Sensors State Monitoring based on LabVIEW and Wireless Nodes

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Abstract

Sensors state monitoring is vital especially in alarm system or mining monitoring system. Traditional monitoring method by wire communication exists poor reliability and short transmitting distance. This paper designs a sensor state monitoring system based on LabVIEW and wireless nodes. RF905 wireless module, single chip microcomputer, serial bus and LabVIEW are used in the system. Experiment results show that LabVIEW program can remote monitor the sensors state real-time and accurately.

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Keywords: Wireless communication; LabVIEW; Serial ports; Sensors State monitoring

1. Introduction

LabVIEW software from NI company is programmed by visual graphic G language which is more intuitive concise compared with traditional text. In order to save expensive Data Acquisition Board cost and remote monitor the sensors state, this system use LabVIEW serial port module for communication between PC and SCM (Single Chip Microcomputer). In the paper the communication mode of RF905 wireless module is studied. Data are sent and received by 905 module during SCM drive program running. The detailed alarm interface made by LabVIEW software is also described. Lastly program is accomplished by calling the labview serial port module and reading MCU data through RS232 serial interface to judge that the sensors work correctly or not.

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2. System Work Principle and Hardware Circuit

System diagnostic principle are shown as Fig.1. Sensors state can be transmitted by wireless communication and their conditions are shown in LabVIEW interface by indicator lights. RF905 module is chosen as transceiver module, and 905 transceiver works at the ISM band of 433/868/915MHz. The module as Fig.2 is made up of a power amplifier, a crystal oscillator and a regulator composition. It is easy for programming configuration through the SPI interface. Current consumption is low. When transmitting power is -10dbm, emission current is 10mA and receiving current is 12.5mA. Powerdown mode into electricity can be implemented easily.
3. RF905 Module Transceiver Program

RF905 as data transmission medium, it works at ShockBurst mode. ShockBurst technology can provides high-speed data transmission without need of expensive high-speed MCU. The high-speed signal process realtion to RF agreement can be done in chip [1]. RF905 provides a SPI interface to micro controller. RF905 with ShockBurst mode reduces the average current consumption by reducing chromaticity of digital application part during maximum rate connection process. In ShockBurst RX mode, address matching and data ready signal inform MCU to automatically generate leading yards and CRC checking code, data ready signals inform MCU that data transmission has been completed. The process of RF905 sending and receiving data are as follows.

4. Serial Debugging

Before making LabVIEW interface, we debug the serial with MCU-tools, then different data are shown respectively by a string form[2-3]. As shown in follow four figures, 32 bytes for a cycle, when one or a few sensors make mistakes, 8bits of the last byte show different value, then sensors’ states can be monitored and displayed.
5. LabVIEW Test and Discussion

LabVIEW calls data from MCU by using a serial port module[4-5]. The working condition of serial parameters must be the same as the microcontroller program. A visual interface is made to timely show every sensor state.
Fig. 9 shows the whole monitoring program including initialization, reading serial port and the serial data from microcontroller. Fig. 10 is the monitoring interface and the lights indicate that eight sensors states timely. If sensors work normally, the lamps are lighted, otherwise go out.

6. Conclusions

This paper puts forward a new way of sensors states monitoring based on LabVIEW and wireless nodes. Wireless module transmits data, then wireless station by microcontroller collects data and sends them to the wireless terminal. It is more economical that LabVIEW can read data by a serial port than the traditional data acquisition card. Experiment results show that the system is reliable and accurate, so that it can be applied in many fields such as explosion-proof performance requirements higher or remote alarm system.

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References