this process will be done for the remaining sides.

4. RESULTS AND DISCUSSIONS

There are some inconveniences in previous approaches – time wasting with green illuminations even though the path is clear. Image manipulation eliminates this. Easy to apply in real time as the accuracy of measurement time depends on the camera's relative location.This project is a solution for reducing road congestion along the old hard-coded lighting grid, causing needless delays.Reduction of traffic jams and waiting time will minimize the number of fuel injuries and also help regulate air pollution. This also provides evidence for potential road planning and maintenance or upgrades which are urgently necessary, such as which intersection has higher waiting times.Figure 3 shows theHardware Connectionof the traffic organizer System, Figure 4shows thecamera output offour lanes,Figure 5shows thevehicle's count for separate roads,Figure 6shows the traffic signal priority by density of vehicles and vehicle's countfor separate lanes.

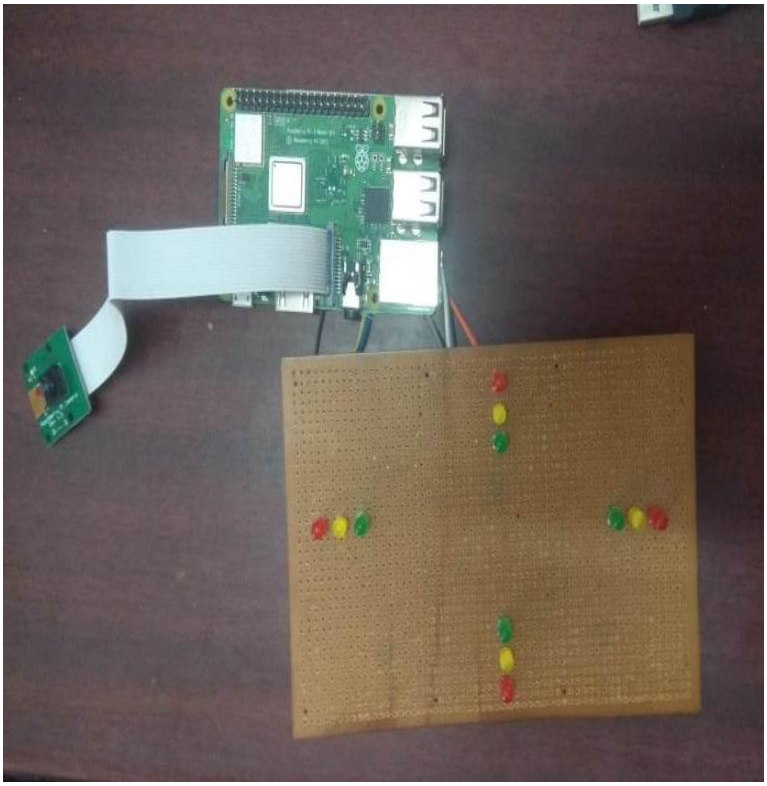

Figure 3Hardware Connection of the traffic organizer System.

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Figure 4Output of lane camera modules.

```
Road 1 Status

Number of cars in the image is 17
Number of bike in the image is 0
Number of bus in the image is 2
Number of truck in the image is 0


Road 2 Status

Number of cars in the image is 12
Number of bike in the image is 0
Number of bus in the image is 0
Number of truck in the image is 4


Road 3 Status

Number of cars in the image is 7
Number of bike in the image is 0
Number of bus in the image is 0
Number of truck in the image is 2


Road 4 Status

Number of cars in the image is 15
Number of bike in the image is 0
Number of bus in the image is 1
Number of truck in the image is 0
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Figure 5Traffic density of each road.

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priority 1  Lane1 19
priority 2  Lane4 16
priority 3  Lane2 16
priority 4  Lane3 9
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Figure 6Traffic signal priority by density of vehicles.

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5. CONCLUSION

In order to ensure the validation of its performance and operations, the density based control system is designed and evaluated. In this analysis, we managed to minimize the traffic jams caused mainly by the light systems based on the assembled time. The system is efficient and manufacturing value is still very low. Future work is being proposed to provide the unit on a large scale and to use all or all highways to scale back holdup in places like cities where the congestion of traffic is becoming a huge problem. The exasperating chaos of the movement will be successfully channeled through the field application of this technology by distributing time slots which support the advantages of the vehicular load on the bordering lanes. The next step is to apply this scheme, until it is implemented on a major scale, the actual scenario for first hand results.

FUTURE SCOPE

- Real time traffic information update on traffic department web server.
- Automated default monitoring.
- Emergency vehicle detection.

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