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Automatic Device Controller By Counting People Using Video Based Image Processing

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ABSTRACT: In places such as large auditorium and classrooms, there will be a fan and light keeps running in unmanned area too, even before the arrival of people. Power supply is scarce resource. Hence, there is a pressing need to conserve power. Proposed method include the count of the people present in the auditorium or classroom with the help of high quality camera. Depending upon the count, control signals are generated and electronic device will be turn on/off. Hence, it is a new proposed method of controlling the power consumption

KEYWORDS: Image Partition, Edge Detection, Image Substraction, Threshold Determination

I. INTRODUCTION

In large auditorium or classroom, electric equipment's like fans, lights are running even if there are no people present. They are operated manually. In unfilled areas those electric equipment's are running meaninglessly. Every time manually turning on/off of a fan and light in accordance with the arrival of people is uncomfortable task. In proposed system we use image processing techniques to monitor the changes in the auditorium or classroom. Through sequence of images that are captured from video. According to this control signals are generated and power supply is controlled. 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 is 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. LITERATURE SURVEY

1. "The passenger flow counting research of subway video based on image processing" [1]. this article takes advantages of the analysing of the method of traffic people statistics and proposes an image processing method for metro video. use this method to carry on the statistics of the passenger flow counting.
2. "Counting People in Groups"[2]. There are three different background subtraction schemes used in system, followed by the actual group count estimation technique. A. Foreground Detection using Mixtures of Gaussians B. Foreground Detection using Pixel Layering C. Shadow Removal.
3. "A People Counting System Based on Face-Detection"[3] This paper presents an automatic people counter based on human face detection method. The counter can count the people, even more than one passenger at a time, passing through a gateway or door.
4. "Dual Camera Surveillance System for Control and Alarm Generation in Security Applications"[4] In this paper, an integrated network-based video system for intelligent security applications has been presented. In order to increase the reliability of detecting the threat to the protected facility, the system integrates image processing



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algorithms for detection and tracking of humans in motion, counting people's traffic and checking the face visibility during approaching the protected area.

III. RELATED WORK

In proposed system we capture image from current video. Captured image is converted from RGB to gray scale image. That Gray scale image is used for the edge detection. From the edge detection we get the total number of count present in auditorium. Depending on the count control signals are generated and provided to the hardware. Electronic devices is automatically switch on by the hardware in those area in which people are present. Image of auditorium is splitted into cells called as segmentation. Even if there is only one person present in that cell, lights and fans covering that area is switched on. Proposed system is designed with following objectives:

1. Can be used in large meeting halls, auditoriums and classrooms.
2. Energy conservation.
3. Human efforts to count the number of person is eliminated.
4. Automatically electronics devices are controlled.

IV. METHODOLOGY

A. Image Acquisition

The first stage is the image acquisition it includes processing, compressing, storing, printing and displaying the images after that any processing techniques can be applied to it. Image acquisition means creating digital images from a physical scene. The most usual method is by digital photography with a digital camera but other methods like using image sensors can also be employed. Here we go with the webcam camera. The camera should be installed in a perfect place so that it covers the entire auditorium or Hall. The camera is interfaced with a computer or a micro-controller. First image of the auditorium is captured, when there are no people. This empty auditoriums image is saved as reference image at a particular location. Note that, reference image is taken only once, whereas the real time images are captured in certain intervals of time. Here we take the real time images in the interval of 2 minutes. Camera should be fixed and stationary one, throughout the process. The captured images are fed as inputs to the main program through certain algorithms. The real time image captured is a color image (RGB image). But grayscale images are comfortable for processing. It carries only intensity information. These images are also known as blackand- white images, and that are composed exclusively of shades of gray, varying from black at the weakest intensity to white at the strongest. The gray scale image contains image components with 256 intensity levels ranging from 0 to 255. RGB to Gray conversion is done for both the reference and captured images. The purpose of this image intensity conversion is the analysis of the image which is easy for processing in gray scale mode than in the RGB mode.

B. Image Partitioning:

An image is understood as a collection of regions that totally covers it (a partition). Regions are homogeneous in the selected feature space and connected in the image space. Such an image representation enables region-based user interaction. In it, the user can interact with the underlying partition(s) that represent the image. After partitioning the features are the regions can be parallel processed. Now in our case, auditorium is installed with many fans and lights. Each fan or a light has its own coverage area. According to the coverage area we split the image into many cells, with each cell is simply the area covered by a fan. This is because; during the image comparison we have to know the place where the humans exist. So initially the cells are split and given a unique name or label. Each region is the coverage area of each fan and light. Using these regions further processing is carried out. Note that both the reference and real time images are partitioned in a same manner. Field study is required to know the exact coverage areas. These areas are carefully specified in the main program.



