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AN OVERVIEW ON AUTOMATIC IRRIGATION SYSTEM

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ABSTRACT

A modern irrigation system was created to reduce the amount of water used in agricultural fields as well as improve the food quality. In the agriculture field, a lot of water and other resources are wasted. We are utilising an automated plant monitoring system to avoid this problem. Manyfarmers will be able to afford this low-cost automated irrigation system. According to the findings, the system is effective in providing an appropriate amount of water to improve crop yield. We use different sensors in contemporary irrigation systems, such as temperature, humidity, and soil moisture sensors, which sense the various elements of the soil and automatically water the area depending on the soil moisture value by turning on and off the motor. Irrigation automation is a potential technique for reducing irrigation waste and increasing water efficiency. Automation allows farmers to irrigate just when there is a pressing need for water and distribute nutrients in a regulated and exact way, saving time and resources while improving agricultural efficiency and yield. The automatic irrigation system makes an irrigation system more reliable and remove loses of existingirrigation system. This smart irrigation system allows plants to be watered for longer periods of time while maintaining optimal growth conditions. It saves time, and a timer delay based on the weather may be programmed for automated watering. This intelligent watering system may be changed and updated in response to changes in the environment.

KEYWORDS: *Automatic irrigation, Crop, Mobile phone, microcontroller, sensor, soil, Temperature.*

1. INTRODUCTION

We live in a world where everything can be managed and run automatically, yet there are still a few key areas in Laos where automation has yet to be fully accepted or implemented, possibly due to a variety of factors including cost. Agriculture is one of the sectors in Laos. There are several water-saving methods available for various crops, ranging from the most basic to the most technologically complex. An irrigation system that is controlled by computer is called an automated irrigation system. Another approach to measure moisture is to use a low-cost moisture sensor. Agricultural irrigation is a plant system that is estimated. It is also possible to use. Crop cultivation requires a lot of water since agriculture is a water-intensive activity. This necessitates the development of a system that, on the one hand, conserves water while also producing a high output. Almost every electrical component may

be configured to function without the need for human interaction. Using a mobile phone, you may monitor and regulate the water flow to an irrigation system. This may be accomplished with the help of a soil moisture sensor, which detects the amount of water in the soil. This sensor output is sent to an ARM-based control system for additional analysis[1]–[3].

The primary goal of the project is to send SMS to farmers informing them of irrigation status for various plots, as well as ON and OFF conditions. The Internet of Things (IOT) is a technology that allows a mobile device to monitor a gadget's operation. The Internet of Things (IOT) is concerned with the interconnection of communication items that are deployed in various locations that may be far apart. The Internet of Things is a concept that allows a mobile device to monitor the operation of a device. The Internet of Things is concerned with the connectivity of communication devices that are deployed in a variety of places, some of which are rather remote. The proposed system is intended to reduce the amount of water that flows into agricultural lands unnecessarily. Temperature, moisture, and humidity measurements are continually monitored and sent to the designated IP address utilising temperature, moisture, and humidity sensors. The data from that given IP address is continually collected by the Android application. When the soil moisture readings surpass the specified limit, the motor is controlled by the relay, which is coupled to the Arduino microcontroller[4]–[6].

1.1.Existing System of Irrigation:

The constant rise in food consumption necessitates rapid advancements in food production technology. Even in a country like India, where agriculture is the main source of income and the climate is isotropic, we are unable to fully utilize agricultural resources. The main cause is a lack of rain and a paucity of water in land reservoirs. The never-ending Water extraction from the soil is lowering the water level, causing a lot of area to dry up. In the unirrigated zones, things are moving slowly. Another significant cause for this is that because of haphazard water use, which wastes a substantial amount of water.The existing system of manual irrigation is very inefficient in regard to solving these issues.

In modern drip irrigation systems, the most significant advantage is that water is supplied near the root zone of the plants drip by drip due to which a large quantity of water is saved. . At the present era, the farmers have been using irrigation techniques in India through manual control in which farmers irrigate the land at the regular intervals. This process sometimes consumes more water or sometimes the water reaches late due to which crops get dried. Water deficiency can be detrimental to plants before visible wilting occurs. Following a little water deficiency, the growth rate is slowed, and the fruit is less in weight. This If we employ an automatic irrigation system, the problem can be completely solved. Irrigation will only take place if there is a pressing need for water.

1.2.Types of Automatic irrigation system

1.2.1. Soil Moisture Sensor based irrigation:

A soil moisture sensor based on probes made of nickel and a monitoring scheme were devised and built to determine soil moisture. Knowing the moisture content allows the agriculturist to estimate when and how much to water the soil in order to avoid excess watering and crop wilting. These measures will boost crop yields, enhance crop quality, conserve water, save energy, and reduce fertiliser usage[7].An automatic irrigation system which comprises a controller, a water inlet and outlet control device, a soil humidity detector and a power supply, wherein the water inlet and outlet control device, the soil humidity detector and the power supply are respectively connected with the controller. The soil humidity detector is connected with the controller in a wired or wireless mode and used for acquiring data of water in soil and transmitting the data to the controller[8], [9].

