The Trapping Device Implementation of Wireless Sensor Network

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Abstract. Organic agriculture is an important direction of modern agriculture development, and the biggest problem encountered in organic agriculture is the weather factor, thieves and pest problems. In this paper, we adopt wireless communication technology, micro-computing and energy saving solar technology to solve all of these problems. This system used the wireless sensor network (WSN) microcomputer judgment and wisdom of energy saving solar technology to solve all of these problems, such as the humidity, and light intensity. The purpose was to monitor the parameters of the current farm's environment.

Keywords: Organic agriculture · Wireless communication · Micro-computing · Solar technology · Wireless sensor network (WSN)

1 Introduction

Organic agriculture cannot use pesticides, the use of net house cultivation way, been able to avoid large-scale insect pest, but the use of net room cultivation, pests and diseases is still one difficult issue to face the farmer.

So we combined the internet of things (IOT) which any objects can be connected to the internet for information exchange and communication in order to achieve the objects intelligent identification, location, track, monitor and management, according to the agreed protocol, through wireless sensors such as RFID, ZigBee, Bluetooth module.

In this paper, the system is divided into the insect, anti-theft and Soil testing three functions, this function mainly through some interviews after organic farming operators set direction. We hope to reduce agricultural pests while allowing farmers about soil conditions and immediate prevention of illegal mining is not a bad guy or animals.

2 System Block Diagram and Flowchart

Figure 1 is the block diagram of the system. This system will be divided into two kinds of hanging and insert mode, we are using solar panels to light signals into electrical signals to detect whether the night and turned on the UV LED for insect phototropism were catching insects. Table 1 is the system specification.

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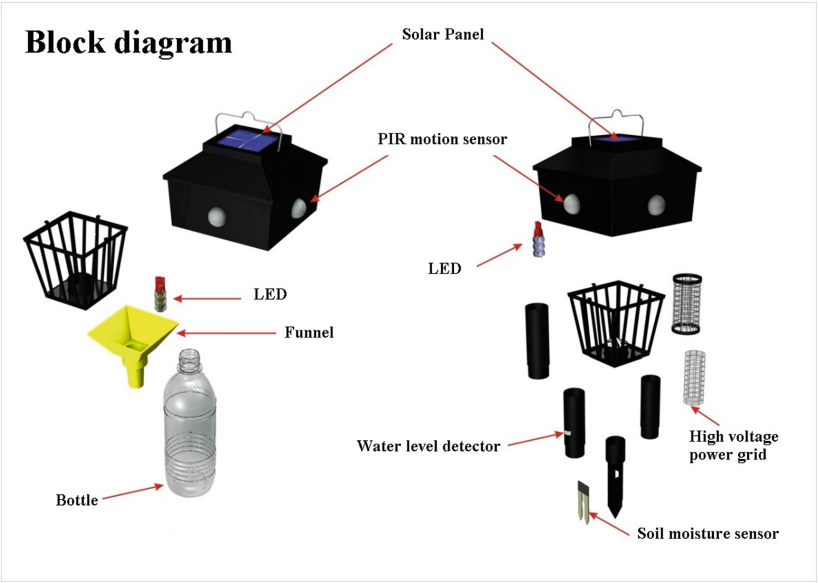

Fig. 1. The block diagram of the system

Table 1. The system specification

	Specification	Remark
Solar panel	4 V 0.14 W	Piece
Distance	200 m	ZigBee
Battery capacity	600 mAh	NiCd battery
PIR motion sensor	Wavelength 750 nm ~ 25000 nm	Pyroelectric component
Soil moisture sensor	2.4 V to 5.5 V	SHT10
Length × Width × Height	150 mm * 150 mm * 450 mm	

Operational processes as shown in Fig. 2. Mainly, electricity provided by the solar cell to the battery, then power from the battery to the following three loops.

Anti-theft system section is the use of PIR motion sensors for a period of 10 s to determine whether there are thieves invaded, if the alarm is activated and send message to user by Zigbee; Soil detect the utilization of soil moisture is detected for a period of 30 min to determine whether the soil is too dry; Solar panel for a period of 30 min to determine whether the brightness is weak, if open LED attracting insects device utilizing optical properties tend trapping pests.

As show in Fig. 3, the system uses solar energy to provide electricity. The device is placed in the farm, one to absorb sunlight store electricity, and secondly, PIR motion sensor was used of theft. Alarm is activated and send message to user by ZigBee network, if through PIR motion sensors.

