

MOBILE VIDEO ALARM SYSTEM BASED ON CLOUD COMPUTING

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ABSTRACT

As the video decoding communications with the continuous development, which using smart phone real-time to look at the camera became possible? The design is a cloud-based mobile video alarm system you can play a very good security effect. It introduces the design of the system hardware platform and architecture, especially in this paper discusses the design needed to key technologies and systematically research on how to construct a huge amounts of cloud storage server platform, armed with implementation to end on the video stream of cloud storage and real-time monitoring, and finally tests, verifies the effectiveness of design.

Keywords: Mobile video surveillance, Security and Protection, Wireless networks, Cloud computing, Give an alarm.

1. INTRODUCTION

Video surveillance has been playing a key role in our life, which was mainly used in security and transport before. But now, it is also used in education, health care, government, hotels, companies, as well as other fields. Such as smart phones, video coding and the continuous development of wireless network technology, the traditional network video monitoring system has already can't satisfy people's needs, and mobile video surveillance system is continuously go deeply into our life. As video coding Android H. 264 streaming media with the rapid development of communication technology [1] the embedded intelligent terminal to the improvement of multimedia processing ability and the growing demand for security, for the application of video monitoring business in mobile intelligent terminal provides a broad prospect of [2]. This project is to develop a based on Android mobile client video monitoring terminal software, using mobile phones for mobile video surveillance, which can be very good to have the security household effect. Its advantages are very obvious, and they are mainly in the following respects [3]:

(1) Sound network, coverage. At present, China mobile GPRS network, China Unicom's CDMA network, China telecom ADSL coverage's range is very wide, almost

everywhere. Wireless network has been applied in our daily life. Monitor the use of mobile phones, almost without being limited by the region. The current mobile phone is the most common mobile terminals, easy to use, simple operation, as long as can use mobile phone; you can use the mobile phone monitoring.

(2) The cost is low. The current mobile data volume is not large. Mobile operators, in order to encourage the use of data services, are using a lot of preferential measures. Rise in mobile data, mobile data service costs will be drastically reduced.

(3) Timely and effective. Because of the cell phone video monitoring, real-time monitor, such as text messaging on mobile phones, mobile phone MMS timely communication, more timely and convenient.

Police confirmed. The false alarm ratio is very high, at the same time, it takes a lot of manpower and financial resources, use of mobile phones function of instant messaging and video monitoring, which can easily solve the problem of alarming. .

2. THE SYSTEM DESIGN

The overall block diagram as shown in figure 1:

