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The Design and Implementation of Intelligent Microgrid Monitoring System Based on WEB

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Abstract

With the development of Internet and information technology, the traditional Microgrid environmental monitoring system operation is not stable. This paper designed an intelligence remote monitoring system based on Web. The system used B/S architecture to realize real-time monitoring and adjusting the value of the environment factor data. Besides, the system controlled the equipment and collected the data. This monitoring system was stable and strong, and had wide application prospect in the remote data acquisition and transmission, remote monitoring and so on.
Keywords: Web; Remote Monitor; Intelligent Systems; Microgrid

1. Introduction

At present, the power system and Microgrid in China is in a new stage that transform from traditional style to high reliability and high efficiency. Besides, Microgrid security and state of DGs are closely related to light intensity or other environmental factors. [1]DGs in different state need stay in a suitable circumstance that can be monitored. With the development of computer network and intelligent automation technology, automatic and precise monitoring of Microgrid information has become an important part. In recent years, the traditional motoring method collected data by the lower computer send data to the host computer through the serial port, then releasing controlling instruction. [2]This kind of monitoring method has many shortcomings, failing to serve multi users or extend.

Nomenclature

DG	Distributed Generator

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With the development of computer network and embedded technology, the monitoring technology has been improved rapidly, and the monitoring system has been gradually developed from the centralized monitoring to the remote intelligent monitoring systems. Based on embedded and Web server technology, this paper designs and realizes the intelligent remote monitoring system from the lower computer by the wireless network to the Web server. In the part of lower computer, make the Arduino board as the control core, and add the Ethernet network module, realizing the function of data acquisition and data wireless transmission. In the part of host computer, apply the Java technology under the Eclipse environment, based on the module of design principles and JFinal development framework. Then design the monitoring system of Microgird through the browser and server (B/s) mode.

2. Framework of system

The system is mainly composed of data acquisition layer, data transmission layer and application layer. Data acquisition layer main role is obtaining the environment factor data through Arduino board and sensors or other hardware equipment. Data transmission layer is mainly sending the environment factors to the web server's IP address and storing them in the database by Arduino Ethernet W5100 network module. The main function of the application layer is to achieve real-time remote data monitoring and control of the implement part based on the framework of JFinal and the information system of host computer combined B/S architecture.[3-4]

3. The hardware design of system

3.1. The hardware design of data acquisition layer

Data acquisition layer is responsible for the intelligent control of Microgird environment data and equipment. It is made up of control unit, temperature sensor, light sensor, Ethernet W5000 module and controlling composition. Control unit taking the Arduino Leonardo board as the control core, collects the environment data of illumination, temperature, humidity, carbon dioxide and other factors through sensors, which connects to Ethernet W5000 module by wireless mode. Then using logic circuit control equipment to ventilate and fill light. The overall design of the data acquisition layer is shown in Fig. 1.

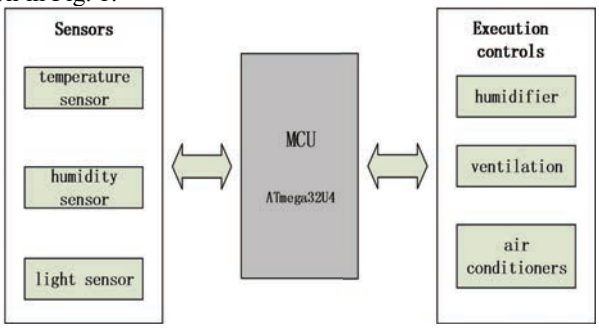

Fig. 1 Design of data acquisition layer

3.2. Design of transmission layer

The transmission layer is responsible for transferring the collected Microgird state data to the specified server. Hardware equipment is mainly composed of Leonardo Arduino control board and ethrnet W5000 network module. After determining their MAC address and IP address, the software uses get or post method to transfer the data to the specified server through wireless mode.