Design and Implementation of Continuous Monitoring System for Transmission Networks

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Abstract: This paper explains the power earth-line continuous monitoring system to reducing the fault resolving time and it monitors itself to. The system operates based on Browsing and Serving mode and includes three parts: detecting unit, remote observation unit and monitoring section. The remote observation point continuously detecting the line and then the data are transmitted to monitoring platform through the GSM message system (GSM SMS). In the system, operating conditions of the database are saved in the form of log file; intelligent fuzzy queries are supported; the data can be backed up; and the recovery functions are complete.

Key wards: Power earth-line · Detecting unit · Monitoring section · Transmitted to monitoring · GSM message system (GSM SMS).

INTRODUCTION

The power earth-line continuous monitoring system is a system that uses GSM communications network to receive, store and display the physical parameters of earth lines condition when the power lines are under normal or abnormal condition it sends message to monitoring section. The system is used to provide the help to reducing the fault resolving time to keep continuity in power supply. The large construction of power lines often have many measurement and control objects which are each separated by a certain distance but require. How to effectively collect and transmit data and then control and manage the whole procedure to ensure construction safety has a very important significance.

System Structure: In this paper, by using GSM SMS network we developed and designed the power earth-line continuous monitoring system based on embedded technology which monitors transmission line and by giving some in codeing programme it sends continious msg, which monitor kit it self to, Implementing the information management on the collection of earth-line state, Run mode configuration, SMS platform configuration, mail management etc. Whole system structure as shown in Figure 1: intelligent earth monitor is
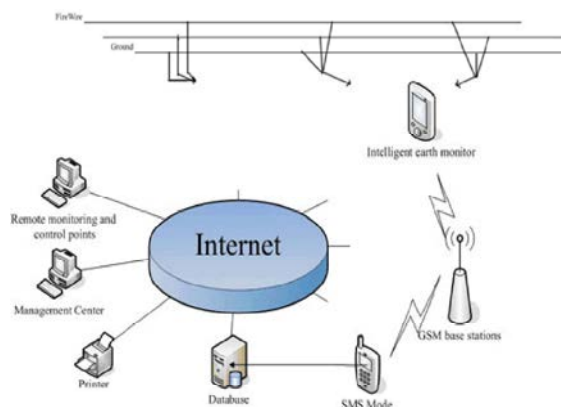

Fig. 1: Ground state of the power line remote monitoring system structure

to collect data, then GSM SMS transmits the received data to the database server. By setting up a connection among Internet, monitoring platforms and workstations, the database server monitors and verifies data. Each intelligent earth monitor is equipped with a message modem which is used to collect data via RS232 and a microcontroller 89C2051. The message modem transmits all kinds of SMS messages to the communication base stations which then communicate with smart phones. The SMS platform running in the workstation can

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bi-directional communicate with the staff's phones. This method improves the humanization and work efficiency of the system [1].

Related Work

At Instruction : [11]AT is the abbreviation of Attention.. AT instruction set is transmitted from Terminal Equipment (TE) to Terminal Adapter (TA) or from Data Terminal Equipment (DTE) to Data Circuit Terminal Equipment (DCTE) [5]. TE and DTE send AT instructions to control Mobile Station (MS) which interacts with the GSM network services. Users can use AT instructions to control Call, SMS, phone book, data services, fax and so on. In the early 90's, AT instructions only be used for Modem operation. At that time, there was no precedent on controlling mobile phone text messaging and only a protocol named SMS BlockMode was developed to use TE or computer to completely control SMS [2].

Microcontroller 89C2051: Microcontroller employs a small MCU 89C2051, introduced by Atrnel Company, which contains 2 KB of Flash program memory and 128 B of the on-chip RAM. 89C2051 has 20 pins, shown in Figure 2. The 8 pins in P1 port, which working voltage are $2.7 \sim 6$ V, can be used as general quasi-bidirectional ports and have strong pull-down capacities. When the working voltage is at 3 V, the current is equivalent to $1 / 4$ of that when the working voltage is at 6V. When the microcontroller is idle, the current is 1mA and only 20nA when it is power-down. The low power consumption is very suitable for small battery-powered light control system. Microcontroller 89C2051 has three main features. The first is that, it uses Flash storage technology; the second is its software and hardware are fully compatible with MCS-51; and the third is that the program is electrical erasable. These main features of microcontroller make the development and experiment comparably easier [3].

