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AUTOMATIC IRRIGATION SYSTEM USING SOIL MOISTURE SENSOR AND TEMPERATURE SENSOR

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ABSTRACT:

The productivity of the crop depends on the soil, fertilizers, and water. The fertilizers provide micronutrients for vegetable farming like nitrogen, zinc, and others. To meet the increasing demand for food, crops should be able to withstand the adverse effects produced by the environment and unpredictable sources. The structure of smart agriculture is similar to networks, which are designed in 3 layers. Sensor layer to get information about various parameters, products, and operating environment. Transport layer to communicate the obtained information in between the various devices and as well as to and from a remote server. Application layer to analyse, visualize and predict the data for further actions to be implemented. In the proposed system, it uses multilinear regression to predict the water levels and micro-nutrients that are excess for the crop cultivation because farmers need analog data, not digital data. So that they can take necessary precautionary steps to protect the field from getting damaged.

Keywords: Agriculture,Microcontroller,sensors,Iot,Irrigation system

I.INTRODUCTION

To supply food for a growing population in countries like India, researchers have started providing solutions by Embedding the Internet of Things with deep learning techniques, which is a state as “Smart IoT”. With this advancement, E-farming has taken a new paradigm, where all the sensors needed for farming are connected to the remote server either using remote protocols or wireless technologies in the distributed environment. This smartness helps the farmers to monitor these fields even they are far away from the fields. The data from different sensors exist in different formats so in a cloud environment all these are converted into a single and understandable format so that the designed framework can work on it. IoT supports a third-party tool knows as “ThingSpeak”, which works with MatLab Simulator, to provide the visualization and analysis on the data shared. It is one of the best tools which can provide more sophisticated, and reliable data after collecting from multiple sources.

II.LITERATURE REVIEW

In [1] A. Archana et al explored irrigation management studies for finding the saline solids in soil. To improve the crop yield facility it uses two strategies, one is bioremediation, in which different species of plants can be cultivated and the change of plant growths can be changed from time to time. But the plants which have good property to absorb the salinity should be planted before seeding the plants. The second strategy identifies the products that limit the amount of salinity so that measures can be adopted to increase/decrease based on the requirement of soil. It uses a cyclic and sequential reuse mechanism. The model has developed a mobile application which takes care of soil nutrients based on the nano materials and optical sensors to find the deficient values among the soil particles those results in less agricultural production.

In [2] Md. Hafizur Rahman et al studied the impact of domestic sewage on soil composition for soil efficiency. In this study, the system majorly focused on phosphorous, zinc, nitrogen, and potassium elements. The model has clearly studied the controlled release on nano fertilizers and their impact on the agricultural soil lands. The research has proved that the utilization of sewage has significantly improved the harvest of crops. Continuous monitoring of toxic substances is focused majorly on this paper. The impact of the toxic sf rate greatly impacts the productivity rate of the agriculture soil. The quality of sewage is analysed by assessing the irrigation water. The PH value measures the content of acidity in the heavy materials. It is observed that the contents of nutrients are more in sewage content. The disposal of these elements will contaminate the groundwater and air.

In this chapter, we have discussed various types of Automatic Irrigation mechanism for better irrigation. Let us discuss each and every technique of Automatic Irrigation System.Irrigation Management System Using Soil Moisture Sensor and Arduino ,SP.Maniraj et al., proposed that the automated irrigation system is done by soil moisture sensor and arduino. In this system, the contol is used to on and off the motor without the help of humans which is done by microcontroller. The LED is provided for the indication of working of the arduino. The moisture level of the soil will be checked and the irrigation status will be sent to the local host or server. Automated Irrigation System Using a Wireless Sensor Network and GPRS Module, Joaquín Gutiérrez et al., proposed an automatic irrigation system was introduced to help farmers. In this a wireless network of soil moisture and temperature sensor are employed to senses the information.

Existing System:

The economy of many countries depends on agriculture. To achieve the best quality from this research, it is important to focus on some vital characteristics such as the appropriate amount of electricity as well as water supply and a suitable schedule for irrigation of crops. Farmers are facing problems in meeting these standards, especially those living in poverty. This project looks into developing an automated irrigation system that could be controlled through mobile application. This system will work to minimize the number of workers in a crop field, control and save water and electricity, Increase agricultural production using small quantities of water, minimize manual intervention in watering operations with increasing watering speed and preserving plants from fungi. All these features make these research sustainable option to be considered to improve the agriculture and irrigation efficiency.

