Design of IR Based Image Processing Technique For Digital Camera Deactivation

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Abstract- *In this paper, we proposed a system to detect and deactivate photography in forbidden areas which are taken through digital cameras. This procedure will detect a camera and then will deactivate it. To detect lens of camera image processing is used. After detecting camera's lens an infrared light will be passed towards that lens which will misrepresent the image by overexposure. Because of infrared light it will cause strong reduction in image quality. It will not interfere with camera's operation also it is not harmful to the user. The main use of this proposed work is to avoid piracy at movie theaters. This application of this work is at places such as industries, jewelry stores, exhibitions, historical monuments, museums, shopping malls changing rooms where maintaining secrecy is big issue.*

Keywords- Image Processing, Raspberry Pi-3, Camera, Servomechanism, Infrared.

I. INTRODUCTION

Smart phones with camera are very common these days. While visiting places such as museums, historical monuments, temples, exhibitions or places where maintaining secrecy is a big issue, user carries his smart phone with him. Though photography is prohibited in such areas, user tend to capture images of these sites secretly, which is not significant. Considering the piracy at theatres, Indian film industry suffers dense losses because of it. To avoid such problems, we need to develop a system which will detect such smartphone camera or any digital camera and they neutralize image or video taken by that camera. At that time the system should not cause any mutilation to camera or the user. So system design aims at a suitable technique which will not interfere with cameras operation along with being harmless for the user. System will simply a detect camera in photography prohibited area and then it will emit a strong infrared beam at every device to counteract it from capturing image or video. As we are using infrared beam for neutralizing digital camera, it is nither a health danger to human nor it will affect the detected camera's operation. This detection and deactivation method of camera is to identify possible attacks.

It is Supreme Court judges themselves who have been the most vocal rivals of permitting cameras into court. The no-photography approach isn't constrained just to India. In any case, it is an overall marvel. Photography is restricted at spots, for example, historical centers, courts, shopping centers, enterprises, safeguard territories, adornments stores and so forth. Disposing of utilization of cameras in such places enhances guest encounter. Avoiding photography guarantees the blessing shop keeps up an imposing business model on offering pictures. Forbidding photography is accepts to help security by keeping hoodlums or fear based oppressors from outwardly catching and pinpointing shortcoming in caution frameworks and reconnaissance. Likewise, taking photos after disregards copyright security. Film industry likewise endures 1/3 misfortune because of motion picture robbery. Henceforth, there emerges a need to keep this undesired photography, to stay away from this overwhelming misfortune. This paper presents answer for this undesired photography to avert security and protection of the site. Our answer depends on distinguishing the camera's that are catching photos of the site. After location of camera's a solid light is engaged onto recognized camera, which debases the nature of the caught picture, subsequently rendering the caught photo pointless.

II. OBJECTIVE

1. To achieve high accuracy of detection and low false alarm rate.
2. Response time of system should be very fast.
3. Quality of restored image will be as good as possible.

III. PREVIOUS WORK DONE

[1] Retro-reflection 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. We have developed a software tool that simulates a sight detection system. With the use of this tool we can 'test' different sight detection system designs and make estimations on detection ranges of optical systems. In this paper we give a short overview of the

physical aspects that have been implemented in the model and discuss the experimental validation of our model.

[2] With the ubiquity of camera phones, it is now possible to capture digital still and moving images anywhere, raising a legitimate concern for many organizations and individuals. Although legal and social boundaries can curb the capture of sensitive information, it sometimes is neither practical nor desirable to follow the option of confiscating the capture device from an individual. We present the design and proof of concept implementation of a capture-resistant environment that prevents the recording of still and moving images without requiring any cooperation on the part of the capturing device or its operator. Our solution involves a tracking system that uses computer vision for locating any number of retro-reflective CCD or CMOS camera sensors in a protected area. A pulsing light is then directed at the lens, distorting any imagery the camera records. Although the directed light interferes with the camera's operation, it can be designed to minimally impact the sight of other humans in the environment.

[3] Detecting circular objects over digital images have received considerable attention from industries for applications such as detection of pellets in pelletization plant, target detection, inspection of manufactured products etc. Several algorithms were proposed in past few years to detect circular features. One powerful approach for circle detection is the Circular Hough Transform and its variants. This article presents an algorithm which is based on CHT and Local Maxima concept. Finding one or several maxima considering different accumulators simultaneously and mapping the found parameters corresponding to the maxima back to the original image is key concept of proposed algorithm. Experiments were performed on real industrial images to validate the efficiency of proposed algorithm regarding good accuracy of detection.

[4] In this paper, we propose a new method for the problem of digital camera identification from its images based on the sensor's pattern noise. For each camera under investigation, we first determine its reference pattern noise, which serves as a unique identification fingerprint. This is achieved by averaging the noise obtained from multiple images using a denoising filter. To identify the camera from a given image, we consider the reference pattern noise as a spread-spectrum watermark, whose presence in the image is established by using a correlation detector. Experiments on approximately 320 images taken with nine consumer digital cameras are used to estimate false alarm rates and false rejection rates. Additionally, we study how the error rates change with common image processing, such as JPEG compression or gamma correction.

