

The Excitation Controller Based on the Android System Record Download APP Research

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ABSTRACT

This paper introduces the use of mobile terminal equipment in the excitation controller of synchronous motor intelligent system based on Android, and realizes the remote transmission and monitoring function and procedure of synchronous motor excitation controller online data download function.

CCS Concepts

•General and reference → Design • Information systems → Data warehouses • Information systems → Mobile information processing systems • Hardware → Emerging architectures • Hardware → Digital signal processing • Hardware → Hardware-software codesign • Hardware → Memory and dense storage

Keywords

Excitation controller debugging; Android APP; Wave record; Communication; download.

1. INTRODUCTION

This software (file name: LSTECTERMINAL.APK) is to realize synchronous generator excitation controller debugging and remote monitoring based on Android system and Internet technology. The APP is suitable for mobile phone and tablet computers carrying the system of Android 4.0 and above. It has functions of recording and downloading the synchronous motor microcomputer excitation controller online. It can also be used to monitoring remote data under mobile phone network.

2. PROJECT DESCRIPTION

2.1 The Project Differs from the Regular APP

The difference between development of this project and traditional Android end cell phone APP is that the final purpose of this project and traditional Android end cell phone APP is that the

final purpose of this software is implementation of serial real-time communications between Android cell phone and excitation magnetic regulator. In software developing process, we need not only know developing environment of Eclipse, but also know the hardware principle and process: excitation magnetic regulator sends and receives data through serial. We need to design the appropriate data receiving and sending function in Android system. Finally, the function of recording and downloading the controlling software of excitation magnetic transfer machine can be implemented using cell phone.

2.2 Design of FT232 Serial Communication for Android System

Since Android phones don't have direct communication with serial, we need to use U-turn to wiring of serial produced by the corresponding chip ft232 of excitation regulator of cell phone can be achieved with the direct link. So we need to use ft232 system provided by ftdi chip Android side of the driver and library functions.

2.3 The Main Content of the Design

System design and development : Including the front page, real-time data acquisition and processing.

2.4 The System Debug

After the programming provided by the eclipse Android static visual Device Manager for software debugging, by directly connected to the Controller, real time recording and dynamic debugging of the software program download.

3. THE CONTENTS OF THE PROJECT

The project is divided into 3 modules. The hyper-terminal feature, recording capabilities, software downloads feature three main modules of excitation regulator, under the three major modules and integrated data, viewing the files, online help function module, the specific organization chart shown in figure 1 below:

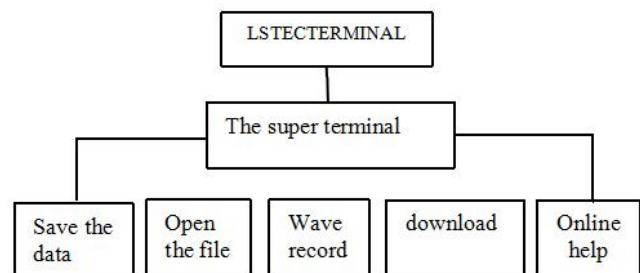


Figure 1. Organization chart

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In figure 1, LSTECTERMINAL the name of the software for the project, hyper-terminal feature implemented into the software main page, the following small module is the function of the corresponding module, which recorded modules and Software Downloads module as the main feature of excitation regulator module. The following main to the specific design of the two function modules are described.

3.1 Was recorded Wave Function Module

The so-called was recorded wave, is regulator gets the entire excitation magnetic system run process in the various workers conditions big data, excitation magnetic regulator reserved a serial to external device, external device by the appropriate software will excitation magnetic regulator serial send data gets and the appropriate resolution processing, that a series of response excitation magnetic system real - time workers conditions data, such as machine end voltage, and excitation magnetic current, and no work power, and active power, and control corner wait data, from access to data analysis of excitation magnetic system whether normal work, for next excitation magnetic debug and development work lay the basis. Recording function module chart is as follows Figure 2:

