# EMBEDDED SURVEILLANCE MONITORING SYSTEM USING MATLAB

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## ABSTRACT

*This paper is an Implementation of Surveillance Monitoring System based on embedded system and sensor modules. In this we have implemented low cost surveillance system using the serial camera and other devices. When the human presence is detected by PIR sensors, the camera will start & captures the video and save it into memory. After saving video, these will be sent on the processing unit which provides the information about the number of person present in that video. Matlab is used to for detection of number of person using Blob algorithm and GSM module provides necessary information to the owner via SMS.*

*Keywords: Blob Analysis, GSM module, Matlab, PIR sensor, Remote surveillance.*

## I. INTRODUCTION

For security monitoring facilities are necessary from home to several companies, everyone has some kinds of surveillance systems in order to keep their security. But People need higher-performance surveillance system at lower cost. Security cameras and sensors are widely employed in the several areas and public environments. So users utilize them and obtain useful information such as images and video. [1] Surveillance systems originate from CCTV (Closed Circuit TV) systems. In traditional CCTV the access tools and methods were dependent on user's location. [2]

A wireless surveillance system is an improved technology & has been already developed to perform remote monitoring and remote controlling services for security improvement. Now, the aim is to improve and reconstructing functionality of system. With some kinds of facilities such as database handling, video processing and remote control function. [1] Lately the use of a surveillance system for image detection is becoming more important. A common method for real-time segmentation of moving regions in image sequences involves "background subtraction," or thresholding the error between an estimate of the image without moving objects and the current image. The numerous approaches to this problem differ in the type of background model used and the procedure used to update the model. [3]

The article deals with PIR sensors to track the human body movement, which is triggered when an intruder enters the monitoring area. And send information to user. This surveillance system enables users to monitor their personal properties or household safety during the period when users are away from home or industry. [4]

The paper is organised as follows, section II express the Design hardware and flow chart for the proposed system along with its overall working. Section III demonstrates process of counting the number of persons from captured video. In section IV the experimental results are presented. Finally conclusion is drawn in section V.

## II.    SYSTEM DESIGN
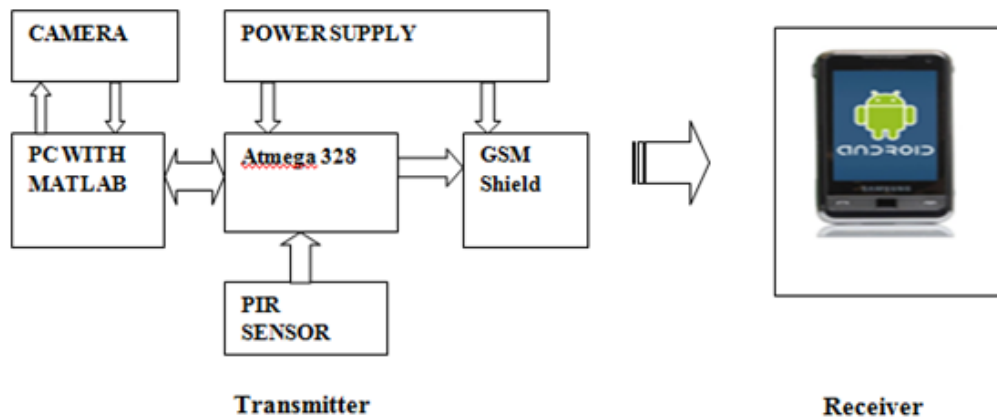
### 2.1 Design of the hardware system:



**Fig.1. Block Diagram of the System**

### 2.1.1 Working

Power Supply design for the system to provide 5v fixed DC power to it. 230v AC input is applied to that voltage is step down to 15v by the step down transformer. The output of that is fed to the rectifier circuit then it is passed through the constant supply voltage regulator. The regulator is design in such a way if there is change in input but also the output will get constant 5v and another source is 12V DC.

PIR (Passive Infrared) sensor this sensor on detect the change in infrared frequency in the atmosphere. We are going to put the camera at the top corner of the room such that from there all the space in the room can be visible to us. And we are also going to put the PIR sensor along with the camera. When any person enters the room, the PIR sensor will detect the heat radiated by him in terms of infrared frequencies. And then it immediately gives trigger to microcontroller.

Camera is connected to microcontroller with Tx, Rx and Gnd. All the initialization command and resolution of image is pre defined in program. When PIR sensor detect any human body is trigger the microcontroller. Then microcontroller will turn on the camera and that will capture the video which will be sent to the user.

The video which is capture by the camera & that is stored in PC. Then by using the Matlab Programming it counts the number of persons in that area, microcontroller then it will initialize the GSM module when GSM module is configured for SMS then it will sends the SMS to owners mobile. Mobile application is used to receive that SMS at user. App is continuously checked that SMS when the SMS is present then it will ring the buzzer for security alert. So user can check the mobile and take further action.