89C2051 has a very high Performance Price Ratio. Compared with the 80C31, 89C2051 do not need to add additional two chips of 74H373, 27C64 to access the same function and is price-reasonable in the view of the circuit board area and encryption. When compared with the PIC microcontroller, although the price of 89C2051 is higher than that of the OTP type of PIC, but significantly lower than that of the EPROM type of PIC. 89C2051 has a watchdog as its weakness, but its terminal system, stack structure, serial communications capability and timer systems are all stronger than those of the PIC system. More importantly, 89C2051 with standard serial ports but none in PIC controller, can be used in the large-scale networking [4].
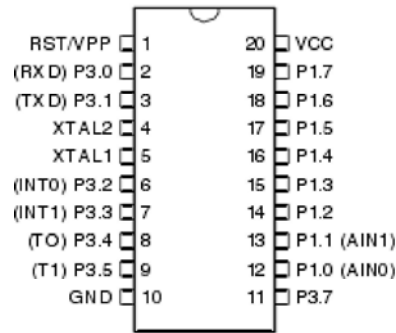

Fig. 2: 89C2051

System Design

Intelligent Earth Monitor: The controller and the message modem in intelligent earth monitor connect with each other via the serial port RS232 which are TX, RX and GND. The connection of network labels of TX, RX and GND are shown in Figure 3, 4. Because their working voltage are different from each other, MAX3232 level conversion chip is used to achieve the level conversion. MCU Parallel I / O ports are separately connected with the three-phase power lines through the network label P1.1, P1.2 and P1.3 [3-5]. If the three -phase power lines and three-phase earth-line are detected to be connected, the intelligent earth monitor will show earth state. If the three-phase power lines and three-phase earth -line are detected to be disconnected, the monitor will show off state. In both states, 89C2051 transmits state data to GSM data transmission module through the serial port [4] and then the GSM data transmission module sends state data in the form of short messages by using GSM network. The remote receiver receives state data via GSM data transmission module and then using monitoring platform to receive and sort the data before these data are sent into the monitor host in monitoring center.

System Implementation: The Microsoft.Net2005 is used in the design of system monitoring platform; Assembly language is employed by intelligent earth monitor to control programming; Crystal Report 9.0 is chosen to be used in the statement design software; Microsoft SQL Server2005 is employed in the database design. The system uses MD5 to encrypt key data and any operation in the system will be saved in the operating log for query [6-7]. Some of the implementations of functional program are given below:

The Program Flow Chart of Intelligent Earth Monitor: When the intelligent earth monitor detects that the three-phase power lines and the three-phase earth-line are
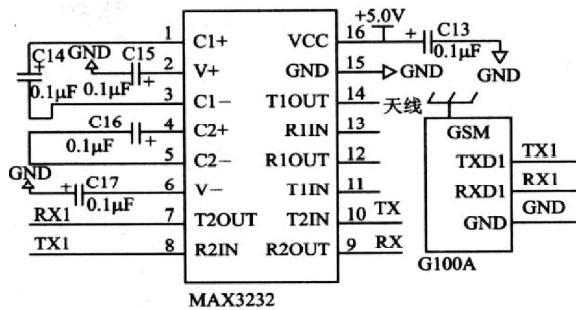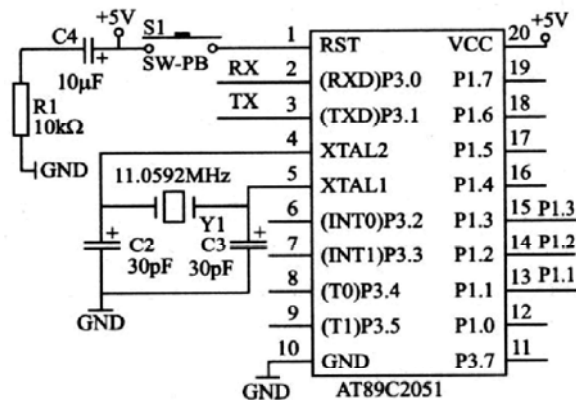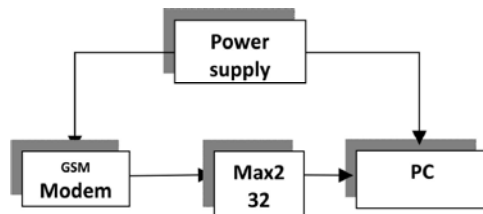
Fig. 3: Level converter circuit

Fig. 4: MCU control circuit

connected, it shows earth state. When the three-phase power lines and three-phase earth-line are detected to be disconnected, it shows off state. In both states, 89C2051 transmits state data to GSM data transmission module through the serial port and then the GSM data transmission module sends state data in the form of short messages by using GSM network. The remote receiver receives state data via GSM data transmission module and then processes them through MCU before they are sent into the monitor host in monitoring center via RS -232 port [6-8]. In the monitoring center, earth information is shown by the "Service monitoring program".


