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Hybrid System of Motion Tracking Using Background Subracton and Frame Difference for Real Time and Recorded Videos

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Abstract: ***In today's competitive generation, the security concerns have grown rapidly. The latest technology used for security concerns is motion detection system. Motion detection is broadly used in many computer vision tasks like pose estimation, human tracking, and human in danger and face recognition. It is a basic part for many computer vision tasks. By using these technologies, it is possible to monitor and capture every motion by inch and second of the area of interest. As motion detection system is real time and it is implemented widely, system is used to detect any motion in a real time video and once motion has been detected in the real time. We have even provided the provision of human identification using recorded video. Both the methods employed to detect the motion are background subtraction method and frame difference method. The proposed method makes background image using previous consecutive frames. This method detects the motion via a standard webcam in real-time YUY2_640x480 resolution. Experimental results showed that the proposed method is more robust in nature as it can avoid the noise in motion detection due to camera flicker and useful to reduce the number of false positive alarms. We additionally use the variant of MATLAB i.e. SIMULINK. It is efficient enough to track the human with its boundary condition.***
Index Terms— YUY2_640x480, camera flicker, SIMULINK, MATLAB

I. INTRODUCTION

Motion detection means it's a process of detecting a change in position of an object relative to its surroundings or the change in the surroundings relative to an object. Motion detection can be achieved by both mechanical and electronic methods. When motion detection is accomplished by natural organisms, it is called motion perception. The main task of a motion detection system is to detect an "area of motion" present in an "area of environment being monitored". The area of motion here refers to the portion of the environment being monitored with activity due to the motions of moving objects. Motion detection is usually a software-based monitoring algorithm which, when it detects motions will indicate the surveillance camera to begin capturing the event or simply shows the motion detection using graphical method.

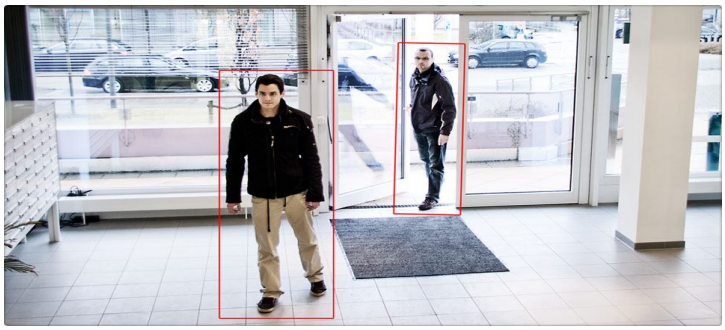

Fig 1.0 Motion detection

The existing system is passive infrared sensor and optical flow method. A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. All objects with a temperature above absolute zero emit heat energy in the form of radiation. Usually this radiation is invisible to the human eye because it radiates at infrared wavelengths, but it can be detected by electronic devices designed for such a purpose. This can catch the heat and track the motion but it has the drawbacks like it has operational life. Costly to implement and cannot work alone it need whole circuit like IC, Power Supply and Buzzer to operate.

Optical flow method is to calculate the image optical flow field, and do clustering processing according to the optical flow distribution characteristics of image.

This method can get the complete movement information and detect the moving object from the background better, however, a large quantity of calculation, sensitivity to noise, poor anti-noise performance, make it unsuitable for real-time demanding occasions**.**

The Disadvantage of the existing system is that In PIR- Operational life. Costly to implement and cannot work alone it need whole circuit like IC, Power Supply and Buzzer to operate. Optical flow method - a large quantity of calculation, sensitivity to noise, poor anti-noise performance, make it unsuitable for real-time demanding occasions.

