

Cloud Based Irrigation System-A Precision Agriculture Technology

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Introduction

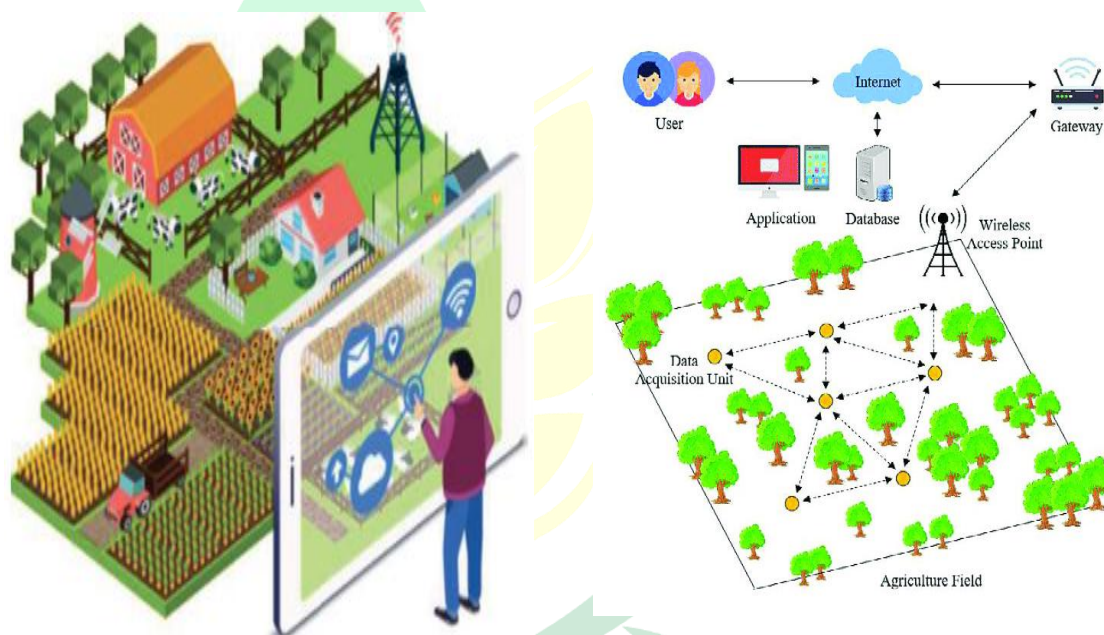
The backbone of the Indian economy, agriculture has a significant impact on the country. The global population is rapidly expanding in the modern world. The importance of agriculture in supplying the needs of humanity has increased. However, irrigation is necessary, and we use more water each year than rainfall. As India's rainfall patterns become more unpredictable every year. Finding ways to conserve water becomes crucial for growers as a result. Water scarcity has a significant impact on how fertile the soil. Introduction of a smart irrigation system that waters plants as needed to address all the aforementioned issues. Nothing needs to be done manually; everything is carried out automatically. The goal is to use less electricity, fuel, water, and human labor. We can minimize water waste and maximize scientific technologies in irrigation techniques by utilizing internet and sensor network technologies.

In a cloud-based irrigation system, sensors are placed in the soil to measure moisture levels and transmit that information to a cloud-based server. The server then analyzes the data and sends commands to the irrigation system, instructing it to turn on or off based on the moisture levels in the soil. The system can also consider weather forecasts and adjust watering schedules accordingly.

One of the main benefits of cloud-based irrigation is that it can reduce water waste by only irrigating when necessary. It can also increase crop yields by ensuring that plants receive the optimal amount of water. Additionally, cloud-based irrigation systems can be remotely accessed and controlled, allowing farmers to manage their irrigation systems from anywhere with an internet connection.