**2.2 Design of Software Platform**

2.2.1 Transmitter



2.2.2 Receiver

Receive SMS in Phone
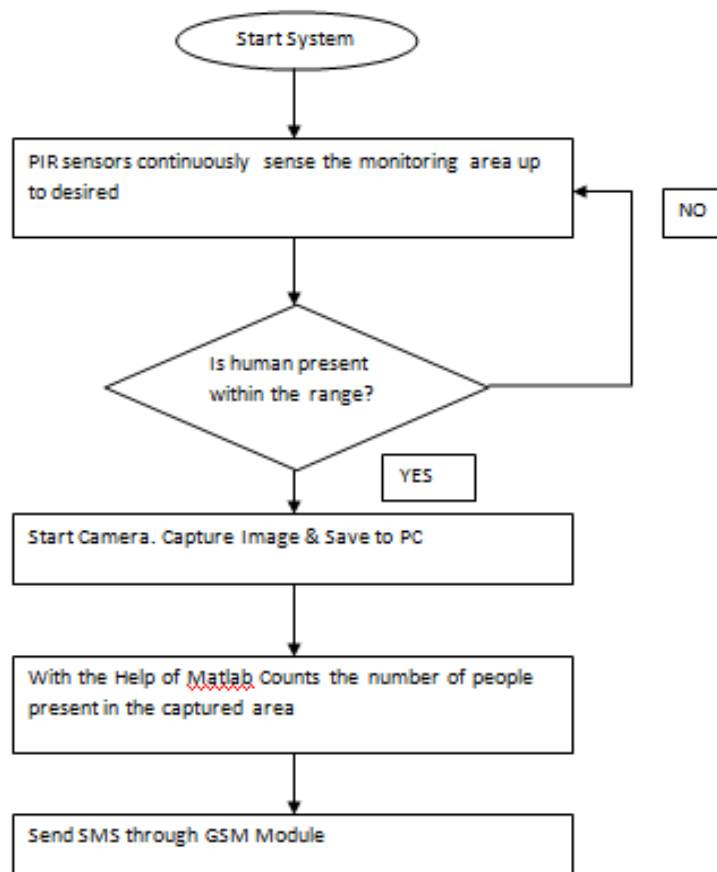
**Fig. 2 The schematic diagram of system software platform**

## III. PROCESS FOR COUNTING NO. OF PERSONS USING MATLAB

For count the number of persons in the image BLOB method is used. One main reason behind using this method is it provides complementary information about regions, which is not obtained from edge detectors or corner detectors. Diverse set of Blob Analysis methods allows creating tailored solutions for a wide range of visual inspection problems.

It is an algorithm which can figure out the count of any object present in image or it will find out the position of the person in image. BLOB indicate Binary Large OBject which is nothing but group of interrelated pixels in a binary image. "Large" indicates that only objects of a certain size are of interest and that "small" binary objects are usually noise. To count the number first we have to separate the different objects in the image and then we have to analyze which object is the one we are looking for to at respective location. This process is known as

BLOB extraction and the latter BLOB classification. The proposed algorithm would be implemented in MATLAB 12.

The basic steps involved while dealing with Blob Analysis are:

1) Extraction - the initial step is to apply Image Thresholding techniques to inspect the region of an object.

2) Refinement - the extracted region is often affected due to noise of different kinds. Region transformation techniques are used to enhance the region in refinement process.

3) Analysis - refined region is computed and calculations are made. If multiple objects are detected in a particular region then each object is divided into individual blob which is computed separately. And for individual blob thresholding, morphology is carried out.

Image Acquisition → Binarization → Smoothing → Background Removement → Rectification → Blob Detection → Blob Count
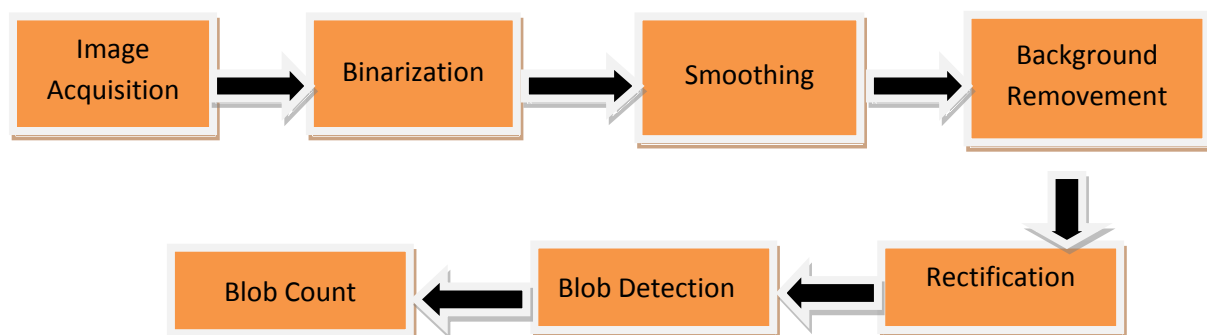
Fig.3 Image Processing Flow Chart