II. PROPOSED SYSTEM

The proposed system method used for motion detection. A new approach is proposed which is a combination of both background subtraction method and consecutive frame subtraction method. As in this method background image is obtained by taking mean of previous consecutive frames and then this background image is compared pixel wise with current image to detect motion. Experimental results showed that the proposed method is more robust in nature as it can avoid the noise in motion detection and it's useful to reduce the number of false positive alarms. The methods used in detection of motion are background subtraction method, consecutive frames and threshold comparison method. In the Simulink part the frames has been separated from the given input then each frames is been assigned to some values. The threshold values has been compared with the previous frame and the current frame then it converts the input to the black and white. Then it applies the compliment to the black and white now it compares both it gets the confusion whether to indicate the border part with the black or white colour. Then it gives the partial of white and black colour that part is visible in the border region. Thus the digital part works.

First, need to interface a camera using MATLAB using image acquisition toolbox.

Start the camera in background.

Making a mean image from previous consecutive images.

Compare the current image with mean image pixel by pixel.

Next compare the pixel values with threshold value.

If pixel value is greater than threshold value then, Motion is detected.

If pixel value is less than threshold value then, Motion is not detected.

If no motion is detected, again need to perform third point.

Finally Motion detection is shown by audio message (SAPI) and display.

III. PROJECT DESCRIPTION

The main focus of this paper is on making a background image from previous consecutive frames in real time by trigger method .The current image is compared pixel wise (pixel by pixel) or subtracted from background image to detect any motion. The image obtained after subtraction is called Difference Image. Values of pixels can be positive or negative in difference image. Therefore absolute of difference image is taken and then values of pixels in

Difference image is compared with threshold value, then if the pixel value is more than threshold value then it means there is motion in the area being monitored and motion is detected. This method continuously keep making background image using previous frames in real time. To make it practical and useful warning system, graphical method is used. This approach will also show the number of objects detected in motion and percentage area of total area in which motion is present. This method (background image formation and motion detection process) happens in while loop because it has to continuously detects the motion in Real time, it will not stop until required it to stop. This method will bring some robustness in motion detection because previous background subtraction method is very sensitive to the very little motion that can be called noise. Two methods can be used for indication of motion detection, one by blowing alarm upon motion detection and second is the graphical method to take a record which shows number of objects in motion and percentage of area in which motion is present.

A. Background Subtraction Method

Background subtraction, also known as Foreground Detection, is a technique in the fields of image processing and computer vision where in an image foreground is is extracted for further processing. Generally an image's regions of interest are objects in its foreground. After the stage if image pre-processing object localization is required which may make use of this technique. Background subtraction is a widely used approach for detecting moving objects in videos from static cameras. The rationale in the

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approach is that of detecting the moving objects from the difference between the current frame and a reference frame, often called "background model".

1) Using Frame Differencing: Frame difference (absolute) at time t+1 is,

$$D(t+1) = |V(x, y, t+1) - V(x, y, t)| \quad \text{---- eq.1}$$

The background is assumed to be the frame at time t. This difference image would only show some intensity for the pixel locations which have changed in the two frames.

$$V(x, y, t) - V(x, y, t+1) > Th \quad \text{---- eq.2}$$

2) Mean Filter

For calculating the image containing only the background, a series of preceding images are averaged. For calculating the background image at the instant t,

$$|V(x, y, t) - B(x, y)| > Th \quad \text{---- eq.3}$$

Where Th is threshold. Usage of global and time-independent Thresholds (same Th value for all pixels in the image) may limit the accuracy of the above two approaches.

IV. MOTION DETECTION AND FRAME SUBRACTION

A. Change In Pixel Values Indicates Motion

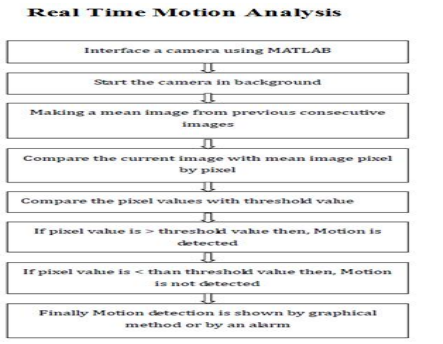
A simple method of subtracting one movie frame from another will provide information about which parts of the scene have changed. This method was performed on each frame of the movie, with consecutive frames being subtracted from each other.

