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HIDDEN CAMERA DETECTION

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ABSTRACT

This paper intends to aid in maintaining the safety and security of people by developing an application with the help of which spy cameras can easily be detected, also the location and the perpetrator's identity would be sent to the concerned authorities. It finds its application in courts and places where cameras are not allowed. The camera retroreflects the light beam and then images are captured which are image processed to detect the camera. The area to be protected is scanned by normal led light. At the end, colour segmentation is used to identify the green component that represents the area where camera is present.

Keywords: Retroreflection, Overexpose, charged coupled device (CCD), Thresholding, Colour Segmentation, Image Processing

I. INTRODUCTION

The issue of hidden cameras at public places is very paramount these days. These cameras are secretly put up in changing rooms, theatres and many other places which pose a major threat to the privacy of people. Movie shows as soon as they are released are recorded and put up for public use way before the actual legal CDs are made available in the market leading to huge losses for the actual owners who don't get their share of the benefit. This project intends to aid in maintaining the safety and security of people by developing an application with the help of which spy cameras can easily be detected. Also this project finds its application in courts and places where cameras are not allowed. Some people might argue that cameras are easy to find and this proposal is therefore unnecessary, but searching for covert cameras is no easier a job. Manually checking their presence is almost impossible, this system will find its application at such places.

II. EXISTING SYSTEMS

A number of systems are already present which use different types of technologies to detect spy cameras at different places. Few such technologies are as follows:

2.1 Hidden Camera Detector

Hidden Camera Detector analyses the magnetic activity in the surrounding area and in case a resemblance to a camera is detected, an alarm is raised for further investigation for getting hold of the spy camera. It finds its application in trial rooms, hotel rooms and places where cameras maybe hidden. This app can also detect infrared lights. Also helps sharing of the location with friends easily. Radiation meter feature need to have magnetic sensor in your phone, otherwise this feature will not work.

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2.2 Glint finder-camera detector

An android user application based on the principle of retro reflection and is used mainly for hidden camera lenses and dropped part of contact lenses. Basically it searches for the lens glint given off by the hidden camera optics. Retroreflection is availed using a camera flash which shows up as hotspots in the output image. Flash rate and duty cycles depend on the device's capability.

2.3 The radio frequency detector of active cameras

It involves a circuitry consisting of a number of resistors, a few capacitors, some typical ICs and piezo-buzzer which makes a sound when a camera is detected. The basic principle of this device is a disc capacitor to detect the cell phone signal with frequency of 0.9 to 3 GHZ within a range of 1.5 meter radius. [1]

2.4 Pirate eye

The system constantly records the theatre and catches the recording camera and sends pictures to the authorities. The pirate eye has a software built in which detects the camera and highlights the exact location of the recording camera with a red circle around that portion and the pirates are caught red-handed in the act. It has a network operation centre which sends an alarm to the theatre authorities. It is an invasion of privacy of the audience for the sake of entertainment industry. It creates a sense of hostility in the minds of watchers as they are being constantly watching. Sometimes innocent are caught in the act while they are not even involved.

III. METHODOLOGY

Architectural Block Diagram:

This system consists of the following components as explained before.

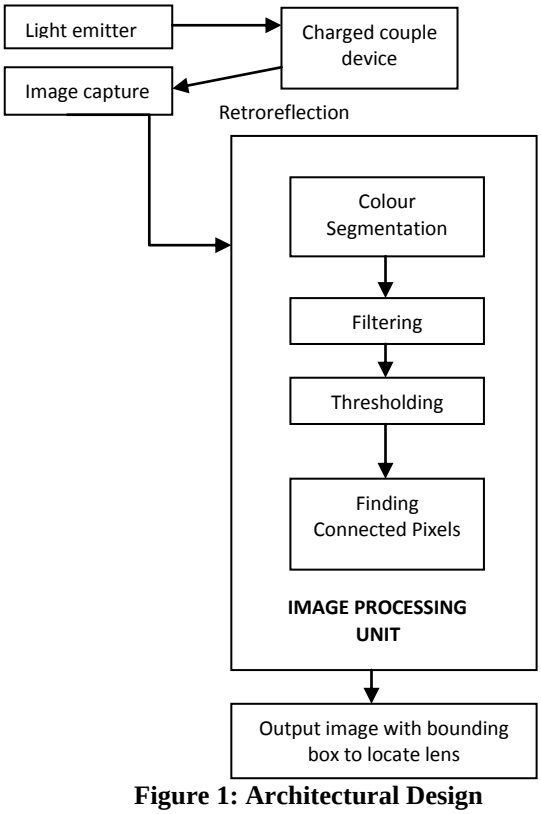

Figure 1: Architectural Design

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3.1 Retro reflection property of a camera

