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Wsn for Green House Monitoring Using Anti-Collision Algorithm

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Abstract: *Greenhouse cultivation is growing popularity amongst farmers. Since these cultivation give promising outputs, it is necessary to maintain the variables Temp, Humidity, Gas, Soil Moisture in the desired limits to gain maximum output. In conventional greenhouse farmers need to monitor and regulate these variables manually making the job hectic, increasing the labor cost and less efficient. Hence to overcome these problems we have proposed these technology which will monitor and regulate Temp, Humidity, Gas and water level of the tank. Also in the automated monitoring system it is necessary to enhance the time of transmitting data and to avoid the collision amongst the data of different units. Hence we have developed the WSN for green house monitoring using Anti-collision Algorithm. ZigBee is used for wsn, the zigbee network transmits data at high speed and for higher range. Also the cost of this network comparatively less. The Anti-collision Algorithm provides a benefit of using multiple sensing units under single system making the technology simple to use. Hence a single person can handle this system, reducing the labor cost.*

Keywords: Greenhouse monitoring; AVR; humidity; temperature; wireless sensor network (wsn); ZigBee; soil moistures; gas.

I. INTRODUCTION

The greenhouse agriculture is developing very fast with the increasing demand of fresh vegetables in the large and medium cities. It is a kind of place in which it can change the plant growth environment, create optimum condition for plant growth, and keep out of the environment changes and the influence of atrocious Weather [5-6]. On the basis of making full use of natural resources, greenhouse monitoring system obtain the optimum condition of plant growth by changing the factors of greenhouse environment such as temperature, humidity, intensity of illumination, carbon dioxide content and moistures so on, and the purpose is to increase crop yield, improve its quality, regulate growth cycle, improve economic benefit. Greenhouse monitoring system is a complex system, the different kinds of parameter in the greenhouse needs automatic monitoring, information processing, real-time control and on-line optimizing. In recent years, the greenhouse industry has got greater progress, and improved agricultural labor productivity. However, we have quite big difference with developed country in control system area. On the one hand, the introduction costs of foreign advanced control system are too high, and most of them are not suitable for the national conditions of our country; on the other hand, The vast majority of existing control technology and equipment are backward in the domestic, equipment types is too simple, environmental regulation is limited, and it is difficult to Popularize application [3]. At present, the greenhouse cable monitoring system is relatively mature, the network topology structure evolved from that of centralized to that of distributed. Although the system's functions are more and more decentralized and the system has more and more distance, the most of greenhouse data acquisition systems adopt the wired collection way which is factitious or prewired. The workload is increased and real-time and validity of the data cannot be guaranteed by means of artificial. The monitoring control system which adopts the wired collection way is influenced by geographic position, physical circuit and complex environment and it is bounded clearly. With the appearance of low cost, low power dissipation sensor and the development of wireless communications technical, it is time to construct wireless green-house monitoring system, this will have great real significance to realize agricultural modernization [2-4]. According to the requirement of collecting greenhouse environmental message quickly and accurately, this paper explores deeply at some aspects, such as greenhouse environmental message collection, dispose, transmission, release and so on, and the greenhouse monitoring system based on WSN is introduced [1]. In our case, greenhouse monitoring and control system based on Zigbee network was developed. The system can collect environmental information inside greenhouse by using temperature sensor, humidity sensor and CO2 sensor soil moistures sensor. The system can also realize manual control and automatic control of greenhouse. We have also introduced Anti-

Collision algorithm to avoid a collision of information of two greenhouse units.

I. MATERIAL AND METHODS

A. SYSTEM OVERALL DESIGN

A greenhouse environment parameters monitoring system based on wireless communication technology has been developed, which realizes the measurement, summary and control of temperature, humility and the other parameters. On the one hand, every terminal takes charge of collecting temperature, humility, carbon dioxide and other parameters, and transmit these parameters to centralized control unit by wireless sending modules; on the other hand, it takes charge of carrying out the instructions sending by PC and then to adjust these parameters. Centralized control unit not only summarizes the data collecting by every terminal and transmits these parameters to PC, but also receives control instructions from PC and also sends it to every terminal to adjust the environment parameters of every terminal [7]. The PC collects the environment parameters of every terminal, handles and displays it, which gives all kinds of control instruction according to these parameters.

