The Design of Oil Field Remote Monitoring System based on Improved B / S Structure

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Abstract—The design of oil field remote monitoring system based on GPRS and Internet technology can achieve unguarding oil field management and monitoring oil well data information real-time.The system has the function of auto-alarm for the manager who can treat it immediately when the oil leakage , and is designed on embedded system based on GPRS and Internet controlling system, combining B / S structure of remote control network and understanding data information of each oil wells.

Keyword: GPRS, Remote Monitoring System, Oil Field

1. Introduction

In recent years, with the rapidly development of global economy ,oil resources has become the world's most important resource, it is crucial to the normal operation of economy. Oil exploitation and oil wells management become a major concern ,however, oil fields often dstributes in the swamps and many other areas far from the cities and communications, the collection of oil and oil wells managing are very difficult .So the field of remote control system design become focus, the wireless communication based on GPRS-Internet is an efficient way to solve the problem . This paper tries to explore the design of remote control system based on the embedded system.

2. System hierarchy

2.1 GPRS remote control system technique

GPRS is based on GSM, sharing with the same base stations and spectrum resources, wireless modulation standard and jumpping frequency regulation. Using the exchange of technological, users can occupy resources only when sending or receiving data ,

Shareing with a radio channel between multiple users, improving the efficiency of wireless resource using, always on line, in meter charges, providing high-speed wireless IP and X.25 service. Its theoretical bandwidth can reach 171.2 kbt/s, practical using bandwidth is between about 40 to 100 kbit/s, providing TCP/IP service for internet connection in the channel.

2.2 System of network topology structure

Traditional B/S structure is an improvement to C/S structure, user interface can achieve powerful functions through a browser on client and server centre by web technology. B/S structure has a good open and can adapt to different platforms. Users can develop the server based on actual needing, but the structure of the client and server side is limited,.By the limit of browser itself ,it is less flexible than C/S structure for interface displaying ,data processing and so on.

This design adopts an improvement b/s structure combining with three layers of c/s structure and b/s structure , for security considerations, monitoring centre is not directly connected to the internet network,but through the web proxy server to establish the data link network and receive connecting datas. The monitoring terminal access the network proxy server accordding to a predetermined IP address in its internal or domain, through a proxy server and monitoring centre to set up TCP/IP link. The network layout structure of the system can see the Figure 1.
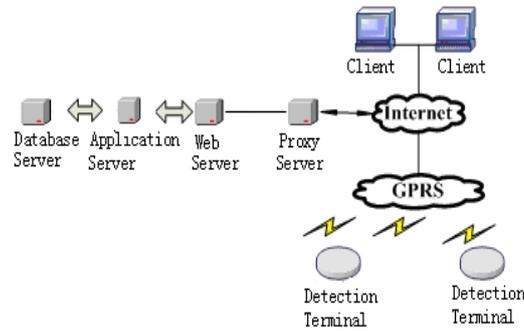
Figure 1.   Network layout structure

2.3 Oil wells monitoring terminal

The monitoring terminal is responsible for monitoring the information real-time and dynamicing transport, the administrator can detect the informations related to the oil wells by internet terminals. Monitoring centre includs web server document, application servers and database servers.

The monitoring terminal is composed with ARM processor，GPRS module and Sensors. The structure of the hardware can see Figure 2.
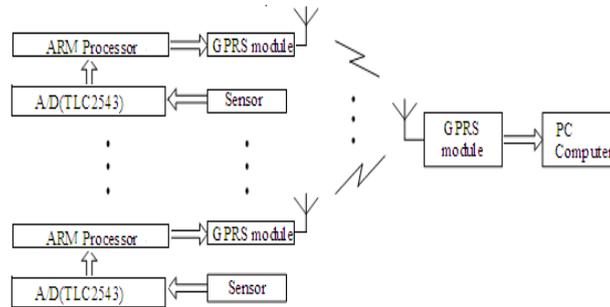

Figure 2.   Structure of the hardware

First , installing the relevant sensors in the relevant position of the well, sensors will transfer the collected datas to A/D part, than tranform datas from A/D part to Arm slightly controller. Arm slightly controller complete sensors data coding , TCP/IP encapsulate and senting to GPRS radio transceivers module, transferring datas to monitoring centre through GPRS wireless network, monitoring centre can analyse and process datas according to the needs. Monitoring centre is a computer connectting with the internet.,using the customer management software DRMC based on the development of the VC environment, achieving various monitors data are received, sended, displayed and managemented .

