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A Modern Approach for Motion Detection and Responsive Control of Appliance Using Matlab

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***Abstract*--- Motion tracking is a major issue in security field whether it is borders, banks, offices and institutions etc. Security is always maximum concerned. To maintain security we deploy security guards but with them human errors are most common as they cannot available on a place all the time. Hardware sensor based systems are very costly and maximum lasts for few years only. it can be placed on single place. This paper proposes to create motion detection system using software. It deals with the concept of motion tracking using cameras in real time. It is designed to create a visitor identification system in which motion is detected MATLAB system reads predefined message.**

***Index Terms*--- Frame extraction, Graphical User Interface, Motion Detection, Motion identification.**

I. INTRODUCTION

A webcam is a video camera that feeds or streams its image in real time to or through a computer to computer network. When captured by the computer, the video stream may be saved, viewed or sent on to other networks via systems such as internet, and email as an attachment. When sent to remote location, the video stream may be saved, viewed or on sent there. Unlike an IP camera (which connects using Ethernet or Wi-Fi),a web camera is generally connected by a USB cable, or similar cable, or built into computer hardware, such as laptops. The term webcam may also be used in its original sense of a video camera connected to the web continuously for an indefinite time, rather than for a particular session, generally supplying a view for anyone who visits its web page over the internet. It is used at places such as institutions, offices, banks etc.

A webcam is used for motion detection. It is used for identifies a person. Motion Detection is usually a software-based monitoring algorithm which, when it detects motions will signal the surveillance camera to begin capturing the event. It is also as called activity detection. An advanced motion detection surveillance system can analyze the type of motion to see if it warrants an alarm. Motion detection is the process of detecting a change in the position of an object related to its surroundings or a change in the surroundings relative to an object. Motion detection can be achieved by either mechanical or electronic methods.

II. EXISTING SYSTEM

Several motion detection schemes were researched in recent years but a motion detection scheme with such broad application is not tried out yet. Nobody even tried yet to do some responsive work to assemble embedded hardware with MATLAB based motion detection.

Disadvantage of Existing System

- Only motion detection was possible.
- It was not accurate as video input was only used.
- Real time video acquisition and tracking was not checked with audio alert system.

III. PROPOSED SYSTEM

The main objective of this paper is to create and Automatic Visitor Information System with voice Announcement. And also to create a motion detection system interfacing with hardware opening closing from remote location to check the system working in real time. Android application is used for listen the audio see the video and control the gate from remote location. It is kept in the principal room of the institution. MATLAB is the best tool to do this kind of operation due to its highly efficient and accurate nature. It simply transforms our computers into Motion detection system. It deals with the concept of motion tacking using cameras in real time. It is used for a security system using MATLAB. If it detects any motion using cameras it automatically speaks whatever we have typed in command like "principal is available or principal is busy " like that the predefined message. The same audio will run simultaneously on the mobile phone connected with the internet to the computer. We can even see the video of the person in real time in mobile phone. If we find the person is genuine means then we can open the door from remote location (all over the world).

Advantages

- Highly accurate system of motion detection using "Background Subtraction algorithm".
- Responsive audio message is used by using SAPI toolbox.
- Graphical User Interface using MATLAB is designed to open and close the door from computer as well as mobile from remote location is implemented.
- Internet screen sharing in between computer with MATLAB is associated with our smart mobile phone.
- 89C51/Audrino based embedded system of Gate mechanism is assembled with MATLAB GUI to control hardware part.
- It is a best system of hardware software assembling.

A) 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 re objects (humans, cars, text, etc) in its foreground. 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 reference frame, often called background image or background model.

Background subtraction method is developed to involving the process of removing the blobs and objects from the current frame for the identification purposes. Background subtraction operation is shown in figure1.

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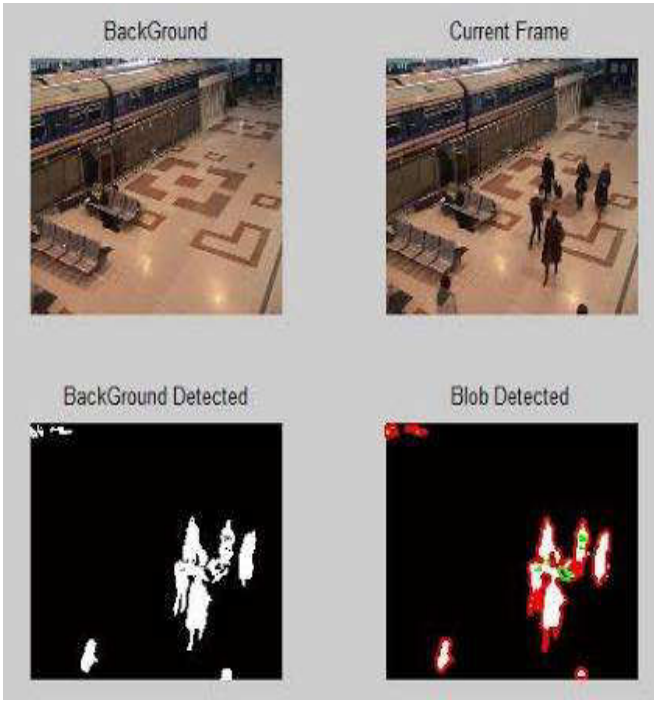

Fig. 1 Background Subtraction

Background subtraction (BS) is a common and widely used technique for generating a foreground mask (namely, a binary image containing the pixels belonging to moving objects in the scene) by using static cameras.