Block Diagram
Block Diagram(monitoring System)
The Program Flow Chart of Intelligent Earth Monitor: when the intelligent earth monitor detects that the three-phase power lines and the three-phase earth-line are

connected, it shows earth state. When the three-phase power lines and three-phase earth-line are detected to be disconnected, it shows off state. In both states, [9-14]89C2051 transmits state data to GSM data transmission module through the serial port and then the GSM data transmission module sends state data in the form of short messages by using GSM network. The remote receiver receives state data via GSM data transmission module and then processes them through MCU before they are sent into the monitor host in monitoring center via RS -232 port [6-17]. In the monitoring center, earth information is shown by the "Service monitoring program".

Relation Between Graph Sheet
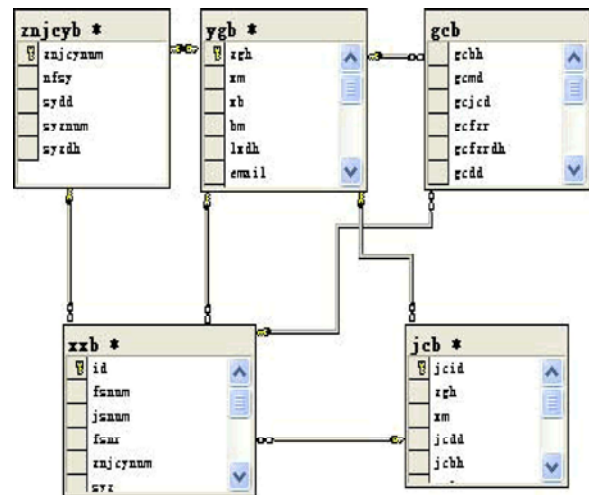
SQL Server 2005 Database Connection: Dim SqlConn as new SqlConnection 'Define a database connection object SqlConn'
Dim ConnStr as String 'Define a database connection string'
ConnStr=" Server= MyServer; Database=JCPT;UID=sa; PWD=****** ;" 'Set connection string of the database connection object
SqlConn.ConnectionString=ConnStr 'Set the database connection string'
SqlConn.Open() 'Open the database connection object'

Send SMS: If Adodc1£®Recordset£®RecordCount=0 Then
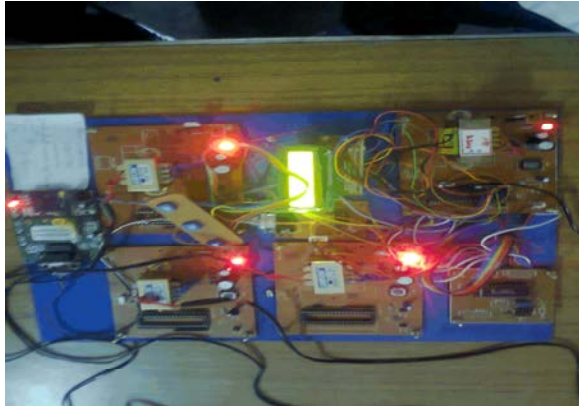MsgBox"You select at least one record !",," error"
Else
Form_BulkSMS£®Show
Form_BulkSMS£®Adodc1£®RecordSource=Adodc1£®Re cordSource
Form_BulkSMS£®Adodc1£®Refresh

Form_BulkSMS£®List1£®Clear 'Clear the list box'
If Form_BulkSMS£®Adodc1£®Recordset£®RecordCoun
Then
Form_BulkSMS£®Adodc1£®Recordset£®MoveFirst 'Move
to the forefront of record set'
Do While
Form_BulkSMS£®Adodc1£®Recordset£®EOF=False
Form_BulkSMS£®List1£®AddItem Form_BulkSMS£®