The water inlet and outlet control device is connected with the controller in a wired or wireless mode and comprises a water inlet pipeline, a first electromagnetic valve switch, a water storage tank, a second electromagnetic valve switch and a water outlet pipeline which are sequentially connected, wherein the first electromagnetic valve switch controls the water inlet pipeline to store water into the water storage tank, and the second electromagnetic valve switch controls the water storage tank to drain water for irrigation. The controller transmits a control command to the second electromagnetic valve switch according to the data of the water in the soil acquired by the soil humidity detector, so that draining irrigation of the water outlet pipeline is realized. The power supply is used for supplying power for the system. The automatic irrigation system is used for automatically controlling irrigation according to the detected soil water, and can be used for automatically storing the water. This system used in the roof gardens, lawn house, agriculture land, etc.

Benefits of this SMS:

- The most important benefits of this SMS are the faster execution w.r.t manual irrigation system.
- This complete set-up are portable.
- The power consumption is low as compare to Exiting system.
- The dryness of the soil can be easily detected.
- Not required extra knowledge for the operating this system.
- Save the time which are better for agriculture sector.
- This system save the labor cast as well as the save the water.

Limitation of this system:

- They need large amount of sensors for the irrigation of larger agriculture land.
- This system uses two different supply.
- This system also not reliable 100%. Its reliability is affected by number of factor that's why it need maintenance time to time.

1.3.Microcontroller Based Automatic Plant Irrigation System:

This system uses the controller (ATMEGA 328 microcontroller) which gives the on or off signal to the motor. The temperature and humidity sensors are attached to the microcontroller's internal ports. Whenever there is a change in the voltage, the controller uses a comparator. These sensors measure the temperature and humidity of the environment. Detects changes in temperature and humidity and provides feedback signal to the microcontroller and, as a result, to the motor this buzzer, in addition to being engaged, is used to signal that the pump is turned on. Automatic irrigation systems can be programmed to deliver the appropriate amount of water to a specific region while simultaneously encouraging water saving. Automatic irrigation systems can be programmed to deliver the appropriate amount of water to a specific region while simultaneously encouraging water saving. Automatic irrigation systems can be programmed to deliver the appropriate amount of water to a specific region while simultaneously encouraging water saving. After that, the microcontroller transmits a signal to the GSM Module, which delivers a message to the mobile phone. The automatic plant irrigation system is primarily intended for the implementation of embedded technology in the irrigation industry. This technology will assist farmers in reducing their workload. Farmers will benefit from this technology since it will save them time and increase crop production[10].

The pump/motor in this irrigation system is turned on/off based on the humidity content of the soil. The project employs an ATMEGA 328 microcontroller that has been configured to collect input signals of varied soil moisture conditions via a sensing arrangement.This is accomplished by employing an op-amp as a comparator, which serves as a link between the sensing system and the microcontroller. The microcontroller is also connected to an LCD display that shows the status of the soil and water pump. Two stiff metallic rods put at a distance into the field form the sensor configuration.

Benefits of this system:

- This methods save the time of irrigation.
- The quality of the food is improved.
- It also helps to control the fungal disease.
- It remove the manual operation of closing and opening of the valves.
- The labor cast will be minimize.
- This technology is adaptable.
- Increases the income of the farmer.
- This technology also operate in night.

Limitation of these system:

- This technology is advanced in the field of irrigation system so it required training on how to operate this device.
- The different circuit required different voltage.
- It is programmable that's why it is little be difficult for manufacture.
- Maintenance is required.
- Depending on the size of the property, these systems might be extremely costly.
- Water-delivery systems may be harmed by underground bugs, resulting in water pooling or broken parts.

1.4.Automatic Irrigation System with the help of android:

An autonomous irrigation system utilising an Android application, a Raspberry Pi microcontroller, and soil moisture and temperature sensors to assist a farmer in controlling and monitoring their land. This project makes farm irrigation easier by allowing users to turn on and off the pump motor using an Android phone. The most notable benefit of current drip irrigation systems is that water is delivered drip by drip towards the root zone of the plants, saving a huge amount of water. Two sensors are connected to the controller in this Raspberry Pi-based autonomous irrigation system, and the values from these sensors are sent to an Android application. This different monitoring and controlling system can be used to automate the monitoring and control of agricultural parameters such as temperature and soil moisture. The Raspberry Pi is a small, low-cost computer the size of a credit card. It's capable of completing any task you throw at it. This system include the Wi-Fi which helps to connect through internet. Android is a Google-developed mobile operating system that is based on a modified version of the Linux kernel and other open source software and is primarily intended for touch-screen mobile devices like smartphones and tablets.

