Anti-Photography System For Photography Prohibited Areas

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Abstract- *Digital cameras and smartphones with cameras are very common these days. These cameras used a CCD sensor, which is responsible for converting light falling on it into equivalent electric charge and process it into electronic signals. When we visit places such as banks, courts, theatres etc. people tend to capture images of the site which interferes with the privacy of the site owner. This paper aims at a solution which will detect the cameras which are interfacing with privacy or security of site owner. After detection of the camera, a strong light source i.e. LASER will be focused onto that camera's lens, the highlighted content of the image will be distorted due to overexposure of light. Our system involves two sections: First section is camera lens detection section which is based on image processing and the second section is camera neutralizing section which is based on a controller and servo motor movements. Both these units will be in synchronization with each other.*

Keywords- Digital Camera, CCD sensor, Image processing Camera lens detection, Camera Neutralizing.

I. INTRODUCTION

The no-photography policy is a worldwide phenomenon. Photography is banned at places such as museums, courtrooms, shopping malls, industries, defence areas, jewellery stores etc. Eliminating the use of cameras in such places improves the visitor experience. Banning photography is believes to boost security by preventing thieves or terrorists from visually capturing and pinpointing weakness in alarm systems and surveillance. Also, taking photographs after violates copyright protection. Film industry also suffers 1/3 loss due to movie piracy. Hence, there arises a need to prevent this undesired photography, to avoid this heavy loss. Our project provides a solution for this undesired photography to prevent the security and privacy of the site. Our solution is based on detecting the camera's that are capturing pictures of the site. After detection of the camera's a strong light is focused onto the detected camera, which degrades the quality of the captured image, thus rendering the captured photograph useless.

1]Using Mobile Communications to Assert Privacy from Video Surveillance
Author: Jack Brassil.
Published in :2005,19th IEEE International Parallel and Distributed Processing Symposium.
This paper propose a system in which the use of mobile communications to permit individuals to assert a preference for privacy from video surveillance. This system, called Cloak, grants an individual the right to prohibit others from distributing video containing their image.This system, grants an individual the right to prohibit others from distributing video containing their image.

2] Blind Spot: Creating Capture-Resistant Spaces.
Authors: Shwetak N. Patel, Jay W Summet and Khai N Truong.
Published in: 2009 -Springer Science Business Media LLC.
This paper consists of three components.
First component-The camera the camera detector – actively tracks CCD or CMOS lenses in the environment.
Second component- the camera neutralizer – sends a localized beam of light at each camera's lens to obstruct its view of the scene. This technique also works on video cameras.
Third component- the capture manager – regulates camera capture within the environment.
This solution involves a simpletracking system for locating any number camera lenses around a protected area.

3] Modeling the detection of optical sights using retro-reflection.
Author: Arjan L. Mieremeta, Ric(H.) M. A.,Schleijpen, P. N. Pouchelle.
Published in: May 2008.
This gives information about the Retro-reflection which can be used for the detection and classification of optical systems. The probability of detecting sights over large ranges depends on parameters of the laser, the sight, the detector and the atmosphere.

4] Approach to Accurate Circle Detection using Circular Hough Transform and Local Maxima Concept.

Author: Virendra Kumar Yadav, Saumya Batham, Anuja Kumar Acharya, Rahul Paul.
Published in: 2014 ICECS -Electronics and Communication Systems (ICECS), 2014 ,International Conference on 13-14 Feb. 2014.

This paper gives us an idea about how we can detect the circular object in the digital image with the use of Circular Hough Transform algorithm and local maxima.

Motivation

The main reason or motivation for choosing this project is to boost security by preventing thieves or terrorists from visually capturing and pinpointing weakness in alarm systems and surveillance of government, public and private places where photography is prohibited.

Problem Statement

Taking photographs violates copyright protection even Film industry also suffers 1/3 loss due to movie piracy. Hence, there is a need to prevent this undesired photography, to avoid this heavy loss. Our project provides a solution for this undesired photography to enhance the security and privacy of the site.

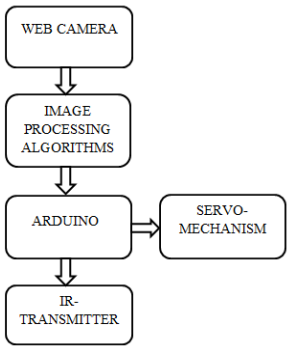
II. METHODOLOGY

This techniquesis useful for detecting and deactivating digital cameras in photography prohibited areas which consists of two parts.The first part is camera detection unit and the second part is digital image deactivating unit.Both these units must be synchronized with each other.

