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DIGITAL CAMERA DETECTION AND DEACTIVATION USING IMAGE PROCESSING

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Abstract - *The fundamental expectation of this project is to build up a framework that detects and deactivates digital cameras or hidden cameras in photography restricted zones. The framework involves two segments. The principle area is camera locating segment during which focal point of the camera is detected using Image Processing techniques and the second segment is the camera deactivation segment which depends on Arduino. In this segment, Arduino directs the IR transmitter towards the recognized camera and a solid infrared light is anticipated into camera focal point in order to neutralize the images captured by the detected camera. The infrared light projected is neither a health hazard nor interfere in cameras operation. Both these units are in synchronization with one another.*

Keywords: Web cam, Personal Computer, Image processing, Hough transform, IR transmitter, Matlab software, Arduino, Power supply.

1. INTRODUCTION

Computerized cameras, smart phones with cameras and hidden cameras are exceptionally basic nowadays. In spite of the fact that photography is denied at places such as theatres, historical monuments, changing rooms, museums, courtrooms and so on user consistently attempt to capture images of the site secretly which isn't worthy. Movies as soon as they are released are recorded and put up for public use before the genuine legitimate CDs are made accessible in the market. Film industry suffers heavy loss due to piracy at theatres. There emerges a need to prevent this undesired photography as to avoid this overwhelming misfortune. Hidden cameras at open spots are making a major issue in keeping up secrecy of people. These cameras are very small which cannot be detected by naked eye and they are put up in changing rooms and shopping centers which represent a significant danger in maintaining security of individuals to the privacy of people. So by considering all these threats and issues we have come up with a solution to detect and deactivate cameras at photography denied territories. On the other hand the system should not cause any damage to the camera or the user. The framework created identifies cameras in prohibited area and transmits solid confined light beam at each device to neutralize it. As we are utilizing infrared beam for neutralizing computerized camera, it is neither a health danger nor it will affect the detected cameras operation. Luckily, most weapon systems have a typical feature of optical sight which resembles with camera lens, so identification of cameras or other optical gadgets out of sight could assist military powers with detecting a potential assault. The sooner a danger is identified the better, and in this way a strategy that can identify a risk before being initiated is supported. so this strategy likewise is valuable in defence areas to identify possible attacks. The project is beneficial at places like museums, historical monuments, changing rooms, public rest rooms, theatres, shopping malls, jewellery shops, courtrooms, defence areas and so forth.

2. LITERATURE SURVEY:

A number of systems are already developed which uses different techniques for anticipation of photography in disallowed territories. But most of the solutions are complex, inefficient and they require some sort of instrumentation of the capture device.

Arjan L.Mieremet [1] proposed a system "Modeling the detection of optical sights using retro-reflection". In this paper, it is descried that when light is projected on optical sight, the radiation is gathered by the focal point and sends back to its original source. This effect is known as cat's eye effect and the property is known a retro reflection property.

Vaishali kaul [2] published a paper "Hidden camera detection" 2017. In this paper an application is

introduced which examines magnetic activity in the encompassing region. If any similarity to camera is detected, a caution is raised for additional investigation. But there is a need to have magnetic sensor in the phone otherwise this app is not effective.

Khai N.Truong [3] introduced a system "Preventing camera recording by designing a Capture Resistant Environment". In this system IR transmitter scans the environment with laser beam, and a solid retro-reflective signal is created by the optical sight or camera lens. Due to retro reflection property, the focal point of the recognized camera seems as a splendid white round sparkle through the hand cam. After detecting the cameras, a projector is utilized which emanates localized light beam at each recognized camera lens. A portion of constraints of these frameworks incorporate significant expenses because of utilization of projector, progressively perplexing and not exceptionally effective.

Jan Lukas [4] published paper "Digital camera identification from sensor pattern noise". For each camera under inspection, initially its reference pattern noise is decided by averaging noise acquired by different pictures using a denoising filter.

Snehasis Mukharjee [5] proposed a system "Tracking multiple circular ojects in video using Helmholtz perception rule" 2019. In this paper an algorithm is proposed which track different round articles present in the video by segmenting the video into frames and comparing objects in different frames.

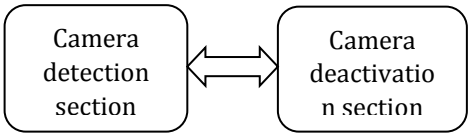
Virendra kumar yadav [6] published a paper "Approach to accurate circle detection using circular Hough transform and Local Maxima concept" 2017. One incredible methodology for circle identification is the Circular Hough transform and its variations. The framework exhibits a calculation which depends on CHT and Local Maxima idea.

