



Motion Detection using Frame Subtraction and Contour Detection Method

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ABSTRACT: This paper describes the idea of motion detection using camera by the method of frame subtraction and contour detection. In the traditional recording system, the camera keeps recording day and night, even records the idle screen time where there is no movement or activity at all. This cause large wastage of storage and increases search time. Our system is designed to detect and track any moving event in a frame automatically. We are proposing a system based on background subtraction and contour detection to detect motion. The method that we are using in our project is highly efficient because it saves a lot of memory as it records only those data that are meaningful.

KEYWORDS: motion detection, contour detection, video recording, frame difference, raspberry pi, camera

I. INTRODUCTION

Fast development in the technology has increased the risk intrusion. Using security cameras allows a person to monitor his property. The majority of organization and administrations are making use of such security cameras with the intention to save their business as well as property from terrorists and illegal entry. Nowadays, the security cameras have become much more advanced, reasonable, smaller and straight forward. Video surveillance is important as far as security is concerned these days. Commercial spaces, schools, hospitals, warehouses and other challenging indoor and outdoor environments require high reasonable and much more advanced cameras. Therefore by proposing this idea, we offer a more convenient, effective and efficient surveillance system where high-end security comes into picture. The system captures images only when the motion exceeds a certain threshold that is pre-set in the system. It thus reduces the volume of data that needs to be saved or reviewed by not capturing static images, that, usually do not contain the object of interest and the system is therefore a more convenient way of monitoring the environment. After the project is implemented successfully, it can be applied to the motion detection for smart security system which would be greatly helpful in auto-theft detection for security purpose.

II. REVIEW OF LITERATURE

Video surveillance is important as far as security is concerned. Commercial spaces, schools, hospitals, warehouses and other challenging indoor and outdoor environments require high end cameras. The current technology require RFIDs which are costly and hence the security domain in all becomes expensive and there is a need to work on this. This paper describes the use of low cost System on Chip (SOC) computer Raspberry Pi. This new technology is less expensive and it can be used as standalone platform for image processing. It provides mobile and portable technology which provides security to above mentioned indoor and outdoor environment.. [1]



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The motion detection system is implemented for real time applications, background subtraction method and frame difference methods are used for detecting the motion from video frames. Motion detection is usually a software-based monitoring system which, when it detects the motion will signal the surveillance camera to begin capturing the event or shows the motion detection using graphical method. Background motion detection method is a simple method for motion detection by a fixed camera which compares the current image with a reference image or background image pixel by pixel. The values of pixels in difference image is compared with threshold value is more than threshold value then it means there is motion in the area being monitored. [2]

The proposed system in this paper captures images only when the motions exceed a certain threshold that is preset in the system. It thus reduces the volume of data that needs to be reviewed and is therefore a more convenient way of monitoring the environment. Also, it helps to save data space by not capturing static images which usually do not contain the object of interest. There is less (3%) chances to skip any detection. There is may be some false detection due to the illumination effects, which can be overcome for the better performance. [3]

A new algorithm for detecting moving objects from a static background scene, to detect moving object based on background subtraction. They set up a dynamic threshold method to minimize the effect of illumination. After that, median filtering is initiated to remove the noise and solve the background interruption difficulty then the moving human bodies are accurately and reliably detected. The experiment results show that the proposed method runs rapidly, exactly and fits for the real time detection. [4]

The algorithms that are discussed here are those implementing image subtraction methods and background segmentation approach. It gives idea about the architecture of a human motion detection system in applications.[5]

This kind of system reduces the manual effort for searching the records for long hours of time as the records only holds the data recorded only when there is any motion in the viewing angle.

III. SYSTEM MODEL

The purpose of this paper is to describe a recording system that records only when it detects motion. The major drawbacks of the traditional system are that it records even when there is no motion or when there is no need for recording. It keeps on recording throughout the day and night. This causes huge wastage of memory and searching for old records becomes immensely tedious. We have proposed a system that records only the data that is useful. It detects the motion by the method of frame difference and contour detection.