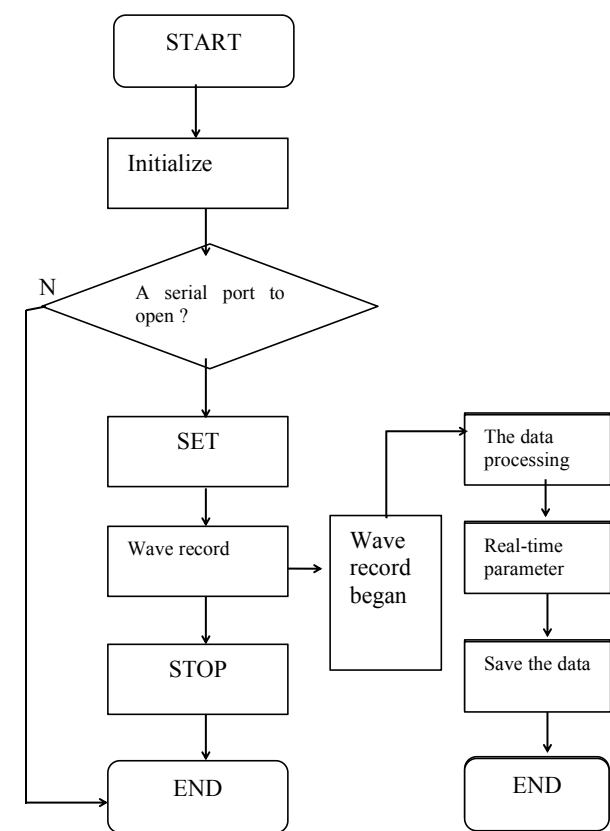


Figure 2. Recording function module chart

You can see from the flowchart, recording function modules of the main functions of the Implementation of Serial port switch is set, the serial set of related parameters, recorder switches, data is saved, the more difficulty and is the most important of these is received from the Controller serial port on the software side for secondary analysis of data processing procedures. Because sending out data from the serial port is 16 hexadecimal values,

and data needs to be read at any time, data errors exist, the possibility of missing data, and require the data for the second time check and reverse process of encoding. This is the problem to be solved by the data processing function in the system. In the actual development of the software first?

3.2 Program Download Module

Excitation magnetic regulator is Maintain the entire excitation magnetic system normal run core is located, which regulator core part is its central processing unit, here with TO is arm embedded chip, control the entire regulator normal run is exist chip in the embedded program, the so-called program download function is by cell phone end and regulator serial connection, use must be technology means, will this embedded program by serial write to the appropriate arm chip in the, write process must guarantee program integrity and correctness, this to guarantee the entire regulator normal run, to guarantee excitation magnetic system normal work.

Until then, the regulator control program can only be initialized with PC Connection or later update, such as Debug or developers at work caused some inconvenience benefit, implementation of mobile - terminal regulator program download function will allow debugging work with developers to become more flexible and more convenient.

Program download the flowchart shown in the following functional modules Figure 3:

