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## Power save Using Intelligent Street Method

S. Sri Gowthem<sup>1</sup>, K.P. Kaliyamurthie<sup>2</sup>, Dr. Nageswara Rao Patibandla<sup>3</sup>

Assistant Professor, Dept. of CSE, Bharath University, Chennai, Tamil Nadu, India<sup>1</sup>

Professor & Head, Dept. of CSE, Bharath University, Chennai, Tamil Nadu, India<sup>2</sup>

Professor, Dept. of CSE, Bharath University, Chennai, Tamil Nadu, India<sup>3</sup>

**ABSTRACT:** Usually street lights are raised source of light on the edge of a road or walkway, which is turned on or lit at a certain time every night. But manually operated street lights are not switched off properly which leads to the wastage electricity. So, we plan to develop an algorithm or improving existing algorithms to classify the street light to work only when it is needed.

**KEYWORDS:** object detection, image conversation, energy save, digital image processing, edge detection

### 1. INTRODUCTION

In our country, there are lots of street lights working during night hour. The street lights are switched on and off starting from 6pm to 6am. The aim of this study is to design a system through which power could be saved, i.e. power saving street light which automatically gets off in day time and gets on in night. It also sense moving vehicles and people traveling on road and gets on at that time. We use an infrared camera to find the presence of people and vehicles by image processing techniques. And also the street light gets automatically switched off where there is no movement such as people or any other vehicles.

Cameras are fitted for each and every street which covers about 200m and street lights are connected together to central monitoring system to which images from the camera are sent. Street lights will switch on at evening time nearly about 6pm and maintained without the use of sensor up to 9pm. After 9 pm traffic may be less in city side as well as industrial area. It is the time at which intelligent street light system will start working. The image from camera is taken to central system where the image processing is done. By using simple template matching or prototype matching system we find the presence of human beings, any vehicles like automobiles, bicycles or bikes etc.

If vehicle enters the camera coverage and if the object is identified as car or people by the central monitoring system then it checks whether the object stays same for a long time. If anything found, then street light are switched off until unless if there were another automobile or human being presence found in the same area. In another situation, if there was an accident between the automobiles such as car accident, the central monitoring system identifies the accident and reports to nearby police control room and hospital.

#### 1.1.1 Statement of the problem.

##### 1.1.2 Manual Control

Manual controlling the name instance it required for man power to control the street lights from 6pm to 6am. Depending on countries and states the government has allotted a person to controls street lights to their required area.

##### 1.1.3 Automatic controlling

Automatic street lights are controlled by timers and electrical sensors. In street lights each phase a constant numeric value is loaded in the timer. The lights are automatically getting on and off depending upon the timer value change. Using the sensor will capture the availability of human beings and vehicles on each phase depending on the light are getting on and off.

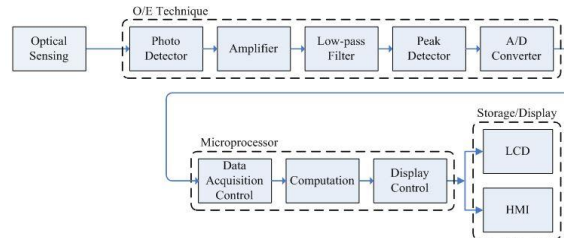
##### 1.1.4 Drawbacks.

In the manually controlling system we need more man power to control the street lights as well as the lights are working there is no presence of human beings and vehicles. So we need better solution to control the street lights. On other side, automatic controlling the street lights uses timer for every phase. If use this system the

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street lights are kept on working if there is no presence of human beings and vehicles.

## 1.1.5 Needs for image processing in street light control

We propose a system to controlling the street lights by image processing. The human beings and vehicles are detected by the system through images by help of sensors and CCTV night vision camera. The camera sensors will be placed along with the street lights and its connected to the server. Image processing is a better technique to control the street lights. By using this system the lights will be automatically getting off if there is no presence of human being. It shows to avoid the wastage of electrical energy.

## 2. Introduction to Sensors and cameras.

### 2.1 Photoelectric sensors

A photoelectric sensor, or photo eye, is a device used to detect the distance, absence, or presence of an object by using a light transmitter, often infrared, and a photoelectric receiver. They are used extensively in industrial manufacturing. There are three different functional types: opposed (through beam), retro-reflective, and proximity-sensing (diffused).



### 2.2 CCTV Night Vision Cameras

Closed-circuit television (CCTV) cameras can produce images or recordings for surveillance purposes, and can be either video cameras, or digital stills cameras. Marie Van Brittan Brown was the inventor of the CCTV camera. This type of video cameras are either analogue or digital, which means that they work on the basis of sending analogue or digital signals to a storage device such as a video tape recorder or desktop computer or laptop computer.

