International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 04 Issue: 11 | Nov -2017 www.irjet.net p-ISSN: 2395-0072

MONITORING GREEN HOUSE ATMOSPHERIC CONDITIONS USING DISTRIBUTED SENSORS

Mrs. R. Malarvizhi[1], Ms. V. Veni Priya[2], Mrs. S. Ayisha Siddiqua[3]

[1,2,3] *Research Scholar, Dept of computer science and application, D.K.M College for women (autonomous), Vellore, Tamilnadu, India.*

Abstract – *Wireless sensor networks are considered an important dimension of the modern information and communication technology-based solutions for greenhouse monitoring.They carry out cooperative activities due to limited resources and nowadays, the applications of these networks are abundant, varied and the applications in agriculture are still budding. One interesting purpose is in environmental monitoring and greenhouse control, where the crop conditions such as weather and soil do not depend on natural agents. To control and notice the environmental factors, sensors and actuators are essential. Under these conditions, these devices must be used to make a distributed measure, dispersed amount of sensors all over the greenhouse using distributed clustering mechanism. In modern greenhouses, several measurement points are required to trace down the local climate parameters in different parts of the big greenhouse to make the greenhouse automation system work properly. Cabling would make the measurement system expensive, unsafe and unprotected. Moreover, the cabled measurement points are difficult to relocate once they are installed. Thus, a Wireless Sensor Network (WSN) consisting of small-size wireless sensor nodes equipped with radio and one or several sensors is an attractive and cost efficient option to build the required measurement system. This paper reveals an initiative of environmental monitoring and greenhouse control using a sensor network.*

Key Words: Wireless sensor, monitoring, environmental, actuators, clustering mechanism, greenhouse gases

1. INTRODUCTION

In order to improve the farming practices in greenhouses, Eco-friendly high-quality agriculture has been investigated. Recent developments in the field of wireless sensor networks as well as make on a smaller of the sensor nodes has allowed accurate agriculture to grow. Accurate agriculture concentrates on providing the means for harvest, managing the work and growth information.In modern greenhouses, several measurement points at plant level are required to create an objective and detailed view of the climatic conditions at various areas in the entire greenhouse region. All greenhouse cultivation systems, regardless of geographic location, comprise climate control components. Air temperature, solar radiation and air relative humidity are important variables of the greenhouse climate that can be controlled, since they affect crop growth and production but also energy expenditure, which can account for up to 40% of the total production cost. The main purpose of greenhouse climate control is to obtain healthy, well-developed crops with high yield and quality production, while using fewer resources.

Sensors are devices that translate aspects of physical reality into a representation understandable and processable by computers. A multi sensor node is intelligent to sense several magnitudes in the same device. In a multi sensor, the input variables may be temperature, fire, infrared radiation, humidity, smoke and CO2. The most imperative factors for the quality and yield of plant growth are temperature, humidity, light and the level of the carbon dioxide. Constant noticing these variables of these gives information to the person to better understand, how each aspect affects growth and how to administer maximal crop productiveness.

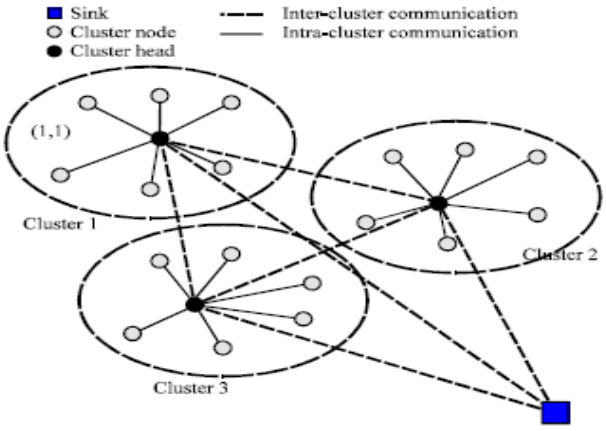

Fig-1: Clustering in a sensor network

Wireless sensor network can form a helpful part in contemporary greenhouses constructively. Compared to the cabled systems, the setting up of WSN is fast and easier to relocate the measurement points when needed by immediately moving sensor nodes from one location to another within a communication range of the organizer gadget. If the greenhouse vegetation is high and dense, the small and light weight nodes can be hanged up to the

branches. WSN maintenance is also relatively inexpensive and problem-free. The only other expense occurs when the sensor nodes run out of batteries (figure 2) and the batteries need to be recharged or replaced. In this work, the very first steps towards the wireless greenhouse automation system by building a wireless measuring arrangement for that purpose is taken and by testing its convenience and trustworthy with a straightforward experimental setup. Clustering may be centralized or distributed, based on the array of Cluster Head. In centralized clustering (figure 1), the CH is preset but in distributed clustering CH has no permanent architecture. Distributed clustering mechanism is used for some classified reasons like sensor nodes prone to failure, better collection of data and minimizing redundant information. Hence these distributed clustering mechanisms cover considerably self-organizing capability.