The system would capture the frame and it will initialize all the variables to be occurring in all the later loops. It will capture frames during loops and will convert the frames in greyscale image and will compare them with the previously stored frames. The resultant frame will be stored in a temporary frame and because of the frame subtraction, all the static objects will be removed from the frame and only the objects that are in motion will be present. This frame will be checked for contours. If contours detected are greater than the specified value, then the object that is in motion is detected. The system will then start recording immediately. The recorded frames would be stored with date in video container in 'avi' format

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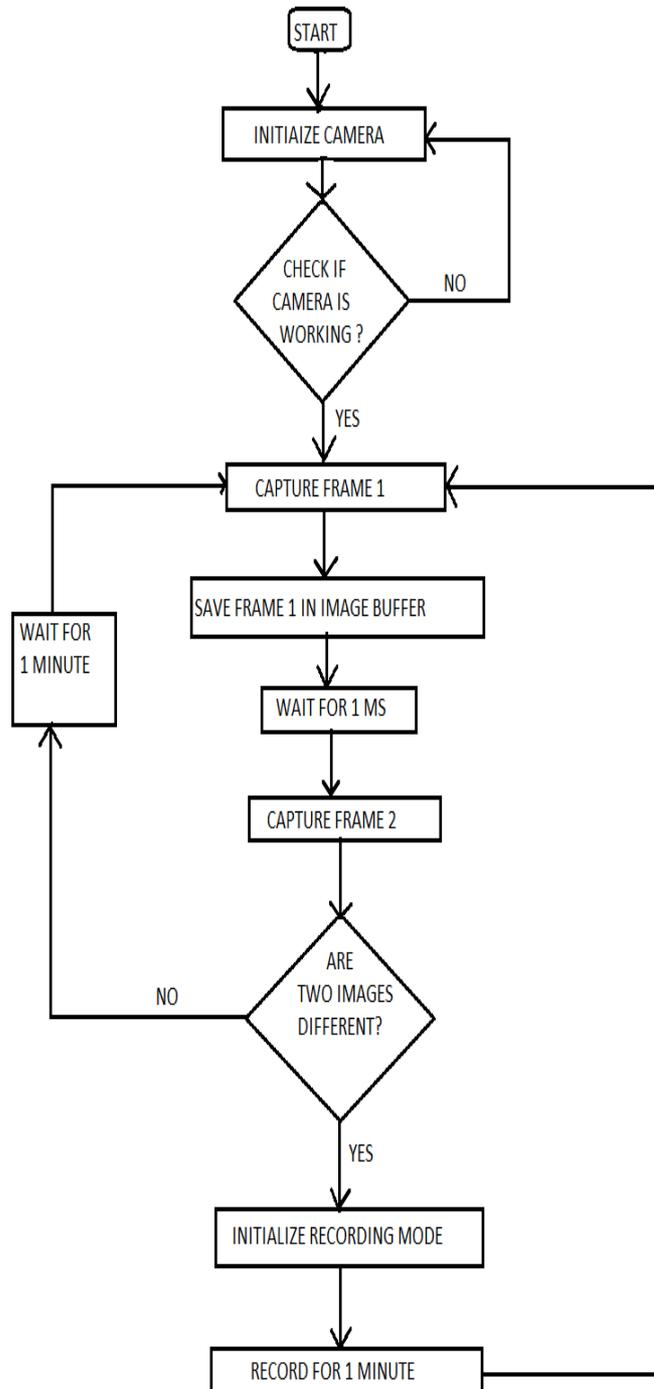


Fig 1: Flow chart of the system.