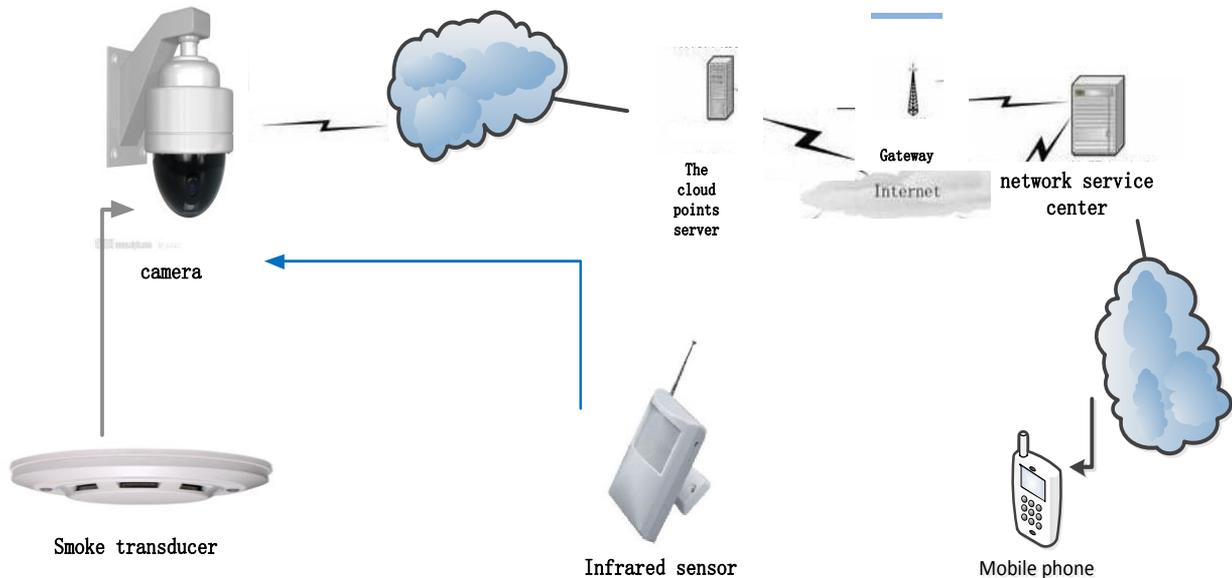


Figure 1. System block diagram

The system contains three parts, the Internet of things, a cloud server, hardware mobile client. Among them, the Internet of things the hardware part of the complete video acquisition, and infrared, the smoke of technical information acquisition; Cloud server to complete the user management, it is a link between mobile phones and the Internet of things; Mobile client users to view.

2.1 Internet of Things hardware parts

Camera: When users enter the alarm device configuration interface, mobile phone APP will display device list, equipment list in fact two levels. Level 1 is the camera list, the second is a list of all alarm equipment for camera control. Phone APP in general list after trend server sends the query request, the server will be the latest configuration of a certain number of camera sent to mobile phone APP, in the database server connection, the server list storage camera as follows: DVR_CID UID || DVR_PID | PWD1 | PWD2 |

Meaning is: DVR_CID: camera configuration CID - Not NULL auto increment to chassis, unlike DVR_ID, DVR_ID is DVR connected server generated after the ID of the unique identification of the device

UID: user registration ID;

DVR_PID: camera user name (factory equipment/identification number);

PWD1: camera machine code;

PWD2: camera access password.

Infrared sensors, smoke sensors: when a stranger infrared, he can sense in the family, and promptly report to the police, after notification to mobile phones and cameras, which can have the effect of security. Smoke alarm device is mainly refers to the situation when a fire at home, the device can quickly through it and then report to the police.

2.2 Cloud server part

Cloud server block diagram is as follows:

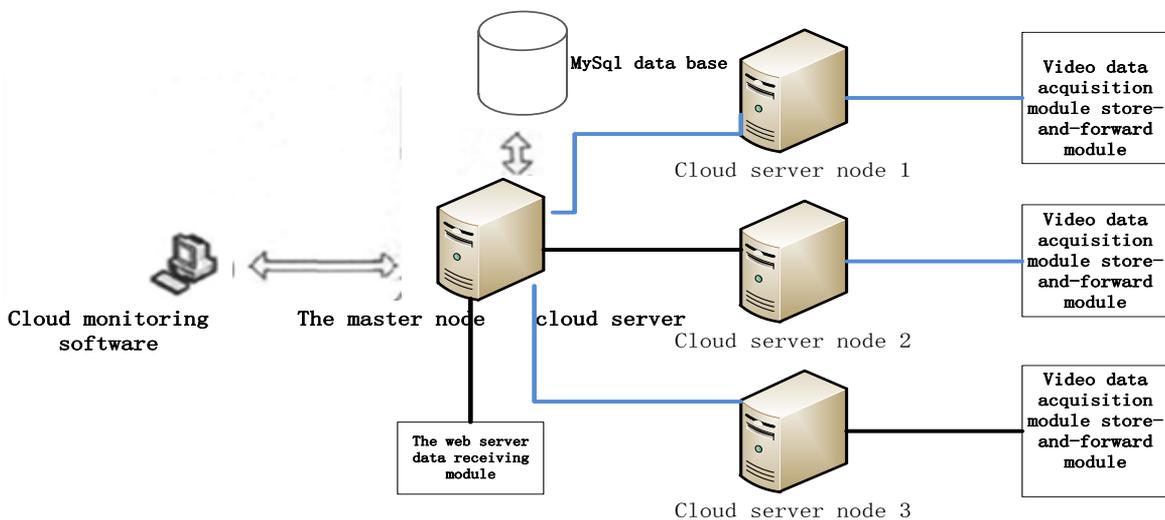


Figure 2. The cloud figure

The working process of the cloud server modules includes data acquisition module, data receiving module and video store-and-forward module. Cloud server client and mobile terminal transmission link effect, when a user login system need to input the user name and password (at this point has been registered to use username and password), register using TCP protocol, this time by the client software to the user information sent to the server for validation. After verification, the server will reply a confirmation to the client, if the input is correct, then open the system, or shut down the system. After entering the system, the user can select network cameras, then send video request to the server. When the client send video request, the server will start sending video data to the client. Monitoring process, the Android mobile terminal can set different channel to switch each other, when a user needs to shut down video transmission, he should firstly sends a request to the server, then close the client video playback thread, finally exit the program.

