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IoT Based Traffic Control System using Image Processing

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Abstract: ***In the current scenario we can see that the traffic jam has become a serious problem in rapidly growing cities (As per their population) of India by which there is increase in air pollution, Fuel consumption as well as vehicular density.***
So there is a requirement to find a new way for traffic controlling traffic system which will be managed through real time IoT based traffic control system using image processing.
This is a smart traffic management system that is designed to control real time traffic system which consist of components of Raspberry Pi, Pi camera. Raspberry pi is the key component which is used to control all performance multitasking. By using cameras, we monitor different lanes constantly. Image processing is used to examine detection and counting no. of vehicles in different lanes. It increases the traffic efficiency and clearance. The signal light will be decided as per the no. of vehicle count using image processing.
Keywords: IoT, Raspberry Pi, IR sensor, LED, Traffic Management

I. INTRODUCTION

As we can see that one of the most fastest growing thing in India is its population. And due to this traffic congestion problem is also increasing day by day.so there is a need to control this traffic in real time by which a better traffic control signal can be scheduled and also we can route the traffic in a better way. This increase in traffic is not only because of the increase in population but also due the condition of the road either it is their insufficiency or be the pot holes created on the road because of the material we used to made them.it can be because of the condition of the road because of the weather.the normal traffic light changing is hard coded due to which people have to wait on the road for that particular amount of time whether there is that much traffic on the other road or not. So there is a need to find out a way to stimulate and optimize the traffic to reduce the man power.

To control the physical devices around us through internet we use a network called Internet of things (IoT). It provides a extra , precise and quick outcome. This system is designed to allow the computer to store the databases and the storing is done via internet. we can access our component from a far away location by the use of internet of things. By this things we can reduce the man power and tis thing makes it an economical system.

Majorly now the connection is between the human to human but In the future we can see that the things wil go to an extend we there is a machine to human interaction also machine to machine. And that's only possible because of the internet of things that will be the future according to some of the great tech leaders. Different applications and devices can be connected to each other through IoT.

Our country is an emerging country and also developing at a very fast speed. Due to increase in the GDP of the country there is a increase in the no. of private vehicles . This is the leading factor behind the problems of congestion of the traffic on the road.

When we come to big cities of the world the average wasted time in traffic in united states is 81 hours ,in Europe it is 101 hours. This not only trouble the people but also there is more consumption of the fuels because the delay which people are facing due to the congestion of the traffic. And also the valuable time of the people.

Now because of the large no. of vehicles in the urban area.there is an increase in the Air pollution and the noise pollution in the those area. And you will get surprise when you get to know that vehicle consume more gases when they are in traffic due to the continuous acceleration and the braking.Due to which more pollutants get pumped into the atmosphere.

Now the main aim is to make this traffic control management system in a better way and for which we will use image processing to make a real time management system.

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II. COMPONENTS USED

A. Raspberry Pi



Raspberry Pi is small credit card sized computer with a low cost that can be plug into computer, monitor or any screen. we can do various things by using this through connecting it to keyboard or mouse. It gives freedom to people of all the ages to that they can explore computing. It is just similar to the desktop computer and can do anything which it can. People can do program in languages like python and scratch. It can be used in parent detectors, home automation etc.



One of the most wonderful and powerful feature of the Raspberry Pi is its GPIO pins that are general purpose input output pins there are total 40 pins in the raspberry Pi out of which 24 are programmable pins. We can give input and take output through these pins and these can be used for the wide range of the purposes.
You can do various innovations and also build many new projects through this which will make you to go beyond your imagination and try different different things.

B. 4 GB SD Card



An SD card provide nonvolatile storage by using flash memory, There is no requirement of the power source to retain the stored data. Here we are using a SD card of the storage of 4 gb. Traditional storage media is not rugged as the SD cards are.

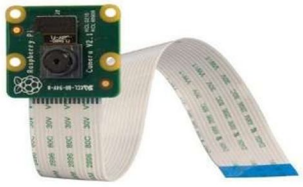
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C. A Power Lead



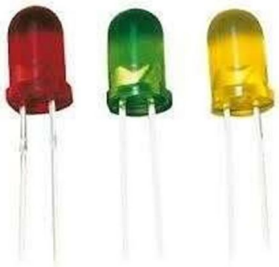
The supply of power differs from Pi model to model. Generally 5.1V is the supply which required to all the model but currently the supply is increasing according to the model. Raspberry Pi 4 uses a USB-C connector. While all other model up to Raspberry Pi 3 require a micro USB power connector.

