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Motion Sensing Based Security System

Jainim Somaiya[1], Neha Surve[2], Komal Shah[3], Anuradha Kapoor[4]
Computer Engineering, Atharva College of Engineering, Mumbai, India

Abstract: ***The aim of the project is to develop a motion sensing based security system using the principle of Background Subtraction Algorithm. Here a Web Cam is connected to the computer and our software will receive the video signals from that web cam. Software will save the previous state of an image (captured from web cam) and will compare with the present state. After doing Image Processing on both the images, a differential image is given as an output which will mark the difference between two images with black pixels.***

If the difference is greater than user defined limit then the software will automatically do the following process:

A. Send SMS to 2 pre-defined numbers.

B. Raise an alarm.

C. Capture the image and store it on Hard Drive.

We are creating a mobile application which consists of two passwords for security purpose.

A. One password is for mobile unlocking.

B. Another password is for application.

The application says that when the authenticated person is entering the particular area, he will click the off button so that the software will not perform the above functions and if the person is not authenticated, the software will perform the above functions.

Keywords: Motion tracking, mobile authentication, Human Motion Synthesis, Background Subtraction, MSBSS Architecture.

I. INTRODUCTION

Nowadays we need a security system based on motion detection for many of the purposes like Offices, Banks, Museums etc. The motion detection security system which we are assembling detects the motion by sensing a change in the field view of the camera that is connected with the system and when any motion is detected, the software will raise an alarm, capture the image and store it on Hard Drive, send SMS to 2 pre-defined numbers. Keeping in mind the limitation of existing system, There was a need for more intelligent system, so we are creating a MSBSS and its aim is to capture the motion and perform some intelligent operations.

II. MOTION TRACKING

There are two methods of motion tracking: recognition-based and motion-based. Object is detected and its position is specified in recognition based motion tracking and it also has drawback that it only detects recognizable object. This method is more complicated than the motion based tracking due to its slow speed. In 3D world motion tracking is defined as the process of tracking the motion vector. Till date various approaches have been tested which are broadly classified as Block Matching Method and Time Spatial Gradient Approach. In the proposed method, algorithms for moving object tracking using fuzzy inference and WT have been used.

Two procedures are involved in the motion tracking stage:

A. Max-min composition operation process.

B. Inference rule generation process.

III. MOBILE AUTHENTICATION

Authenticating users with the help of mobile devices can be challenging and many solutions have been used by mobile applications either compromised security or usability. The mobile application which we are developing functions at that instant:

A. An authenticated person enters that area, he will switch off that button and application will automatically turn off all those software functions If the cellophane of an authenticated person is stolen, then any unauthenticated person cannot make any misuse of the application because of the password assigned to the predefined user.

B. If the cell phone of an authenticated person is stolen, then any unauthenticated person cannot make any misuse of the application because of the password assigned to the predefined use

IV. HUMAN MOTION SYNTHESIS

The key point of our system is human motion synthesis referring to a limited number of visual cues, which are acquired by the perception process. Several real-time vision based human motion sensing have been developed. However, they are based on a rather simple human model and its generated human motion sensing is not natural. For example, the direction of face is not detected, or the number of articulations are limited. Here, we make

the human model more complex and develop a vision- based algorithm for human motion sensing based on the model When a real-time and on-line system is designed, an error recovery mechanism is quite important. If the system is based on feature tracking, once features fail to be tracked, the posture estimation process may reproduce unrealistic human postures, and it can not escape from the erroneous situation. Therefore, in order that we need not reset the system in such a case, we have introduced a simple error recovery process, which executes concurrently with the main human posture estimation process, and which always checks whether the human silhouette makes predened shapes which are easy to recognize precisely. When the process nds the silhouette makes such shapes, it notifies the human posture estimation process, and the estimation process adopts the recognition result regardless of the estimation result

