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基于物联网Android平台的水产养殖远程监控系统

Aquiculture remote monitoring system based on IOT Android platform

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中文摘要:

为了促进江苏省智能农业的发展,该文开发了一种基于物联网Android平台的水产养殖远程监控系统,实现了对多传感器节点的信息(pH值、温度、水位、溶解氧等环境参数)远程采集和数据存储功能,实现了对多控制节点的远程控制。系统不受时间地域限制,用户可以在任何具备网络覆盖的地方从手机上浏览并获取数据,将数据从数据库中导出到用户的SD卡上,以TXT格式存储,系统多手机用户客户端可以共享一台服务器,具有很高的性价比。系统采用CC2430作为底层管理芯片,控制部分采用模糊PID控制算法,系统通过在江苏省溧阳长荡湖实验基地系统的实际调试,各项指标均达到要求,温度测量精度达到0.5℃,pH值测量精度达到0.3,溶解氧的控制精度在±0.3 mg/L以内,水位波动控制在平均±1 cm左右,能够满足水产养殖的需要。

英文摘要:

Abstract: With the rapid development of modern science and technology, the application of the Internet and of technology in Intelligent Agriculture has become more and more widespread. In this paper, a kind of aquaculture remote monitoring system based on the Internet Android platform is introduced. Using the system with many sensor nodes, information (such as pH value, temperature, water level, dissolved oxygen and other environmental parameters) can be collected remotely by many kinds of sensors (such as a pH sensor, temperature sensor, water level sensor, and dissolved oxygen sensor), and then the analog data collected can be transformed to be digital data. The digital data can be sent to an Android mobile system by socket communication. In the Android mobile control interface the data received from pound can be exported into a SQLite database, and the data in the SQLite database can be exported into a SD card and stored in the format of TXT. The filename stored is formed with the information from the time when the TXT file is saved (such as year-month-data-hour-minute-second) in order to avoid the problem of having the file overwritten by a file with the same name file. Therefore, the user needs not designate the name of the saving TXT file. To the Android application, many control nodes can be controlled remotely. The system adopts CC2430 as the underlying management chip. Temperature measurement accuracy of the system can reach 0.5℃. In addition, pH measurement accuracy of the system can reach 0.3. A good control algorithm can achieve good control precision. In our system, in order to obtain more control precision, an intelligent fuzzy PID control algorithm is applied in the remote MCU control system. Dissolved oxygen is a very important parameter in aquiculture. In the system dissolved oxygen control precision can be controlled within ±0.3 mg/L. Moreover, the SOKCET communication is designed in an independent thread to the system. Thus, the reaction of the control system is very sensitive. The function of the system is not limited by time, regional, and climate conditions. The interface of the application is designed in the Android Mobile phone, so the user can handle the application flexibly and conveniently, and the user can browse data from the mobile phone, send remote control commands, and control the bottom water, pump water supply pump, and aerator in any location with an Internet connection. The IP address is exported into a SQLite database, so the IP data can be obtained automatically from the database by the system after the application is started, and it does not need input from the user repeatedly. Many mobile phone clients of the system can share a single server. Thus, the system has a very high price-performance ratio. After practical testing of the system in the Changdang Lake experiment area in Liyang, Jiangsu province, the indicators have reached the requirements, and the control effect of the system is very good. The system has the advantages of simple operation, fully able to meet the need of aquaculture.

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