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基于无线传输的粮仓温湿度远程监测系统

Remote detection system of granary temperature and moisture based on wireless transmission

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中文摘要:

该文设计了一套基于ZigBee无线传输方式的粮仓温湿度远程监测系统,有效地解决了目前粮仓粮情监测系统存在的布线困难、扩展性差和成本高的缺点。该系统采用CC2430芯片搭建ZigBee星型网络,网络中的ZigBee设备以TI公司的Z-Stack为基础进行软件设计。ZigBee终端节点承载了粮仓温湿度数据采集的基本功能,并通过ZigBee网络将数据发送给ZigBee协调器,协调器通过RS232串口将数据传送给服务器。并且系统在服务器机上配置了数据库服务和WEB服务,远程粮仓管理员可以通过http服务访问服务器,查询粮仓的温湿度数据并控制粮仓的温湿度采集,从而取消了对粮仓管理员工作地点的限制。该文采取试验对该系统进行了验证,系统的温度误差在 $\pm 0.4\%$ 范围内,湿度误差在 $\pm 1.0\%$ 范围内。研究结果表明该系统数据传输正确、可靠同时具有实时性好、可靠性高以及耗能低等优点。

英文摘要:

A remote detection system of granary temperature and moisture was designed based on ZigBee technology to resolve problems such as wiring difficulties, poor scalability and high cost which exist in the traditional monitoring systems. CC2430 chip was used to build the Zigbee star network and every ZigBee device software was designed based on Z-Stack which was made by TI company. Basic function such as temperature and humidity data acquisition was completed by the ZigBee terminal node. The data was sent to ZigBee coordinator by ZigBee website service and moisture coordinator sent data to server by RS232 serial. Moreover, database and web services were configured in the server to storage data and provided http service for remote PC. Workers can check temperature and moisture data and then control data acquisition from remote PC by http service. The correction and reliability of communication data were verified. The experiment showed that the temperature error was less than $\pm 0.4\%$ and humidity error was less than $\pm 1.0\%$. The results showed that this system not only transmitted data accurately and securely, but also had advantages such as better real-time, higher reliability and lower energy consumption.

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