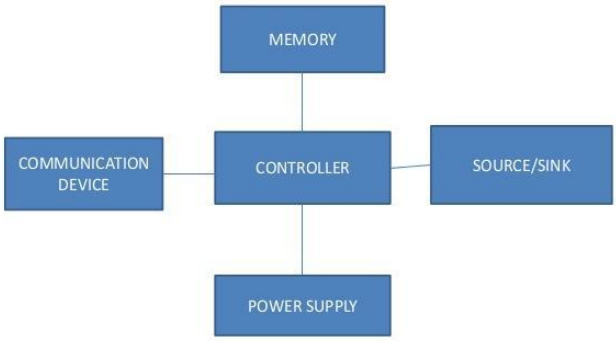

Fig-2: Components of wireless sensor node

2. MEASURABLE FACTORS IN A GREEN HOUSE

2.1. THE GREENHOUSE ENVIRONMENT

A greenhouse is a structure with walls and roof made chiefly of transparent material, such as glass, in which plants requiring regulated weather conditions are grown. These structures range in size from small sheds to industrial-sized buildings As a result, quantities of measurement points are also needed. This group of area is demanding both for the sensor node electronics and for the short-range IEEE 802.15.4 wireless network, in which communication choice is greatly longer in open environments.

2.2. GREEN HOUSE

A greenhouse is a pattern covering the ground frequently used for growth and progress of plants that will revisit the owner's risk, time and capital. This exhibit is mounted with the purpose of caring and keep safe of the crop and allowing a better environment to its advancement. This cover is enough to guarantee a higher quality in production in some cases. However, when the main idea is to achieve a superior control on the garden cultivation and development process, it is necessary to monitor and control the factors that influence the progress of a culture. The foremost role of a greenhouse is to offer a more compassionate environment than outside. Unlike what happens in traditional agriculture, where crop conditions and yield depend on natural resources such as climate, soil and others, a greenhouse ought to promise production independent of climatic factors. It is noteworthy to view that even though a greenhouse protects crop from outermost factors such as winds, water excess and warmth it may root so many problems such as fungus and extreme humidity. Therefore, mechanisms to inspect and manage a greenhouse environment are unbelievably important to get better productivity. To get superior productivity and quality, better control system is necessary and as a result the production costs also get reduced. The chief elements involved in a greenhouse control system are: temperature, humidity, CO2 concentration, radiation, water and nutrients.

2.3. SENSOR NODES DESIGN

Sensor nodes designed in this system receive measured data from heat in the greenhouse area, atmospheric moisture, leaf temperature and rain sensors, process the data with a microprocessor (MSP430 MCU) and transmit the data to a PC and relay nodes using a transceiver (CC2420 RF chip). Nodes and sensors are designed to be separate from each other to minimize the effect of heat emitted from nodes on sensors. The MSP430 microprocessor has a 16 bit RISC structure and has 48 KB of program memory and 10 KB RAM, which can handle multiple sensor data simultaneously with high speed. The CC2420 transceiver is a RF chip supporting Zigbee that works in the 2,400~2,483.5 MHz frequency band. Communication is made by DDDS method, supporting O-QPSK modulation and 250 Kbps data rate, which makes low-power real-time wireless communication possible

Speedy response time, low power consumption and tolerance beside moisture climate, relative humidity and temperature sensor forms a perfect preference and explanation for the greenhouse environment.

Communication between SHT75 sensor and node is similar to IIC interface Communication among sensor nodes can be carried out by IIC interface. Luminosity can be measured by light sensor, which converts light intensity to equivalent voltage. Luminosity was measured by TAOS TSL262R, which converts light intensity to voltage. Unstable output signal is handled by low-pass filter to get correct luminosity values. Unstable output signal is handled by low-pass filter to acquire exact luminosity values. CO2 measuring takes longer time than other measurements and CO2 sensor voltage supply must be within ±0.1V from the 5 Volts.The