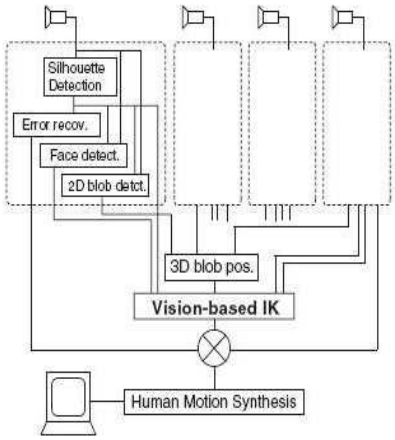

Fig1. S/W human motion synthesis

V. BACKGROUND SUBTRACTION

Background subtraction, also known as Foreground Detection, is a technique in the fields of image processing and computer vision wherein an image's foreground is extracted for further processing (object recognition etc.). Generally an image's regions of interest are objects (humans, cars, text etc.) in its foreground. After the stage of image preprocessing (which may include image denoising, post processing like morphology etc.) object localisation 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 approach is that of detecting the moving objects from the difference between the current frame and a reference frame, often called “background image”, or “background model”. Background subtraction is mostly done if the image in question is a part of a video stream. Background subtraction provides important cues for numerous applications in computer vision, for example surveillance tracking or human poses estimation. However, background subtraction is generally based on a static background hypothesis which is often not applicable in real environments. With indoor scenes, reflections or animated images on screens lead to background changes. In a same way, due to wind, rain or illumination changes brought by weather, static backgrounds methods have difficulties with outdoor scenes.

A. Applications

1) Video surveillance
2) Optical motion capture
3) Human computer interaction
4) Content based video coding

VI. MSBSS ARCHITECTURE

Motion detection is the 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.

Motion can be detected by

A. Infrared (Passive and active sensors)
B. Optics (video and camera systems)
C. Radio Frequency Energy (radar, microwave and tomographic motion detection)
D. Sound (microphones and acoustic sensors)
E. Vibration (triboelectric, seismic, and inertia-switch sensors)
F. Magnetism (magnetic sensors and magnetometers)

1) Database Architecture

The system comprises of 4 Major components:

a) A Phone Number Database.
b) An Electronic Mail (e-mail) Database.
c) An Image Database.
d) Mobile application

A Phone Number Database: This database is use to store the phone numbers of various security personnel's and high authority managers who all are required to be contact when an intrusion is detected.

Electronic mail (e-mail) Database: This database is required to store the email addresses of all the autho-rized personnel's who are authorized to change the password and to access the secured area.

Image Database: This database is used to store the images that are continuously cap-tured within a given time interval by the image capturing device. Motion sensor uses this database to compare the current image with the previous images to sense the motion.

Mobile Application: This application is used by an authenticated person for the security purpose.

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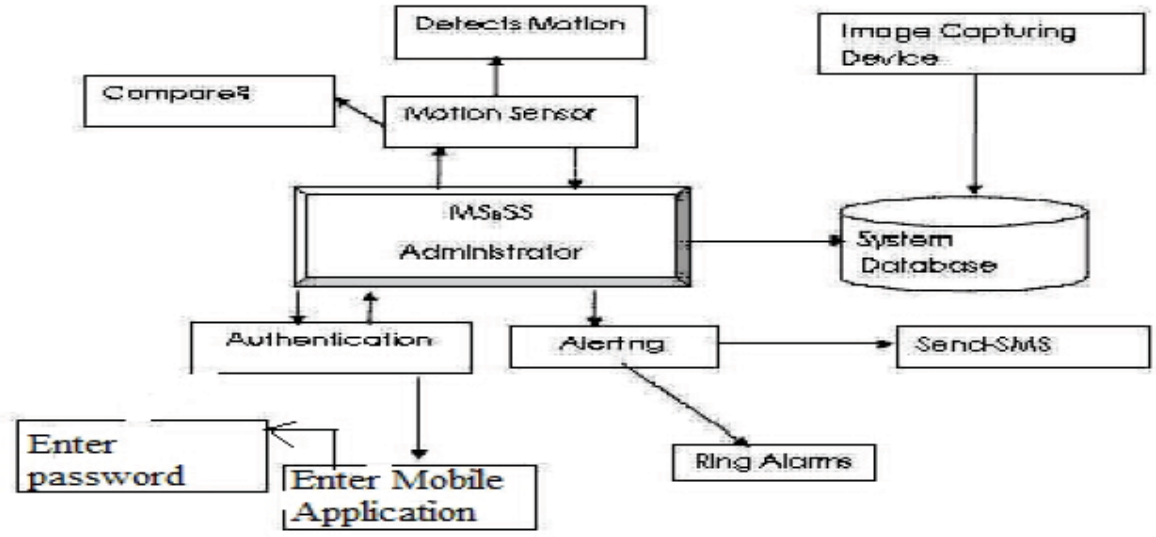

Fig 2. MSBSS Architecture

VII. CONCLUSIONS

In this paper we have reviewed the area of MSBSS. It is quite clear now that various aspects that go into the system have been designed. Thus we can infer that after implementing the system design, a very stable system supporting that has various functionalities has been obtained. The Snap Shots provide a glimpse of how the system works. The mobile application we have used enhances the security.

