

Development of Image Surveillance System using Android

^[1]Ashok V. Sutagundar, ^[2]Ravikant Belagali, ^[3]Padmaja Kuruba

^{[1][2]}Department of E&C, Basaveshwar Engineering College, Bagalkot, India

^[3]Department of E&C, Global Academy of Technology, Bengaluru, India

^[1]sutagundar@gmail.com, ^[2]ravikant.belagali@gmail.com, ^[3]padmajamtech@gmail.com

Abstract: Smart image surveillance, is the implementation of automatic image technologies to closely monitor various situations. Nowadays, image surveillance is integral to security of many locations such as banks, shopping malls, museums, traffic management and even homes. The proposed smart image surveillance system uses the set of static images in detection of variation in the object positions in the monitoring area. Movement of the objects are may be due to the intruder in the target. The method used for object detection compares the current image and previously stored static image in the database, which is taken as the reference image. The idea is that, if the difference between the current image and the reference image exceeds a specific threshold function, a displacement of the object is detected. The proposed idea is implemented and tested using Android tool.

Keywords—Object displacement detection, GCM alert, E-mail, Background Subtraction.

I. INTRODUCTION

Securing ones premises in today's world is quite challenging. With continuous development of modern surveillance equipment we are able to keep pace with this challenge. To tackle such problems, in this work we propose development of object displacement detection using set of static images Android mobile. It takes the concept of image surveillance to a whole new level, using the latest of the technologies like the android mobile platform and image processing. One of the biggest problems in today's image based surveillance is that of manual detection of any unusual events in the area being monitored. This is a very challenging task to accomplish as continuous monitoring round the clock is difficult for humans.

Fully automated image surveillance using mobile device like an android enabled cell phone is used. The Proposed system not only solves the problem of 24 X 7 monitoring but also saves energy and cost at the same time increasing the efficiency of the product [1].

Some of the existing works are as follows. Existing Systems comprises of CCTV (Closed Circuit Television) Camera put everywhere where observing is done ceaselessly and there are one or more individual who continue watching these features in a room. This is manual observation. Such framework requires the individual to be available and watch the features constantly [8].

There will be colossal volume of features which might not

have any unpleasant occasions happening. Individuals need to work continuously for such a framework. The existing security systems consist of manual checking, where a person needs to monitor the premises continuously. There are face recognition systems and alarm systems for home security, which needs more men, power and people to work in shift for such system [7].

Now a days, surveillance for the premises is by CCTV cameras in the application places like shops or museum where the most precious and expensive things have been kept. But, with CCTV camera only the capturing and storing of information has been done. These systems will not alert in case of emergency. Thus insisting on human intervention [4]. So in order to prevent the above stated problem, we designed an application using android platform. This app uses a single mobile phone for securing required premises. In order to do this we need mobile device with android compatible. The proposed application is named as "Automatic Camera App"

Some of the related works are as follows. Smart Video Surveillance is the execution of programmed feature advancements to nearly screen different circumstances. These days, Image Surveillance is indispensable to security of numerous areas, for examples: banks, shopping centres, shops, and even homes [4].

The proposed Smart Image Surveillance framework uses movement recognition to identify the vicinity of any intruder(s) in nature. The strategy utilized for movement identification is the Cauchy circulation

model which analyses the present casing in the nonstop feature grouping to the past edge, which is taken as the reference outline [1].

Feature Surveillance frameworks have build their needs of dynamism so as to permit diverse clients to screen the framework selecting distinctive nature of administration (QoS) contingent upon the framework status and to get to live and recorded feature from diverse confinements, for instance cell phones. All the more solidly, in IP reconnaissance frameworks, a few assets included are constrained or lavish so rapid reconfiguration could get to be upper hand for framework integrator and creators ready to offer adaptable applications which are versatile to clients' requirements [6].

This observation based administration framework gives security to specific spot which cautions the client by sending ready messages. We talk about another calculation, Image subtraction calculation that catches the picture naturally and is spared in the server. The spared picture is sent as a caution to the client portable utilizing Google Cloud Messaging (GCM) [2].

The objectives of the work are as follows: (1) To develop an Android application for motion detection. (2) Providing an efficient surveillance system which will be better than manual surveillance. (3) Automated monitoring of particular place provides security on real time basis. (4) Notification of occurrence of unusual events via email and SMS.

II. PROPOSED WORK

The proposed system tries to overcome with the manual surveillance system. A person tracking the images all the time is not requires, instead the system recognizes unusual event if any and raise alarm to have the attention of the observer. The model is trained for a set of event that we say 'usual'. Any entity other than this set is detected as unusual and is notified.

- ❖ The proposed system uses the power of mobile computing.
- ❖ It does not require computer system or manual checking.
- ❖ It raises alarm as well as contacts remotely the owner of the application premises

Motivation for project is some disadvantages with CCTV camera. As discussed the CCTV camera will not intimate at the time when something unusual has happened at the premises, it only stores the data. And there is need for a human to monitor the records all the time.