[5] A novel algorithm is introduced to track multiple circular objects present in a video using Helmholtz perception principle. First, segmentation of circular objects in the video frame is performed using the perception principle and then same perception principle is applied to track the circular objects. For each circular object present in video, we have taken an assessment of the meaningfulness of the shift of its center of gravity and meaningfulness of the deviation of the direction of movement of the object due to inter-frame displacement. We have shown that a logical threshold in the meaningfulness value tracks circular objects in a video effectively and efficiently.

[6] The paper explains proposed algorithm for object detection using image processing and manipulation of the output pin state of Arduino board with ATmega 8 controller by tracking the motion of the detected object. The object detection algorithm has been developed on MATLAB platform by the combination of several image processing algorithms. Using the theory of Image Acquisition and Fundamentals of Digital Image Processing, the object has been detected in real time. Various features of an object such as the shape, size and color can be used to detect and track the object. The variation in vertical and horizontal axis of detected object is moderated by serial communication port and using serial data communication, the state of Arduino board pin has been controlled. MATLAB programming develops a computer vision system in the real time for object detection and tracking using camera as an image acquisition hardware. Arduino programming provides an interfacing of a hardware prototype with control signals generated by real time object detection and tracking.

IV. PROBLEM STATEMENT

All while visiting places such as museums, historical monuments, temples, exhibitions or places where maintaining secrecy is a big issue, user carries his smart phone with him. Though photography is prohibited in such areas, user tend to capture images of these sites secretly, which is not significant. Considering the piracy at theatres, Indian film industry suffers hefty losses because of it. To avoid such problems, we need to develop a system which will detect such smartphone camera or any digital camera and they neutralize image or video taken by that camera.

In the design of IR based image processing technique for digital camera deactivation we provide a better security and discipline at the photography prohibited areas. It also uses

to avoid the financial losses in the Theatres or places like temples, Museum, Changing room.

V. PROPOSED SYSTEM

We are going to develop a different method for solving the problem of digital camera detection. The process of camera detection is based on Image Processing Algorithm. Here, web camera is used as an image acquisition tool. The web camera can be inbuilt camera or any other USB camera. The MATLAB command imaqhwinfo can be used to get detail of hardware interface with it. The whole procedure can be separated into several parts:

A. *Image Acquisition*:

The early step is to feed the video using the web camera. The video is taken by the web camera having resolution 1280*720 pixels continuously. The video is then transformed into sequence of frames. The transformed sequence of frames will undertake advance 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 precise location of the lens can be spotted by calculating the centroid. According to the calculated values of X-Y axis centroid is detected and depending on the values of axis the control signals are further given to raspberry Pi to operate the mechanism of servo system.

D. *Neutralizing camera:*

Servomechanism plays important role in neutralizing the sensed camera. Raspberry Pi board is interfaced with Servomechanism. A strong point laser is mounted on the servomechanism to operate depending on the control signal sent from Raspberry Pi. 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.

VI. SYSTEM ARCHITECTURE

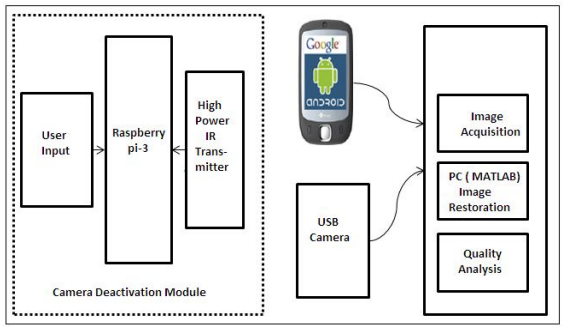

Fig.1. System Architecture

Experimental Results

Fig2 a) Input Image (Penguin) b) Image with added noise

Fig3. Restored image of Penguin

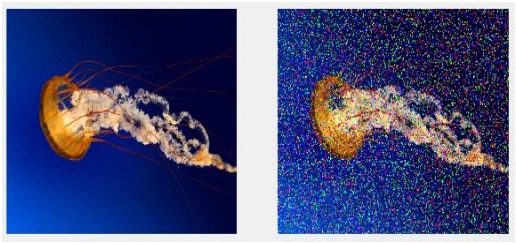

Fig4 a) Input Image (Jellyfish) b) Image with added noise

Fig5. Restored image of Jellyfish

Table1. Results after Denoising

Image Name	PSNR After Denoising (dB)	PSNR After Denoising (dB)
Penguin	11.49	4612
Jellyfish	11.19	5019

Fig6.Final results with respect to hardware.

VII. CONCLUSIONS

The main objective of this paper is to style IR based mostly image processing technique for photographic camera deactivation in photography prohibited space. This technique can find the maximum variety of cameras by exploitation image process algorithms. The detected cameras are deactivated exploitation IR transmitters. This work can serve useful within the areas such as theaters for bar of piracy. It's several applications which embrace maintaining secrecy at defense areas, industries, research and development sections, historical monuments, religious places, jewellery stores, dynamic rooms at looking malls.

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