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Intelligent Drip Irrigation System with Wireless Sensor Network Support for Agriculture to Conserve Water

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Description

The majority of nations on the planet, including India, rely on agriculture as their main source of income. Crop Yield has an impact on a nation's economy and general populace. The most important aspect of agriculture is water, and different crops require different amounts of water. As a result of climate change and the absence of adequate rainfall, the availability of water is now severely limited worldwide. Our nation is currently experiencing severe drought. Conventional Means of Fighting Drought in Agriculture: 1) Storing water in dams, lakes, and ponds; 2) Restoring dams, lakes, and ponds; and 3) Implementing a drip irrigation system In addition, the conventional methods for irrigating crops save water by allowing water to drip slowly to the roots of the plants, either onto the surface of the soil or directly onto the root zone. Both of these processes take a long time and are continuous. Drip irrigation systems currently in use are not entirely automated; farmers must be more involved [1].

Decisions regarding "duration of irrigation" and "quantity of irrigation" are made by farmers based on their prior knowledge. These might not always be true, which can result in irrigations that use too much or too little water. Nowadays, farmers buy water for irrigation. There is an immense hole between exercises of farming research facilities and genuine field conditions. In terms of drip irrigation, advanced technologies and intelligent systems are not fully integrated into agriculture. For water conservation, we propose an Intelligent Drip Irrigation System (IDIS) in this paper. An Agriculture Control Station (ACS) and an Intelligent Soil Moisture Sensor Unit (ISMSU) are two crucial parts of the proposed system. Using a newly proposed multi-depth soil moisture measurement algorithm, the ISMSU is used to dynamically measure the soil moisture value regardless of the crop's root length. The farmers benefit from these soil moisture values by conserving water and electricity and avoiding irrigation water shortages or excesses. In addition, this paper proposes a novel protocol known as the ISMSU communication protocol for collecting soil moisture data from a network of ISMSUs using less battery power. The ISMSUs' ability to conserve power helps to extend the lifespan of the sensors in the network. Using the data collection module for efficient data collection, the ACS is in charge of collecting and processing the data from sensor nodes. Scientists in agriculture can use this data to help farmers navigate the farmer web portal and Short Message Service (SMS) and discover the drip irrigation rules [2].

Two Latin words, "Ager" and "Cultura," are the source of the word "agriculture." Ager refers to land or a field, while Cultura refers to cultivation. As a result, "agriculture" refers to the cultivation of land. In addition, agriculture is both the science and the art of growing crops and livestock for profit. Additionally, In addition to providing food and raw materials to the country's economy, agriculture also provides employment opportunities for a large number of people. For instance, India's agriculture sector is closely linked to foreign trade. In India, agriculture primarily aims to protect the land from deterioration and misuse while simultaneously increasing its yield. From an era of frequent droughts and vulnerability to food shortages, Indian agriculture has made significant strides toward becoming a significant exporter of agricultural products. The persistent efforts to maximize the agricultural potential of land and water resources have made this possible. Farming is the spine and significant gift for living souls in India as well as for from one side of the planet to the other. However, irrigation water scarcity severely affects the majority of cultivation lands worldwide.

Drip irrigation methods have been developed by researchers to cut down on water use in dry areas in this situation. This is because there aren't any rules or systematic ways to use electricity and water in a good way. As a result, farmers using conventional drip irrigation now have to manually visit and keep an eye on their lands frequently because of the high overhead costs. Additionally, effective decision-making with data mining technologies can greatly support a variety of agricultural endeavours. Using rules derived from association rule mining, one of these activities is regulating the amount of water in cultivated fields. In addition, wireless sensor networks are rapidly emerging as a new precision agriculture technology. Smart sensor networks are used in modern irrigation systems to effectively collect field values for watering the plants [3-5].

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Conflict of Interest

None.

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