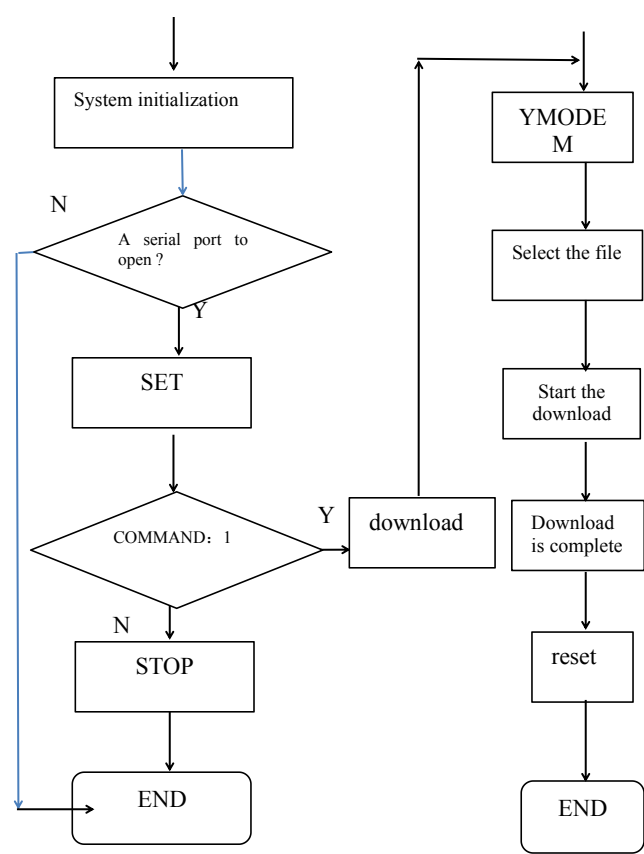


Figure 3. Program download the flowchart

You can see from the flowchart, download function modules of the main functions of the Implementation of Serial port switch is

set, the serial set of related parameters, commands, download protocol implementations, this is one of the more difficult and the most important thing is to download the process of implementation of the Protocol of the YMODEM Protocol. Is select the YMODEM protocol for File Transfer Protocol because of the lower computer or regulator end-to-end file receives. The agreement also YMODEM Protocol.

In software the actual development in the, the same need open a new thread, in software run process in the at any time Listening serial send data, just the Receive data is excitation magnetic regulator be set waiting for download data command state data, the thread will responsible for will data from serial send data real - time read and save to data buffer, waiting for system further processing, in system in the thread for inherited thread class private class read thread{ }, use com.ftdi.j2xx. In the hyper term package provides a library of functions ftdrv. Read (read data, iavailable), enables real - time reading of serial port data. Mobile end receives the data sent to the serial port " Send to send file,2 to cancel 1 " ; once the mobile end to the regulation.

YMODEM Protocol is the same as xmodem-1k plus batch file transfer a file transfer protocol (also known as YMODEM batch).It's faster than standard XMODEM, and send the name of the file before sending the data. YMODEM-g without recognition or error - free channels can be transferred when the modem self - correction, but in the event of transfer errors will cancel. It is evolved by the XMODEM Protocol, can reach 1024 bytes per packet data, is a very efficient File Transfer Protocol.

First look at the below YMODEM protocol transmission complete handshake: look at the picture below Figure 4.

SENDER	RECEIVER
"sending in batch mode etc."	"sb foo.*<CR>"
SOH 00 FF foo.c NUL[123] CRC CRC	C (command :rb)
SOH 01 FE Data[128] CRC CRC	ACK C
SOH 02 FE Data[128] CRC CRC	ACK
SOH 03 FE Data[100] CPMEOF[28] CRC CRC	ACK
EOT	ACK
EOT	NAK
SOH 00 FF NUL[128] CRC CRC	ACK C
	ACK

Figure 4 YMODEM Header Information and Featuree

Figure 4 in the SENDER: the SENDER. RECEIVER: the RECEIVER. The first step by the receiving party first, send a character 'C' sender after receiving the 'C', to send the first frame data, content is as follows :SOH 00 FF FOO.C NUL[123] CRC.

1 byte SOH: it means the package data area size of 128 bytes. If the head for STX said this package data area size of 1024;

Number 2 bytes, 00:, the first a pack of 00, the second package of 01, the third package for 02 accumulation in turn. Continue to increase from 0 to FF;

3 bytes FF: radix-minus-one complement number. Number of 00 FF, corresponding to 01 corresponding FE, and so on;

If the last two bytes to 4 bytes: 1 byte for SOH, there were 128 bytes, you have 1024 bytes for STX, the area is divided into data. "FOO.C" filename, super terminal, after the name of the file and the file size. After the file name and file size, if less than 128 bytes, fill in.

The last two bytes: note here, only data part involved in the effect of CRC check, not including the head and the coding part. 16-bit CRC efficacy, high byte before, and the low byte in the back.

