

Development and Application of a Farmland Test Data Processing System Designed for Wireless Sensor Network Applications

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Abstract. Data collected by measuring farmland environmental indicators are vital sources of agricultural information. Wireless sensor networks (WSNs) have been employed to acquire stable and real time farmland environment data. WSNs, recognized as one of the latest development trends, recently attracted widespread attention and application due to their relative economy, stability, and sophistication. In this study, based upon a large amount of WSNs-obtained data, Microsoft Visual Studio 2005 and ESRI ArcGIS Engine 9.3, amongst others, were utilized to develop a farmland test data processing system, resolve information storage and utilization problems and conduct system applications. The data processing software consisted of four modules: data receiving conversion, database maintenance management, data browsing analysis and the generation and application of data spatialization outputs. Specifically, the data receiving conversion module was mainly responsible for converting raw data acquired by WSNs into standard database outputs, including the automatic reception of measured value, error correction and alerting the observer to abnormal data. The Database maintenance management module's primary functions were the generation and maintenance of metadata generated from stored data, authentic data enquiry, display and analysis. The generation and application of data spatialization products module was principally for the spatial expansion application of measured data, including space-time interpolation and conversion. The system underwent pilot scale testing and improvement at the same time as undertaking the processing of real data collected by WSNs deployed throughout the Hebi test zone. The observed results revealed that the system was able to complete real-time conversion and management of field measured data. In addition, it has several advantages, such as, excellent stability, perfect functionality and a convenient human - machine interface.

Keywords: Wireless sensor networks (WSNs), Measured value, Monitoring.

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