Automatic Irrigation's Need

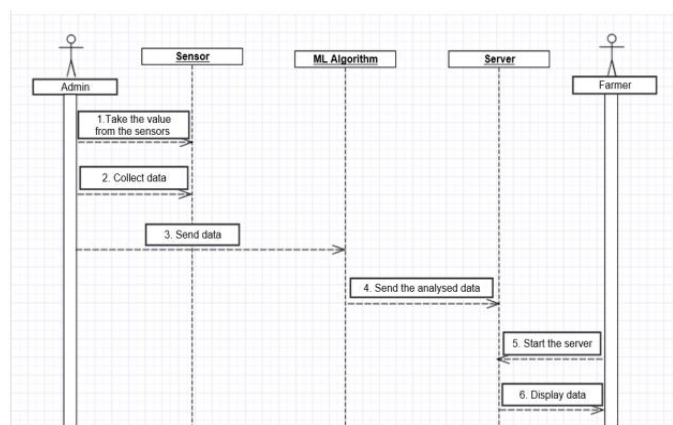
1. Energy and resource savings for precise use,
2. Simple system installation on the field
3. Applying the appropriate amount of water at the appropriate time to make it easier for the farmer to manage farm irrigation and nursery.
4. In automated irrigation systems, valves are used to turn on and off the motor.
5. Sensor-based controllers make it simple to control a pump or motor, eliminating the need for manual labor to run or keep an eye on irrigation systems. Crop efficiency includes a reduction in overwatering due to saturated soil and avoiding irrigation at the wrong time to conserve water.



Cloud Based Irrigation System Layout

Implementation

The sensors are positioned in the soil at an appropriate depth. The sensors are always in an active state, but they can be made passive at the client's (farmer's) request. In an active state, sensors continue to communicate with the microcontroller. The microcontroller directly communicates with the power source (the water pump) and indirectly transmits data to the client via the cloud platform. The MCU has two watering modes. The self-programmed mode is one mode that starts if the client doesn't respond within 60 minutes. Client-driven mode, which is activated if the user responds to the microcontroller's message, is another mode. The user has the ability to monitor his field and regulate the watering rate.



Data sequence framework

Advantages

1. **Improved Water Management:** Cloud-based irrigation provides real-time information on soil moisture levels and other environmental factors, allowing for more precise and efficient water management. This reduces water waste, improves crop yields, and can help farmers conserve water resources.
2. **Remote Monitoring and Control:** With cloud-based irrigation, farmers can monitor and control their irrigation systems remotely from anywhere with an internet connection. This allows them to respond to changing weather conditions and other environmental factors quickly and easily.
3. **Reduced Labor Costs:** Cloud-based irrigation systems require less manual labor than traditional irrigation systems. Farmers can program and control their irrigation systems remotely, reducing the need for on-site labor.
4. **Increased Crop Yields:** Cloud-based irrigation systems provide plants with the optimal amount of water at the right time, which can increase crop yields and improve the quality of the produce.
5. **Lower Operating Costs:** Cloud-based irrigation systems can be more cost-effective than traditional irrigation systems. They require less water, reduce labor costs, and can help farmers optimize the use of other resources, such as fertilizer and energy.

Disadvantages

- **Cost:** Cloud-based irrigation systems can be expensive to install and maintain, especially for smaller-scale operations. The cost of the sensors, server, and other hardware required for the system can be a barrier for some farmers.

- **Dependence on Internet Connectivity:** Cloud-based irrigation systems rely on a stable and reliable internet connection to function properly. If the connection is lost, the system may not work correctly, and crops could suffer.
- **Data Security:** Cloud-based irrigation systems require the transmission and storage of sensitive data, such as soil moisture levels and weather forecasts. If this data is compromised, it could have serious implications for the farm.
- **Technical Knowledge Required:** Cloud-based irrigation systems require a certain level of technical expertise to set up and maintain. Farmers may need to hire additional staff or work with consultants to ensure the system is working correctly.
- **Compatibility:** Cloud-based irrigation systems may not be compatible with all types of irrigation equipment or farming practices. It's important to ensure the system is compatible with existing infrastructure and equipment before investing in a cloud-based system.

Conclusion

With the development of cloud computing and other technologies, using a system with a remote server has never been simpler. Therefore, combining technology and agriculture will greatly benefit farmers. Farmers will be able to manage their resources more effectively thanks to the age of automation and microcontroller components. In addition to increasing food production, this will also reduce water waste by a significant amount. Additionally, because microcontroller systems have a very low power consumption, they will be cost-effective for farmers to implement.

References

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