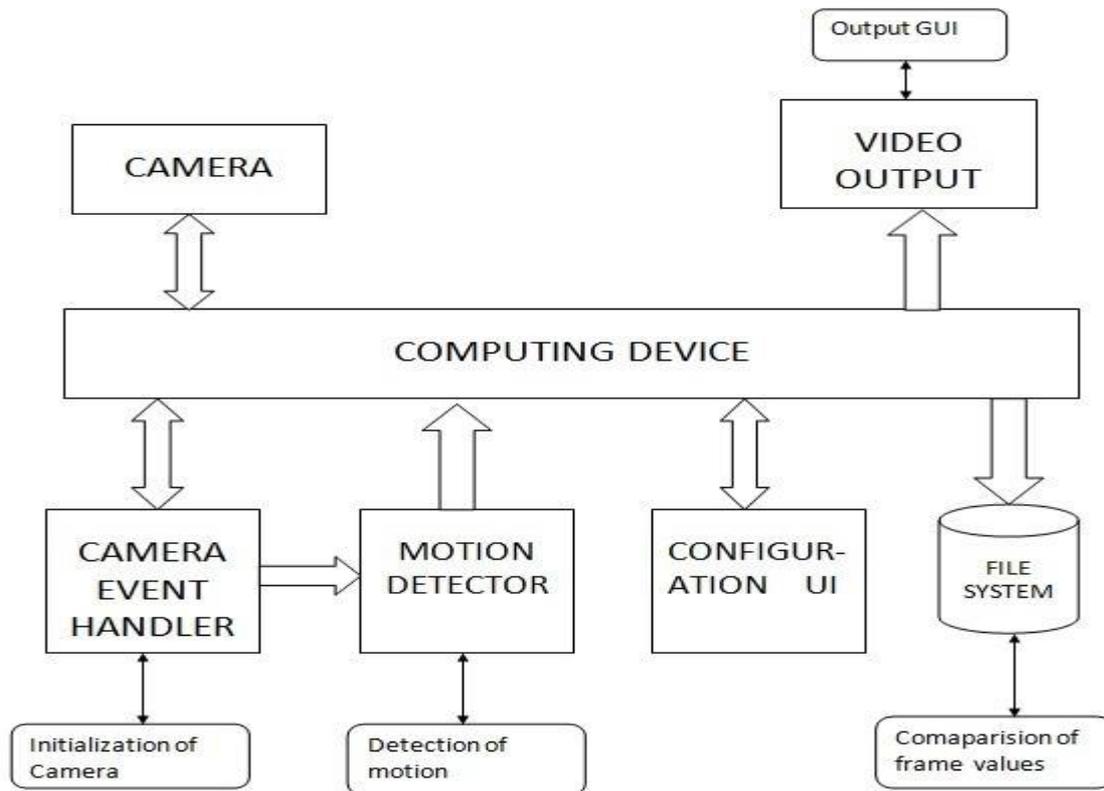


Fig 2: System Architecture.

Camera event handler will initialize the camera and start capturing the frames. Those frames will be sent to motion detector module which will compare consecutive frames and detect contours. Motion detector settings are defined using a configuration file, if motion is detected it will start recording and give an output on GUI.

IV. HARDWARE / SOFTWARE DESCRIPTION

Raspberry Pi:

The Raspberry Pi is a series of credit card-sized single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote the teaching of basic computer science in schools and developing countries. Several generations of Raspberry Pis have been released. The first generation (retrospectively known as the Raspberry Pi 1) was released in February 2012 in basic Model A and a higher specification Model B. Improved A+ and B+ models were released a year later. The Raspberry Pi 2 was released in February 2015 and Raspberry Pi 3 in February 2016.

Camera Module:

This 5mp IR (Infrared) camera module is capable of 1080p video and still images and connects directly to your Raspberry Pi. Similar to the non-IR version Raspberry Pi Camera, connect the included ribbon cable to the CSI (Camera Serial Interface) port on your Raspberry Pi, boot up the latest version of Raspbian. At 25mm x 20mm x 9mm and weighing a little over 3 grams this board is pretty small which makes it perfect for mobile or other small



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applications that require you to see in near dark. The sensor has a native resolution of 5 megapixels with a fixed focus lens on board. The camera is capable of 2592 x 1944 pixel static images and also supports 1080p30, 720p60 and 640x480p60/90 video.

Open CV:

OpenCV (Open Source Computer Vision) is a library of programming functions mainly aimed at real-time computer vision. Originally developed by Intel's research center in Nizhny Novgorod (Russia), it was later supported by Willow Garage and is now maintained by Itseez. The library is cross-platform and free for use under the open-source BSD license.

