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"IoT based Smart Irrigation System using soil Moisture sensor and ESP8266NODEMCU"

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ABSTRACT- Water is one of the most introductory and necessary coffers for mortal survival. Water reduction has been growing in recent times as the population has increased. As a consequence, this has turned into a global extremity. Since the old irrigation scheme uses a lot of water, smart strategies for reducing the quantum of water wasted for irrigation are demanded. In any sphere, from bitsy and introductory operations to massive and complicated operations, we have seen a significant increase in demand for Internet of effects. In practice, enforcing a Smart Irrigation system is a delicate task, but when combined with IoT and the use of smart wireless detectors, it creates an excellent control system. The moisture and Temperature Detector detects the quantum of water vapour present in the air as well as the temperature around the crop. The Soil Moisture Sensor senses the humidity content of a factory's soil; if the content is below the minimal demand, water is supplied from a force through a relay, and an ultrasonic detector tests the force's water position before transmitting the data to the ESP8266 NodeMCU. The ESP8266 NodeMCU is a microcontroller that receives data from smart wireless detectors, processes it, and sends it to its intended destination.

Keywords- Smart Irrigation System, Internet of Things, Water, Soil Moisture Sensor, Humidity and Temperature Sensor

INTRODUCTION

Agriculture plays a vital role in India's development, because agriculture is the back of the country because major source of income is from agriculture sector, 70% of the farmer and people is depend upon agriculture. Agriculture issues have always impacted the development of the country. Smart agriculture is the only solution to this issue by modernizing the new conventional methods of agriculture. The proposed approach is therefore aimed at making agriculture smart using automation and IoT technologies. The Internet of Things (IoT)facilitates multiple applications for crop growth tracking and selection, irrigation decision support, etc. The IOT automated irrigation system based on Raspberry Pi is proposed to modernize and increase crop productivity. The main objective of this project is on crop production at low water usage, in order to concentrate on the water available to plants at the appropriate

time, farmers have to spend time in the field to check appropriate time for irrigation. Effective water control should be established and the size of the device circuits minimized. The proposed device was built on the basis of the information sent from the sensors and the estimation of the quantity of water required. Two sensors are used to collect data from the base station on the humidity and temperature of the atmosphere, the humidity, the temperature and the length of the sunshine each day. The suggested schemes are based on these values and are needed to measure the volume of water for irrigation. The key benefit of the device is the introduction of Precision Agriculture (PA) with cloud storage, which can maximize the use of water fertilizers while optimizing crop yields and will also assist in the study of field weather conditions. Due to data store in cloud, we can do predictions in future for better timing of irrigation based on change in season and temperature.

AIM OF THE PROJECT

The provocation for this design came from the countries where frugality is grounded on husbandry and the climatic conditions lead to lack of rains & failure of water. Our country substantially depends on husbandry. The growers working in the ranch lands are solely dependent on the rains and bore wells for irrigation of the land. Indeed if the ranch land has a water- pump, homemade intervention by growers is needed to turn the pump on/ off whenever demanded. The design end is to descry the blankness in soil using detectors and give water to the shops meetly. This design helps to maintain the shops relatively fluently. In this design we're detecting soil humidity and need for Irrigation. The Aim of our design is to minimize this homemade intervention by the planter. Automated Irrigation system will serve the following purposes

1) As there's noun-planned operation of water, a lot of water is saved from being wasted.

The irrigation is done only when there isn't enough humidity in the soil and the detectors decide when the pump should be turned on/ off. This saves a lot time for the growers. This also gives important demanded rest to the growers, as they do n't have to go and turn the pump on/ off manually.

PROPOSED SYSTEM

Agriculture is a pivotal sector of the frugality in numerous countries. still, conventional irrigation systems aren't effective in terms of water operation and control. To overcome these issues, an IoT-grounded smart irrigation system is proposed in this design the proposed system for automatic irrigation using IoT is an intelligent and effective system that utilizes colorful detectors, microcontrollers, and pall technologies to cover the humidity position of the soil, descry downfall, and control the irrigation system. The proposed system for automatic irrigation using IoT not only overcomes the downsides of traditional irrigation systems, but it also incorporates fresh features to ameliorate water operation effectiveness. One similar point is the use of a rain detector to help over-watering and water destruction. The rain detector detects the presence of rain and sends a signal to the microcontroller to stop the water pump, thereby precluding over-watering and water destruction. This point ensures that water is only used when it's necessary and promotes effective water operation. likewise, the proposed system allows growers to cover their fields ever through the Arduino IoT cloud platform. The detector data collected by the system is uploaded to the pall, and growers can pierce the data using their mobile bias. This allows growers to cover the soil humidity position, temperature, moisture, and downfall in real- time, enabling them to make informed opinions regarding irrigation and crop operation. Overall, the proposed system for automatic irrigation using IoT is an intelligent and comprehensive result that not only overcomes the downsides of traditional irrigation systems but

also incorporates fresh features to promote effective water operation and enable remote monitoring. With the help of this system, growers can optimize their irrigation systems, reduce water destruction, and ameliorate crop yields.

