

AUTOMATIC DEVICE CONTROL USING IMAGE PROCESSING

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ABSTRACT

One of the major problems in the most populated and developing countries like India, is Energy or Power crisis. Hence, there is a pressing need to conserve power. There are many simple ways to save electricity, like using the electric and electronic gadgets whenever and wherever needed and switching them off, while not in use. But in places such as large auditoriums and meeting halls, there will be a fan or an Air-conditioner keeps running in unmanned area too, even before the people arrive. This contributes to a considerable amount of electricity wastage. There are many ways to prevent this wastage, like, installing IR sensors to detect people etc. These methods are quite costlier and complex for larger areas. Hence, here we propose a new method of controlling the power supply of auditoriums using, Image Processing. Here first we take a reference image of an empty auditorium and any change in that reference image is detected and then according to that change respective equipment's alone are turned on. Thus power wastage is controlled. This is dual usage system in which a camera is used for detecting people as well as surveillance purposes. This is very simple, efficient and cheaper technique to save energy. Another big advantage is, we can extend this up to applications like home automation etc.

Keywords: Image Partitioning, Edge Detection, Image Subtraction, Threshold determination.

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I. INTRODUCTION

Often, we may have come across a scenario that in places such as large auditoriums or halls, electric equipments like, fans, lights or air conditioners are running, even if there is no people. They are operated manually. Moreover, in some cases, some areas may be unfilled. But even in those areas those electric equipment's are running meaninglessly. This is because, every time manually turning on and off a fan in accordance with the arrival of people, is an uncomfortable task. To avoid this, they are turned on prior to the arrival of people, as a precaution. This causes considerable wastage of power. Hence an efficient system that automatically controls the power supply of this kind of places is in a demand. Current automatic controlling techniques use Infrared sensors to detect people. For simple setup, the operation depends on the count But we cannot find the places which are unoccupied. Large array of IR sensors are needed to be installed in places with larger area. Hence installation cost

as well as the circuit complexity increases. As everyone knows, IR is harmful for human beings. Hence, here we propose a new method to meet this demand, using a famous technique called, Image Processing. Using this technique we monitor the changes in the auditorium through sequence of images and according to that the power supply is controlled. Image processing is a form of signal processing for which the input is an image, and the output may be either an image or, a set of characteristics or parameters related to the image. Most image-processing techniques involve treating the image as a two-dimensional signal and applying standard signal-processing techniques to it. The implementation of power supply control using image processing is relatively very simple. The empty image of the auditorium is taken as a reference image, using a digital camera in an elevated view. The image is converted to gray and enhanced using image enhancement techniques. Now edge detection is done.

Similarly the captured real time image is enhanced and edge detected. These two images are compared and using the comparison results, respective control signals are generated using a hardware prototype. The reference and real time images undergo the following processes starting from their acquisition, Gray conversion, Partitioning, Edge detection, Comparison and finally generating the control signals..

II. REVIEW OF LITERATURE

Pezhman Niksaz et. al.[1] propose a system that estimates the size of traffic in highways by using image processing has been proposed and as a result a message is shown to inform the number of cars in highway. This project has been implemented by using the Matlab software and it aims to prevent heavy traffic in highways. Moreover, for implementing this project following steps must be considered: 1) image acquisition 2) RGB to grayscale transformation 3) image enhancement and 4) morphological operations. At first, film of highway is captured by a camera has been installed in highway. Then, the film comes in the form of consecutive frames and each frame is compared with the first frame. After that, the number of cars in highways is specified. At the end, if the number of cars is more than a threshold, a message is shown to inform the traffic status. By this message we can predict the need to reduce the size of traffic carried. Experiments show that the algorithm will work properly.

In this particular research paper they have used video camera. Camera is shooting video and the video is then converted to sequence of images by taking snapshots. This is quite difficult as we are nothing to do with video coverage. So we avoided this method and decided to use a simple camera only. Chandrasekhar. M, Saikrishna.C, Phaneendra Kumar[2] propose the implementation of image processing algorithm in real time traffic light control which will control the traffic light efficiently. A web camera is placed in each stage of traffic light that will capture the still images of the road where we want to control the traffic. Then those captured images are successively matched using image matching with a reference image which is an empty road image. The traffic is governed according to percentage of matching. The key point of the paper is the technique which is used for image comparison. The authors have used image matching technique. SIFT algorithm is been used in this paper and this is very effective and pretty simple.