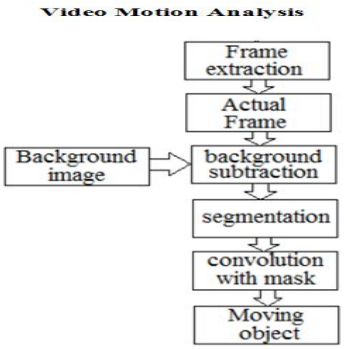
B. Frame Subtraction

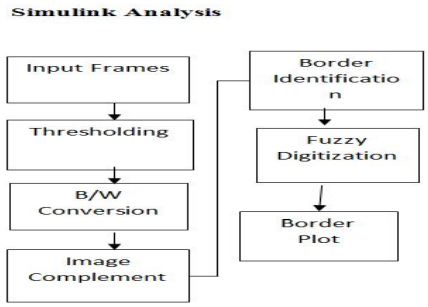
First, the scene is converted to an array of pixel values. These pixel values are the averaged Red, Green, and Blue (RGB) values for each pixel. The pixel values of the previous frame are then subtracted from the current frame's pixel values, and the absolute value of the values is taken. The amount of change in a region of pixels can be interpreted as the amount of motion that is taking place in that region. These data can then be used to determine where in the scene the most motion is taking place.

V. OUTPUT

A. Block Diagram







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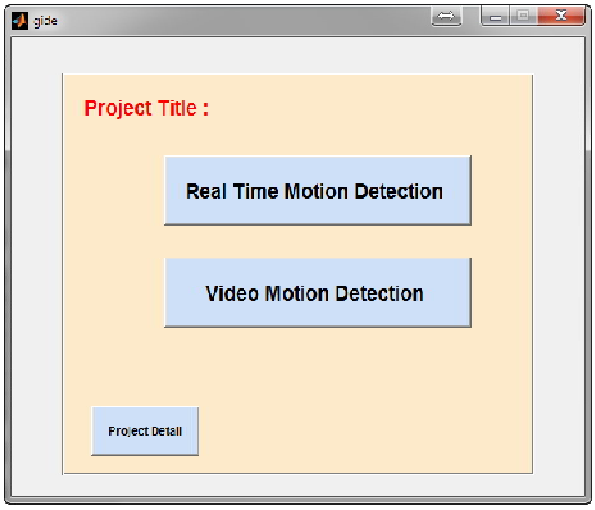
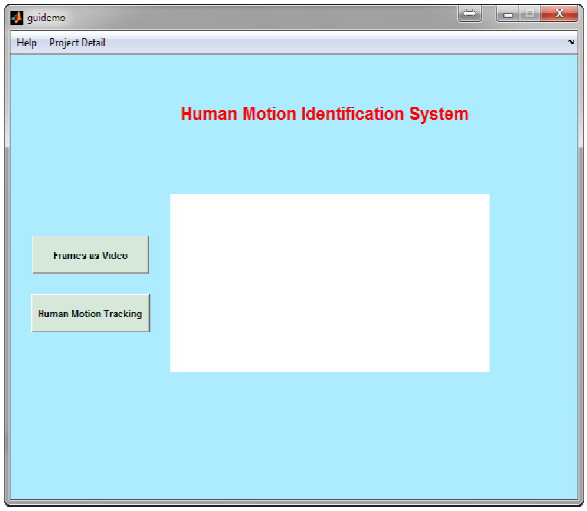
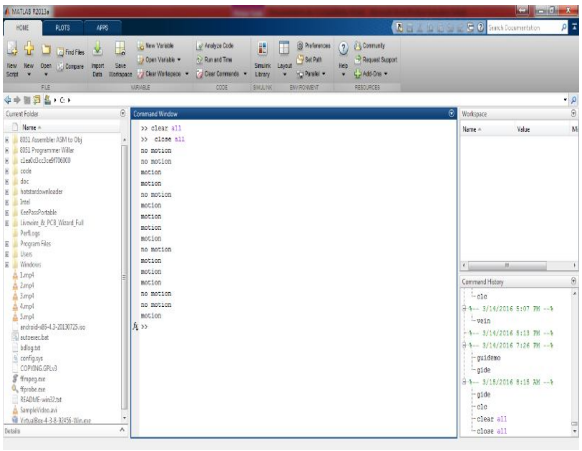
Graphical User Interface (GUI)





