Application of botu software in industrial automation control fieldbus course

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Abstract: the industrial automation control fieldbus involves the information and data transmission between two or more programmable controllers. This paper uses botu integrated automation software and Siemens s7-1200 PLC to introduce in detail how botu software realizes the application of Modbus communication technology and PROFINET communication technology in the industrial automation control fieldbus course.

Key words: Siemens s7-1200 PLC; Industrial automation control Fieldbus

Introduction: Poter integrated automation software is widely used in industrial automatic control, in which Modbus communication protocol and PROFINET communication protocol are widely used in the design of industrial automation fieldbus. This paper will introduce in detail the use of Siemens s7-1200 PLC and Poter software to communicate, transmit and read data with other communication equipment with two typical examples.

1. Modbus communication case

1.1 Modbus protocol

Modbus communication protocol is widely used in the communication between electronic devices. It is a serial communication protocol established in 1979. It has no copyright restrictions, can be freely published and used, and is easy to maintain. Especially important is that it allows multiple electronic devices to connect to the same network at the same time for communication, such as through the upper computer, We can monitor the readings of the thermometer and hygrometer at the same time, and we can use this protocol to read the readings of the two instruments into the upper computer.

In this case, we will take the Modbus RTU serial connection mode as an example to introduce in detail how to establish a communication connection with the intelligent temperature PID regulator through TIA POTU software, and read and monitor the temperature measured by the intelligent temperature PID regulator through Siemens s7-1200 PLC.

1.2 Introduction of temperature intelligent PID regulator

Xmt62x instrument is a new generation of intelligent automatic regulating instrument, which adopts advanced microcomputer chip and technology. It can be used together with various sensors, transmitters, etc. only through panel key setting. This regulator adopts the mature intelligent P1D control algorithm that has been used and optimized for a long time, and has strong adaptability to most control objects. Its new fault control strategy will further improve the safety of the control system. It can be widely used in petrochemical, heat exchange, heating, water supply and metallurgy, food and other industries to measure process parameters such as temperature, pressure, liquid level, flow, etcDisplay and precise control. This instrument has transmission output and communication functions, and can be easily connected to the computer or PLC to realize remote control.

1.3 Application examples of Modbus RTU communication course

Modbus RTU communication carries out data transmission in a master-slave manner. In the process of transmission, the Modbus RTU master station is the active party, that is, the master station sends a data request message to the slave station, and the Modbus RTU slave station returns a response message. In this example, the communication module cm 1241 RS485 is used as the Modbus RTU master station.

Set up a new task in POTU software, configure the communication module, find "communication module" → "point-to-point" → "cm1241 (RS485)" in the hardware directory, double-click or drag the module to the left of the CPU. After the hardware and software are configured, click "command" → "communication processor" → "MODBUS" to directly call "mb\u comm\u load" and "mb\u master" or "mb\u slave" commands, and the temperature display instrument will communicate with Siemens 1200plc master station as a slave station.

Select cm1241 (RS485) module with the mouse in "device view", and configure the hardware interface parameters of this module in "properties" → "port configuration". Set the transmission rate =9.6kbps, parity = no parity, data bits =8 characters, stop bits =1, and others remain the default. Confirm the hardware identifier. The hardware identifier is automatically assigned when it is configured. In this example, the hardware identifier is: 271.

In the program of botu software, call the "mb\u comm\u load" instruction. When calling the "mb\u comm\u load" command, the interface for creating the corresponding background data block will pop up automatically. Click OK to edit the footmarks of the command. After the instruction call is completed, the address is assigned to each input / output pin of the instruction. Pay special attention to MB_The DB input pin must point to the background data block of the "mb_master" command. After the instruction is called, you need to input or select parameters at each pin. You can use the help function of botu software to call out the meaning of each pin parameter, and then make specific settings.

