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ADVANCED MOTION DETECTION ALGORITHM FOR PATIENT MONITORING USING CELL PHONE WITH VIDEO DISPLAY

K. VISHWANATHA

Dayananda Sagar College of Engineering (DSCE), Bangalore, India, vishwanathkadhri@yahoo.in

MURIGENDRAYYA M. HIREMATH

Dayananda Sagar College of Engineering (DSCE), Bangalore, India, mm.hiremath@yahoo.co.in

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ADVANCED MOTION DETECTION ALGORITHM FOR PATIENT MONITORING USING CELL PHONE WITH VIDEO DISPLAY

¹VISHWANATHA K & ²MURIGENDRAYYA M HIREMATH

^{1&2}Dayananda Sagar College of Engineering (DSCE), Bangalore, India
E-mail : vishwanathkadhri@yahoo.in, mm.hiremath@yahoo.co.in

Abstract - Proposed is a smart, reliable and robust algorithm for motion detection, tracking and activity analysis. Background subtraction is considered intelligent algorithms for the same. We use this to track the motion and monitor the movements of the subject in question. Mount the web camera focused to the patient. PC should have a unique external Internet IPAddress. Android mobile phone should be GPRS enabled. GSM technology is used for sending SMS. It is a client-server technology wherein client captures the images, checks for motion if any, discards the packets until motion is detected. Use background subtraction algorithm to check the motion. The surveillance camera does not move and has a capture of the static background it is facing. It uses image subtraction to determine object motion. It provides more reliable information about moving object, but it is so sensitivity to the dynamic changes such as lighting. Once motion is detected, camera stops monitoring further motion. Instead, it starts capturing the video. Simultaneously, SMS alert is sent to the responsible doctors and also alerting the medical staff with audio speaker in the hospital. Java mail API is used to mail the captured video to the entered e-mail IDs. Once the doctor demands for video, socket is established between the PC and the mobile phone and video (series of images) are streamed to the doctor's mobile phone. Save live video of first few seconds at the server end for future use. Activate alert at the remote end.

Keywords- *patient monitoring, motion detection, advanced background subtraction algorithm, Android based mobile, Java.*

I. INTRODUCTION

1.1. Purpose

The purpose of this document is to demonstrate the requirements of the project "Advanced Motion Detection". The document gives the detailed explanation of the both functional and non-functional requirements.

1.2. Background Subtraction Algorithm

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 the "background image", or "background model". The background image must be a representation of the scene with no moving objects and must be kept regularly updated to adapt to the varying luminaries conditions and geometry settings. Models that are more complex have extended the concept of "background subtraction" beyond its literal meaning. In general, BS can be simplified as shown in the Equation below

$$f(x, y) = \text{abs}(\text{Frame}(x, y) - \text{Background}(x, y))$$

1.3. Document Conventions

The following are the list of conventions and acronyms used in this document and the project as well: Client: A Cell Phone running at User end,

where all controlling activities of the Application take place.

Server: A Computer connected with Web Cam and Bluetooth enabled mobile.

JMF: A Java Library that enables audio, video and other time-based media to be added to Java applications and applets. This optional package, which can capture, playback, stream, and transcode multiple media formats, extends the Java Platform, Standard Edition (Java SE) and allows development of cross-platform multimedia applications.

JAVA: Is a widely-used general-purpose application programming language

Data flow diagram: It shows the dataflow between the entities.

Java Communication API: a Java extension that facilitates developing platform-independent communications applications for technologies such as Smart Cards, embedded systems, and point-of-sale devices, financial services devices, fax, modems, display terminals, and robotic equipment.

TCP/IP: The communications protocol that undergirds the Internet and communications between computers in a network.

