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Smart Farming: IoT Based Water Managing System

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Abstract: ***Now-a-days farming is an important occupation which plays a vital role in the survival of all the Human Beings. This is a field where every other person can start with their own farming system. But farmers of current environment don't have the intelligent process involved in it. So there is an alarming need for the intelligent farming processes. New methods have to be incorporated from the conventional ways of farming to achieve efficient farming. Among all the problems that the farmers are facing, most common and important problem that the farmers have is water problem. They have scarcity of water for the farming because of irregular presence of water availability due to floods and sometimes due to drought. So there is a need for smart water management and conserving the systems to effectively utilize the water whenever required. Addressing the problems faced by the farmers in the proper utilisation of the water in the farming, this work proposes an IoT based water management system to effectively use, conserve and reuse of the water for the plants.***

Key words: IoT, Farming, Sensors, Water Management, Soil Moisture.

I. INTRODUCTION

In many places especially India, people are depending more on farming. Most people occupation itself is farming. People income depends on farming in majority of the area. But most of the farmers still using older technology of farming, irrespective of new technology been introduced. Because of the irregularity in the monsoon, unevenness of water availability throughout the year poses a major problem for the farmers. This yields to the low production of the crops and inadequate of yields. There is a need for the system to implement and integrate the system that will ensure the increased levels of productivity, and crop monitoring at all stages of cultivation and harvesting [1, 2].

II. PROPOSED SYSTEM

The proposed system consists of following items:

- A Rectangular Plastic Tray
- Soil
- Concrete
- Few coriander seeds.

Using the above items experiment set up is been done. Based on the set up it has proposed some objectives for this work. The main objective of this system is by adopting few new relevant techniques.

- An elevated soil platform is created in order to provide a sloped field.
- Giving the look of a pythogorous triangle. From the side view there is a small enclosure for water collection is to be made.
- At the lower end of the base excess water gets collected. Once the plants on the field absorb the water, the excess water flow down the sloped farm to get collected at the bottom.
- Soil moisture sensors are placed inside so that the sensors detects the moisture present in the soil and when water is required, excess water collected will be reused by the plants.

Diagrammatic view of the experiment is as shown below in figure 1 and figure2.

Figure 1: Soil placed on the tray in a slopped way

Figure 2: Coriander seeds placed in the vertical manner

III. METHODLOGY

The whole idea behind this model is to provide a smart and easy way of irrigation and farming. The model consists of a sloped farming surface with a reservoir at the bottom of the slope. In the reservoir, there is a pump installed with is coupled with a soil moisture detector. When the moisture content of the soil goes lower than the threshold value, the pump automatically waters the plants providing a smart way of irrigation.

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Watering of the farm can be done based on the soil moisture level.

If the soil moisture goes below the threshold value that indicates that the water is required for the plants. Hence the pump automatically waters the plants. This way it reduces the work of farmers and also every minute manual observation of the farm is not needed. Hence this smart pump is used for smart irrigation. Making the use of an Arduino program [3, 4, 5] a smart pump has been programmed in such a way that it does not need a manual activation for irrigation of the crops in the farm.

A water level detector has been installed in the reservoir to keep a check on the level of the water in the reservoir. This water level detector helps the pump to switch off by itself so that excess water will not be done and wastage of water can be avoided. In order to keep a check on the temperature of the farm, a temperature detector is also installed. The smart farm also consists of a humidity detector to keep an eye on the humidity. Temperature and humidity is important because the water level of the plant is basically detected by these sensors. The status of the farm is displayed as a whole on LCD display so that the owner of the farmer can easily grab the details regarding the status of the farm at a glance.

BLOCK DIAGRAM OF THE PROPOSED SYSTEM

The proposed system has a block diagram which is been shown in figure 3.