As the name suggests, BS calculates the foreground mask performing a subtraction between the current frame and a background model, containing the static part of the scene or, more in general, everything that can be considered as background given the characteristics of the observed scene.

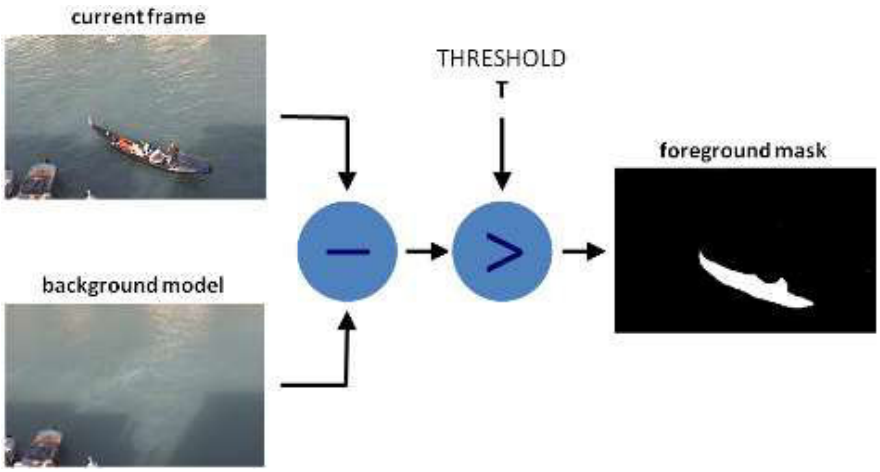

Fig. 2 Background subtraction Method

Background modeling consists of two main steps:

- Background Initialization;
- Background Update.

In the first step, an initial model of the background is computed, while in the second step that model is updated in order to adapt to possible changes in the scene.

In this tutorial we will learn how to perform BS. As input, we will use data coming from the publicly available data set Background Models Challenge (BMC).

B) GRAPHICAL USER INTERFACE

In a computer science, a graphical user interface is a type of user interface that allows users to interact with electronic devices through graphical icons and visual indicators such as secondary notation, instead of text based user interface, typed command labels or text navigation.

C) SAPI

SAPI (Speech Application Program Interface) is an application program interface provided with the Microsoft windows operating system that allows programmers to write programs that offer text –to-speech and speech recognition capabilities.

IV. IMPLEMENTATION

In phase1 we develop the motion identification and audio message responsive system using MATLAB. Also test for real time image acquisition and its response on our MATLAB code.

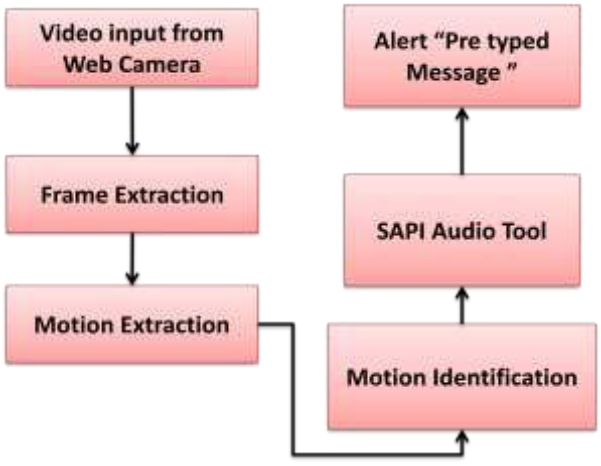

Fig. 3 Block diagram of motion detection

The input of the system is video from the web camera. Whenever any motion is detected one audio visual come as principal is available or principal is busy. Then user can also see whether any person come on gate and listened audio on the mobile phone.

A) MOTION DETECTION

In video surveillance, motion detection refers to the capability of the surveillance system to detect motion and capture the events. Motion detectionis usually a software-based monitoring algorithm which, when it detects motions will signal the surveillance camera to begin capturing the event.

