Monitoring Platform for the Material Warehouse

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Abstract: After investigating the current storage system, the S3C2440 processor with ARM9 architecture and a network video system is built. In this article, the JZ2440 development board is the control platform. Through the WIFI module, building a webpage interactive server on the Linux system, it can connect the mobile phone or other devices directly. So, the various monitoring data of the storage environment, including video information, temperature, humidity, and light intensity can also achieved through the Linux system. The real time system can control the operation of the fan to simulate the cooling in the storage environment.

1. Introduction

Material maintenance must follow the principle of "prevention first, combination of prevention" [1]. The temperature and humidity of the warehouse should be adjusted according to the performance and characteristics of the material and seasonal changes.

In recent years, the Internet technology has been widely used. So, the video surveillance plays a very important role in the monitoring system. Nowadays, there are two main types of video surveillance products that are used more frequently. One is a system with recording equipment and the other is a network video surveillance system with the embedded device [2,3]. In this paper, an IoT storage system based on the ARM9 Linux system platform is designed. The JZ2440 development board is used for the development system. The architecture of the entire software platform is completed, and the work of related system transplantation is implemented.

2. System architecture design

Linux system is used to build the software development environment of the project. The main hardware equipment includes the JZ2440 development board [4], the temperature and humidity sensor, DC motor fan, camera module and the WIFI module. The JZ2440 development board uses the S3C2440 microprocessor as the main control chip, which is developed based on the ARM9 architecture [5].

Based on the successful transplantation of the operating system, multiple threads are created to handle individual tasks and then inter-process communication and data interaction are implemented through PC. The board uses the kernel of Linux3.4.2, and the cross-compilation tool. The system structure is shown in Figure 1:

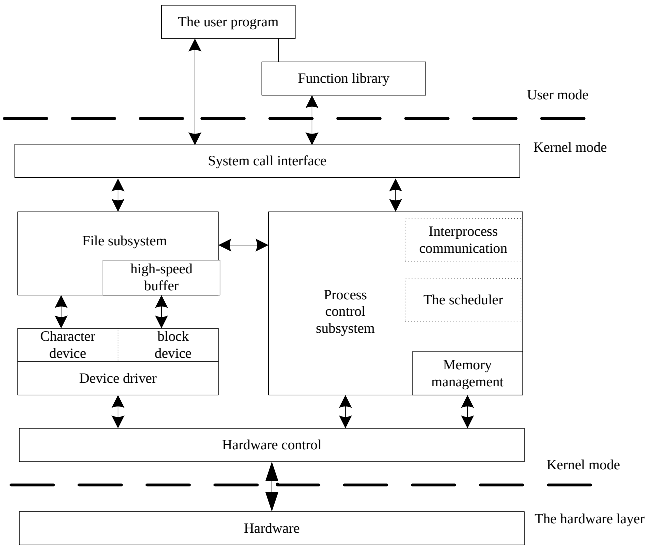

Figure 1. Linux system kernel structure

3. IoT monitoring system

3.1 System software framework

The scheme of the Internet of Things system is generally divided into three layers: application layer, network layer and perception layer. The ARM9 microprocessor equipped with S3C2440 of the system, some peripherals such as temperature and humidity, sensors, cameras, etc. are collected in the actual physical environment. Then the data was transmitted to the Web page. At the same time, the system connects the fan with the peripheral device to change the state of the environment [6,7], and finally connects a WIFI module. The mobile devices can be easily connected to the corresponding web page and obtain the data to control the hardware in the embedded system.

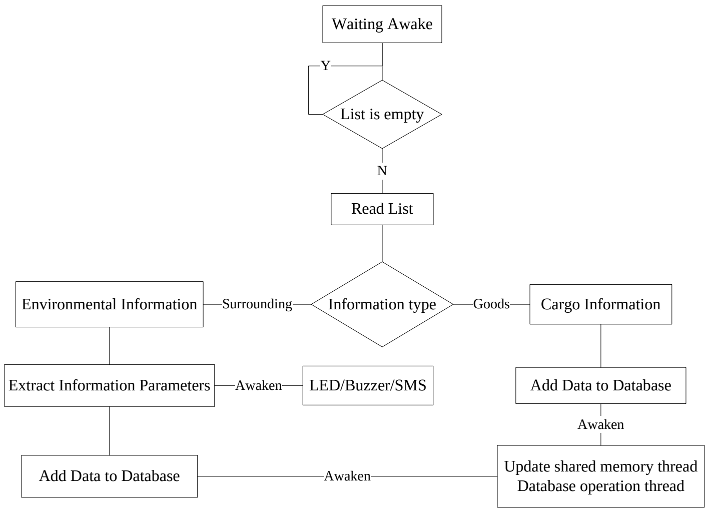

Figure 2. Flow chart of data analysis thread

It simulates the actual warehouse process, including extracting environmental information such as temperature and humidity, light, cargo information [8]. The cargo processing part records the warehousing and storage of goods through RFID technology [9, 10]. And then insert the data into the database for query and management. Although the cargo part is not implemented, these extensions can be easily implemented on this architecture. The specific process is shown in Figure 2.

