The Design of 3G Mobile Video Surveillance System Based On J2ME Platform

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Abstract

The moving video surveillance system plays an important role in many fields, a moving video surveillance system based on 3G wireless network is proposed in this paper. The increasing bandwidth of 3G wireless networks provides us with implementing the moving video monitoring in 3G mobile. The J2ME platform is applied in 3G mobile video monitoring software design because of the outstanding mobile application development platform and cross-platform advantage. The design of mobile video surveillance is discussed and presents a mobile client development details.

Keywords: 3G Mobile, Video Surveillance, J2ME Platform, Wireless Networks

1. Introduction

As wireless communication technology, 3G wireless networking has become the main monitoring transmission applications. The development of 3G mobile networks will enable intelligent video surveillance is widely used. The existing video surveillance system in real life gradually revealed some shortcomings: 1, the original DVR-based surveillance system, generally do not have the initiative to identify or capture the ability to track, monitor personnel in the working state of fatigue, prone to missing reports; 2, the current network bandwidth, video surveillance and other issues by Restrictions, mainly in the fixed control-based, fixed monitoring obviously can not reach any place at any time to complete the purpose of monitoring; 3, the original target video surveillance system for the handling of suspicious done by a surveillance officer, according to video processing, if a suspicious target missing, it means that target processing can not be completed. Intelligent video surveillance system to monitor real scene in real time, access to real-time video data to extract and track moving objects in the scene, recording the activities of the process of automatic analysis by computer to produce active understanding of the target, so as to
provide simple control. Effective monitoring information. In this paper, do remote video surveillance system on a brief analysis and discussion based on J2ME platform [1], complete smart client mobile video surveillance software design.

2. System framework

Video surveillance control channel to send the picture data and video data, digital control channels of digital data transmission control. Monitoring client on the phone to access Web servers through the mobile network. Digital monitoring the status of client data collection equipment and devices to send control commands; image monitoring side by JMF (Java Media Framework) to control video equipment video surveillance data collection. The Web server as an intermediary, the digital data through the digital channel monitored by the client to the phone number of the client, the image data via the image channel by a video surveillance client sends to the mobile client. The overall structure of the system is shown in Fig.1.

3. Key technology

3.1. J2ME and the MIDlet

J2ME is the Java2 Platform, Micro Edition (Java2 Platform Micro Edition) for short, mainly for mobile devices, embedded devices development. (Java2 Platform Micro Edition) for short, mainly for mobile devices, embedded devices development. J2ME using the Configuration (Configuration) and the summary table (Profile) custom Java Runtime Environment (JRE). Sun J2ME configuration is provided for different levels of market demand: CLDC for small devices, is designed to run on devices with very limited resources of the Java ME application development framework; The CDC for large equipment, CDC is configured for such operations as TV set-top boxes ability, adequate power supply systems, applications with large memory, in particular, 2MB or more devices. Summary table defines the supported device type, Mobile Information Device Profile (Mobile Information Device Profile, referred to as MIDP).

MIDlet supported on devices of MIDP running MIDP applications, is the system developed by the mobile client application type [2].

The application must inherit the MIDlet class to allow application management software to control the MIDlet, to obtain from the application descriptor various properties, as well as changes in various states of notice or request. MIDlet class is a life cycle, startApp() is a MIDlet thread start function, pauseApp() is thread-suspend function, destroyApp() function is thread destruction, which control the operation of MIDlet thread. We usually use startApp() function to do some initialization work, and in the pauseApp()...
function to suspend the work of some of the work, such as sound, and MIDlet application processing. DestroyApp() function is the destruction of the work, the application releases the memory occupied.

3.2. Java Media Framework

With the gradual maturity of 3G technology, mobile streaming media technology into the mobile data value-added services has become the worldwide one of the hot mobile business. Mobile streaming media services, applications have also emerged, such people are very familiar with video on demand, remote education, remote monitoring.