So our motivation is to create an application using android platform to be installed in an android phone. This application will monitor application premises covered by mobile camera all the time when the app gets started. This app will start remotely by sending a start SMS by using another mobile phone (may be a android phone or owner's phone). After getting a start SMS the app will start and monitoring the surrounding place is initiated.

In order to find any motion detection, it will start capturing the images by mobile camera, and saves first image as reference image, and next go on capturing the images and compares with the reference image. If any changes have occurred, it will intimate the owner's mobile phone that something unusual has been occurred at your premises.

III. PROPOSED METHOD

The proposed work and algorithm are described in this section.

3.1 System Environment

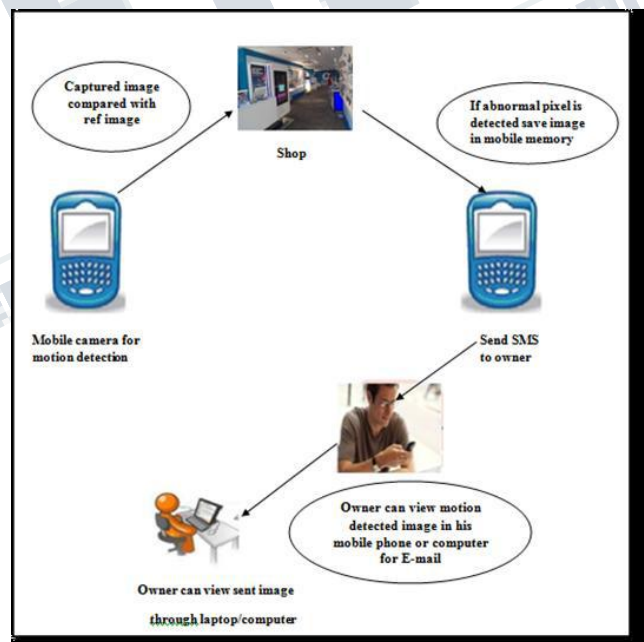


Fig 1 Proposed system environment

Create an application using android platform to be installed in a android phone. This application will monitor some premises covered by mobile camera all the time when the app gets started. This app will start remotely by sending a start SMS by using another mobile phone (may be a android phone or other normal phone called owner's phone). After getting a start SMS the app will start and it start monitoring the surrounding place. In order to find any

motion detection, it will start capturing the images by mobile camera, and saves first image as reference image, and next go on capturing the images and compares with the reference image.

If any changes have occurred, it will intimate the owner's mobile phone that there exists some security issue at the premises. If the owner does not respond within a predefined time then, the android phone will send the SMS to the second party (may be a police mobile phone). At the same time it will start the Alarm (it will be twice the default set ringtone). The difference image is send to the owner's E-mail id.

3.2 Architectural Design

A system is an entity that provides some behaviour to its environment, where the environment consists of people or other systems. Hence for building the specified software system, designing the architecture is a key step. This architecture design provides high level overview of the proposed system and hence shows how the subsystems interact with each other to give final required output. The architecture of the system is designed such that different components will be responsible to implement different functionalities. The architectural design consists of the capturing unit, a comparison unit, a difference finder and the notification unit [9].

3.3 Modules of proposed Work

The proposed system has mainly five modules. They are namely (1) Image Capturing Module, (2) Image Comparison Module (3) Communication Module (4) Alarm Module

Image Capturing Module:

This module is responsible for capturing of images automatically. Here we have built a custom camera application which captures images after fixed intervals of time and stores them as JPEG images.

Image Comparison Module:

This module is accountable for building up two photographs to comprehend any development amidst that time. It continues running with the logic of foundation subtraction to discover any alteration in the photographs by working out on pixels of the photograph.

Communication Module:

This module manages the procedure of sending SMS and Email to the clients of the framework. For sending of SMS we utilize the SMS oversee objects of Android and Google's SMTP server is used to email.

Alarm Module:

As the name proposes this module oversees climbing of alerts at whatever point any improvement is recognized,

this will be called by the examination module in the application. Here we make a Media Player question and call the current Ringtone as the tune in that. The Architectural design flow of automatic camera app is as shown in figure 2.

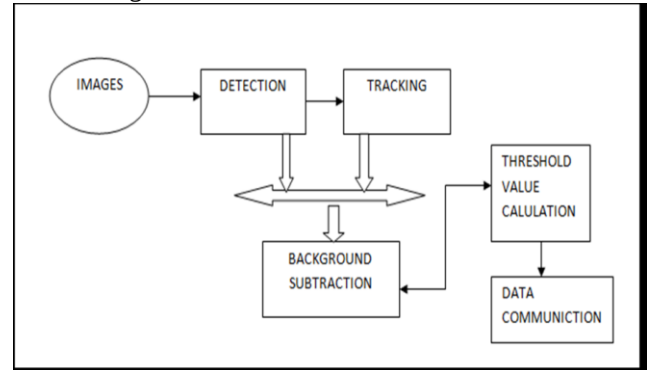


Fig 2 Architectural design flow of automatic camera application

ALGORITHM

Step-1: Install the application in the user Android phone.