Adodc1£®Recordset£®Fields("name")&""
Form_BulkSMS£®Adodc1£®Recordset£®MoveNext 'Move
to the next record'
Loop
End If
Form_BulkSMS£®txt_msg£®text=Form_JBXX£®txt_msg£®Text
End If
End Sub
D. PICTURIOL VIEW

CONCLUSION

This paper explaines a power earth-line continuous monitoring system which is based on browsing and serving structural model and uses GSM SMS network to transmit datas. The collection of power earth-line state data, the information transmission and the monitoring unit. After implementing hardware design of intelligent earth-line monitoring system and software design of the platform for the monitoring center, we conducted system integration, operation and testing. The results showed that: the system works stable and it can successfully collect data and count work progress. So far, this system has been using in a power company in Fuyang, Anhui province and it has made about 600 thousand Yuan benefits.

REFERENCES

1. Xiao Jinqiu, 2004. Principle and Interface Technology of single-chip. Beijing,, Tsinghua University Press, pp: 388-395.
2. Jingnan Tang and Guoqin Shen, 2008. Development and Examples of C language of 51 single-chip. Beijing, Posts & Telecom Press, pp: 295-301.
3. Beijing Jie, 2004. Mai Tong Communication Co. Ltd. G100A. Product Data Sheet, Beijing, pp: 5-8.
4. Chen Faguo, Chen wei and Huang Qiuyuan, May 2006. GSM communication in the water level detection system", Microcontrollers & Embedded Systems, 325: 124-133.
5. Sun Caiyun, Zhao Yuandong, Gao Chao, May 2007. The Realization of Remote Water Rate Gathering System. Microcomputer Information, 65: 1520-1523.
6. Long Ma Studio, V.B., 2008. NET 2005 Programming. Beijing, Posts & Telecom Press. ch12: 404-410.
7. Chun-lin, G.E. ZHOU Jie, May 2008. Mobile Communication Station Monitoring System based on PLC and SMS Technique of GSM", Communications Technology, 45: 224-228.
8. Wang, Y.I. and Zhou Jie, May 2008. Design & Realization of Remote Monitoring System of Greenhouse Environment by Using GSM", Modern Electronics Technique, 22: 350-353.
9. WANG Lixia, ZHOU Jie and CHEN Suting, Feb 2009. Automatically off-hooking system for experiencing mobile communications products", Journal of Nanjing University of Information Science & Technology(Natural Science Edition), 15: 168-170.
10. Chen, S., B. Mulgrew and P.M. Grant, Design of a RS232 serial port communication for singlechips with PC, Foreign Electronic Measurement Technology, 625: 1124-1127.
11. Vijayaragavan, S.P., B. Karthik, T.V.U. Kiran Kumar and M. Sundar Raj, 2013. Analysis of Chaotic DC-DC Converter Using Wavelet Transform, Middle-East Journal of Scientific Research, ISSN:1990-9233, 16(12): 1813-1819.
12. Vijayaragavan, S.P., B. Karthik, T.V.U. Kiran Kumar and M. Sundar Raj, 2013. Robotic Surveillance For Patient Care In Hospitals, Middle-East Journal of Scientific Research, ISSN:1990-9233, 6(12): 1820-1824.
13. Vijayaragavan, S.P., T.V.U. Kiran Kumar and M. Sundar, 2013. Study of effect of MAI and its reduction in an OCDMA system, Middle-East Journal of Scientific Research, ISSN:1990-9233, 16(12): 1807-1812.

14. Vijayaragavan, S.P., T.V.U. Kiran Kumar and M. Sundar Raj, 2013. Study of Effect of Mai and its reduction in an OCDMA System, Middle-East Journal of Scientific Research, ISSN:1990-9233, 15(12): 1803-1808.

15. Pattanayak Monalisa and P.L. Nayak, 2013. Green Synthesis of Gold Nanoparticles Using Elettaria cardamomum (ELAICHI) Aqueous Extract World Journal of Nano Science & Technology, 2(1): 01-05.

16. Chahataray Rajashree and P.L. Nayak, 2013. Synthesis and Characterization of Conducting Polymers Multi Walled Carbon Nanotube-Chitosan Composites Coupled with Poly (P-Aminophenol) World Journal of Nano Science & Technology, 2(1): 18-25.

17. Parida, U.K., S.K. Biswal, P.L. Nayak and B.K. Bindhani, 2013. Gold Nano Particles for Biomedical Applications, World Journal of Nano Science & Technology, 2(1): 47-57.