2.3 Mobile phone client

After login system: enter the system to enter the user login interface, then click the “register” jump to “user agreement” page. In the login page, divided into the public part of the action bar and main function of demonstration, the inside of the each input box need comments input format, after finish need to register in the user input user name, you need to identify whether the current user name can be registered user name. Adopted gestures password Settings, password is to prevent others to get the benefits of mobile phones for gestures after want to play the security software, as a result, the privacy of home.

Security system: when entering the security function interface, which contains the real-time video button, the alarm history button sets and equipment management. After click “real-time video” icon, the list of camera system access has been added, and real-time video can see. Through the real-time transport protocol (RTP) will be compressed video monitoring data sent to the mobile control terminal [4]. If you click on “offline”, “smoke”, “security” can view

the device offline respectively, infrared alarm, smoke alarm history record information (on the icon to show how many unread alarm information).

Offline Settings: who wants to offline Settings for the users, he only need to click on the home page “offline” icon below, entering the offline equipment list page. Captured picture for the display of information, users only need to click on the “image” in the history alarm records, then show a specific list of image information. When users click on the image button in the historical records, cell phone to see if local has the image, or send information to the APP server requests transmit images. After the server receives pic_index corresponding pictures transmitted to a mobile phone to the client.

Qr code scanning directly: add or remove, add or remove switch, alarm equipment to add or delete the lost devices can be used direct qr code scanning way, convenient, convenient and effective.

3. KEY TECHNOLOGY

With alarm, real-time monitoring, the main key technologies include three parts: cloud computing, mobile phone client message distribution technology, Internet penetration function.

3.1 Cloud computing technology

As shown in figure 3, NIST defines cloud computing as users can conveniently, on-demand access to a Shared resource pool through the network, network, servers, storage, applications and services, etc.), and with rapid deployment, minimum cost management or at least a new type of IT service provider of intervention operation mode. Cloud computing technology is on the server, storage and networking equipment such as hardware on the basis of the use of parallel programming, data management, distributed storage, virtualization technology.

