Available online at www.sciencedirect.com

SciVerse ScienceDirect

Procedia Engineering 15 (2011) 2469 – 2473

Procedia Engineering

www.elsevier.com/locate/procedia

Advanced in Control Engineeringand Information Science

Wireless Environmental Monitoring Device

Rui Jiang*, Yaqi Xu, Zhen Huang, Zheng Ma

School of Electronic Information, Wuhan University, Luoyu Road No.129，Wuhan, 430079, China

Abstract

This wireless environmental monitoring device is based on the principle of binary Amplitude Shift Keying (2ASK). Under the control of ultra-low-power single-chip microcomputer MSP430F449, the device can detect the temperature an light around it. The detect system consists of monitoring terminal, detecting nodes and coupling coils. In the mode of UART asynchronous communication, the device can realize the function of wireless data transmission with the carrier of 8MHz. Monitoring terminal and detecting nodes are both applied on the same transceiver circuit. The transmitter achieves 2ASK modulation by using the keying method. The receiver achieves 2ASK demodulation by using the envelope detection method. Detection nodes are battery powered.It can preset code, detecting the ambient temperature and light, and then transmit the message automatically. The absolute error of measured temperature is below 2 ℃, and the absolute error of power consumption is below 0.2W. Monitoring terminal uses one single power supply. It can communication with the detecting nodes directly, and display the node number and the detected information. In the condition of detecting delay is below 2S and detecting range D + D is above 50cm, the supply power of the monitoring terminal ≤ 0.5W. The whole system has simple circuit, low power consumption and multifunction.

Keywords: ultra-low-power SCM; 2ASK; UART asynchronous communication; keying method

1.Introduction

As the requirements of monitoring the surrounding environment increases, the durability, interference immunity, accuracy, and the efficiency to transmit data of the environmental monitoring

* Corresponding author. Tel.:+8615072351911
E-mail address: jiangrui@whu.edu.cn

1877-7058 © 2011 Published by Elsevier Ltd.
doi:10.1016/j.proeng.2011.08.464

devices are very valuable. One important application of sensor networks is environmental monitoring, which involves the use of several sensornodes scattered over a target field, such as a dam or a bridge. In particular, the wireless sensor network (WSN) enables easy construction of such a monitoring system because of the flexibility of wireless communicationtechnology.

This subject requires a Ultra-low power consumption design of environmental monitoring simulation device, in order to achieve the information surrounding temperature and light. And the main contributions of this paper are summarized as follows.

First, this paper considers the optimization of system design:the system sustainability

of Rui Jiang. Tel.: +8615072351911; E-mail address: jiangrui@whu.edu.cn

the sensor nodes are taken into account in terms of the selection of source coding, modulation and the carrier signal generator selection mode in addition，through the use of constantly adjusting the sample-judgement voltage In demodulation end which Reduces the bit erro rate, the immunity from interference of ASK modulation mode is strengthened):The system is very simple, practical and convenient.

Second, this paper gives the test methods and results of the system in the actual test including:

Test of the preset number of the detecting node;Test of collection of the ambient temperature and light information;Test of communication between the monitoring terminal and the detection;Test of forwarding information automatically;Test of power of the monitoring terminal and detecting nodes

2. Related Work

Many designs of Clock Module in recent years of Wiress Environmental Monitoring Device are mainly focused on Active timing chip which ,however, does not apply to long-term work system with High

power consumption.Whereas by using MSP430F449 MCU internal 8MHz clock signal as the carrier signal, a stable crystal frequency is provided with system power consumption effectively reduced.

DF Wireless Data Transceiver Module is Commonly used in the data transceiver module.In this mode ,to ensure system stability, PT2262 and PT22742M are used for data encoding and decoding. However, the data can be converted in this way is limited in number of bits and the complexity of the system is increased.

Achieveing source coding and decoding in the method of inductive coupling and UART asynchronous communication. Such code is very flexible and can automatically work from any kind of low-power mode.

In general,such system,which is low-cost and stable, with low power consumption and perfect function ,but achieved advanced environment monitoring, will have more advantages in the application in future.

3. System overall design

The system consists of a monitoring terminal and two detection nodes. While the monitoring terminal transfer instruction to the detecting nodes, the source address and destination address are