Firstly, the original image which is been captured by camera has to be converted into mono image. Binarization processing is been adopted for thresholding. To remove noise in the image smoothing process is used in which images are filtered. Then the background subtraction is done and only contact area's information remained. After that rectification existence of each blob is detected by counter processing. Count is given if the blob is found. In processing, blob detection function mainly considers to identify same gray level pixels from the image. And these pixels are separated into different blobs based on relationship of inter-connection. One critical question is that the blob which is easily identifiable by the human eye as several distinct are often be interpreted by software as a single blob. [5]

## IV.    RESULT

In this section we show the experimental results with the use of serial camera module. The camera will capture video for 6 sec. 240*320 resolutions. This includes 90 frames. The algorithm continuous with blob analysis which gives the persons count**.** And the message is sent on users mobile. Below Fig shows some snapshots of output window**.**
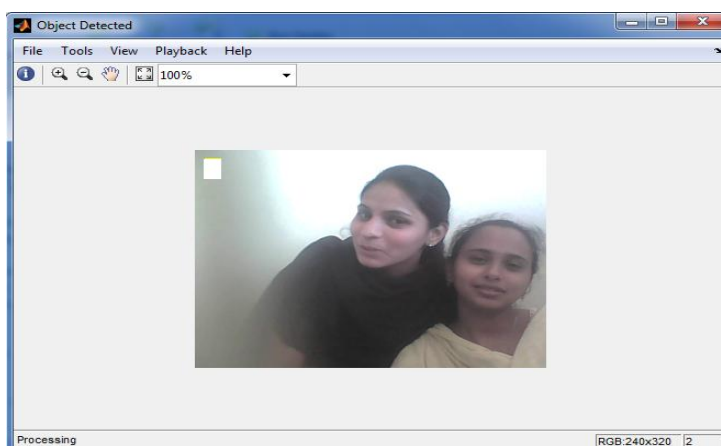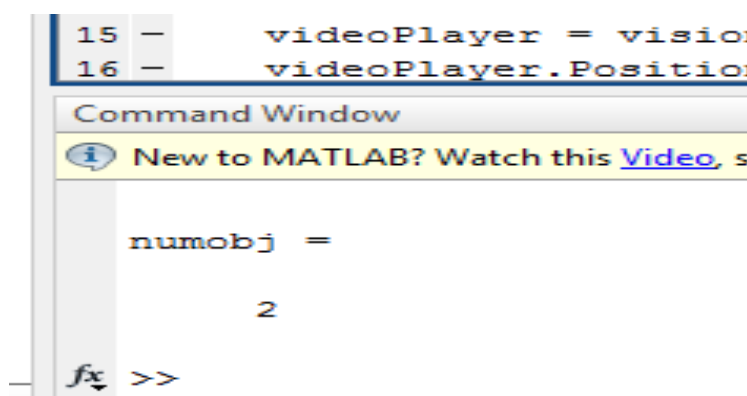
**Fig. 4 Snap Shot from Captured Video**



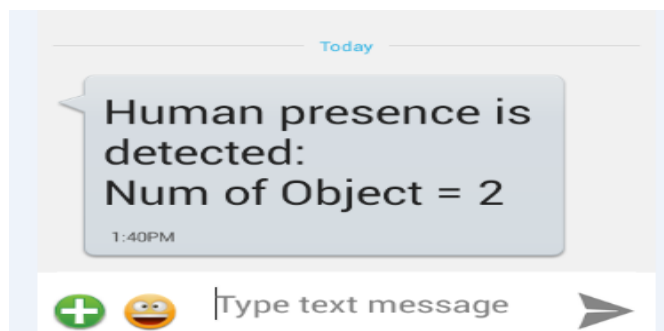**Fig. 5 Snapshot of Matlab Window showing object Count**



Fig. 6 Message Received at Users Mobile

## V. CONCLUSION

It is very hard to find the graphical information in the conventional system. It is also very difficult to manage the information which makes the tracking very difficult. Human errors may occur in tracking and measuring the related information in the conventional system. To overcome the drawback of the conventional system the advanced system is been proposed. This proposed system uses a blob analysis and can give us a video evidence with a different object reorganisation. It can also provide a SMS to the user having information of number of persons present. Also there is no need to monitor area personally.

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