D. Pi Camera



This is a light weight camera that is portable and supports Raspberry Pi. By using MIPI camera serial interface protocol, it communicates with Raspberry pi. Normally we use it in projects which include image processing, machine learning or in surveillance projects.

E. LEDs



LED stands for light emitting diode. It is a semiconductor light source which emits light because of the flow of current through it .that is because of the combining of the electron and electron hole. Which releases energy in the form of photons.

III. IMPLEMENTATION

In this system we are using Raspberry Pi with Pi camera to do real time monitoring of the traffic. Here the camera is used for the purpose of the image processing. Here the first step is to setup the raspberry pi and to install the particular software required for the purpose of the coding.

Now we will connect the Pi camera to the raspberry Pi and run the code which will work in such a way that first the camera will click the picture of the road and by image processing it will calculate the no. of the vehicle present on that road. Same will be of the other three also and then after calculating the no. of vehicles on the road they will get arrange in the descending order and the traffic light will also be operate in the same way and a few second break and again the same from the start.

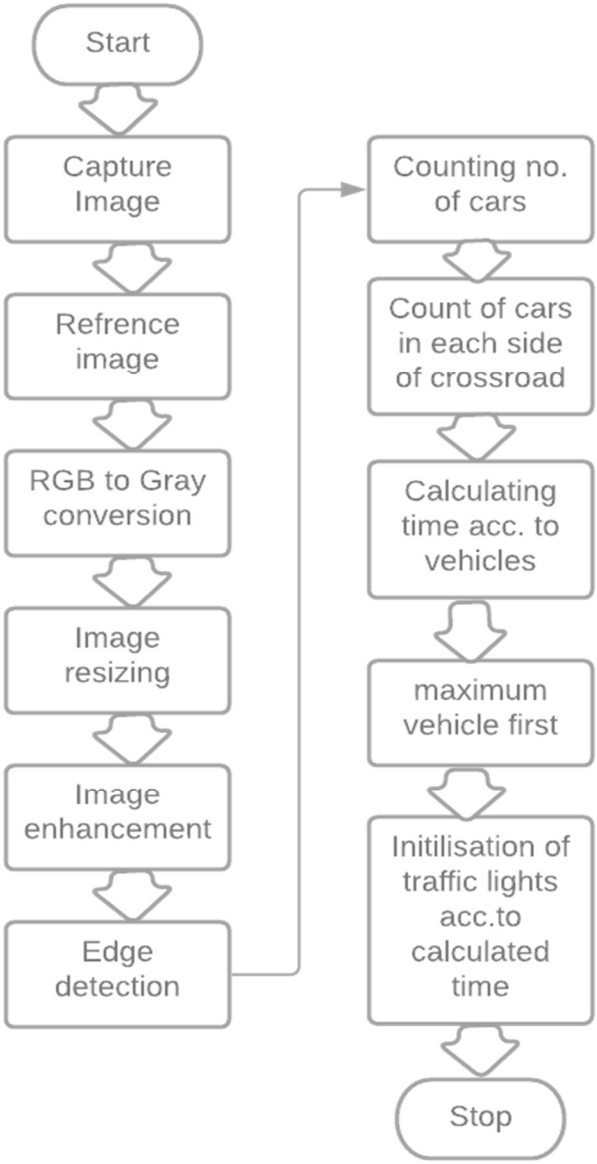
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IV. FLOWCHART

By this flow chart we can see the pattern in which the project works, firstly camera will capture the picture of the vehicles on the road. This camera is connected to raspberry pi.

After clicking of the picture the concept of image processing start in which the Pi will count the no. of vehicles present in the picture of each road. After counting they will get arrange into descending order. And the one which have higher no. of vehicles will be green first and the lowest will be the last. Timing also depend on the lane of the road or no. of vehicles both.