3.   The measurement of oil wells datas

In the recovery work，often needs to collect datas   including, pressure, traffic, temperature, work plan and so on., these datas are important information in the recovery work, reflects the work condition. This system mainly collectes   the   data of   the oil wells pressure and work plan.

A work plan is an important part of the oil wells parameter,it reflects the work condition of oil well and always reflects the curve of   well work plan through detecting   the load boom of   oil pole periodic motion in different displacement. The horizontal axis is the one time rod displacement, the vertical axis is one of the oil changed circumstances. Selecting pressure sensors to get a load of the data collected, measuring displacement through installing   smoke sensors in the bar.   Figure 3 is oil well work plan. The maximum load is 97.6 ,the smallest load is 18.4.Figure 4 is   the acceleration lines of the sensor.
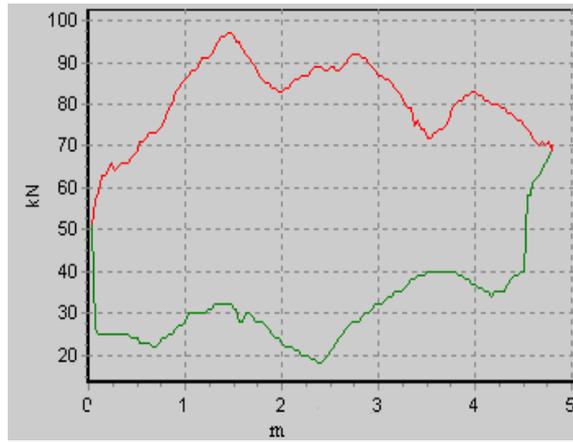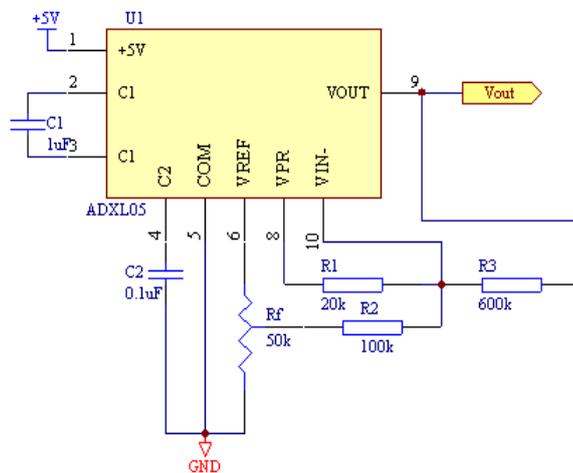
Figure 3.   Oil well work plan

Figure 4. The acceleration lines of the sensor

4. The design of Software system

The whole system functions includes, showing oil wells work data real-time, fast database looking up, convenient printout, working of the diagram shown in diagram, convenient system increasing capacity, calling the police automated, operating interface friendly, convenient and so on. This software system chart shown in Figure 5.
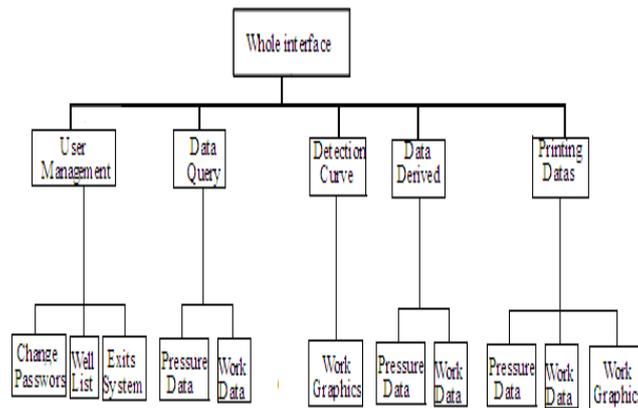

Figure 5.   Software system chart

User downloads the interface of the system would see the client window ,on the client side window, it can display the presure datas real-time, users management, historical datas view, monitoring curve, serial datas communication, datas derived, printing datas, and so the menu options.

13

5. The conclusion

GPRS remotting control system based on B/S structure uses a dynamic web pages way , on the basis of the existing network,using advanced technology to enhance system function, satisfied with the process of collecting. System development costs lower, easy to maintain, portable sexual strong, In the remote control system has been applied widely.

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