## III. INTRODUCTION TO IMAGE PROCESSING

Image Processing is a technique to enhance raw images received from cameras/sensors placed on space probes, aircrafts and satellites or pictures taken in normal day-to-day life for various applications. Many techniques have been developed in Image Processing during the last four to five decades. Most of the methods are developed for enhancing images obtained from unmanned space probes, spacecrafts and military reconnaissance flights. Image Processing systems are becoming widely popular due to easy availability of powerful personal computers, large memory devices, graphics software's and many more.



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## 3.1 IMAGE ACQUISITION

Generally an image is a two-dimensional function  $f(x,y)$  (here  $x$  and  $y$  are plane coordinates). The amplitude of image at any point say  $f$  is called intensity of the image. It is also called the gray level of image at that point. We need to convert these  $x$  and  $y$  values to finite discrete values to form a digital image. The input image is a fundus taken from stare data base and drive data base. The image of the retina is taken for processing and to check the condition of the person. We need to convert the analog image to digital image to process it through digital computer. Each digital image composed of a finite elements and each finite element is called a pixel.

The figure is the captured by a sensor. Here photoelectric sensor is used. The sensor is constructed with silicon material. The output voltage waveform of sensor is proportional to light. We can also use filter to improve selectivity. We can also make a output which has one strong color than remaining visible colors using filter. We can generate a 2-D image using single sensor with a displacement in both directions of plane. The arrangement used here is for high precision scanning where film negative is mounted on to a drum which produces mechanical rotation. This mechanical rotation provides displacement in one direction. A sensor mounted on a lead screw is used as it provides motion in perpendicular direction. Using this we can control mechanical motion effectively and images are obtained with high resolution. The sensors a arranged as strips to provide imaging in both direction. The strip provides image in one direction while motion takes care about perpendicular direction. This method is effectively used in airborne imaging. The arrangement is attached to aircrafts during their flights. One dimensional imaging sensor strips that respond to various bands of electromagnetic spectrum are mounted perpendicular to provide perpendicular image so as form a 2-D image.

## 3.2 FORMATION OF IMAGE

We have some conditions for forming an image  $f(x,y)$  as values of image are proportional to energy radiated by a physical source. So  $f(x,y)$  must be nonzero and finite. i.e.  $0 < f(x,y) < \infty$ .

## 3.3 IMAGE FORMED DUE TO REFLECTION

The function  $f(x,y)$  is characterized by two components.

1. The amount of source illumination incident on the scene being viewed, which is called illumination components denoted by  $i(x,y)$  and
2. The amount of illumination reflected by the objects in the scene which is called as reflectance components denoted by  $r(x,y)$ .

We can get the image as product of intensity

$$f(x,y) = i(x,y)r(x,y) \quad (1)$$

$$0 < i(x,y) < \infty \quad (2)$$

$$0 < r(x,y) < 1 \quad (3)$$

(reflection bounded by total absorption and reflection)

The nature of  $i(x,y)$  is determined by illumination and  $r(x,y)$  nature is determined by characteristics of imaged object.

## 3.4 RGB to GRAY CONVERSION

Humans perceive color through wavelength-sensitive sensory cells called cones. There are three different varieties of cones, each has a different sensitivity to electromagnetic radiation (light) of different wavelength. One cone is mainly sensitive to green light, one to red light, and one to blue light. By emitting a restricted combination of these three colors (red, green and blue), and hence stimulate the three types of cones at will, we are able to generate almost any detectable color.[1] This is the reason behind why colour images are often stored as three separate image matrices; one storing the amount of red (R) in each pixel, one the amount of green (G) and one the amount of blue (B). We call such colour images as stored in an RGB format. In grayscale images, however, we do not differentiate how much we emit of different colors, we emit the same amount in every channel. We will be able to differentiate the total amount of emitted light for each pixel; little light gives dark pixels and much light is perceived as bright pixels. When converting an RGB image to grayscale, we have to consider the RGB values for each pixel and make as output a single value reflecting the

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brightness of that pixel.[2] One of the approaches is to take the average of the contribution from each channel:  $(R+B+C)/3$ . However, since the perceived brightness is often dominated by the green component, a different, more "human-oriented", method is to consider a weighted average, e.g.:  $0.3R + 0.59G + 0.11B$ . [3]

Original Image



Lightness



Average



Luminosity



### 3.5 IMAGE ENHANCEMENT

Image enhancement is the process of adjusting digital images so that the results are more suitable for display or further analysis. For example, you can eliminate noise, which will make it more easier to identify the key characteristics.[4]

Algorithms for image enhancement:

- Contrast-limited adaptive histogram equalization (CLAHE)
- Decorrelation stretch
- Histogram equalization
- Linear contrast adjustment
- Median filtering
- Unsharp mask filtering

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- Noise-removal Wiener filtering

## 3.6 EDGE DETECTION

Edge detection is the name for a set of mathematical methods which aim at identifying points in a digital image at which the image brightness changes sharply or, more technically, has discontinuities or noise.[5] The points at which image brightness alters sharply are typically organized into a set of curved line segments termed edges. The same problem of detecting discontinuities in 1D signal is known as step detection and the problem of finding signal discontinuities over time is known as change detection.[6] Edge detection is a basic tool in image processing, machine vision and computer envisage, particularly in the areas of feature reveal and feature

### 3.6.1 EDGE DETECTION TECHNIQUES

Different colors has different brightness values of particular color.[7] Green image has more bright than red and blue image or blue image is blurred image and red image is the high noise image.