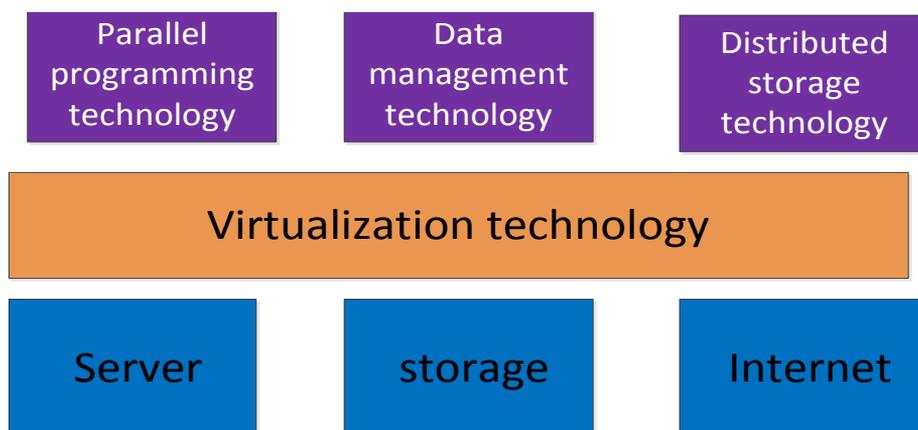


Figure 3. Cloud computing structure

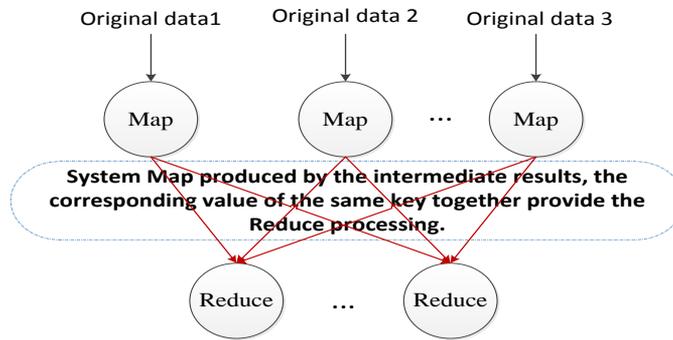


Figure 4. MapReduce Model

Parallel programming, the system USES is developed by Google graphs parallel programming model, the core idea of the model is a problem that will execute down into the Map (Map) and Reduce (reduction), as shown in figure 4, suppose you have M a Map and R Reduce operation, first through the Map program isn't related to divide data into blocks, the distribution of (schedule) to a large number of computer processing, to achieve the effect of distributed computing, to consolidate the results through the Reduce program output [6,7]. Using graphs to develop parallel processing application, you need to write two functions:

(1)The Map: $(in_key, in_value) \rightarrow \{(key_j, value_j) \mid j = 1 \dots K\}$; One input parameter in_key and in_value said Map to deal with the raw data, $(key_j, value_j)$ is the output of, is a result produced in the middle of the Map operation.

(2) Reduce: $(key, [value_1, \dots, value_m]) \rightarrow (key, final_value)$; The $(key, [value_1, \dots, value_m])$ is to Reduce the input parameters, Reduce the input parameters in the same key corresponding to merge the Reduce processing, eventually form $(key, final_value)$ results.

Distributed storage: cloud computing System adopts distributed storage data, using redundant storage way to guarantee the reliability of data, this System USES is that Google GFS (Google File System) File System, the System can be run on ordinary hardware, service for a large number of users with high performance.

Data management: the system adopts is that Google's BT (Big Table) data management technology, different from the traditional relational database, it put all the data are treated as objects, forming a huge table, used to store massive distributed structured data.

To a software application and the underlying hardware virtualization technology isolated, the technology of a single

resource can be divided into many virtual resources splitting patterns, can also be multiple resources integration into a virtual resource aggregation patterns.

3.2 Mobile client message distribution technology

Receiving and decoding of video data are complex and continuous process, blockages if one process will affect the operation of the entire program, as a result, the client using multithreading implementation data reception and parallel processing of the video decoding. In the process of the whole program is running the main thread in response to user operation, responsible for screen refreshes, and creates two child threads: data reception and video decoding the child thread.

In Java, there are two ways to implement the multithreading: extending the Java. Lang. Thread class or implement Java Lang. The Run able interface. Here through inheritance Thread class and overriding the run () method to realize two child Thread. The multithreaded applications is key to deal with the thread synchronization between the problem, access to the Shared storage area, in order to solve conflicts, to avoid cause thread and even the deadlock of the whole system. Java multithread mainly using the synchronized keyword and wait (), notify () method to realize synchronization between threads [8].

3.3 Network penetration function

The whole system by the server cloud of process, equipment, terminal and the client SDK, as shown in figure 5:

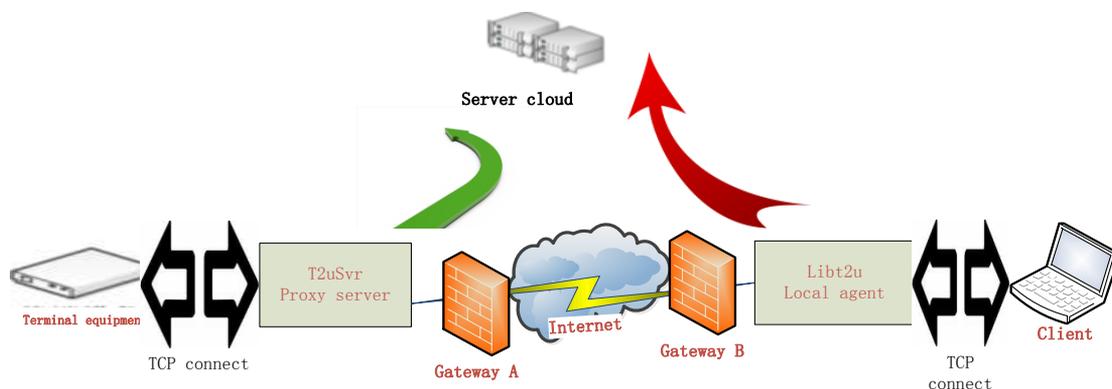


Figure 5. Network through the scheme

Because of the mobile phone and the camera IP address may have the same may also be different, mobile phones and mobile devices, video camera is fixed equipment, with mobile phone, IP address is also likely in constant change, to realize mobile phone can be real-time monitoring, at any time and place must be network transmission technique is used to solve this problem. Because T2U scheme can solve the problem of TCP NAT penetration, so can use this solution.

