Review on Digital Farming

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Abstract— This project probes into the design of the automated irrigation system based on WSN. This Embedded project is to design and develop a low cost feature which is based on embedded platform for water irrigation system. Optimum use of water is main objective of this irrigation system to reduce water consumption. This project uses temperature, humidity and soil moisture sensors to detect the water quantity present in agriculture. Aim of this embedded project is to monitor status of the sensors on remote PC through a window application. Here temperature and humidity sensors can be monitored on window application through micro controller. Soil moisture is controlled by application activating ON/OFF status of the motor.

Key words: Automated Irrigation System, Digital Farming

I. INTRODUCTION

Monitoring and control of agriculture environment play a significant role in agriculture production and management. To monitor the Agriculture environment parameters effectively, it is necessary to design a control system. Here controlling process takes place effectively by automatic manner. For monitor and control purpose, wireless network is used, which will send status of agriculture environment to central station. There we can control the activities through PC and send to controller back which is in agriculture environment. There it will activate the actuator according to our wish. The main objective is to design a simple, easy to install, Microcontroller-based circuit to monitor and record the values of temperature, humidity, soil moisture, rain measurement and sunlight of the natural environment that are continuously modified and controlled in order optimize them to achieve maximum plant growth and yield. Microcontroller communicates with the a variety of sensor modules in order to control the soil moisture and temperature, humidity efficiently in a agriculture area by actuating a dripper and water pump respectively according to the necessary condition of the crops.

The automated irrigation system is feasible and cost effective for optimizing water resources for agricultural production. Using the automated irrigation system we can prove that the use of water can be reduced for different agricultural production. The irrigation system provide only required amount of water to crop. This automated irrigation system allows it to be scaled up for larger greenhouses or open fields. An automated irrigation system was developed to optimize water use for agricultural crops. The system has a distributed wireless network of soil moisture and temperature sensors placed in the root zone of the plants and water level sensor is placed in tank for checking the water level in tank. In addition, a gateway unit handles sensor information, triggers actuators, and transmits data to a web application. An algorithm was developed with threshold values of temperature, soil moisture and water level that was programmed into a micro-controller based gateway to control water quantity.

II. RELATED WORK

Various commercial WSNs exist, ranging from limited and low-resolution devices with sensors and embedded processors to complete and expensive acquisition systems that support diverse sensors and include several communication features. Recent advances in microelectronics and wireless technologies created low-cost and low-power components, which are important issues especially for such systems such as WSN. Power management has been addressed in both hardware and software with new electronic designs and operation techniques. The selection of a microprocessor becomes important in power aware design. Modern CMOS and micro-electro-mechanical systems (MEMS) technologies allowed manufacturers to produce on average every three years a enhance generation of circuits by integrating sensors, signal conditioning, signal processing, digital output options, Communications, and power supply units .For example, the parallel combination of a battery and a super capacitor has been used to extend the runtime of low-power wireless sensor nodes.

In this paper, the development of the deployment of an automated irrigation system based on microcontrollers and Wireless communication at experimental scale within rural areas is presented. The aim of the implementation was to demonstrate that the automatic irrigation can be used to reduce water use. The implementation is a battery powered automated irrigation system that consists of a distributed wireless network of soil moisture and temperature sensors deployed in plant root zones. Each sensor node involved a soil-moisture probe, a temperature and humidity in air, a microcontroller for data acquisition, and a radio transceiver; the sensor measurements are transmitted to a microcontroller-based receiver. This gateway permits the automated activation of irrigation when the threshold values of soil moisture and temperature are reached. Communication between the sensor nodes and the data receiver is via the Zigbee protocol, under the IEEE 802.15.4WPAN.