Ajun Venugopal [7] introduced a technique "Image processing technique for digital camera deactivation" in May 2018. This framework uses the idea of servo mechanism. Here Raspberry pi is interfaced with servo motors. After recognition of camera focal point, Raspberry pi will operate the servomechanism and the system starts moving to the position of detected camera and discharges solid IR beams through IR transmitter into cameras lens which will reduce the quality of captured image. Still there are confinements right now, the framework is complex due to the presence of servo mechanism and needs time to reach the detected area which diminishes the effectiveness of this framework.

So as to overcome these constraints, we have proposed a new framework which detects and deactivates digital cameras effectively without any delay; we removed servo mechanism which is the main cause for the delay in reaching the detected cameras position.

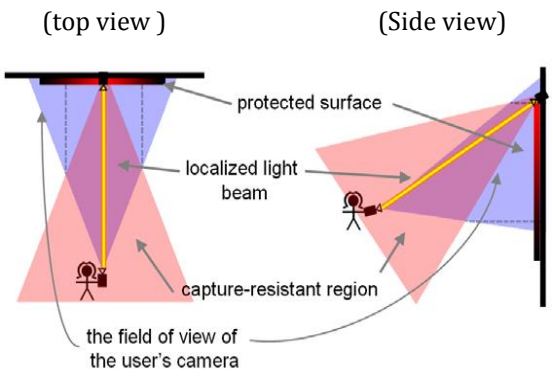
3. PROPOSED SYSTEM

As to overcome the constraints of the existing framework, we propose a new strategy which can detect and deactivate camera easily. The innovation that is being utilized in this topic is Image processing. A picture can be defined as a two dimensional capacity f(x, y), where x and y are special coordinates of the image and 'f' represents amplitude. Image processing refers to processing of image, which means performing some operations on an image in order to extract some useful information from it. When digital computers are used to process the image then it is known as Digital Image processing. The proposed system involves two sections, camera detection section and camera deactivation section. Both sections should be in synchronization with each other as shown in the below figure.



The first section is camera recognition section in which camera focal point is detected by using distinct features of camera in Image Processing. The second section is deactivation section within which detected camera is neutralized by focusing solid IR rays into camera lens.

3.1 Camera Detection Section: Our essential objective is to design a domain that prevents certain parts of the space from being captured by mobile phones or digital cameras. The area which is to be protected from capturing images or videos is under the surveillance of web cam and it is known as capture-resistant environment.

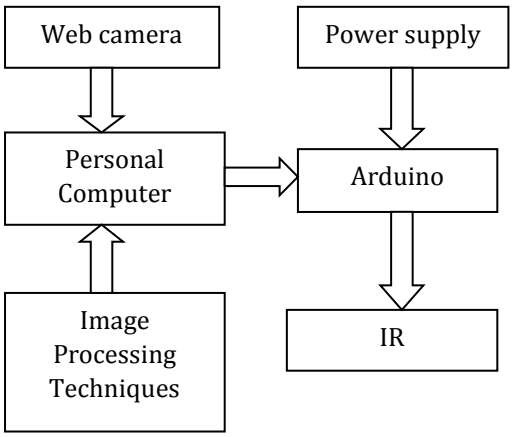


From the above figure, the area which is indicated in blue color is protected area that is the area which is to be

restricted from capturing images and the pink colored surface is capture-resistant region. In camera detection section, we cam is interfaced with personal computer. Image processing techniques are utilized by considering features like radius of lens, size, shape etc to detect camera in capture-resistant region scanned by the web cam.