B) FRAME EXTRACTION

A key frame in animation and filmmaking is a drawing that defines the starting and ending points of any smooth transition. The drawings are called "**frames**" because their position in time is measured in frames on a strip of film. A sequence of key frames defines which movement the viewer will see, whereas the position of the key frames on the film, video, or animation defines the timing of the movement. Because only two or three key frames over the span of a second do not create the illusion of movement, the remaining frames are filled with in-betweens.

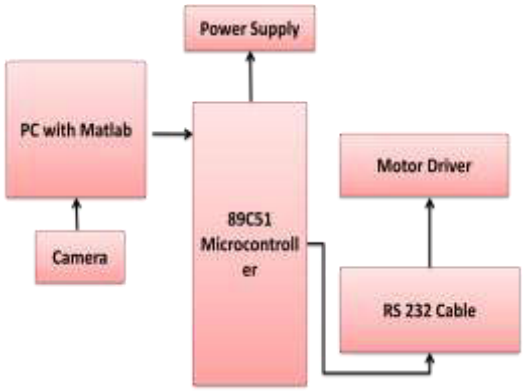

Fig. 4 Gate control mechanism

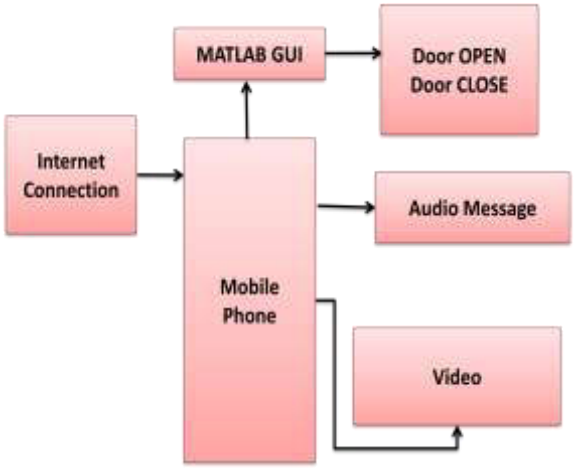

Fig. 5 Remote response and control

V. COMPONENT DETAILS

MICROCONTROLLER

AT89C51 is an 8-bit microcontroller and belongs to Atmel's family. It has 4Kb of Flash programmable and erasable read only memory (PEROM) and 128 bytes of RAM .It can be erased and program to a maximum of 1000 times.

The **ATmega328** is a single-chip microcontroller created by Atmel in the megaAVR family.

Fig. 6 Atmega328

RS232 CABLE

In telecommunications, RS-232 is a standard for serial communication transmission of data. It formally defines the signals connecting between a DTE (data terminal equipment) such as a computer terminal, and a DCE (data circuit –terminating equipment or data communication equipment) such as modem

MOTOR DRIVER

A motor driver is a little current amplifier; the function of motor drivers is to take a low – current control signal and then turn it into a higher-current signal that can drive a motor. Gear motors are an all-in-one combination of an electric motor and gears or a gearbox. A gear motor simplifies combining a motor with a gear reducer system. Gears are used with motors to lower the motor's speed while increasing the output torque.

VI. RESULTS

The proposed system is used to create motion identification by using image acquisition toolbox of Matlab in real time. By using Graphical interface,

Fig. 7 Screenshot of voice alert

This is the result of using graphical user interface. It consists of voice alert and project details. The coding output will be as,

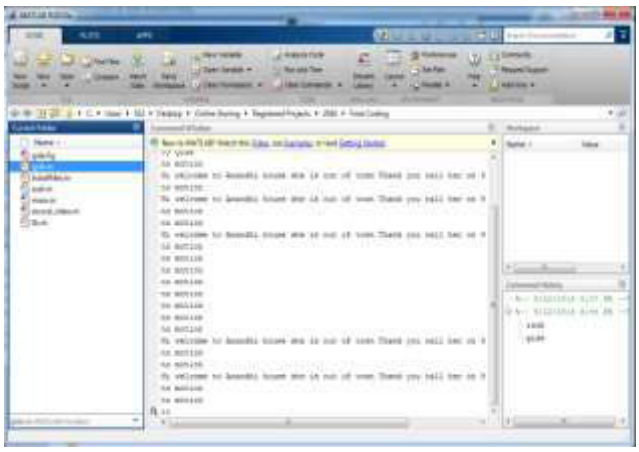

Fig. 8 Command window

HARDWARE UNIT

Fig. 9 Snapshot of hardware unit

Fig. 10 Online Gate Control Unit

The gate control is consists of 5 and 10 seconds. If the person known means we can open the gate. The person who standing near the gate, image will appear on the mobile phone as well as the computer. And audio can be alerted the predefined message.

VII. CONCLUSION

The proposed system is used to create motion detection and voice announcement is implemented. We develop the hardware system of gate opening and closing using embedded system. And also check for mobile pc internet link and check our hardware to run from remote location using internet. Put overall system and assemble it to produce the proposed task. And future work it is implemented through wireless system.

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