III. PROPOSEDSYSTEM

Irrigation plays a vital role in the plantation of crops. The manual supply of water does not give an ultimate result for food production. The better production needs a correct amount of water at a right time. The introduction of Automatic Irrigation System aims to lessen the consumption of water from the over usage of water in the agricultural field. The Automatic Irrigation System improves the monitoring of crops often without the help of manpower. The Automatic Irrigation System designed with the Wireless Sensor Network and Mobile communication. The WSN consists of sensors which are employed in the agricultural field for sensing the moisture and temperature of the soil. The sensed data are bring under the microcontroller for regulating the valve of the pump. If the moisture of the soil gets decreased, the sensor

sends the data to the microcontroller. Then the microcontroller instructs the valve to turn on. After reaching the threshold value of the moisture, the microcontroller instructs the valve to turn off. The updated value of the moisture and temperature and the action taken by the microcontroller will be send to the user.

IV.METHODOLOGY

The system consists of many sensors including temperature, moisture sensors etc. At first all modules are initialized and the moisture value is read.

If the soil moisture is lesser than the threshold value, the pump with sprinklers and drips is automatically started. If moisture value is greater than the threshold value, the drip with pump will be automatically turned off. As the data is completed hosted in cloud, we use a web app to access the data and notifications. The flask web framework is used.

The whole project is being developed based on the requirements of the client. Therefore, the basic idea here is to focus on parameters such as temperature and soil moisture and others depending on client's further requirements. This is a Mobile Integrated and smart irrigation system using IOT based on application controlled monitoring system. The main objective of this project is to control the water supply on sprinklers and monitor the crop and soil condition through a remote device say a smartphone. The application that is been developed as a part of this project is completely hosted on the cloud using the platform.

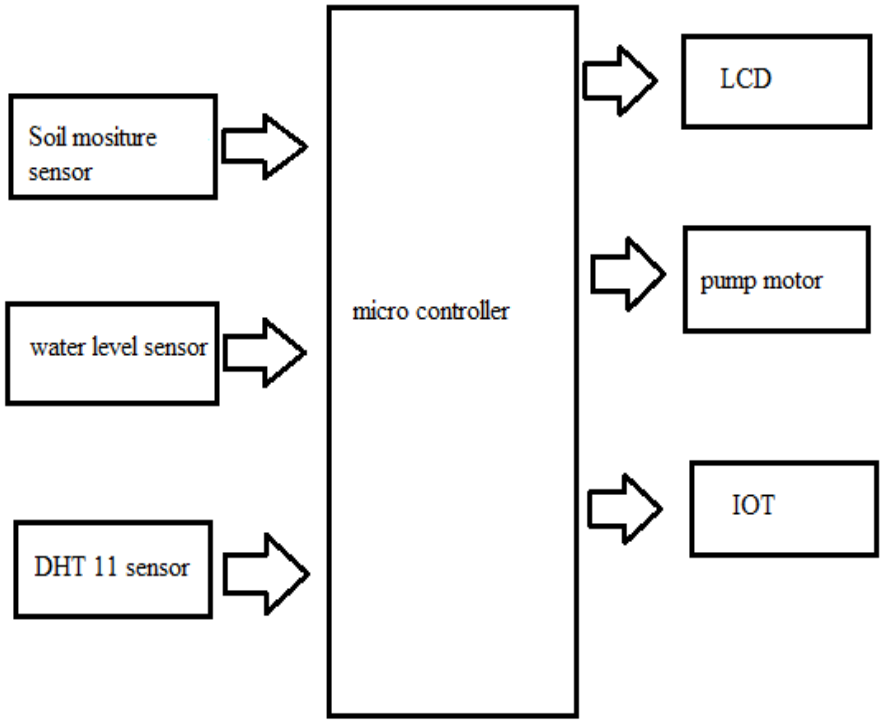

Figure1: Block Diagram.

SOIL SENSOR

METER soil moisture sensors use high-frequency capacitance technology to measure the volumetric water content of the soil, meaning they measure the quantity of water on a volume basis compared to the total volume of the soil.