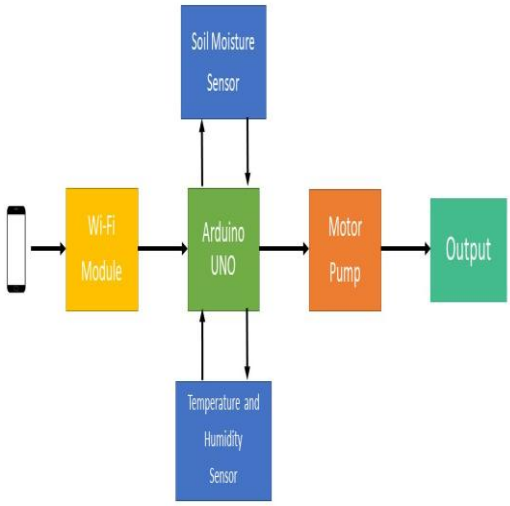

Figure 3: Blok Diagram of the system

In this work, the set-up is how made ready in a slant/slope manner such that whenever we water the plants, much water is needed for the plant it will be used by the soil and excess water will stored in the reservoir at the bottom of the slope. This technique is been used so that water could be saved for later use by the farmers as water scarcity will be there in most of the places. Soil moisture detector is connected to a power supply and the Arduino UNO board. The WIFI module is connected to the board and coupled with the laptop, which is used to give the appropriate instructions. It is used to provide a wireless Interface. Humidity and the temperature detectors are connected to the UNO board and inserted in the farm. A LCD display is connected to all these components so as to display the required information about the overall status are of the farm. Another moisture detector is installed in the reservoir to detect the water level. All the components are given commands through the Wi-Fi module. Soil moisture sensor, humidity sensor and temperature sensor is been connected through an Arduino board as shown below in the figure 4. Soil moisture sensor will penetrate inside the soil such that it will detect the moisture level of the soil time to time. Once the moisture level decreases and it sends the signal for watering the plants, water will take from the reservoir through the pump motor which is been kept inside the reservoir. Water level detector is also placed inside the reservoir to keep track of the water that is present in that reservoir.

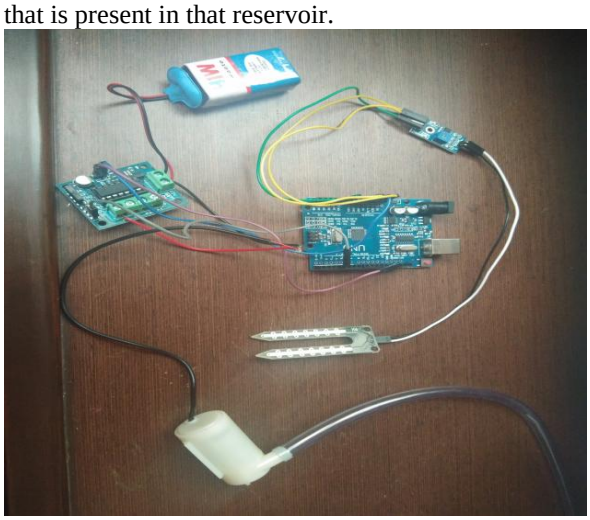

Figure 4: Set up with sensors

This will help in reducing the manual work of the farmers in a regular interval of time. Daily once if the water is watered to the plants with little amount of excess water, the rest of the day that much amount of water is sufficient for the plants to grow. This technique will help in water saving and also manual work of the farmers will be reduced.

IV. RESULTS AND CONCLUSION

With rapid increase in agriculture, farmers are very much in need of the outside machineries to run their farm without any distraction in the middle, without any water scarcity. This work will help farmers to reserve the water for later use, though the scarcity of the water is there in that region also by following this technique water could be sufficient for growing plants.

Sensors are used to detect the water level. Proper planning and necessary machines which is of low cost has to be used which benefits the farmers.

But the limitation of this work is, it is used only for small farms because sensors whatever is been used will detect the moisture level for certain distance or for certain area. If we want to detect for more areas one has to use more number of sensors and the reservoir for storing of water.

Future more sensors enabled in one board can be developed to place it in an area and a bigger reservoir to collect the water and motor pump capacity which is of higher voltage can be used such that water can be pumped throughout the farms in a better and efficient manner.

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Afra Zaib Fayaz, is a student of BMS Institute of Technology, Bangalore.She is pursuing 2nd year engineering in Computer Science. She is an enthusiastic programmer and coding has always been her passion. Along with her blistering academic excellence she shows great ethos in extracurricular activities and is an all-round performer. She works as an associate for the Entrepreneurship Development Cell of BMSIT. Possessing excellent oratory skills she is also a part of the Debate Club of BMSIT. She has also been a part of various workshops and Hackathon based on Arduino.

Allen Benny, is a Computer Science student studying in BMS Institute of Technology, Bengaluru. He always had a keen interest in computers and using IoT to make life simpler. He recently visited the Google DevFest 2019 Bengaluru, where he came to know about the recent technological advancements in the current World, which has inspired him to make this project. He also has an Interest in learning about Networking and ethical Hacking and has also completed few courses regarding the same. He hopes to work more on IoT related projects and one day make a project than can help the Public.