



Smart Irrigation System Using WSN and GPRS Module with Three Level Access Mechanisms

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Abstract— Aim is to develop a wireless three level controlled smart irrigation system to provide irrigation system which is automatic for the plants which help in saving water and money.

The main objective is to apply the system for improvement of health of the soil and hence the plant via multiple sensors

Keywords: microcontroller, temperature sensor, humidity sensor, soil impurity sensor, load sensor, sprinklers, wireless sensor network (WSN)

I. INTRODUCTION

As we all know now a day's water usage is becoming one of the biggest problems in the world. Different methods have been developed for water conservation. Water is needed in each and every field. Water is an essential part of our day today life. Hence water is considered to be basic need of human. Water is required in tremendous quantity in agriculture field. Water wastage is one of the major problems in agriculture. This water wastage occur when excess of water is provided to the fields. Different techniques is been used to control or to save water wastage from agriculture

Terraced irrigation: in this method the land is been cut into steps and supported by retaining walls. The flat area is been used for planting and the idea is that the water flows down each steps watering each plot. This in turns allow steep land to be used for planting crops.

Ditch irrigation: this method is considered to be a traditional method in which ditches are dug out and seedlings are planted in rows.

Sprinkler System: in this irrigation system sprinklers are used which is been installed in ground and the sprinkler rises up when water pressure rises which is one of the popular irrigation system used on parks and golf courses

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II. EASE OF USE

This type of automated irrigation system can be found convenient, especially for those who keep on travelling. If this system is been installed and programmed properly it can save your money and helps in water conservation. This type of irrigation system is been designed to discharge water in more precise amount in a targeted area which in turns result into water conservation.

III. HARDWARE PLATFORM USED

ZigBee module: zigBee (IEEE 802.15.4) is the specification for the suite of high level communication protocol. This technology is based on WSN and it was selected for this battery-operated sensor network because of its low power consumption and low cost. It has a greater range as compared to other wireless technologies such as Bluetooth (IEEE 802.15.3), Wi-Fi (802.11).

Zigbee frequencies are as follows:

Operates in Unlicensed Bands

ISM 2.4 GHz Global Band at 250kbps

868 MHz European Band at 20kbps

915 MHz North American Band at 40kbps

Reason why zigbee is been used are:

Standards based

Low cost

Can be used globally

Reliable and self-healing

Supports large number of nodes

Easy to deploy

Very long battery life

Secure

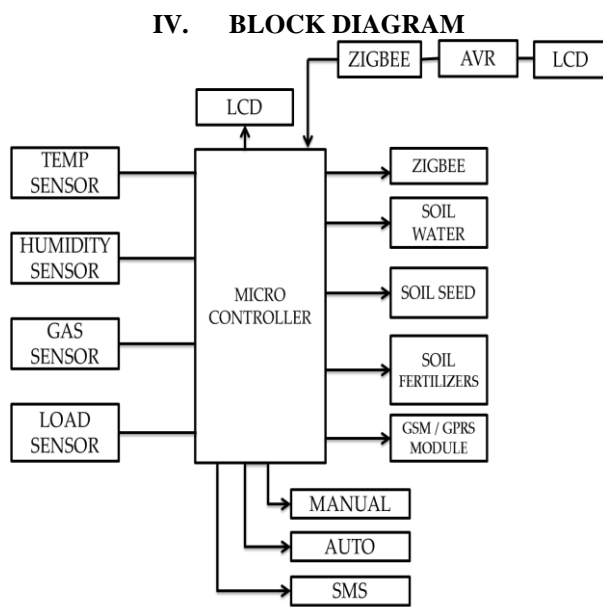
GPRS module: GSM/GPRS module is been used to bring internet connectivity. It includes an embedded transmission control protocol/internet protocol to bring this internet connectivity. It also consists of UFL antenna connector and SIM (subscriber identity module) socket.

Microcontroller: entire automation is done using microcontroller.

Wireless sensor unit: several WSU are been deployed in-field to configure the distributed sensor network for automated irrigation system. WSU comprises of radio frequency transceiver, sensors, a microcontroller, and power sources.

Wireless information unit: all data from WSU is been received, identified, and analyzed in WIU. It consists of master controller, GPRS module, and web application.

Watering module: the irrigation is performed by controlling the two pumps electromagnetic relays connected with microcontroller



V. CASE STUDY OF THE PREVIOUS INSTALLED SYSTEM

The system which is been implemented previously has the following details and applications

The previous system consists of five infield sensor station implemented across the field, a base station and a irrigation control station. The infield sensor station is used to monitor the field condition of air temperature, soil temperature and soil moisture. On the other hand a nearby station is used to monitor the air temperature, relative humidity, wind direction and solar radiation of the field. The base station feeds control signal back to the irrigation control station based on sprinklers head GPRS location

VI. ADVANTAGE OF PROPOSED SYSTEM OVER PREVIOUS MODEL

Less hardware involve: this proposed system consist of less hardware as compared to the previous model hence it is compact as compared to the previous system.

Cost efficient: this proposed stem is more cost efficient than the previous system this claim is made on the fact that the proposed system does not need the heavy and expensive hardware for implementation

VII. BASIC ADVANTAGES

Saves water: studies shows that this type of automated irrigation system consumes 40-50% less water as compared to the traditional system

Improves growth: ideal growth condition is been provided when small amount of water is been applied over large amount of time. This smart irrigation system extends watering time for plants, and provides ideal growth condition.

Save time: in this sprinklers moving and setting is not required hence it saves time and timer delay as per the environmental condition can be added for automatic watering

Adaptable: this smart irrigation system can be adjusted and modified according to the changing environment.

Simpler method: it is simple to operate it starts by designing the map of your garden and marking the location of planting. Then the required distance is been measured for length of plastic tubing so that the desired area can be reached

VIII. CONCLUSION

This type of system requires less man power for operation. The water is been supplied by the system only when the soil humidity goes below the reference level. The soil ratio at the root zone is been maintained constant at some extent by providing direct transfer of water to the roots which further result in less water consumption. The system helps minimizing the overall watering and crops production cost

This system is considered to be cost effective and allow cultivation of agricultural products and plants in the area where there is water scarcity. It requires very less maintenance and is adjustable according to the changing environment.

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