3.2 Display of video images

Use function “xawtv” to test the camera in the Ubuntu virtual machine [11]. First shut down Ubuntu, open the service in Windows, and find VMware USB service [12]. After completing the above steps, open and enter the virtual machine, install the “xawtv” test software in Ubuntu, and view the camera device and execute the command ls / dev / video0. The presence test indicates that the Ubuntu virtual machine successfully recognized the camera device [13, 14], and then execute xawtv / dev / video0 can be tested. The test results are shown in Figure3:

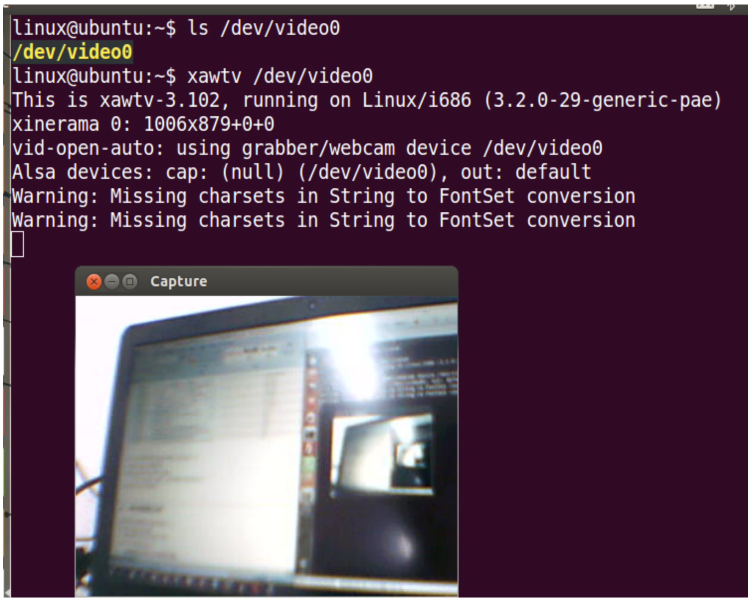

Figure 3. Test the camera in Ubuntu

4. Test Results

After running the BOA server and application, access the web page to view the data through the PC side. At first, starts the BOA server on putty and then run the MJPG-stream video streaming server. Secondly, starts the application, the user can enter the board on the browser and login in. it is showed as shown in Figure4:

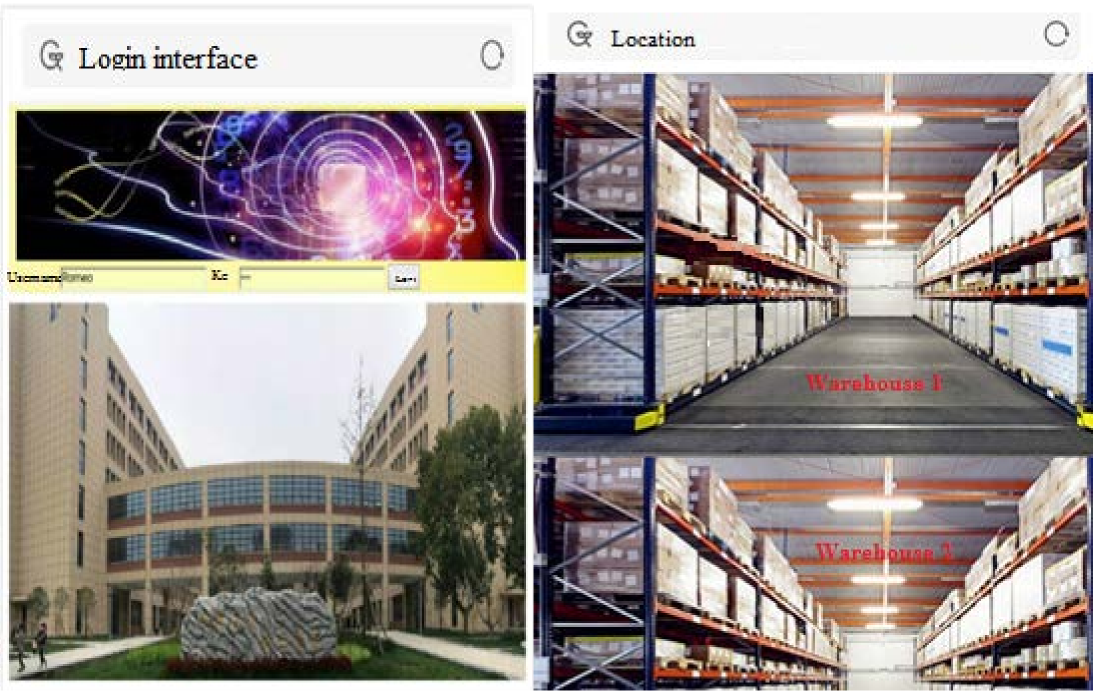

Figure 4. Service login interface

In the left of the Fig 4 is the login in interface. The user can select the warehouse in the main control interface. The right of the Fig 4 is the real-time monitoring part. The video stream data of the actual environment is captured and uploaded to the Web side. When log in to the PC, the effect in real time can be viewed in the right figure. The hardware control part mainly controls the operation of the fan to change the temperature in the warehouse. Then the system can open the LED to change the light with the dark atmosphere. The environment temperature and humidity information can be a control factor, when the temperature is higher than 30 degrees, the fan automatically runs. So, the system could automatically adjust the environmental information.

Conclusion

Based on the embedded technology, this article designs an IoT warehouse monitoring system, uploads the environmental data collected by the hardware platform to the web page through the BOA server. The user can view the environmental information in the warehouse at the remote end. When the user wants to change the environmental state, the user can also issue instructions on the Web page to control the operation of the fan to change the environmental state. When the temperature is too high, the system can also automatically run the fan to cool the environment. It achieve the effect of regulation and control, and the final design achieves the predetermined effect.

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