Remote Theft Identification using Raspberry Pi Systeem Based On Motion Detection

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Abstract
    This system is to avoid theft from remote place and give alert to the remote user.This happens by the use of Raspberry Pi kit, which include Raspbian OS and OpenCv.The camera input is continuously verified for some motion. If the image processing detects any motion then it sends the notification as a video to respective user by the use of messaging API. There is no live video streaming and notification facility in the existing system, they can only get the data on demand through some special applications. But using this device the user will be getting alerted at any time.

Keywords
    Image processing,Motion detection,IoT

I. INTRODUCTION

Internet of things (IoT) [7] provides inter connectivity between objects (physical devices, vehicles, buildings, etc), this also helps to collect and exchange data. Using this IoT application, we can view anything remotely and get notification when intrusion is detected. Raspberry Pi[8] is a low cost device which has a connectivity to computer or TV also along with other accessories. Any programmer can use of it easily, and program with c, c++ and python.

In the proposed system the existing CCTV system is equipped with remote alert and reporting facility. In this system the camera input is continuously verified for some motion in the captured frame. If the image processing module detects any motion, then the raspberry records the particular scene for a time span. Then using the network the details will be messaged to the concerned user with a secret key. At the same time the particular video clip will be stored in a local storage like pen drive. The main advantages of using this system is, it will capture the events that occurs at non presence of user and it sends the captured images as a stream to the particular user as a multimedia message. All these functions are coordinated by Raspberry controller.

II. RELATED WORKS

There are many existing literature for motion detection and remote alert system. Priya B Patel[3] explains use of pyro-electric infrared sensors to detect the motion instead of any algorithms. The motion will be detected through the sensor input and the image will be temporarily stored in the raspberry pi. It is useful to make people aware about their working places in their absence. There is no remote control and video streaming in this project. M.B.Potdar[2] gives an application to avoid theft in small and also in big industries when the person is in remote place. It sends the push notification to the android application when the intruder is found. Power management is not considered here,and an application need to be developed to send notification to the user in the remote. There is no live video streaming. Paskar et al[4] worked on home security based work using wireless mesh network. It uses PIR sensor to detect the motion and Filezilla server to transfer the captured image. This is much useful in clear human face detection and recognition Maintaining consistency is difficult while file sharing. V.Ramya [2] this is to avoid theft in the ATM. Its also same like motion detection but there is no notification and time stamping.

III. ISSUES TO BE ADDRESSED

Finding motion detection is addressed in many ways using CCTV, using web camera, using PIR (Sensors). Somehow they are varying in image capturing and motion detection. Like the PIR sensors don't need any algorithm to detect the motion. Whereas CCTV and web camera need some algorithm to detect the motion. In CCTV they don't have any push notification method. In ATM surveillance they don't have notification plus time stamping. In smart motion detection there is no live

video streaming and push notification to the android device.

IV. PROPOSED WORK

To add the alert facility with existing CCTV cameras, the image processing unit with motion detection method is added with the normal image capturing, streaming and archiving procedure. The alert message is instantaneous to any vital motion that is detected in the camera view area when the premise is closed. The power of online messaging can be used to alert the authorized person about the anomaly person in the premise with live video frames.
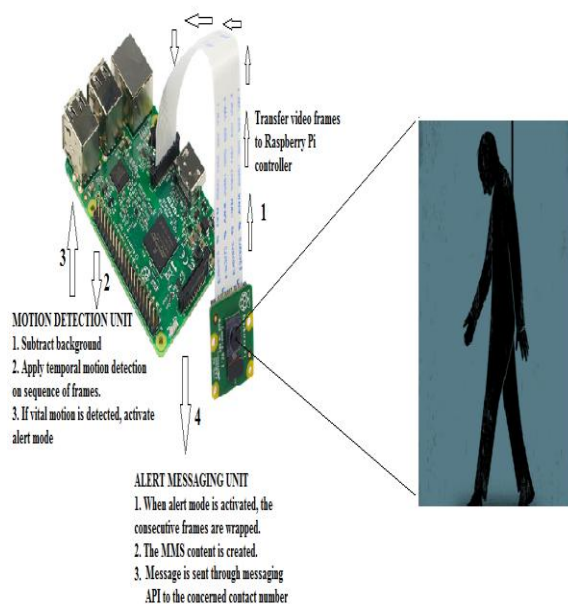