V. CONCLUSION

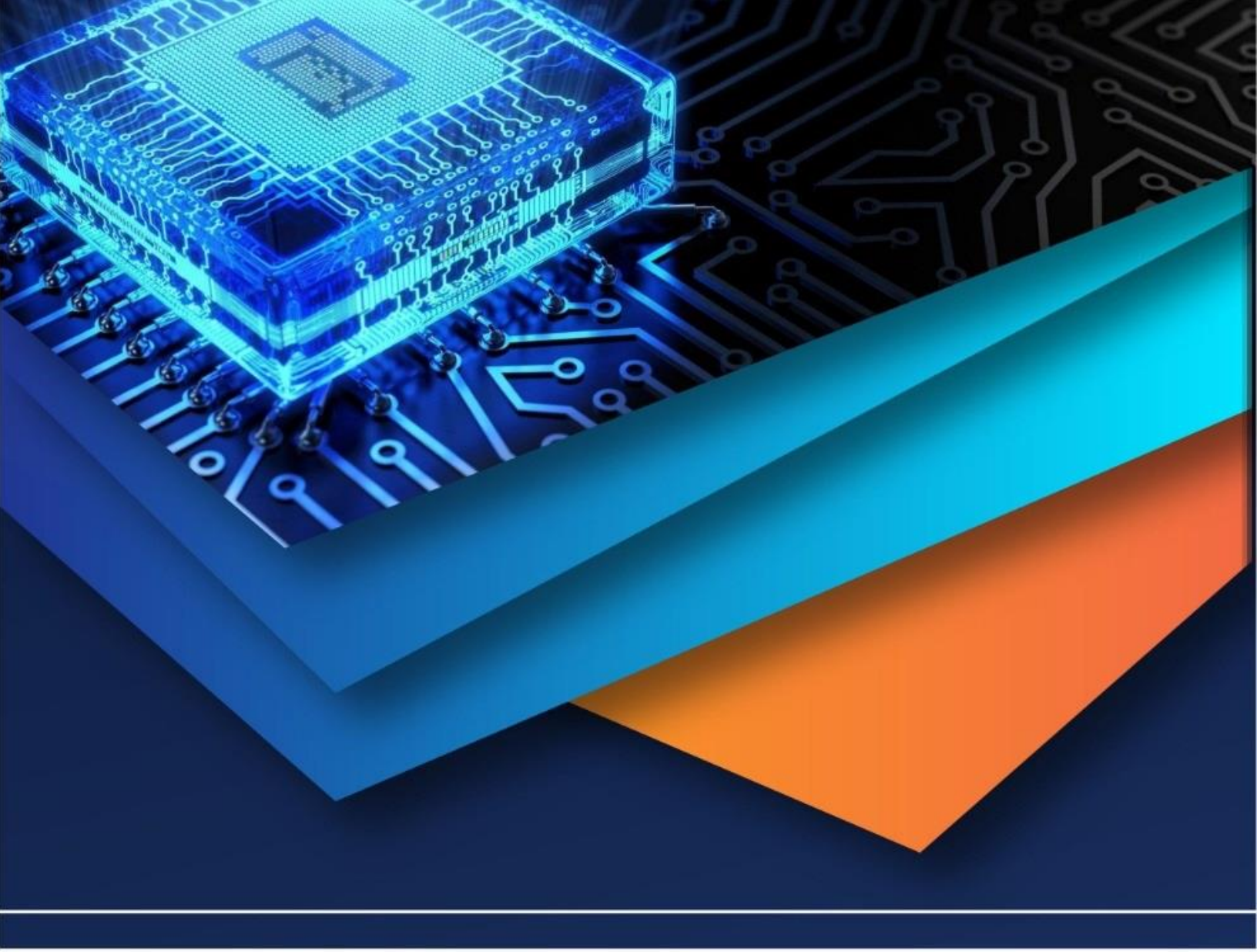
A fixed amount of time taken by the existing system results in traffic jam. As traffic signal are not sufficient to hold the traffic.the above limitation will be overcome by our project as it is not hard coded it is manually and works in real time that makes it more efficient and convenient for the people. This innovative idea is based on the IoT. Also makes our environment clean and pollution free also consumption of fuel get low.

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