After each pin of the instruction is defined, you also need to create data_PTR data sending and receiving buffer is used to receive data sent by intelligent temperature PID regulator. The specific operation is to create a DB block through "program block" → "add new block", select "data block (DB)" and mark the meaning of the data. The data sent by the intelligent temperature PID regulator is received as a decimal place and a series

of temperature related figures. We need to process these two data before it can be changed into the same temperature as the intelligent temperature PID regulator. As shown in Figure 1, it is the data received from the intelligent temperature PID regulator.

Sensor data

		name	data type	offset	Starting value	keep	Available from	from H--	in the HM---	Setpoint
1		▼ Static				☐	☐	☐	☐	☐
2		■ Temperature PV	Word	0.0	16#0	☐	☑	☑	☑	☐
3		■ Temperature decimal point	Word	2.0	16#0	☐	☑	☑	☑	☐
4		■ 3	Byte	4.0	16#0	☐	☑	☑	☑	☐
5		■ 4	Byte	5.0	16#0	☐	☑	☑	☑	☐
6		■ 5	Byte	6.0	16#0	☐	☑	☑	☑	☐
7		■ 6	Byte	7.0	16#0	☐	☑	☑	☑	☐

Figure 1Data sent by intelligent temperature PID regulator collected by PLC

In botu software, call the "mb\u master" instruction, and when calling the instruction, the corresponding background data block will be automatically created. Click OK. This data block is the footmark MB in the "mb_comm_load" command_The data block to which the DB pin points.

Call MB_After the master communication command, assign parameters to the input and output pins.

Similarly, the meaning of the instruction pin can be retrieved and set with the help of botu software.

After the program is written, it is downloaded to Siemens s7-1200 PLC and set to run mode to open real-time monitoring. At this time, the PLC reads the current temperature PV value and decimal value, which are 235 and 1Actual temperature value = current temperature PV value /10 (one decimal point), i.e. 23.5 ℃, is the current temperature. At this time, using botu TIA software, Siemens s7-1200 PLC and intelligent temperature PID regulator, through MODBUS-RTU serial port communication mode, PLC reads the real-time temperature in the environment, which is the typical application of MODBUS-RTU communication protocol mode in the field bus course of industrial automation. Similarly, it is also applicable to the communication between a series of electronic devices such as humidity regulator and PLC.

2. PROFINET communication case

2.1 PROFINET communication protocol

PROFINET is based onIndustrial Ethernet TechnologyAutomation control bus standard based on. PROFINET communication protocol has a wide range of applications. It can not only be used by various electronic equipment suppliers, but also be compatible with the current Ethernet automatic control and the field bus technology previously invested.

In the course of industrial automation fieldbus, the mutual settings of Cognex insight2000 industrial intelligent camera and Siemens s7-1200 PLC are cited to introduce the application of PROFINET protocol in industrial automation fieldbus. Because of its high reliability and high integration, it is widely used in industrial automation control.

2.2 Introduction of intelligent vision system

In this course, Cognex insight2000 series smart cameras and software are used. The camera settings are described in detail below.

In-sight2000 vision system is an independent vision system with compact structure and direct networking. The system is suitable for automatic detection, measurement, product recognition and robot navigation applications in factory workshops. All models of the vision system can be easily configured remotely via the network using an intuitive user interface.

2.3 Camera composition

(1) Camera lens, white light source, protective cover;

(2) Camera body, CPU, status indicator;

(3) Ethernet interface;

(4) I/o, RS232, 24V DC power interface;

(5) Manual key.

The Ethernet cable is used to connect the vision system and other network devices. The Ethernet cable can connect a single device or multiple devices through a network switch or router.

IS2000 camera requires in sight Explorer version 5.5.0 and above. Double click the shortcut icon , open the software. After configuring the local IP address, set it in Cognex software, modify the camera IP address and host name, and connect the camera. In setting the shape and position of the object to be recognized, it is necessary to set the shape, color and position of the object to be recognized, and then set the trigger method when recognizing the object

2.4 Application examples of PROFINET communication course

This course introduces the configuration method of PROFINET communication between Siemens s7-1200 PLC and Cognex insight2000 camera.