VIII. ACKNOWLEDGMENT

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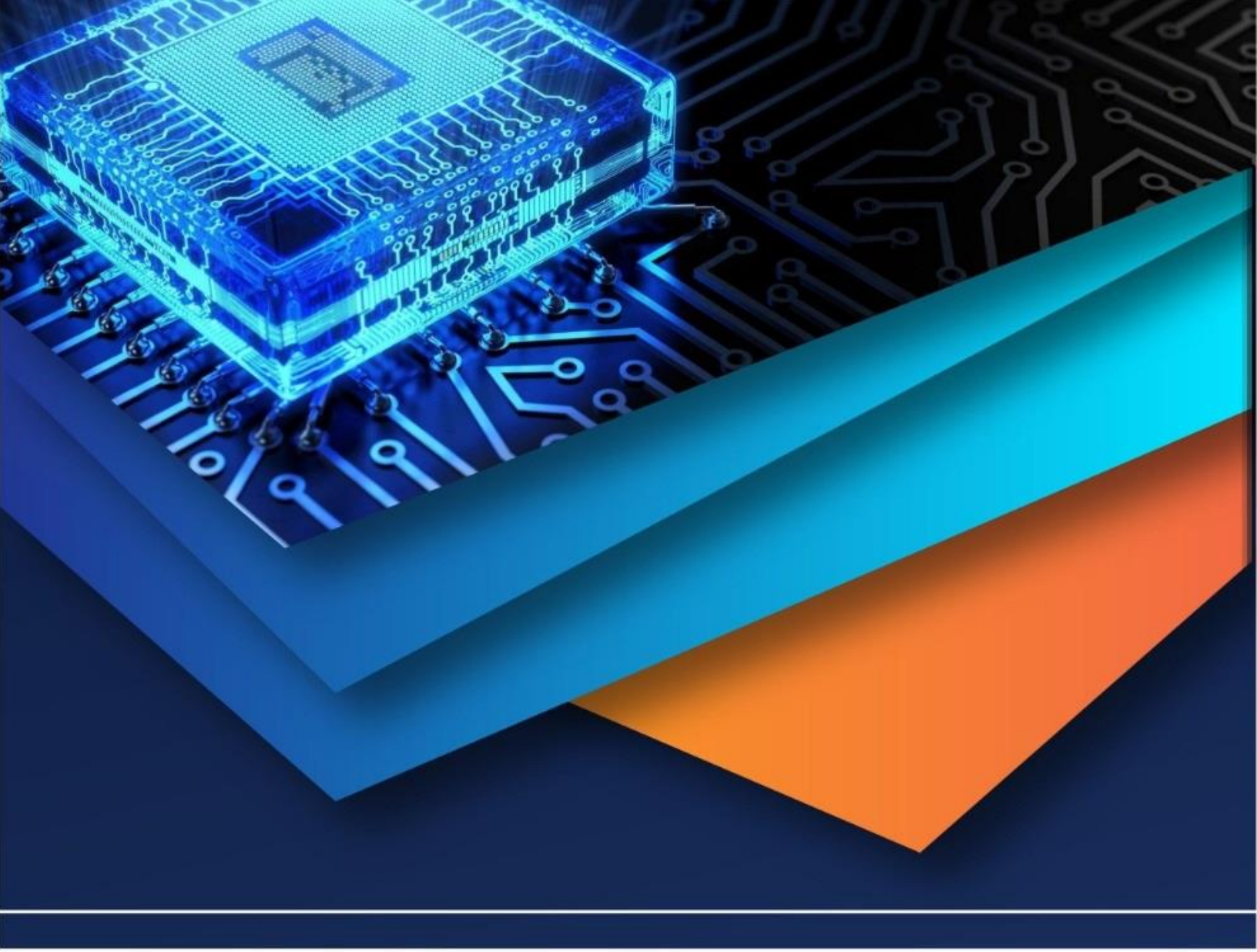

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