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SMART TRAFFIC MANAGEMENT SYSTEM FOR AUTOMOBILE

Mr. HARSHAD PAWAR

GRADUATE TRAINEE, AUTOMOBILE DEPARTMENT, RUSTOMJEE ACADEMY FOR GLOBAL CAREERS, DAHANU

Abstract - This paper aims to overcome traffic bottleneck caused by inadequate traffic management systems that are antiquated and work on a pretend countdown. These conventional systems allocated timings distracted of the certain frequency in traffic on a conclusive road thereby begin extensive red light setbacks. The systems we appoint establish traffic lights acknowledge to real time values of traffic, thereby granting proper management of time and assets. In order to do this we first adjust the density of traffic which is purposeful using a consolidation of ultrasonic sensors and image alters techniques. This information is classy or we can say processed by a Raspberry Pi, which in turn controls the traffic light indicators. In addition to that, the data that is possessed is sent to the cloud, and can be used to monitor traffic flow at occasional intervals. In case of sensor system collapse, the values stored in the cloud will also be useful in anticipate the density of traffic based on long term periodic analysis.

Key Words: Cloud, Image Processing, Raspberry Pi, Traffic Congestion, Ultrasonic Sensors.

1. INTRODUCTION

In today's world where technology has overstepped the entire boundary and it has now turned into easy to solve most human problems and one of these complications include traffic congestion. Traffic dispute has increased desperately over the years and has had denial impacts that include road rage, accidents, air pollution, wastage of fuel and most importantly unnecessary delays. One of the many causes of traffic crowd is improper traffic management systems.

The first gas lit traffic light was established in London in the 1860's to control traffic caused by horse carriages in the area and it was managed manually by police officers. Since then traffic lights have became so as to allow the smooth act of traffic. The electric traffic light came soon after in the early 1900's, and this was later recouped by the automated traffic lights which are still used in a number of cities today. This system is entirely like clockwork with the lights developing at regular intervals, but soon people accomplished that the system had a flaw. In many moment vehicles had unnecessary delay periods because the light would be red even when the adverse road was empty.

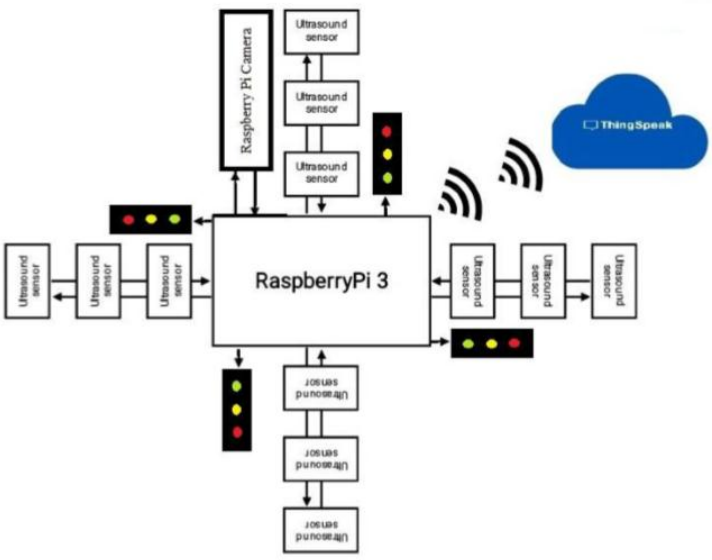
The main purpose of this paper is to adverse a system which will appoint time to each road based on the approach of traffic. The amount of traffic on a single avenue is classified under three levels: low, medium and high. These levels are purposeful by the Raspberry Pi based on inputs received from the ultrasonic sensors and camera. Occupying on the level of traffic the Raspberry Pi then allots timings for a lane, and makes changes to the red, green and yellow gauge. In addition these values processed by the Raspberry Pi are sent to the cloud where they can be gather and accessed whenever required. Also, if the level of traffic designated by the image processing techniques and ultrasonic sensors frequently differ then the preceding values gathered on the cloud can be used to regulate the level of traffic for that distinct time till the required repairs are made.

