IRRIGATION OF WATER BY AUTOMATIC SPRINKLER SYSTEM

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ABSTRACT

Irrigation is one of the largest consumers of fresh water in the agricultural sector. Surface irrigation is one the most widely adopted method of irrigation due to its simplicity and low energy requirement. Although, it is mostly associated with poor irrigation application efficiency mainly due to deep percolation and uneven distribution of irrigation water. In all agricultural seasons, an automatic irrigation system has been designed to facilitate the automated provision of adequate water from a reservoir to field or domestic crops. This project is to determine how human control can be removed from irrigation while also optimizing water use in the process by incorporating IoT sensors. The method used is to continuously monitor the soil moisture level in order to determine the intensity of irrigation required and how much water is to be supplied based on the soil condition.

INTRODUCTION

1.1 INDIAN AGRICULTURE DATA

India is the second largest producer of wheat and rice, the world's major food staples. India is currently the world's second largest producer of several dry fruits, agriculture-based textile raw materials, roots and tuber crops, pulses, farmed fish, eggs, coconut, sugarcane and numerous vegetables. it is mostly associated with poor irrigation application efficiency mainly due to deep percolation and uneven distribution of irrigation water. This project is to determine how human control can be removed from irrigation while also optimizing water use in the process by incorporating IoT sensors. The method used is to continuously monitor the soil moisture level in order to determine the intensity of irrigation required and how much water is to be supplied based on the soil condition. The crop grown in southern India like Sugarcane, potato, Rice etc were taken into consideration. The area of study was chosen in **Thiruneermalai, Chennai** with a location of (latitude:**12.963203432700**). The crops evapotranspiration rate was calculated manually for the crops grown in that particular field Rice, Sugarcane, Potato, Sweetcorn .IoT is used for monitoring the soil moisture sensor data through the web page. A control box, and 12v dc charger unit were mounted on the Automatic sprinkler system.

1.2 NEED OF THE STUDY

- The continuous extraction of water from earth is reducing the water level due to which lot of land is coming slowly in the zones of un-irrigated land.
- This is due to unplanned use of water due to which a significant amount of water goes to waste.

1.3 OBJECTIVES

- To facilitate with an help of automaticirrigation system.
- To continuously monitor the soil moisture level for various crops
- To calculate the irrigation water requirement for various crops.

1.4 SCOPE

- Water shortage due to increased exploitation has urged to develop a new technology which can save water from wasting and therefore there will be a smart way to check the loss of water.

  The purpose of this idea is to make the water planting system smart, autonomous, and efficient, to optimize the water supply to the plants to decrease manual intervention

EMBEDDED SYSTEM IN SENSORS

An embedded device can range from a relatively simple product for example a toaster to complex mission critical applications such as those used in avionics. A typical embedded device will have both hardware and software components. The hardware could be micro components such as embedded microprocessor or microcontroller. Microcontroller is relatively small, has a onchip memory, an I/O controller and other supported modules to do processing and controlling tasks. The software consists of applications that perform dedicated tasks and may run on Real time operating system .

4.3.0 COMPONENTS OF ANEMBEDDED SYSTEM

An Embedded system has three main components : Hardware, Software and timeoperating system

i) Hardware

- Supply Processor
- Memory
- Timers
- Serial communication ports
- Output/Output circuits
- System application specific circuits

ii) Software:

The application software is required toperform the series of tasks.

An embedded system has software designed

to keep in view of three constraints:

- Availability of System Memory
- Availability of processor speed
- The need to limit power dissipation when running the system continuously in cycles of wait for events, run , stop and wake up.

iii) Real Time Operating System:

(RTOS) It supervises the application software and provides a mechanism to let the processor run a process as per scheduling and do the switching from one process (task) to another process

Figure 4.3.1 shows basic components used in Embedded System are as follows:

- Microcontroller: It monitors and controls the environment.
- Sensors: It collects data from environment through input devices.

4.3FIXING OF SENSOR IN FIELD

Calibration of soil moisture sensor :

The soil moisture sensors were calibrated before installation in the field. Thirteen soil samples were randomly collected from different soil moisture conditions ranging from very dry to wet concurrently with soil moisture sensor reading. The soil moisture was determined using the gravimetric method. After weighing the fresh weight, samples were oven-dried at **105 ºC for 24 h**. The soil moisture content was determined using **Eq.**

(1) . $\theta g = (m\ wet - m\ dry)m\ dry \times 100$ **(1)**

Where, ɵ g is the gravimetric soil moisture content (%), m wet and m dry is the fresh and dry weight of soil (g), respectively. The gravimetric soil moisture content was converted to volumetric soil moisture content using **Eq. (2) .** $\theta v = \theta g \times \rho soil\ \rho water$**.**

Fig:4.4.0 Inserting moisture sensor

5.0 Soil Moisture Sensor

Soil moisture sensor is used for the measuring of the water content in the soil. The traditional quantities description of the soil requires a various methods such removing drying etc., but the soil moisture sensor indirectly measure the water level of the soil by usingthe another set of property such as electrical resistance, dielectric constant or the synergy of the neutrons. The soil moisture may vary according to the temperature, soil type and the electrical conductivity. The set of moisturesensor will help to find out the potential of the water, hence this type of sensors called soil water.

CONCLUSION

The agriculture is emerging as the backbone of the country. This Automated sprinkler System is designed for the welfare of the farmer. This system is said to be a real time feedback control system which helps to irrigate the land in an efficient manner. This system is Very reliable and user- friendly. This System can be used at anytime from anywhere. The moisture sensor will be monitored in the base station. The employing of IoT reduces the regular monitoring of the field. The present proposal is a model to modernize the agriculture industries on a small scale with optimum expenditure. Using this system, one can save manpower, water to improve production and ultimately profit.

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