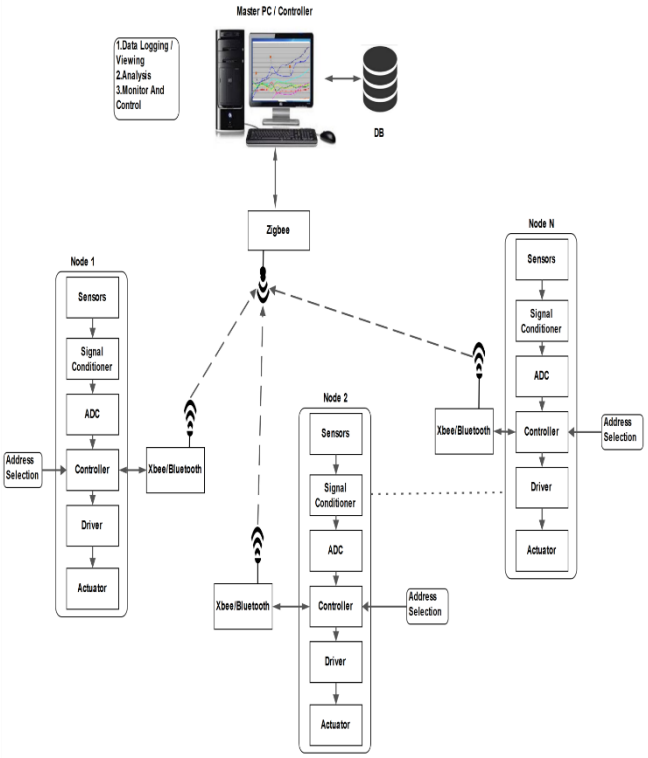


Figure 1: System Design

B. Hardware Architecture

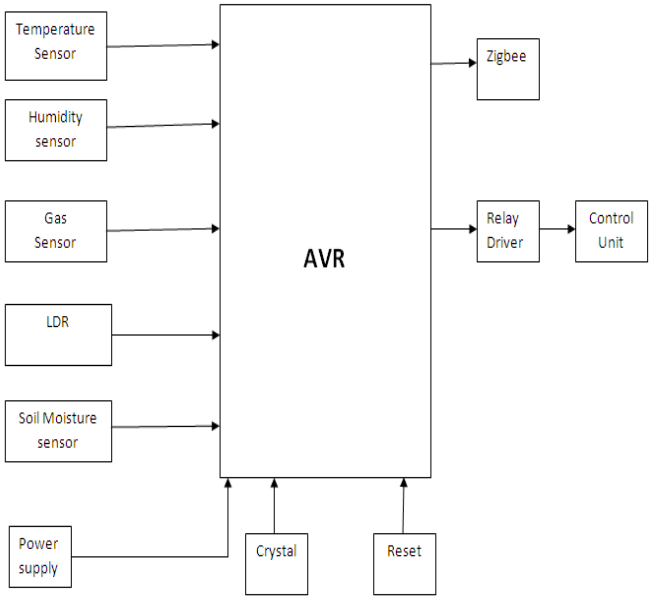


Figure 2: Unit 1 Block Diagram++

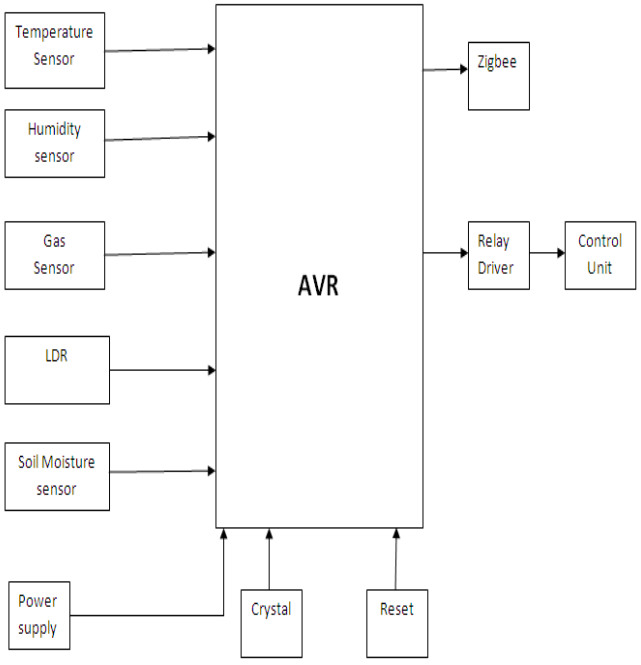


Figure 3: Unit 2 Block Diagram

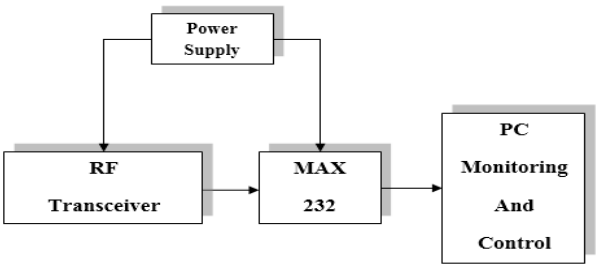


Figure 4: Monitoring Unit

The main elements involved in a greenhouse control system are: temperature, humidity, CO2 concentration, radiation, water and nutrients. It is important to note that although these factors are presented separately, they are related and influence each other. Factors are:

• **Temperature:** temperature is one of the most important factors to be monitored because it is directly related to the growth and development of plants. For all plants there is a temperature range considered ideal and to most plants this range is relatively close, varying between 10º C and 30º C (Hanan, 1998). Among the parameters of temperature to be controlled are important extreme temperatures, maximum and minimum, day temperature and night temperature, as well as the difference between day and night temperatures [8].