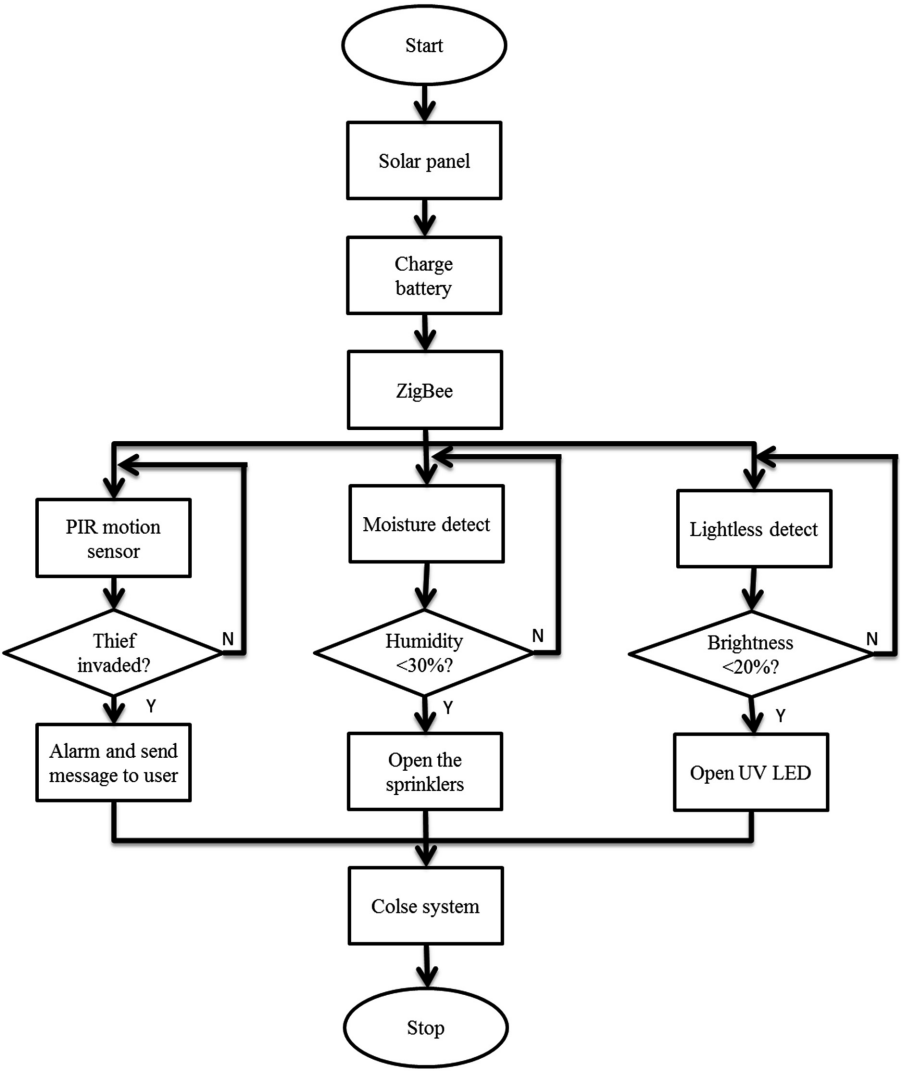

Fig. 2. The system flowchart

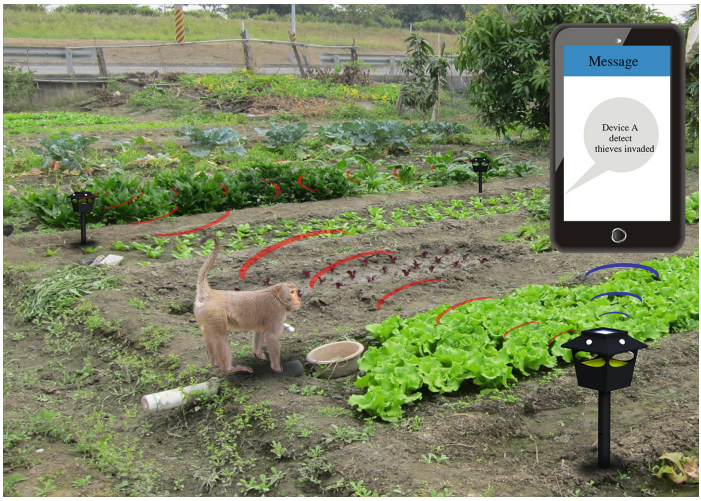

Fig. 3. Anti-theft system schematic

3 System Configuration

This system is mainly combined with wireless communications, PIR motion sensor, moisture sensor, and solar panel.

3.1 Solar Panel

The Amorphous silicon can be produced in a variety of shapes and sizes. Due to the universality of amorphous silicon solar cells, high efficiency, long service life and wide voltage range, etc. advantage considerations, here we choose it as a power supply, and use wisdom to determine loop solar panels do Detection action, solar panels current drops to a certain extent it is determined that night, open LED means attracting insects.

3.2 Wireless Communications

As shown in Table 2, we use low-cost ZigBee technology as a communication system of the device, according to this agreement technology is a short-range, low-power wireless communication technology to support a large number of network nodes with a variety of network topologies. Mainly applied to the field of automatic control and remote control, you can embed a variety of devices.

Table 2. Comparison between ZigBee and RFID

	ZigBee	RFID
Operating frequency	900 MHz/2.4 GHz	13.56 MHz/900 MHz
Range	Large than RFID	Less than ZigBee
Storage	More	Less
Nature	Always active	Both active and passive possible

3.3 PIR Motion Sensor

PIR main purpose as human infrared detection, because the sensor housing having a multi-layer coating can be hindered most of the infrared, only allow temperatures close to 36.5° by the wavelength of the infrared, so as suitable for human motion detection. For that reason we used it to determine whether there are thieves invaded.

3.4 Soil Moisture Sensor

We used SHT1x which is Sensations' family of surface mountable relative humidity and temperature sensors. It is a measure of temperature and humidity and very sensitive sensor module, and only through two serial to read temperature and humidity values. The sensor works with 3 or 5 V logic.

4 Conclusions

The power of this system is provided by solar energy, combined with attracting insects, security and soil moisture detection, mainly used in organic farming. We hope to use this system to improve the troubled development of organic agriculture in Taiwan, in response to energy saving but also enhance the agricultural added value. The future will be combined with private security system set up in this residential area, improve the quality of home life.

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