B. Result



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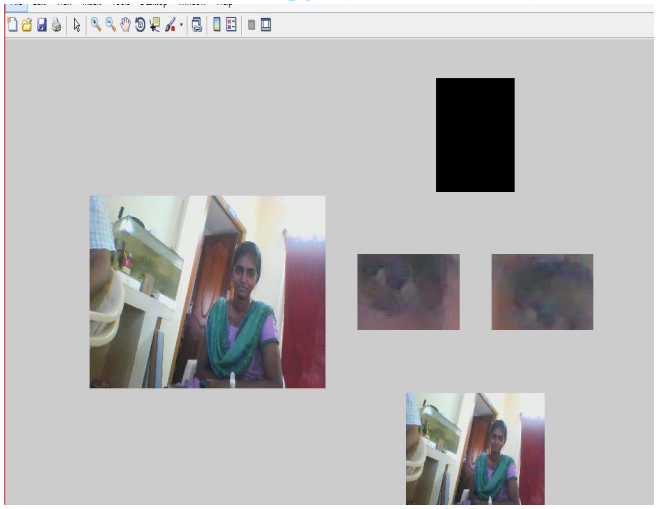

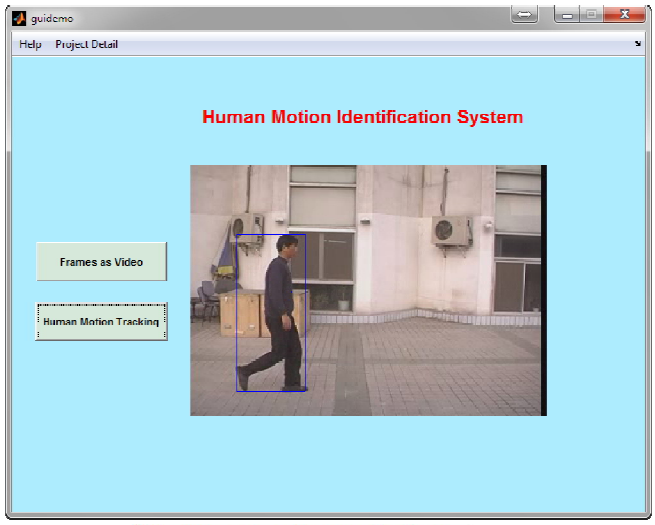

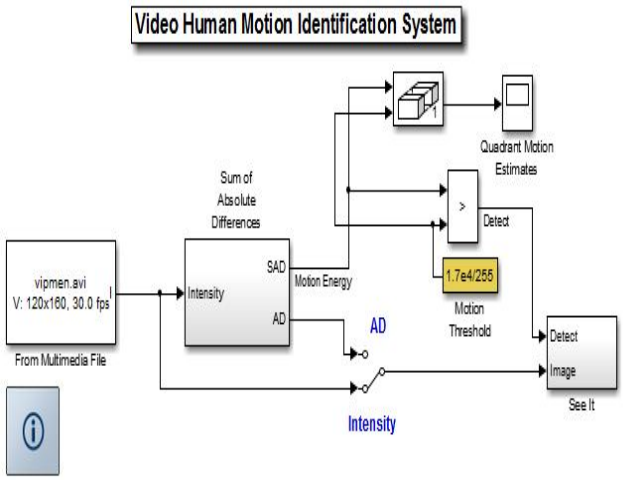

VI. CONCLUSION

In this paper, a new method is proposed to detect motion using the algorithm. A video monitoring & detection system was thus developed successfully. The system mainly provides an efficient method for surveillance purposes and is aimed to be highly

beneficial for any person or organization. The proposed method is adjustable to the camera movements which were shown as detected motion in other approaches because of their over sensitivity. Experimental results showed that the proposed method is more robust in nature as it can avoid the noise in motion detection. Therefore this method is useful to reduce the number of false positive alarms.