• **Water and humidity:** another important factor in greenhouses is water. The absorption of water by plants is related to radiation. The absence or low level of water influences growth and photosynthesis. Besides air and ground humidity also modify the development of plants. The air humidity is related to transpiration while the ground humidity is related to water absorption and photosynthesis. An environment with excessive humidity decreases plants transpiration, reducing growth, and may promote the proliferation of fungus. On the other hand, low humidity level environments could cause dehydration [8].

• **CO2 Concentration:** CO2 is important because it is an essential nutrient for plants development, allowing the absorption of carbon. The carbon retaining process occurs during the photosynthesis, when plants remove CO2 from the atmosphere [8].

C. Software Architecture and Algorithm

The anti-collision algorithm is simply polling method used in the microcontroller. Polling is process where the computer device waits for an external device to check for its readiness or state, often with low level hardware. For example, when printer is connected via a parallel port, the computer waits until the printer has received the next character. These processes can be as minute as only reading one bit.

- ***Algorithm***

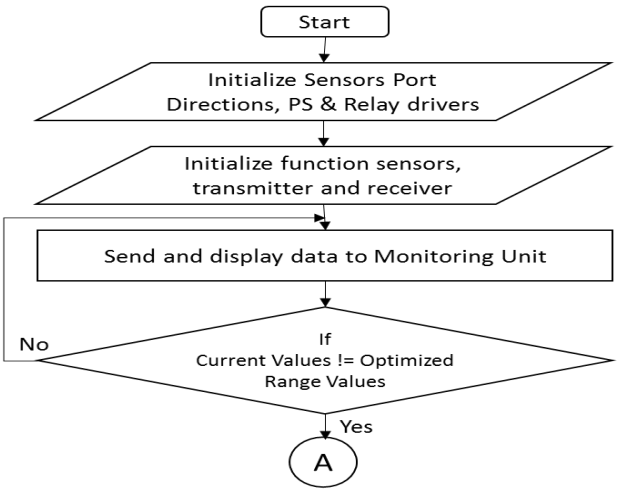
  Polling can be described in following steps:

  1. The host repeatedly reads the controller unit it becomes clear.
  2. When clear, the host writers in the command register and writes one byte into the data-out register.
  3. The host sets the command-ready bit (set to 1).
  4. When the controller senses command ready bit is set busy bit.
  5. The controller reads the command register and since write bit is set, it perform necessary I/O operation on the device. If the read bit is set to one instead of writer bit, Data from device is loaded into data-in register, which is further read by the host.
  6. The controller clears the command-ready bit once everything is over, it clears error bit to show successful operation and busy bit (o).

- ***Software***

  We have used AVRStudio-4 for interfacing hardware and software algorithm. This is mainly used for monitoring and observing all ranges of sensor.

- ***Flowchart***



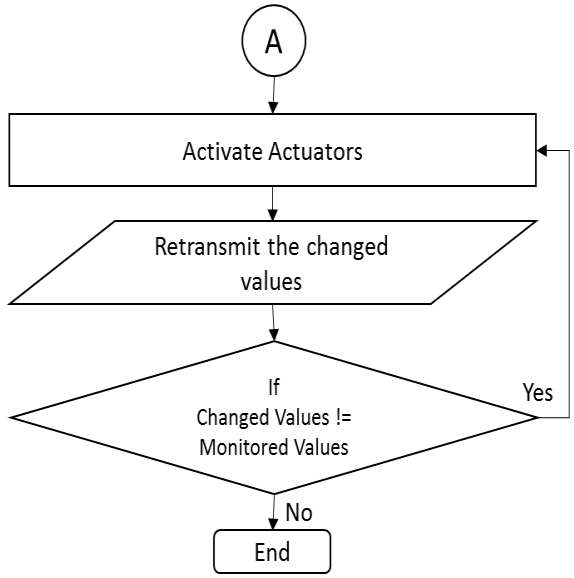


Figure 5: Flowchart of Units

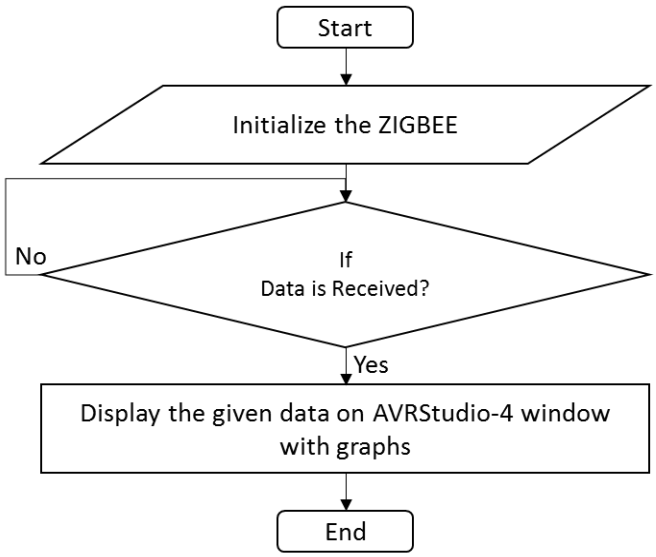


Figure 6: Flowchart of Monitoring Units

II. PREDICTED RESULT

User will place the order using Green House Unit. Menu Card will be displayed on LCD. User will select items, quantity using Green House Unit. ZIGBEE will send order to Kitchen Unit and Counter Unit. Buzzer will beep when acknowledgement of order acceptance receives from Kitchen Unit. At Counter Unit received order from Table Unit will be displayed on Hyper Terminal of PC.

III. FUTURE SCOPE

The system can be further improved for classifying crackles from normal breathing and wheezing. Also by collecting more real world data with the help of the mentioned hardware and adding into the training samples will make the system more efficient. Early detection of crackles and wheezing can be achieved using this technique. The hardware can be further improved for removal of noise by making the amplifier more efficient.

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