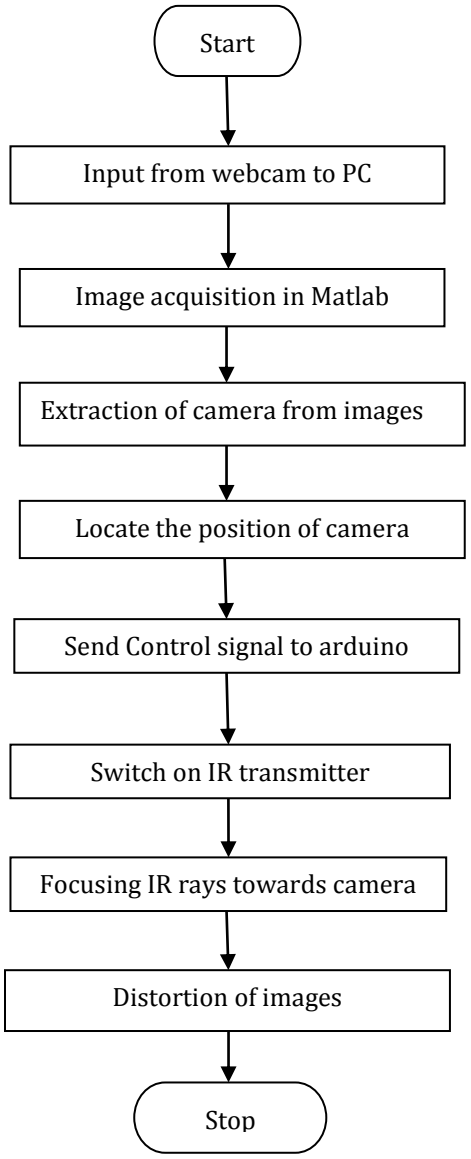
3.2 Camera Deactivation Section: After locating a camera in denied territories, the second step is to neutralize the cameras detected in prohibited area. Camera deactivation section is based on arduino. When camera focal point is recognized using image processing, Arduino will switch on the IR transmitter and focus it onto cameras lens. Due to overexposure of solid laser light, the images captured by the detected device are distorted and hence camera is deactivated.

4. BLOCK DIAGRAM



The main phase of any vision framework is a picture securing gadget. Web camera will be utilized as a picture obtaining gadget for surveillance in photography disallowed zones. This web camera will be interfaced with PC by means of image acquisition tool kit in Matlab software. The acquired information will be as video. The video will be separated into distinct frames for additional processing. After obtaining pictures from the webcam position of lens can be detected by using Circular Hough Transform (CHT) algorithm which is utilized in extraction of features from an image. If image processing software recognizes camera focal point then it creates a control signal and sends it to personal computer. The compute sends the coordinates of the camera to arduino as to control the IR transmitter which plays a vital role in camera disabling section. IR transmitter projects solid rays onto the detected camera in order to neutralize it.

5. FLOW CHART



The first step of the process is interfacing webcam with the computer. The area which is to be denied from photography is under the surveillance of webcam and the video recorded by webcam is given as input to the matlab software. The first and foremost task in image processing is image acquisition which includes segmentation of the images into frames. Code is written in matlab by utilizing Circular Hough Transform algorithm. Camera is extracted from the images by using this code and the position of the camera is denoted by x and y coordinates. A control signal is sent by PC to arduino pointing the position of the detected camera. Arduino switches on the IR transmitter and solid IR rays are focused onto the recognized camera. Due to overexposure of IR rays into camera focal point, the images captured by the detected camera are distorted.

Hence the detected camera is successfully deactivated and the process is completed.

6. RESULT

At first code is written using image processing to detect the cameras in restricted areas and is represented with white circles. Lens of the detected camera is represented with red circle by writing a code in matlab software as shown below

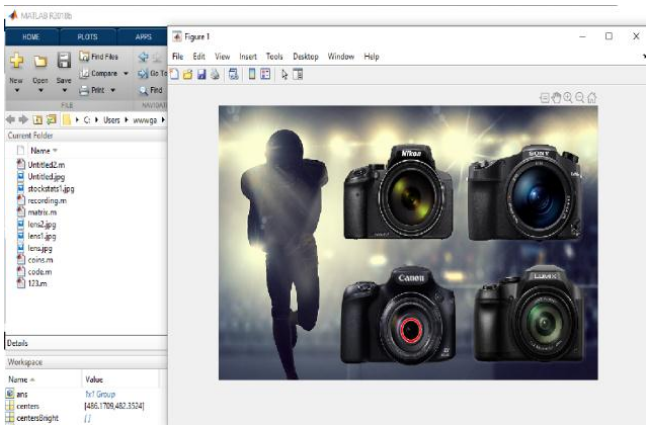


Fig1: locating lens of the detected camera

After deactivation of the detected camera, the overexposed image is shown below

Fig2: Deactivation of camera

The above figure shows the image captured by the detected camera in restricted area. This is due to overexposure of IR rays on camera lens rendering the image useless. Hence we can say that the detected camera is successfully deactivated.

7. CONCLUSION

The principle goal of this paper is to develop a system which is based on image processing and IR which can detect and deactivate digital cameras in photography denied territories without interfering in cameras operation. The project is beneficial at places like historical monuments, museums, changing rooms, public rest rooms, court rooms, theatres, jewellery shops and defence areas etc where maintaining secrecy is a big issue.

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