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C. EDGE DETECTION:

Edge detection is a basic tool in image processing used for feature detection and attributes extraction. The edge is detected by any abrupt change in intensity levels of an image. Using this technique the amount of data to be analyzed is reduced and hence the response time will be reduced. The main objective of edge detection is to find out the variations in the real time captured image from the reference image. There are many detectors for edge detection like sobel, prewitt, canny etc. Here we go with the canny edge detector. It is one of the most widely used algorithms. First, it smoothens the image and detects the image gradient to highlight regions with high spatial derivatives. It then tracks along these regions to suppress any pixel that is not at the maximum. Finally, through hysteresis, it uses two thresholds and if the magnitude is below the first threshold, it is set to zero. If the magnitude is above the high threshold, it is made an edge and if the magnitude is between the two thresholds, it is set to zero unless there is a path from this pixel to a pixel with a gradient above the second threshold. That is to say that the two thresholds are used to detect strong and weak edges, and include the weak edges in the output only if they are connected to strong edges. Here, we find edge detected images for each and every cell. When the images are directly taken for any processing, the analysis time and the process data will be very high. But, here after the edge detection, only the edges appear in the images. So, the calculation time will be reduced.

D. IMAGE COMPARISON:

In this step, the two edge detected images are compared by merely subtracting and the intensity values for the entire new image is calculated. Image subtraction is a type of Image segmentation. We need to extract the human shape from the background. Hence, the real time images are subtracted from the reference image. This subtraction results in indication of the places which are modified. In other words we can say that, the regions which are occupied by humans are obviously indicated. The summation of all values in the resultant matrix is then obtained. We get total count present in the auditorium.

E. INTERFACE:

Arduino is an open source electronics platform based on easy to use hardware and software. Arduino boards are able to read inputs-light on a sensor, a finger on a button and turn it into an input-activating a motor, turning on an LED, publishing something online. A board is instructed what to do by sending set of instruction to microcontroller on the board. To do so we can use Arduino Programming Language (based on wiring), and the Arduino Software(IDE), based on processing.

F. Generating Control Signals:

Now all the changes are identified. The cells which are occupied by humans will be detected. The modified values are summed for each cell separately. If this sum of a particular cell exceeds the threshold value then the fan or light corresponding to that cell is turned ON. The threshold value determination is the important process here. Various test cases are considered and the threshold value must be carefully determined. Generally it should be the minimum change that can be detected when a human being enters the cell. The threshold values vary from cell to cell. The cells that are closer to the camera will have larger threshold values than that of the cells that are farther. This controlling can be done using separate microcontroller circuitry interfaced with the programming system.

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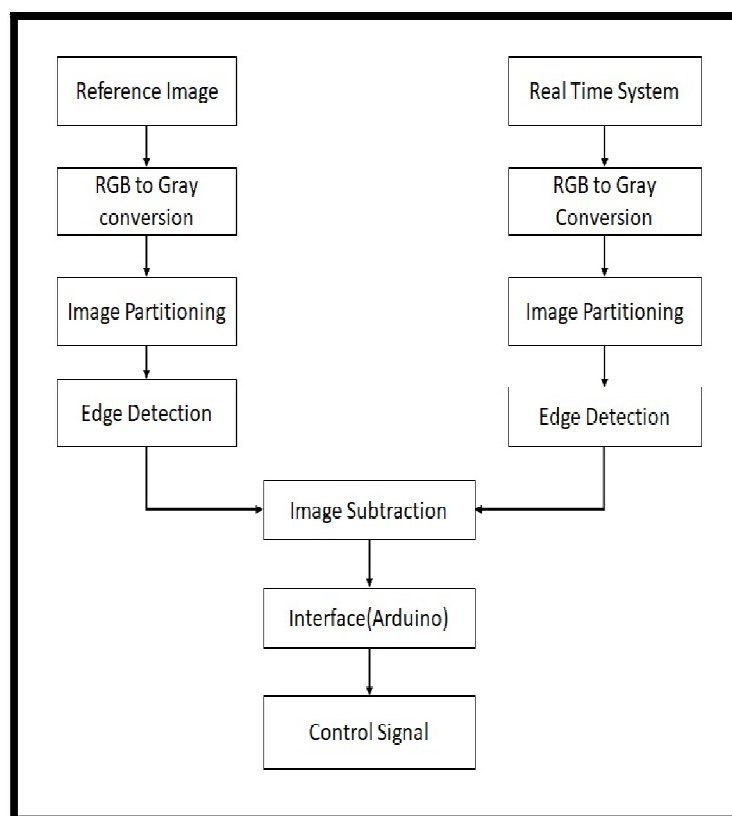


Fig. 1. Framework for determination of controlling signals

V. SIMULATION RESULTS

From the edge detection we get the total number of count. This count is given to the Arduino unomicrocontroller. By adjusting threshold value resulting fans and lights in each cell in auditorium turns on/off.

VI. CONCLUSION

By detecting the faces present in the auditorium total count is generated. This reduces human resources. Facedetection is a better technique to control the power supply . It reduces wastage of electricity and avoids the freerunning of the electrical equipments. It is more consistent in detecting presence of people. It will control the electronicdevice automatically devices in auditorium. Henceit reduces wastage of electrical equipments.

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