This project employs a Raspbery Pi microcontroller that is configured to receive the input signal from several sensors in the field. It is based on an automatic irrigation system that executes multiple operations in the field of agriculture. This signal is received by one Raspbery Pi microcontroller, which provides an output that powers a relay to operate the

water pump. If the user notices that the soil moisture value is below the threshold or that the temperature is over the threshold, the user will use an Android application to switch on the motor until the moisture and temperature levels are optimal, then turn off the motor. The soil moisture and temperature sensors are connected to the microcontroller through wires. This signal is relayed to a mobile phone, which shows the sensor data and allows the user to turn on or off the device.

Benefits of the android based irrigation system:

- This system avoid the uses of extra water hence we can say that it save the water.
- It provide proper irrigation which improve the quality and quantity of the food.
- Minimize the labor cast.
- Save the time.
- Easy to operate, this system is operated from anywhere because is connected to the cell phone
- The dryness of the soil and temperatures are shown on the screen of the android mobile phones.

Limitation of this system:

- Required knowledge about android system for the operating purpose.
- Failure of hardware stop the whole system.
- Different hardware required different voltages.
- Connectivity of Internet is required.
- Cost of this system is high.
- Continuous power supply is required.
- Maintenance is required time to time which will in increase the cost.

2. LITERATURE REVIEW

Bishnu Deo Kumar et al. dicusssed about "MICROCONTROLLER BASED AUTOMATIC PLANT IRRIGATION SYSTEM"[11]. The primary goal of this paper is to provide information regarding automatic plant watering, which saves both money and water.The entire system is controlled by an ATMEGA 328 microcontroller, which sends the motor an interrupt signal.Temperature and humidity sensors are linked to the microcontroller's internal ports via a comparator.

Shoaib Mazid Khan et al. explained the "ADVANCE IRRIGATION SYSTEM"[12]. The goal of this research is to provide us with a thorough examination of a technology-based system that would be a superior method of communication. Irrigating the garden and agricultural lands in today's world, Water is one of the most pressing issues in the globe. There is a scarcity of water, and agriculture uses a lot of it.

Pavankumar Naik et al. discussed about the "AUTOMATION OF IRRIGATION SYSTEM USING IOT"[13]. India is mostly a farming country. For the vast majority of Indian families, agriculture is their primary source of income. It is critical to the agricultural country's growth.Agriculture's primary resource is water. Irrigation is one technique of supplying water, although it can waste a lot of water in other instances. As a result, the author has presented a project dubbed automated watering system utilising IOT in order to save water and time

3. DISCUSSION

In this paper discussed the three methods of smart irrigation system. We know in Indiathe maximum peoples are dependent on agriculture sector as well as it play an important role in economy. Day by day population willincreases so we need to adopt new techniques for making better irrigation system. Which impact on the quality of the food, farmer income, save the time, save the water wastage and many more. The SMS (soil moisture sensor) water irrigation methods is a part of automatic irrigation system, in which SMS detect the moisture level of the soil and send signal to the relay and this relay connected to the water pump. When the moisture level of the water is below the set limit then it send a signal to relay and this relay On or OFF the motor on the basis of the moisture level. But this system have some limitation then new system of modern irrigation are introduced and this system containing microcontroller as well as this controller is connected to the mobile phone through the internet. The moisture and temperature sensor connected to this controller and all the data are received on the screen of android phones. If the dryness of the water exceed the pacific limit then the irrigation system will be on through the mobile phones on single tap. This technology helps the farmer for make the irrigation better and the save the time and wastage of water. It also help the farmer to increase the production and maintains the food quality.

4. CONCLUSION

When compared to previous ways to building similar systems, the system proposed is cost effective. The goal of creating an Automatic Plant Irrigation System has been accomplished, and the intended outcomes have been met. The gear and software that were employed did a good job of producing the intended outcome that the farmers in the irrigation field needed. The gear and software that were employed did a good job of producing the intended outcome that the farmers in the irrigation field needed. The use of a microcontroller to interface with run time switches allows for greater flexibility in terms of time settings for running a water pipe line. Farmers will benefit from this method. While working on the irrigation system, considerable caution must be exercised. Unusual weather conditions, arduous assembly work Poisonous reptiles will be eradicated. The system, which is now in use, developed to assist farmers with their irrigation procedure Also at night. The automated irrigation system is critical for agricultural production water resource optimization. This technology assists in automatic monitoring, allowing us to save manpower. It also demonstrates that water consumption can be reduced for a given quantity of fresh biomass output, and this irrigation system is used for big green house production.

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