Camera retroreflects an incident beam of light back to the point of emission at an angle of 180 degrees. So it sends back the beam to the source .Reroreflection is a property in cameras where it reflects back a beam of light incident on it. The entire device is setup on the basis of this principle. [2]

3.2 Camera Detection

3.2.1 Scanning

The entire area to be protected is scanned by using a beam of normal light.LED (green) is used for producing them. The scanning beams sweep through the vertical and horizontal direction of the area, to ensure no camera escapes from the device. [3]

3.2.2 Test image capture

The area being scanned by the light beams is simultaneously recorded. The preprocessing image being acquired is called as the test image. The test image is obtained by use of high resolution camcorders. The camcorder should have a wide angle of capture so that it covers the entire area. The retro reflected beams also have the same properties of the original emitted beam. [3]

3.3 Image processing

3.3.1 Colour segmentation:

The image is taken in BGR format, we split the image into its Blue, green and red planes and extract the green plane from the image.

3.3.2 Filtering:

Median filters and applied on the image in order the remove noise and gets a smoothened image for further processing.

3.3.3 Thresholding:

The image in next step is thresholded to get the pixel in required range. Then we perform, morphological closing along with flood fill to get the foreground image.

3.3.4 Finding connected pixels:

Then we find the connected pixels in the foreground image that are the potential lenses that are to be detected.

IV. FLOWCHART

Figure 2 gives the flow of the image processing techniques that is done on the input image. First the image in taken in colour format. Then it is split into RGB components and the Green plane is extracted followed by conversion of the input image to grayscale image. The grayscale image is subtracted from the green plane to get a sub image. Using median filtering, the image is smoothened. The filtered image is thresholded in a given particular range, here 35 to 255. The morphological closing is done on the image to connect the small gaps that are not connected. Then flood fill is done to perform to fill regions of the area of interest followed by an inverse flood fill operation.

The results of closing and flood fill are combined to get the foreground pixels. Finally after identifying connected components in the foreground image, a bounding box is created on the lenses identified.

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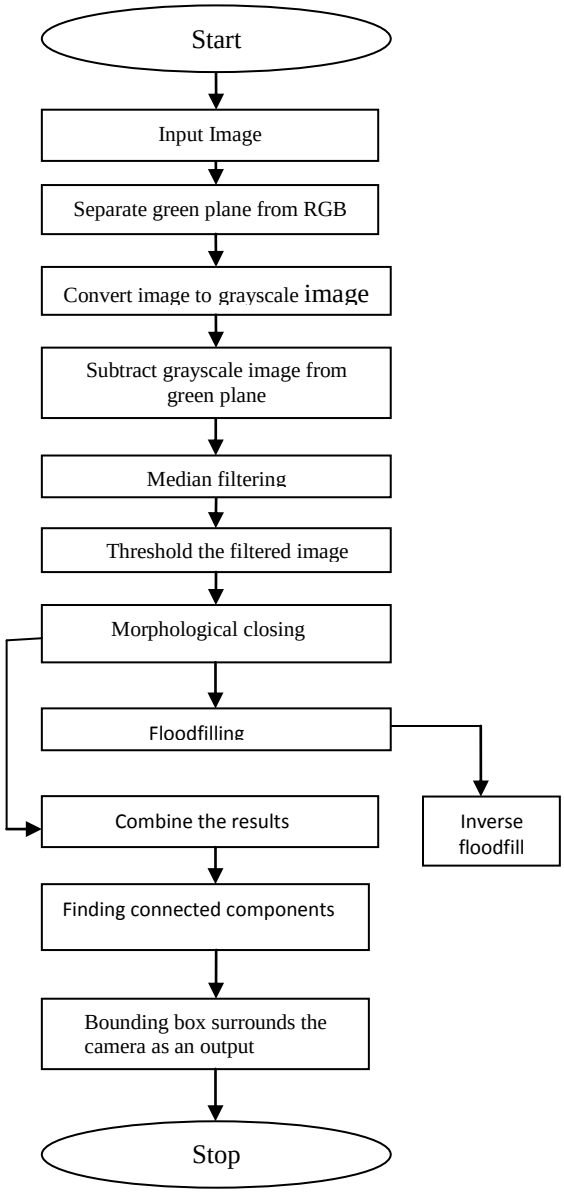

Figure 2: Image Processing Flowchart

V. CONCLUSION

Hidden camera detection would detect spy cameras in trial rooms, theatres and many other public places where it is prohibited with immediate report to the authorities after the detection. Manually checking their presence is almost impossible, the proposed system is an efficient method for camera detection because no matter how small the lenses are, they can be easily detected. In confidential meeting rooms, even after heavy checking people manage to skip the security and take cameras inside, record the conversations and use them for illegal purposes. So this application would be of great help for camera restricted areas.

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