Step-2: Send the start SMS using owner's number.

Step-3: As soon as it receives the SMS, it will start capturing the images.

Step-4: Initial image it will saves as reference image, and next image as New image.

Step-5: It starts comparing reference image with new images.

Step-6: If difference is found, then it will intimate the owner's Number that some possible security breach has occurred at your premises.

Step-7: If the owner has not replayed as NO, within a predefined time interval, it will raise the Alarm and at the same time it will send an SMS to second party number that security breach has been occurred at application premises.

The algorithm flow diagram as shown in figure 3

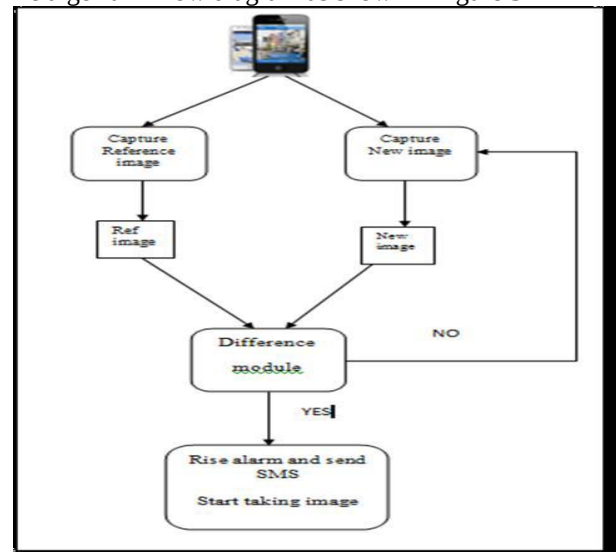


Fig 3 Flow diagram for Motion Detection

IV. IMPLEMENTATION

This work is implemented using Android 4.4. The hardware and software requirements of the proposed system are as follows.

Hardware Requirement:

Dual Core Processor, 1 GB of RAM, 500 MB of Hard disk space, Android Mobile Phone with camera (3 MP)

Software Requirement: Android SDK, Java SDK, Eclipse Integrated Development Environment, Programming language JAVA and XML, Operating System: Android, Development System Pc (Windows 7).

V. SIMULATION AND RESULTS

The proposed system has high precision in perceiving development besides, getting picture. Webcams are unobtrusive and basic to setup in the obliged reach. There will be a sensor placed at the top of the android phone; as soon as the movement is detected the phone will start capturing the image. If this image is same as reference image, then that image is send to the owner's e-mail id and the notification SMS is sent to the owner's mobile phone. As the photos in which the intruder is watched are set away on a server, the customer can get to these photos from remote territories, reducing the time and division necessities. The amount of pictures which can be set away is vast, as they are set away on the server and not on an adjacent hard plate. The customer gets a prepared when the development is recognized, so the customer knows the circumstance at the checked area constantly.

The Eclipse IDE was utilized to make the Java ventures also, the Android ventures. Java programming dialect is utilized to compose the code. Java code is for the most part arranged to byte code that can keep running on any Java Virtual Machine (JVM) paying little mind to PC structural planning. It receives the 'Compose Once, Run Anyplace' approach. Android working framework is composed fundamentally for touch screen cell phones, for example, Smart phones and Tablets. It is an open source working framework with lenient authorizing [6].

In this the application is able to start remotely by sending of SMS from the owner's mobile phone, once it get the start SMS, it start taking the images and the initial image is saved as the reference image as shown in figure 5 and the next image is saved as new image as shown in the figure 6. If the deference between previous and current image has been found, then that image will be send to the owner's E-mail id.



Fig. 5 Reference image



Fig. 6 New image

Table 1 Experimental evaluation of motion detection

Input Image Segment	Results
No apparent movement in Area	No motion detected
Human entering monitored Area	Motion detected
Calendar fluttering	Motion detected
Mosquito flying across the Room	No motion detected
Moderate earthquake	Motion detected
Strong earthquake	Motion detected
Door closing	Motion detected
Curtain fluttering	Motion detected

VI. CONCLUSION

The proposed method of image surveillance features high accuracy of moving object detection and quick notifications to the user on the event of intrusion. It uses Absolute Differential Estimation to detect if there are any changes in the environment and the reference frame is updated dynamically. Cauchy Distribution model isolates the moving foreground object from the background.

When a significant motion is detected, GCM alert is sent to the user's Android Smartphone and a loud, customizable sound is played on it. After authentication, the user can access the detected image stored in the server. The user can also store the image onto the Android Smartphone, which makes future reference. The performance of the system is evaluated and it is found that it can be easily implemented in real time applications of image surveillance in various areas like Banks, Supermarkets, Museums, etc.

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