Figure.1 System Design

V. MODULE DESCRIPTION

The primary function of our project is:

Step 1: Image capturing and transfer:

The camera is capturing scenes of a fixed location. The captured frames are transferred to the Raspberry Pi controller.

Step 2: Background subtraction:

Each frame is applied with background subtraction method to get the foreground image where the motion to be identified.

Step 3: Motion detection:

Motion of objects above a standard size (small size insects, animals are not considered) are detected

through a group of frames using temporal motion detection method

Step 4: Activate alert mode:

If any motion belongs to predefined size or type is identified, then the alert mode is activated by a trigger to the controller.

Step 5: Alert message transfer:

The MMS contents are created with the consecutive frames where motion was detected. Then the API command is activated to send the MMS to the receiver.

After sending MMS to the user the captured image is stored in the local storage.

The proposed system has following assumptions for implementations.

- Initial status of the room is unoccupied
- The camera is in fixed position
- The illumination effect (lighting) is not fixed

VI. MOTION DETECTION

A method to identify motion (movement) of objects in the group of live frames. The motion is identified using contour map between frames. The difference in frames is used to find the contour. The human contour is categorized using a threshold contour size.

Algorithm 1. Motion detection

Start capturing video
Status= unoccupied
Set contour threshold=[x,y] (here 500 is used)
Set the first frame as reference frame F_{ref}
 From second frame F_{in}
 If $\| F_{ref} - F_{in} \| > [x,y]$
  Set contour true
  Status= Occupied
  Enqueue F_{in}
Else
 Discard F_{in}

The proposed motion detection algorithm is explained in Algorithm.1.

VII. RESULTS

The proposed system was tested with Raspberry pi-2 with opencv 3.4 and python 3. Figure 2 shows a frame without any motion.
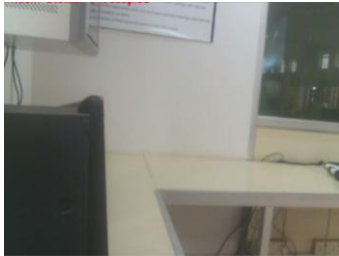
Figure.2 A frame without any motion

Figure 3 shows detected motion by comparing the frame with an unoccupied frame. Figure 4 shows the multimedia message received by the authorized person through the messaging API yowsup for python.
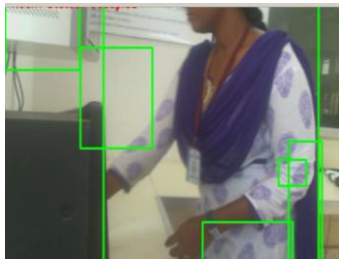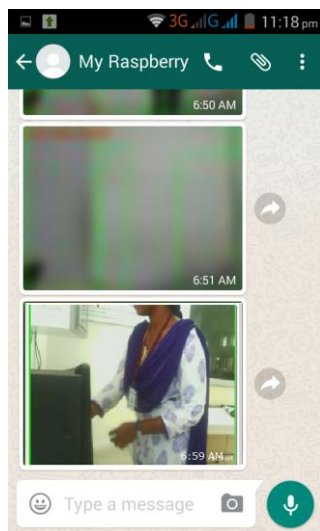

Figure 3. Detected motion

Figure 4. MMS received in user phone

VIII. CONCLUSION

Unique application of image processing is used to implement IoT based remote security alert system. It is a compact and low cost product for surveillance. Continuous messaging ensures security even the concerned authority is in remote place. It can be used 24x7 in anyplace which needs remote monitoring.

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