II. OVERALL DESCRIPTION

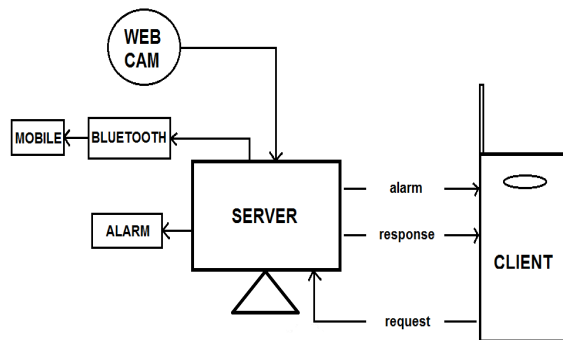


Fig 1 : Block Diagram of Advanced Motion Detection Algorithm for Patient Monitoring Using Cell Phone for Video Display

2.1 Product Perspective

The purpose of this project is to Alarm the User whenever any Motion is detected at the Server Side. With this application we kept our protected place more secure and also, we can achieve the following option:

Live Video of the place, which we kept as protected. We can play the alarm to threaten moving object. We can identify the detected object remotely. If user is not available or not able to send any request then Neighbors will be called automatically.

The application is having user-friendly GUI. The communication between the Server and the client take place through TCP/IP sockets.

The Server part of the application handles the object detection and rotation of Stepper motor using JMF and JAVA Communication API of JAVA respectively. The Client part of the application handles the controlling of the Server part application using GPRS Technology.

2.2 Product Features

- Act as a Security for the specific place.
- Can monitor the specific place remotely.
- Can update the security status remotely.
- Can able to control the application using command.

2.3 Operating Environment

Computers installed with j2se1.6 or higher with LAN Connection is necessary.

2.4 Design and Implementation Constraints

This Product is developed using Java (JMF, JAVA COMMUNICATION API, and TCP/IP) technologies. Computer at Server part must be installed with JMF; Cell Phone at Server part must be installed with J2ME Application Developed. And both the system must be connected by GPRS.

III. NON FUNCTIONAL REQUIREMENT

3.1. Hardware Interfaces

Server Side:

Computer: PC connected with stepper motor Hardware, Web Cam and PC with Sound enabled by Speakers.

Client side:

Cell Phone: GPRS service Enabled cell phone.

3.2. Software Interfaces

1. Network: TCP/IP.
2. Application: Java, NetBeans 1.6.
3. Operating System: Windows 2000 or Higher

IV. ROLE OF CONCEPTS

JMF: To capture the image.

JAVA Communication API: To send the SMS to user via Bluetooth and mediator mobile when motion is detected.

TCP/IP: To transfer the data through GPRS.

Motion Detection: Motion detection process of this application is achieved by the following algorithm:

4.1: Background Modeling:

The proposed BM module designs a unique two phase background matching procedure using rapid matching followed by accurate matching in order to produce optimum background pixels for the background model.

- Initial Background Model.
- Optimum Background Modeling (OBM).

4.2: Matching:

We continuously check the pixels using following techniques.

- Rapid Matching.
- Stable Signal Trainer
- Accurate Matching.

4.3: Background Updating:

We continuously update background model so we get the best result.

4.4: Alarms Trigger Module:

This module consists of a novel block-based entropy evaluation method developed for the employment of block candidates, after which the most likely moving objects within the motion blocks

are determined based on block based morphological erosion and dilation operations

4.5: OE Module:

The detection of moving objects can be achieved through the observed change in gray-level illumination of the obtained motion blocks within the absolute difference $\Delta_i(x, y)$.

V. EXPECTED RESULTS

The alert system kept at hospital location of the alert the medical staff with the help of speaker when the motion is detected. And SMS alert is sent to the responsible doctors.

A few minutes of motion detected video should send to the doctors email id. Whenever the doctor is free, a real time video should view using Android based mobiles from server with IP address.

VI. CONCLUSION

Real-time monitoring of human movements provides an effective means of inferring a patient's level of activity. This project aims at assisting living environments for people with ICU/CCU.

This project initiates the development of a system for patient monitoring and study of their behaviors. The system can be easily extended to other monitoring of two patients in ICUs/CCUs using a I-phone applications & also for single patient to get physiological parameters like BP, Heart Rate, Sugar etc using I-phone.

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