The receiver received after the first frame data packets, an ACK correct response. Then send a 'C' characters. The sender, after receipt of the 'C' start sending the second frame, in the second frame data storage is the first packet of data. Receiver after receiving the data, send an ACK and then wait for a packet of data is transferred to an ACK response. Until all data transfer is completed. Data transfer is completed, the sender sends EOT, receiver with NAK response for the first time, second confirmation. After the sender receives NAK, resend EOT, receiver received a second end, with an ACK response. The final receiver to send a 'C', the sender in the absence of the second file to transfer, send the following data SOH 00 00 FF ~ (128) CRCH CRCL receiver response after an ACK, officially ended data transmission.

The above part, basic operation process for the YMODEM protocol.

Above the YMODEM protocol become the guiding ideology of the software program download function, download function in the design program of file transfer thread to follow this agreement, the design flow chart of the entire thread as shown below Figure 5:

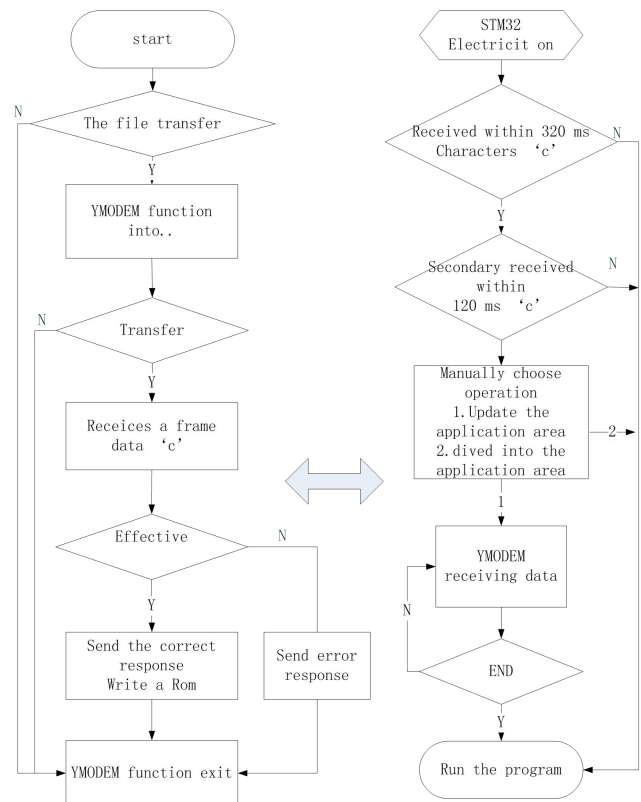


Figure 5. Design flow chart of the entire thread

A serial port receives the data and write data to the ROM, both can be synchronized. This allows maximum effective use of the CPU. For instance receives a frame of 1024 data, the time used $\text{time} = \frac{1}{\text{current baud rate of single character}} (1024 + 1 + 2 + 2 \text{ coding head CRC}) = \frac{1}{115200} * (1024 + 1 + 2 + 2) = 89.323 \text{ ms}$.

Also is in receiving the 90 ms or so, at the receiving end of the next frame during this period, you can put on a frame of data written into the ROM. A serial port receives the data as a way to interrupt, so write basic pay to synchronous operation. The whole process is as shown in the above process.

Since then, another major function of the software program download function is complete.

4. THE PROJECT SUMMARY

Project is in the current The Most Popular cell phone move end based on Android environment software development, system use Google company free provide Android SDK (Android software development tools package), Sun Company free provide jdk (Java language software development tools package), and ftdi company provide ft232 series chip Android end driven program, reality excitation magnetic regulator system need, from serial receive data The appropriate processing and conversion, implementation of regulator was recorded wave function, From the phone at the same time the regulator control Chip program through the serial port in the YMODEM file transfer protocol to the ARM chip, procedures for the establishment regulator download functionality. For excitation regulator facilitated the work of debugging and development personnel, excitation regulator for the future with mobile more closely linked to establish a good basis, to achieve a

more comprehensive communication protocols on the mobile side made possible, so as to truly realize the remote control for excitation system has opened up a new road.

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