III. AUTOMATED IRRIGATION SYSTEM

Wireless sensor network technology can provide optimal and integrated solution to distributed data collection, delivery and analysis in farmland. An in-field soil moisture and temperature, humidity monitoring system was developed which meets the application requirement in farmland environment. This system consists of the soil monitoring wireless sensor network and remote data centre. In the wireless sensor network, the sensor node is developed using IEEE 802.15.4/ZigBee wireless microcontroller. This monitoring system may provide an effective research tool for spatial analysis and for irrigation decision making in precision agriculture.

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The system model consists of sensors, microcontroller, interface such as relay and actuators. Actuators such dripper and water pump are used. Our proposed system aim is to design a microcontroller-based circuit to monitor and record the values of temperature, humidity, soil moisture level and sunlight of the natural environment that are continuously modified and it is get controlled in order optimize them to achieve maximum plant growth and yield. This section explains these design specifications and its requirements in detail.

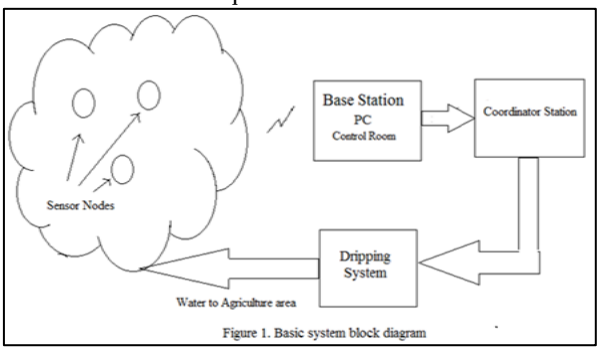

Fig. 1: Basic System Block Diagram

A. Sensor Node Module Design

Sensor nodes mostly make up of microcontroller module, wireless communication module, sensor module and energy supply module. Its structure is shown in Fig.1. Sensor module is in charge of information collection and data conversion in monitoring area, according to the application requirements, it can select temperature sensor, humidity sensor, soil moisture Wireless communication module is responsible for wireless communication, exchanging control information and transceiver acquisition data between this node and other nodes. Position setting switch is used to set a sensor node specific physical location in agriculture area. Energy supply module can provide energy which the work need for sensor node, in the paper, we adopt battery module for node power supply.

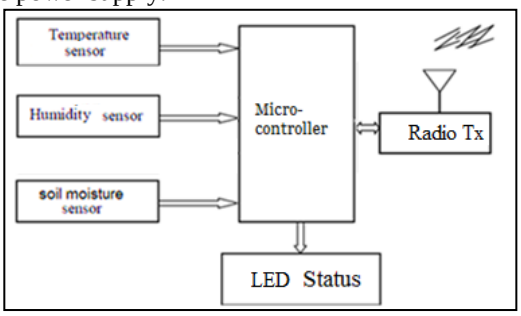

Fig. 1: Sensor Station

B. Sink Node Module Design

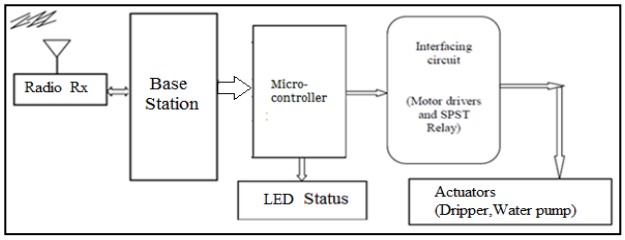

Fig. 2: Sink Node Station

Sink node mainly complete the sensor nodes data gathering and fusion within communication network, and realize ascending and descending communication protocol conversion. It released monitoring task of management nodes, and the data collected is forwarded to the external network through a serial port. Its structure is shown in Fig.2. It consists of microcontroller, relay module, node communication module. Because sink nodes need to handle a lot of data of sensor nodes, and have longer work time and shorter sleep time,

IV. CONCLUSIONS

Digital farming used to increase the yield of plants by monitoring and controlling environmental conditions (parameter) and thus providing necessary information to the farmers.

This system is reduces the use of water because it provide irrigation as per the requirement of the crop.

This system is automated irrigation system so it reduces the human resources.

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