In MATLAB by default, edge uses the Sobel method to detect edges but the following provides a complete list of all the edge-finding methods supported by this function:

Matlab Syntaxes: `BW = edge(I,'sobel')`.

`BW = edge(I,'prewitt')`.

`BW = edge(I,'roberts')`.

`BW = edge(I,'log')`.

`BW = edge(I,'zerocross',thresh,h)`.

`BW = edge(I,'canny')`. In all the above syntaxes I is the Input Image.

## 3.7 IMAGE SEGMENTATION

In computer vision, image segmentation is the process of partitioning a digital image into multiple segments (sets of pixels, also known as superpixels). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze.<sup>[1] [2]</sup> Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. More precisely, image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain visual characteristics.

The result of image segmentation is a set of segments that collectively cover the entire image, or a set of contours extracted from the image (see edge detection). Each of the pixels in a region are similar with respect to some characteristic or computed property, such as color, intensity, or texture. Adjacent regions are significantly different with respect to the same characteristic(s).<sup>[1]</sup> When applied to a stack of images, typical in medical imaging, the resulting contours after image segmentation can be used to create 3D reconstructions with the help of interpolation algorithms like Marching cubes

### 3.7.1 OBJECT DETECTION

Object detection is a computer technology related to computer vision and image processing that deals with detecting instances of semantic objects of a certain class (such as humans, buildings, or cars) in digital images and videos. Well-researched domains of object detection include face detection and pedestrian detection. Object detection has applications in many areas of computer vision, including image retrieval and video surveillance[8].

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### 3.7.2 FACE DETECTION

Face detection is a computer technology that determines the locations and sizes of human faces in arbitrary (digital) images. It detects facial features and ignores anything else, such as buildings, trees and bodies. Face detection can be regarded as a more general case of face localization. In face localization, the task is to find the locations and sizes of a known number of faces (usually one). In face detection, one does not have this additional information[9].

### 3.7.3 FACE RECOGNITION

A facial recognition system is a computer application for automatically identifying or verifying a person from a digital image or a video frame from a video source. One of the ways to do this is by comparing selected facial features from the image and a facial database.[10]

#### 3.7.3.1 TECHNIQUES

##### Traditional

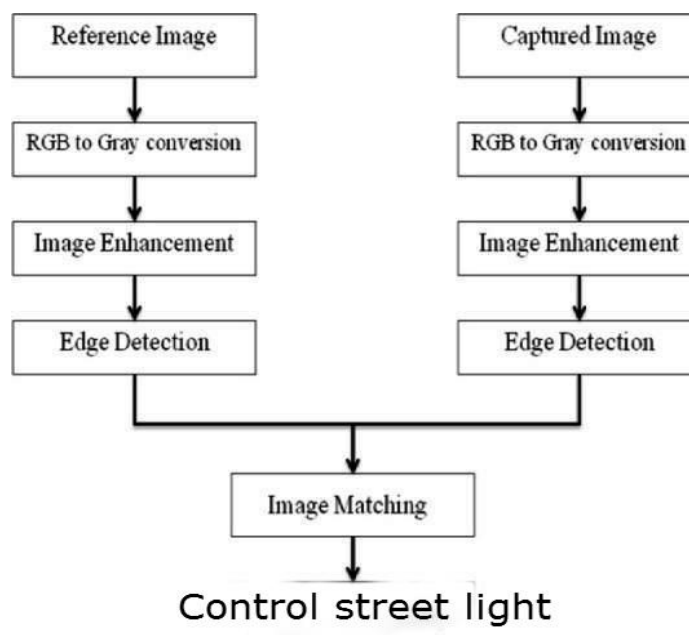
Some facial recognition algorithms identify facial features by extracting landmarks, or features, from an image of the subject's face. For example, an algorithm may analyze the relative position, size, and/or shape of the eyes, nose, cheekbones, and jaw. These features are then used to search for other images with matching features. Other algorithms normalize a gallery of face images and then compress the face data, only saving the data in the image that is useful for face recognition. A probe image is then compared with the face data. One of the earliest successful systems is based on template matching techniques applied to a set of salient facial features, providing a sort of compressed face representation.[11]

Recognition algorithms can be divided into two main approaches, geometric, which looks at distinguishing features, or photometric, which is a statistical approach that distills an image into values and compares the values with templates to eliminate variances.[12]

### 3.7 IMAGE MATCHING:

Edge based matching is the process in which two representatives of the same objects are paired together. Any edge or its representation on one image is compared and evaluated against all the edges on the another image.[13] Edge detection of reference and the real time images has been done using Canny operator. Then these edge detected images are matched and accordingly the traffic light durations can be set.