Figure 2 insight2000 camera

First, configure the network of Cognex camera, click "sensor" and "network settings" in the software menu bar to open the "network settings" dialog box; Enter "hostname: insight", select "PROFINET" for "industrial Ethernet Protocol", and click "Settings".

(1) After clicking save settings, configure the camera for communication. In the "application steps" area, click "communication" and "add

device"; (2) Select "plc/motion controller" for "equipment", "Siemens" for "manufacturer", "PROFINET" for "Protocol", and click "OK".

2.4After the camera configuration is completed, the Siemens s7-1200 PLC needs to be configured. Double click Open botu software, click "create new project", enter "project name", select the save path, and click "create" new project. Click "device configuration", "add new device" and select "controller", "SIMATIC s7-1200", PLC attribute setting. "Under" device view ", select the added PLC," attribute "," general "," PROFINET interface "," Ethernet address "," add new subnet ", and enter the IP address and subnet mask. The IP address should be in the same network segment as the camera, as shown in Figure 3.
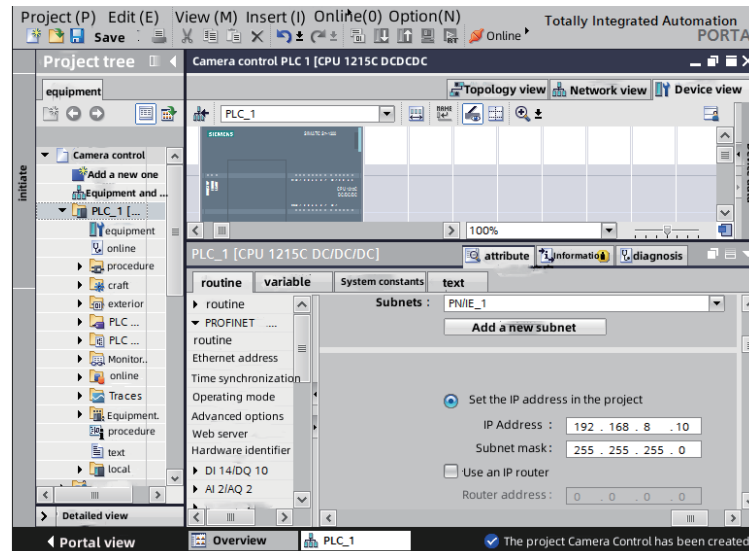

Fig. 3 PLC attribute setting

(1) After installing the camera GSD file, configure the camera in botu software. Double click "device and network" to open "network view"; (2) "Hardware catalog", "other field devices", "sensors", "Cognex vision systems", drag "in sight 2" ×××"To "network view";

Click "unassigned" and select "plc_1" to indicate the connection with PLC_1 carry out PROFINET communication, set the camera properties and IP address, which are consistent with the IP address set in the camera, configure the i/o address of camera communication, select "plc_1" under "network view", and click "download to device" to download the PLC configuration.

After that, the communication between PLC and smart camera is tested, and the real-time data transmitted by the camera can be read in real time through botu software. Add PLC variable, "PLC variable", double-click "default variable table", and enter the variable and name of communication data;

Monitoring variables, "monitoring and enforcement table", double-click "add new monitoring table", double-click the new "monitoring table \u 1", enter the variables to be monitored, and click "monitoring".

Compare whether the data received by the PLC is consistent with the data sent by the camera. If the data is consistent, it indicates that the camera and the 1200 PLC successfully send data through PROFINET communication.

3. epilogue

Through two course examples of industrial automation fieldbus, we can see that both Modbus communication protocol and PROFINET Industrial Ethernet complete solution are widely used in today's industrial control communication field. In particular, PROFINET communication protocol can not only realize the functions of real-time data transmission, processing and monitoring, but also be compatible with previous communication protocols. In the course of industrial automation fieldbus, more application cases will be introduced to enable students to have more and deeper experience of modern industrial automation fieldbus control.

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