This traffic management system fulfils its duty by enabling the smooth evolution of vehicles and it also has a fail-safe system which will prove useful in unexpected footing.

2. METHODOLOGY

The main ingredient of traffic management system as shown in Fig 1 include a camera, the yellow, green and red indicators, the IOT platform for analytics - ThingSpeak and the ultrasonic sensors. The ultrasonic sensors and the camera delver as input devices, the indicators as output devices, and the Raspberry Pi as the edge device that is used to correspond with the cloud.

Fig -1: Name of the figure



The main purpose of the smart traffic managements system is to allot timings to a traffic signal based on the equalize of traffic on a lane. In order to appraise the level of traffic on each lane the road is divided into three equally dispersed sections.

Each branch houses an ultrasonic sensor to determine if vehicles are now in that particular area. The ultrasonic determines the existence of a hitch by finding the distance taken for a transmitted signal to be received. In extension a camera is implanted at the junction who takes images of the lane at periodic intermission. Using image processing techniques, the image of a bare road is cropped into the three sections. The mean value of this empty road is compared against cropped images of the certain road to find the level of influx in the area.

The ultrasonic sensors and the conclusion from the image processing techniques are sent to the Raspberry Pi and based on the absorptions received the Pi calculates the level of traffic and correspondingly allots the time to the traffic indicators. These values handled by the Raspberry Pi are then sent to the IOT platform (ThinkSpeak) where they can be stored in the form of a database useful for evaluate traffic density emulate in a particular area. In addition, the Raspberry Pi compares the values afford by both the ultrasonic sensors and image convert results to make sure the level of traffic is the same in both the cases. If they arrive to be a large adjustment in readings on multiple moments, then the values accumulated on ThinkSpeak provide adequate data to obligated the traffic lights in the non-appearance of the sensor system. This does not provide authentic results, but the timing appointed to the traffic lights are based on earlier levels of traffic calculated over an extended period of time. So saying the above mentioned system has a fail-safe system that can be used in case of failures too.

3. CONCLUSIONS

These system configurations diminish huge traffic queues caused by the conventionally carry out system used in many places. The system also additionally reduces the workload of officers who would have to direct traffic in unexpected situations, or when the traffic lights are not responding. It also enables traffic lights to work continuously with less chances of malfunctioning. The system in simple words provides a simple yet effective solution to improper traffic management systems.

4. RESULTS AND DISCUSSIONS

These sensors can be used to complete the presence of an bump which in our case is vehicles. Each lane houses three sensors which are placed at equal distances and are arranged diagonally at the divider. For the four roads a total of 12 ultrasonic sensors are used. These sensors are connected to the Raspberry Pi using jumper wires and the advice collected by the sensors is handled by Raspberry Pi. . The Raspberry Pi camera module portrayed serves as to confiscation Real time traffic images. These images are processed using Python Image Library (PIL) and Numpy libraries-supporting large multidimensional arrays and cast. The Pi then regulate the level of traffic and allots assesses to the traffic light gauges which are the red, yellow, and green LED's. The setup of the prototype housing the camera module, the Raspberry pi, the ultrasonic sensors and the traffic light indicators.

Every moment the Raspberry Pi search the level of traffic it replenishes the values to ThinkSpeak. On the ThinkSpeak platform the beliefs that are sent can be gathered in the form of a graph. Granting the channel to be made public gives access to anyone who would like to view the level of traffic at specific junction thereby permissive users to be well informed of the traffic frequency in a region. In addition these values can be converted in the form of a database using the data export option, which will also serve as a expert of information of traffic levels. This data can be made useful in case the sensor arrangements fail by finding the average density of traffic at exact time slots. Therefore from the above results it can be contained that together with the help of ultrasonic sensors and image covert techniques an approximate level of traffic can be found out that is comparable to real time values of traffic. This information huddled can be used to assess and control the traffic lights in real time bank on actual densities of traffic. This will intern help in saving time and compressing the negative effects of traffic crowd.

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