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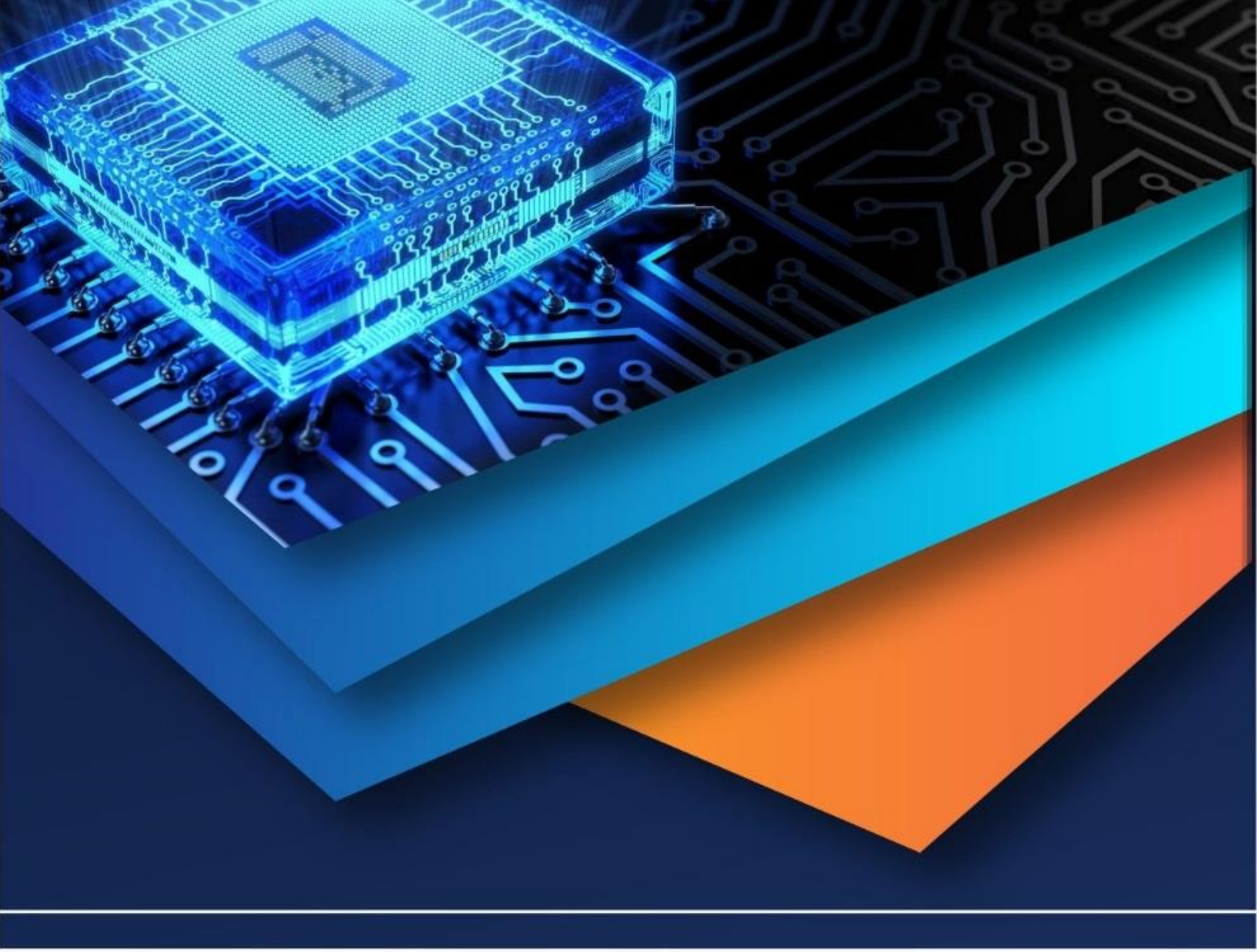

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