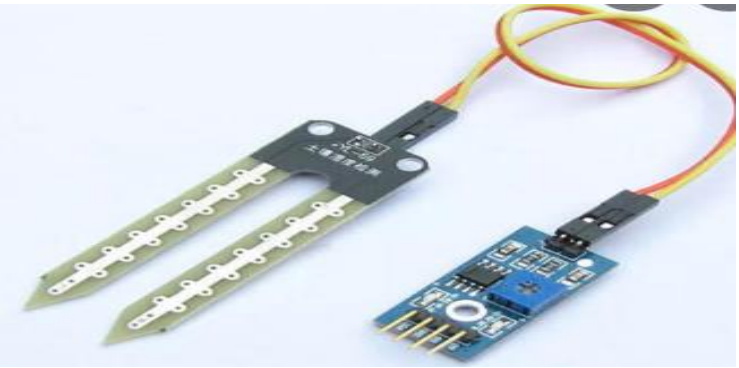

Figure2: Soil Sensor

PUMP MOTOR

A Motor pump is a mechanical device, used to move the liquids/gases from one place to another by using mechanical action. The working principle of the water pump is, it converts the motor's energy from mechanical to fluid flow. These are classified into various types based on the technique they use for supplying the liquid like direct, gravity and displacement.

Figure2: Pump Sensor

A pump operates by using a mechanism like rotary or reciprocating and they consume energy for performing mechanical work to move the liquid. Pumps use several energy sources for their operations like manual, wind power, electricity, engines, etc. These are available in many shapes based on its application like medical to large industries.

WATER LEVEL SENSOR

A float switch definition is: It is a type of contact liquid level sensor which uses a float to operate a switch within a tank. This switch is also known as a level sensor. These switches play a key role in controlling other devices like pumps & alarms when a level of liquid increases or drops to a particular point. The **float switch symbol** is shown below.

Figure3: Water Level Sensor

These switches range from small sizes to large sizes. Float switches come in two different styles: magnetic(Electromagnetic) and Mechanical float type.

V. APPLICATIONS

By adding automated plant watering system to your garden or agricultural field, you will help all of your plants reach their fullest potential as well as conserving water. Using sprinklers drip emitters, or a combination of both, we can design a system that is ideal for every plant in our yard.

VI. RESULT

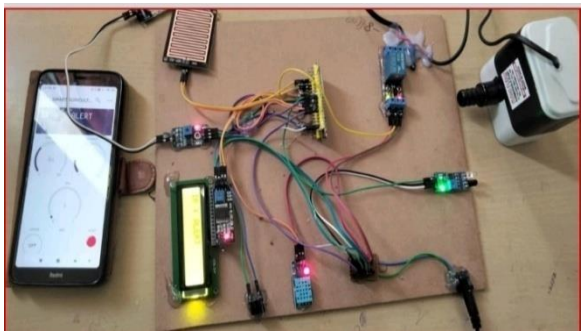

Figure4: Soli and Tempearture reading using IoT

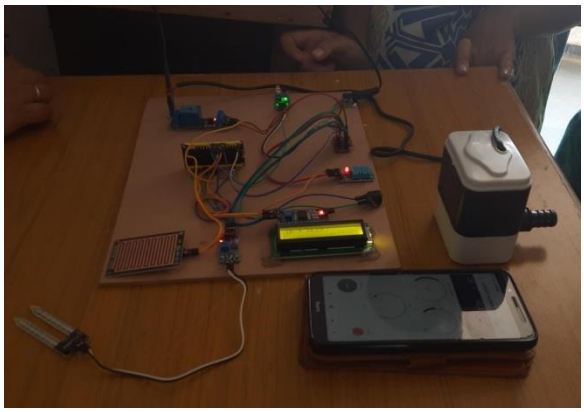

Figure5: Automatic water pump on using IoT

VII. CONCLUSION

This system was proposed to develop a daily operations related to farming or gardening watering is the most important practice and the most laborintensive task. No matter whichever weather it is, either too hot and dry or too cloudy and wet, you want to be able to control the amount of water that reaches your plants. Modern watering systems could be effectively used to water plants when they need it. But this manual process of watering requires two important aspects to be considered: when and how much to water. In order to replace manual activities and making gardener's work easier, we have create automatic plant watering system. By adding automated plant watering system to the garden or agricultural field, you will help all of the plants reach their fullest potential as well as conserving water. Using sprinklers drip emitters, or a combination of both, we have design a system that is ideal for every plant in the yard. For implementation of automatic plant watering system, we have used combination of sprinkler systems, pipes, and nozzles. In this paper we have used ATmega328 microcontroller. It is programmed to sense moisture level of plants at particular instance of time, if the moisture content is less than specified threshold which is predefined according to particular plant's water need then desired amount of water is supplied till it reaches threshold. Generally, plants need to be watered twice a day, morning and evening. Thus, the microcontroller is programmed to water plants two times per day. System is designed in such a way that it reports its current state as well as remind the user to add water to the tank. All this notifications are made through mobile application. We hope that through this prototype we all can enjoy having plants, without being worried about absent or forgetfulness.

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