Camera detection unit-it is completely based on image processing algorithm. It includes camera interfaced with PC,where the digital cameras are detected. Here, webcamera can be in-built camera or any other USB camera.When there uis an any digital cameras appears in the photography prohibited area,then that digital camera will be detected by using the image processing algorithm.

The first step is to get video feed from camera which is connected to the laptop,this video is then converted into sequence of frames. These converted frames will undergo further image processing. The IR transmitter modules, which surrounds the lens of webcamera, will continuously transmit the IR rays in the field of view. When these IR rays strikes on camera's lens, a white circular speckle is seen in the image captured by the webcamera. This white circular speckle can be seen due to retro reflection. Retro reflection is returning light only within an extremely narrow-cone with minimum scattering. This circular speckle can be detected using thresholding, this thresholding can be done by using MATLAB.

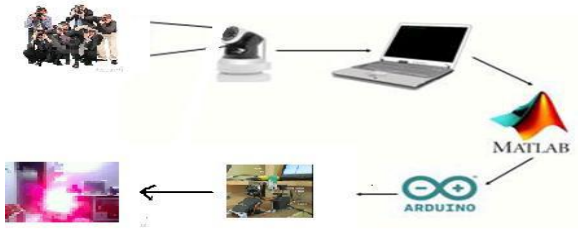
Digital image deactivating unit- it includes microcontrolled along with the servo mechanism. In this, the axis position will be sent to Arduinoia serial communication, Arduino will give control signal to the servo mechanism. A strong light source will be mounted on the servo mechanism. When camera's lens will be detected by camera detection section the control signal will be sent to Arduino and servo mechanism will rotate in that direction and focus strong light on to camera's lens.



Block Diagram

- The first stage of any vision system is an image acquisition device. Web camera will be used as an image acquisition device for capturing images in photography prohibited areas. This web camera will be interfaced with computer via image acquisition toolbox in MATLAB. The image acquisition toolbox enables modes such as processing in loops, hardware triggering, background acquisition, etc. The obtained data will be in the form of video. The video will be divided into frames for further processing.
- MATLAB is aImage Acquisition toolbox. After acquisition of images from the web cam, position of lens can be detected by identifying the distinct features of the camera lens. This can be done by using different image processing algorithms.
- Microcontroller [Arduino] is used as a controller for the deactivation of the digital image. Image processing algorithms identifies the camera lens and generates control signal. The control signal will be sent to the Arduino to control the servomechanism movement. The mode of communication between the MATLAB and Arduino will be serial communication via COM Port.

- Servomechanism will operate as per the control signal received by the Arduino board. Servomechanism controls the direction of IR transmitter. It includes the servomotors interfaced with the Arduino board so that IR transmitter can point in each and every direction.
- IR transmitter plays important role in camera disabling part with the control of servo mechanism.IR transmitter points to the direction of camera, it will redice the quality of captured image.



The whole procedure can be divided into several parts:

A. Image Acquisition

The initial step is to feed the video from the web camera. The video is captured by the web camera having resolution 1280*720 pixels continuously. The video is then converted into sequence of frames. The converted sequence of frames will undergo further image processing algorithm. Here, web camera performs role of image acquisition toolbox. In the sequence of the frame each 5th frame of video is considered for the processing.

B. Detection of camera

Circular shape object detection is very much important for image analysis in various computer vision application. For detecting circular camera lens the circular object detection method can be used. The algorithm for detecting camera's lens can be written in image processing software such as MATLAB. The define algorithm can detect circular shape as well as position of detected lens.

C. Locating camera

After detecting the camera's lens from the background the exact position of the lens can be detected by calculating the centroid. The X-Y axis values are calculated for locating the centroid of the detected camera lens then according to the axis value the control signal is given to the Arduino to operate the servomechanism.

D. Neutralizing camera:

Servomechanism plays vital role in neutralizing the detected camera. Servomechanism is interfaced with the Arduino board. On the servomechanism a strong point laser is mounted to operate as per the control signal sent from Arduino. The laser have alternatives such as IR transmitters or any other strong light source. The only duty of laser is to degrade the quality or fine details of the image by using over-exposure property of light. And the requirement of the strong laser of any other strong light source is that the intensity of strong light source must be greater than background light.

III. CONCLUSION

The main objective of project is to detect and disable digital cameras in photography prohibited area using image processing algorithms and servomechanism. The image processing techniques are used to locate the position of multiple cameras in prohibited area. It locates the lens of multiple cameras but it neutralizes the only one camera lens. The axis values of camera lens received by controller. The servomechanism rotates according to control signal which are received from controller. Because of the strong light source or LASER focused on centroid of camera, the user gets the distorted image. This work will beneficial in the areas such as theatres for prevention of piracy. It has many application which includes maintaining secrecy at defense areas, courts, industries, government offices, research and development sectors, museums, historical monuments, religious places etc.

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