### 3.8 BLOCK DIAGRAM





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## IV. CONCLUSION

Earlier automatic street light control use of timer had a drawback that an electricity is being wasted by a lights are on if there is no presence of human beings. This technique avoids this problem. We have successfully implemented on algorithm for a real-time image processing based on the street light control. Upon comparison of various edged detection algorithm it was inferred that canny edge detector techniques is the most efficient one. This paper demonstrator that image processor is far more efficient method of street light control. In this paper can shows to save the power conception

## REFERENCES

1. [www.wikipedia.org](http://www.wikipedia.org)
2. [www.icrm.com](http://www.icrm.com)
3. Vijayaragavan S.P., Karthik B., Kiran T.V.U., Sundar Raj M., "Robotic surveillance for patient care in hospitals", Middle - East Journal of Scientific Research, ISSN : 1990-9233, 16(12) (2013) pp. 1820-1824
4. [www.ijcrm.com](http://www.ijcrm.com)
5. [www.Tnebnet.org](http://www.Tnebnet.org)
6. Vijayaragavan, S.P., Karthik, B., Kiran Kumar, T.V.U., Sundar Raj, M."Analysis of chaotic DC-DC converter using wavelet transform", Middle - East Journal of Scientific Research, ISSN : B27, 16(12) (2013) pp.1813-1819.
7. Dwayne Phillips," digital image processing using analyzing and enhancing digital image" Cmp Books; Bk&Disk edition (January 15, 1994).
8. Vijayaraghavan K., Nalini S.P.K., Prakash N.U., Madhankumar D.,"Biomimetic synthesis of silver nanoparticles by aqueous extract of Syzygium aromaticum", Materials Letters, ISSN : 0167-577X, 75() (2012) pp. 33-35.
9. Rafael C. Gonzalez, Richards E.woods, Steven L.Eddins,"digital image processing using metalab" Library of Congress Cataloging-in-Publication Data on File 2009.
10. Vijayaraghavan, K., Nalini, S.P.K., Prakash, N.U., Madhankumar, D., "One step green synthesis of silver nano/microparticles using extracts of Trachyspermum ammi and Papaver somniferum", Colloids and Surfaces B: Biointerfaces, ISSN : 0927-7765, 94() (2012) pp. 114-117.
11. J.R.Parker,"Algorithm for image processing and computer vision" Second Edition Published by Wiley Publishing, Inc., Indianapolis, Indiana 2011
12. Dimitras vantaas,"Advance Image Acquisition,Processing Techniques and Algorithm" Published in print Edition march 2012
13. Kulanthaivel L., Srinivasan P., Shanmugam V., Periyasamy B.M., "Therapeutic efficacy of kaempferol against AFB1 induced experimental hepatocarcinogenesis with reference to lipid peroxidation, antioxidants and biotransformation enzymes", Biomedicine and Preventive Nutrition, ISSN : 2210-5239, 2(4) (2012) pp.252-259.
14. Dr.A.Muthu Kumaravel, KNOWLEDGE BASED WEB SERVICE, International Journal of Innovative Research in Computer and Communication Engineering, ISSN(Online): 2320-9801,pp 5881-5888, Vol. 2, Issue 9, September 2014
15. Dr.A.Muthu Kumaravel, Data Representation in web portals, International Journal of Innovative Research in Computer and Communication Engineering, ISSN(Online): 2320-9801,pp 5693-5699, Vol. 2, Issue 9, September 2014
16. Dr.Kathir.Viswalingam, Mr.G.Ayyappan,A Victimization Optical Back Propagation Technique in Content Based Mostly Spam Filtering ,International Journal of Innovative Research in Computer and Communication Engineering ,ISSN(Online): 2320-9801 , pp 7279-7283, Vol. 2, Issue 12, December 2014
17. KannanSubramanian,FACE ECOGNITION USINGEIGENFACE AND SUPPORT ECTORMACHINE,International Journal of Innovative Research in Computer and Communication Engineering,ISSN(Online): 2320-9801,pp 4974-4980, Vol. 2, Issue 7, July 2014.
18. .Vinothlakshmi.S,To Provide Security & Integrity for StorageServices in Cloud Computing ,International Journal of Innovative Research in Computer and Communication Engineering ,ISSN(Online): 2320-9801 , pp 2381-2385 ,Volume 1, Issue 10, December 2013