Vikramaditya Dangi, Amol Parab, Kshitij Pawar & S.S Rathod[3] propose the way to implement an intelligent traffic controller using real time image processing. The image sequences from a camera are analyzed using various edge detection and object counting methods to obtain the most efficient technique. Subsequently, the number of vehicles at the intersection is evaluated and traffic is efficiently managed. The paper also proposes to implement a real-time emergency vehicle detection system. In case an emergency vehicle is detected, the lane is given priority over all the others. The key point of this paper is the technique which is used for edge detection. The authors have given the comparison of various edge detection techniques and conclude that canny edge detection is the

best method for edge detection. Thus we are using canny edge detection.

Pallavi Choudekar et. al[4] they propose a system for controlling the traffic light by image processing. The system will detect vehicles through images instead of using electronic sensors embedded in the pavement. A camera will be installed alongside the traffic light. It will capture image sequences. The image sequence will then be analyzed using digital image processing for vehicle detection, and according to traffic conditions on the road traffic light can be controlled. In the present work the designed system aims to achieve the following. Distinguish the presence and absence of vehicles in road images; 1. Signal the traffic light to go red if the road is empty; 2. Signal the traffic light to go red if the maximum time for the green light has elapsed even if there are still vehicles present on the road. Components of the current project 1. Hardware module 2. Software module 3. Interfacing Key points- Intelligent Transportation System (ITS), Traffic light, Image Processing, edge detection.

III. BLOCK DIAGRAM

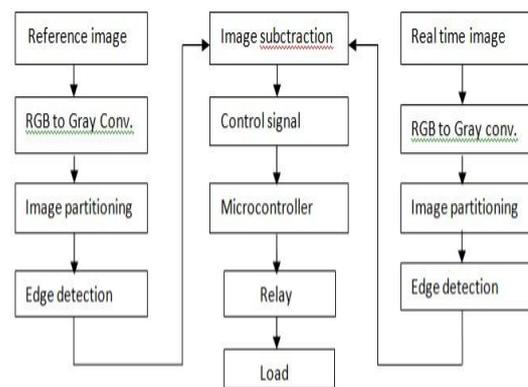


Fig 1. Block Diagram

Algorithm Flow:

Start

Take ref. image of empty auditorium classroom.

Convert RGB to gray

Apply image partitioning

Apply edge detection

Take real time image

Concret RGB to gray

Apply imge partitioning

Apply edge detection

Apply image subtraction on ref. image & real time image

Send signal to controller using serial communication

Device will be switch ON/OFF accordingly

Stop

IV. RESULT

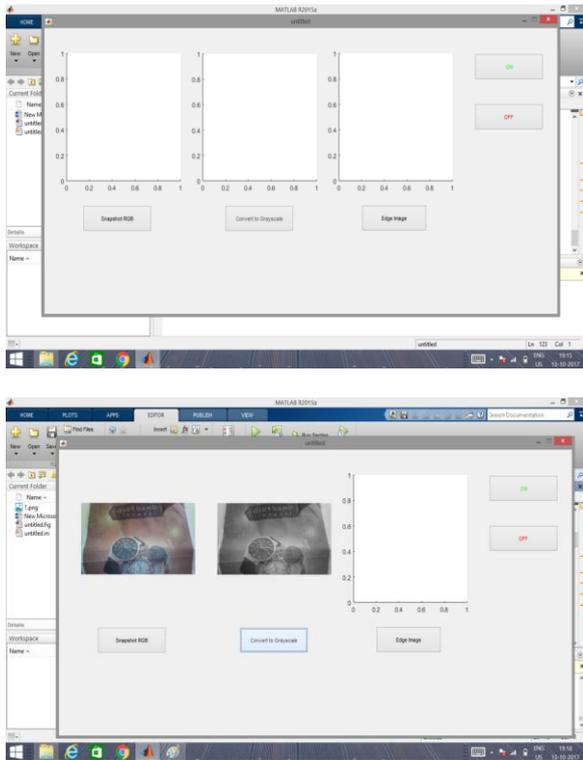


Fig 2. Simulation result

V. CONCLUSION

- The study showed that image processing is a better technique to control the power supply in the auditoriums.
- It shows that it can reduce the wastage of electricity and avoids the free running of those electrical equipments.
- It is also more consistent in detecting presence of people because it uses real time images.
- Overall, the system is good but it still needs improvement to achieve a hundred percent accuracy.
- If achieved, then we can extend this application to many places like theatres and even for home automation.

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