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基于无线传感器网络的农田土壤温湿度监测系统的设计与开发

刘卉[1],汪懋华[1],王跃宣[2],马道坤[1],李海霞[1]

1.中国农业大学 精细农业研究中心，北京100083；2.清华大学 理论计算机科学研究所，北京 100084

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摘要

根据农田环境的应用需求，设计了农田土壤温湿度监测系统，该系统由农田无线监测网络和远程数据中心两部分组成。采用以JN5121无线微处理器为核心的传感器节点开发策略，构建基于ZigBee协议的无线监测网络；采用ARM9微处理器S3C2410，基于嵌入式Linux开发的网关节点实现数据汇聚和GPRS通信方式的远程数据转发。远程数据中心的管理软件FieldNet采用了数据库管理模式，并通过应用ESRI嵌入式GIS组件库ArcEngine进行监测数据的实时变化和空间变异分析。系统的设计开发为精细农业时空差异性与决策灌溉研究提供了有效工具。

关键词 农业工程 土壤温湿度监测系统 无线传感器网络 ZigBee 精细农业

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Development of farmland soil moisture and temperature monitoring system based on wireless sensor network

Liu Hui[1],Wang Mao-hua[1],Wang Yue-xuan[2],Ma Dao-kun[1],Li Hai-xia[1]

1.Research Center for Precision Agriculture, China Agricultural University， Beijing 100083, China; 2.Institute for Theoretical Computer Science, Tsinghua University, Beijing 100084, China

Abstract Wireless sensor network technology can provide optimal and integrated solution to distributed data collection, delivery and analysis in farmland. An in field soil moisture and temperature monitoring system was developed which meets the application requirement in farmland environment. This system consists of the soil monitoring wireless sensor network and remote data center. In the wireless sensor network, the sensor node is developed using JN5121 module, an IEEE 802.15.4/ZigBee wireless microcontroller. The sink nodes for aggregating and dilevering network data is based on ARM9 processor platform in order to meet the requirements of high performance. A GPRS module is integrated into the sink node for long distance communication. In the remote data center, the management software running on the host computer is developed for real time data receiving and logging based on database management method. It also uses ArcEngine, an embedded GIS developer kit to realize on line spatial analysis of in field data. This monitoring system may provide an effective research tool for spatial analysis and for irrigation decision making in precision algriculture.

Key words agriculture engineering soil moisture and temperature monitoring system wireless sensor network ZigBee precision agriculture

DOI:

通讯作者 汪懋华 mhw@public.bta.net.cn