JMF (Java Media Framework, the Java Media Framework) is actually a Java class package, use it to write powerful, multimedia programs, but do not care about the underlying complexity of the implementation details. JMF API is relatively simple to use and can meet the needs of almost all the multimedia programming. JMF is mainly used to deal with audio, video or multimedia data (both audio, another video), in the JMF in the abstraction of such time-base data into a Clock. Processing, storage, capture, play media data, these functions by JMF in a number of specific classes to achieve, for example, an audio compression or decoding, we can use Processor class, in a video store, you can use Data Sink class, to play Media data, you can use the Player class, these classes are a subclass of Clock[4].

3.3. Intelligent video analysis

Intelligent video surveillance is the core content of fitness for particular target detection, tracking and recognition, target tracking, target classification, including motion detection, behavior recognition, and 4 more content [6].

(1) Moving target extraction
Motion detection from image sequences, you will change in the area from the background image is extracted. Effective segmentation of motion area will greatly reduce the amount of operation of the follow-up process.

(2) Moving target tracking
Detection of moving objects is equivalent between image frames in a row, created based on the location, speed, shape, texture, color, and other relevant characteristics of the corresponding matching problem; Tracking objects, tracks such as the hands, face, head, legs and other body parts and track the entire target; track angle, corresponds to a single camera view of a single, corresponding to the multiple cameras from multiple perspectives and a full range of perspectives.

(3) Target classification
Target classification is from the purpose of detection of specific types of objects to the movement of a zone motion regions extraction.

(4) Acts of recognition:
Target behavior recognition in recent years been wide concern of hot spots, it refers to the goal of movement pattern analysis and recognition.

4. System design

4.1. Server Design

Need to implement server-side features include: monitor client requests, authenticate users, capture and transfer video images, control, and video surveillance equipment to handle multiple user requests and so on. Server-side development environment for software is windows XP+JDK1.6+Tomcat
6.0+Oracle9.0; development tools are eclipse3.4+SQL Developer System, multi-threaded server network communication and image acquisition, management, and other monitoring equipment, the run flowchart of the server is shown in Fig.2 (a).

JMF media Locator describes the location of the media, consistent with the form of URL in the form. Abstract audio capture device DirectSound Capture JMF support and Java sound and audio capture, they have support from the 8000Hz~44100Hz sample rate. In order to ensure that audio and video synchronization, integration of data sources are used here to solve this problem— that is, local consolidating two data source for a data source in the two tracks, so that you can transfer audio and video files that use only one processor, and to ensure that audio and video synchronization. On the premise of ensuring audio and video clarity, in order to lower transmission bandwidth as possible, using this system in the implementation of H.263 Video and audio encoding and G.723 as format.

### 4.2. Client Design

Client sends a connection request to the server, server request and client connections, and play a video file obtained from the server. Clients can anytime, anywhere connected to the server, close to real-time monitoring. Entered the stage of video playback, you can also send device control requests to the server, the server after the completion of device control action is sent to the client after adjusting device gets video, as shown in Fig.2 (b).

![Fig2. (a) Server Running Flowchart](image1)
![Fig2. (b) server running flowchart](image2)

### 4.3. Mobile client development

Client is a MIDlet application, the development environment: Eclipse SDK 3.4.1, EclipseME1.7.9, JDK1.6.0_10 and WTK2.5.2. Eclipse is a highly integrated tool, provides a powerful, full-featured,
commercial quality industrial development platform; EclipseME is JavaME development platform; WTK (Wireless Toolkit) is Sun company provides an unlimited development of practical wireless development package.

Mobile client user interface consists of: login user interface and video playback interface. System client interface to use MIDP implemented advanced graphical user interface, mainly to the List, Form, such as TextField, Item, ChoiceGroup class. The Fig. 3(a) is the user verification interface and Fig.3(b) is the monitor interface.

5. Conclusions

Mobile video surveillance with 3G there is broad development prospects, but also facilitates the top daily life. This article by an elaboration of basic knowledge of mobile development platforms, enabling video monitoring system based on J2ME, and through experimental verification.

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References