Libt2u is an implementation of the TCP through the gateway and the development of the P2P connection to the remote device library, it can not modify the original communication protocol, on the basis of the help terminal to realize P2P client and equipment directly connected. Can make equipment to achieve the effect of plug and play.

T2uSvr and Libt2u as two agent, running on the device and client, NA through the P2P technology to establish a connection between two agents, relying on independent research and development of UDP and reliable data transmission and data communication congestion control algorithm, combined with port forwarding technology, and realized to map any port of the remote device to local client. So don't know the device IP address, nor on the router to do port mapping, local port via a TCP connection to achieve the objective of the connected devices.

4. SYSTEM TEST AND RESULT ANALYSIS

At present, the system has been tested in the laboratory, the server of the output is the H. 264 video data, the client installed on the Android mobile phone, WIFI access in the wireless local area network (LAN) with the server connection is established, the real-time monitoring and alarm system test results as shown in the figure below:

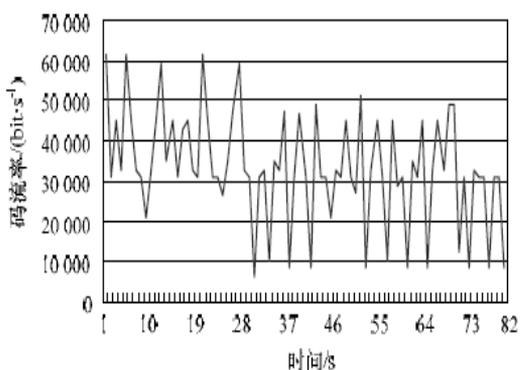


Figure 6. The change of code flow rate

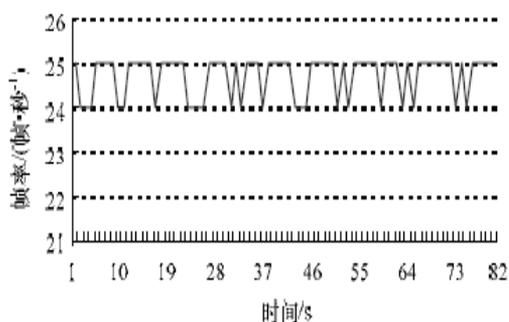


Figure 7. The change of the frame rate

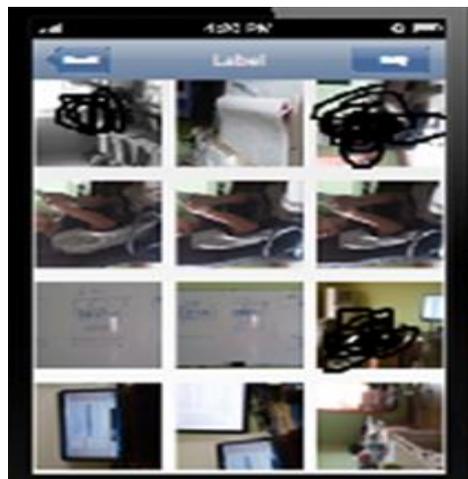


Figure 8. Alarm information records



Figure 9. Real-time video

5. SUMMARIES

In this paper, design and implementation of the mobile video surveillance system in the intelligent household design, the design is based on cloud computing and has the alarm function. Through the use of smart phones for mobile terminals, which is more convenient for the user can view the video in real time, the system has greater convenience, flexibility, mobility, for security has had a very good effect. It is the expansion of smart phones and the continuous development of corresponding technology. Mobile security market is growing and developing, and for mobile video monitoring, not only can be used in security, but also can be used in time to see inside the old man's family situation, the real time traffic information acquisition, a hospital patient's visit, and so on. Therefore, because the mobile video surveillance system is very convenient for the life of people and it can play a role, the market prospect is very big.

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