LITERATURE SUMMARY

The Internet of Things (IoT) is developing, growing, and getting more common by the day; in today's world, nearly 5 billion items are linked to the internet. It is projected that about 50 billion items will be wired to the internet by 2021. IoT is opening up a lot of doors for new uses, and it's also being used in a lot of areas, including intelligent home control systems, food supply chain management, precision agriculture, and so on. The below are some of the benefits of using an automatic irrigation control system:

1.Would maximize the role of current water-saving equipment, ensuring optimum performance and quality.

2.More water and energy efficiency, lowered irrigation costs, and increased irrigation productivity through the use of automated control technology.

3.It would irrigate in a more scientific manner in orderto promote and enhance maintenance. Agricultural modernization necessitates the control and encouragement of water-saving irrigation technologies.

4.Crops can be constantly tracked and prompt decisions can be made as a result.

5.By prompt preventive and control measures, it can help to reduce casualties due to unexpected disease and insect attacks.

6.Earlier environmental alerts and warnings.

SYSTEM DESIGN

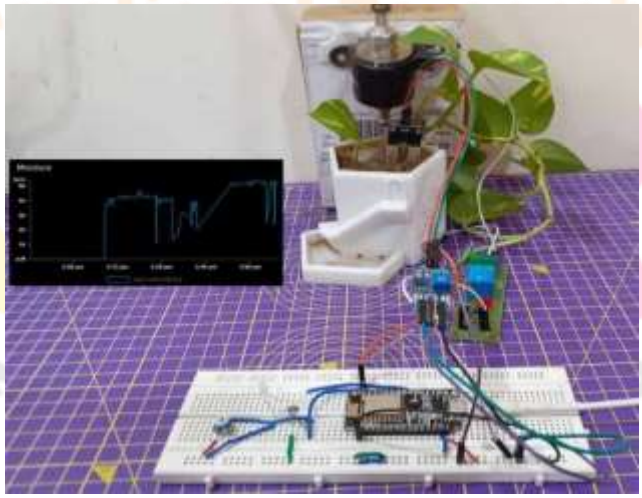

Fig- IoT Based Smart Irrigation System

SYSTEM WORK

Soil Moisture sensor will sense the moisture level and send the signal to NODEMCU which will make decision based on logic condition. If moisture level is low then microcontroller will send the signal to relay to switch the water pump ,So that it will maintain the moisture level of soil. On the other hand DHT11sensor will sense the temperature and humidity level of environment and send signal to NODEMCU for sending data into clouds for monitoring and control.

The value enables the system to use appropriate quantity of water which avoid over and under irrigation. IoT is used to keep farmer updated on an application called as Blynk on which monitoring and working is done easily.

FUTURE RESEARCH WORK

The aim of this analysis is to look at the different attempts and improvements made to increase water use quality, water conservation, and, most notably, food protection using IoT-based monitoring and control systems. Researchers and farmers will use the IoT for real-time tracking and data collection for data-driven control, machine learning, and deep learning for intelligent prediction of agricultural processes such as yield, water consumption, and weather, according to the analysis. The use of the normalised dimension vegetation index (NDVI), the lea area index (LEA), and other scientific indexes in determining and preparing irrigation scheduling for vast irrigation field areas needs more research
Furthermore, various control algorithms in the sense of irrigation systems have been discussed; researchers can concentrate on improving any model-based or adaptive controller with real-time monitoring for precision irrigation.

1. The proposed IoT grounded smart irrigation system has a lot of eventuality for unborn advancements and advancements. Some possible areas for unborn exploration and development include

2. Integration with other IoT systems- The smart irrigation system can be integrated with other IoT systems, similar as rainfall stations, crop monitoring systems, and perfection husbandry systems, to produce a comprehensive smart husbandry result.

3. Use of AI and Machine Learning- The system can be enhanced by incorporating AI and machine literacy algorithms to give more precise and accurate control of the irrigation system grounded on real- time detector data.

4. Wireless Sensor Networks- Wireless detector networks can be enforced to reduce wiring complexity and give better content of the field. This would exclude the need for wiring and ameliorate the inflexibility of the system.

5. Use of Solar Power- Solar power can be integrated into the system to reduce energy consumption and give a further sustainable result.

6. Use of Drones and Robotics- Drones and robots can be used to automate the irrigation process and enable further effective water operation.

7. Overall, the unborn compass of the IoT- grounded smart irrigation system is vast and promising. With continued exploration and development, the system can be farther optimized and enhanced to give a further effective and sustainable result for agrarian irrigation.

CONCLUSION

The impact of global warming and climate change on water shortages and food security is becoming more widely recognised, prompting researchers to step up their efforts to create cutting-edge real-time tracking and control methods for precision agriculture that can minimise the impact of this unavoidable phenomenon. This study of precision irrigation system monitoring and control techniques is focused on previous and relevant studies to aid in water conservation in agriculture. This review article was able to provide a good understanding of research developments in developing advanced control techniques for precision irrigation, as well as evaluate research opportunities in studies that can ensure water efficiency, maximize crop production, and decrease irrigation energy use. It is intended to spark innovative ideas and inspire readers about how existing surveillance and advance management methods can be strengthened to achieve improved precision irrigation for food protection and aid in water conservation in order to avoid impending water crises.

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