Officially launched in 1999, the OpenCV project was initially an Intel Research initiative to advance CPU-intensive applications, part of a series of projects including real-time ray tracing and 3D display walls. The main contributors to the project included a number of optimization experts in Intel Russia, as well as Intel's Performance Library Team.

JVM:

A Java virtual machine (JVM) is abstract computing machine that enables a computer to run a java program. There are three notions of the JVM: specification, implementation, and instance. The specification is a document that formally describes what is required of a JVM implementation. Having a single specification ensures all implementations are interoperable. A JVM implementation is a computer program that meets the requirements of the JVM specification. An instance of a JVM is an implementation running in a process that executes a computer program compiled into Java bytecode.

V. RESULT AND CONCLUSION

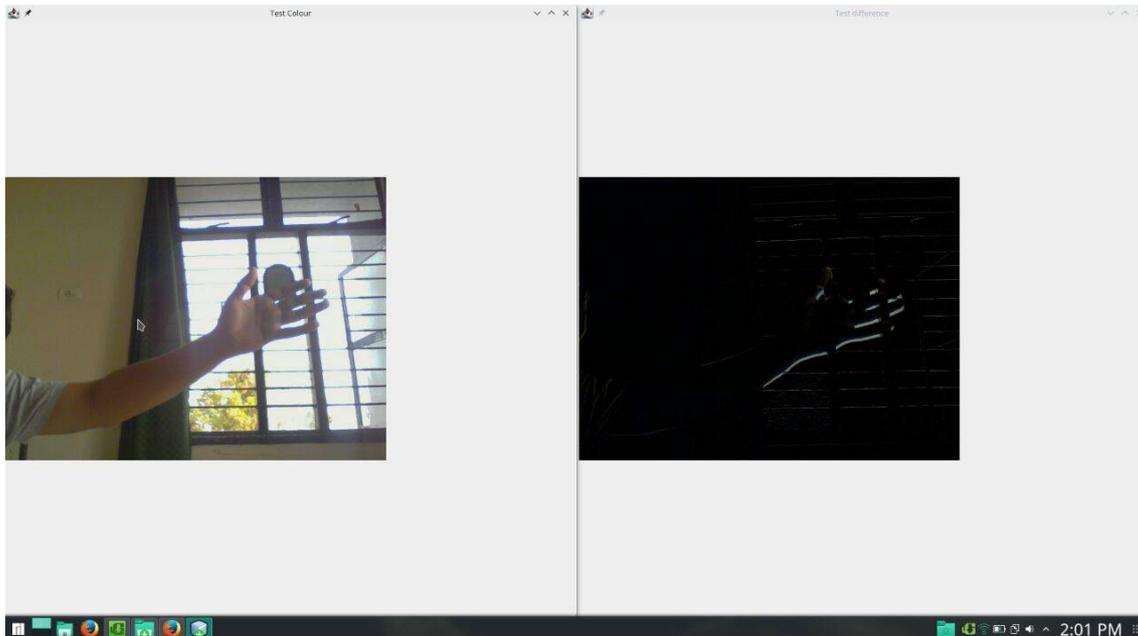


Fig : Output. Contour detection.

The above figure shows the greyscale image. It show the contours.

Efficient and convenient motion detection surveillance is proposed in this work. The system captures images only when the motions exceed a certain threshold that is preset in the system. It thus reduces the volume of data that needs to be



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reviewed and is therefore a more convenient way of monitoring the environment. Also, it helps to save data space by not capturing static images which usually do not contain the object of interest. It is applicable for both office and home uses. After successfully implementing the project, it can be applied for the motion detection for smart security system which would be very much helpful in auto theft detection for security purpose. It can also be useful in bank, museum and street at mid-night. Motion detection camera captures video only when it detects motion. This system will not capture when there is no motion. We have planned to use raspberry pi model and hence the project would be a portable camera. In this project we have developed a basic model of motion detection camera using raspberry pi. This project will help save a lot of memory and hence there will be less wastage of the same. Searching the old records will also become easier because of this project.

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