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Smart Water Management in Agricultural Land Using IoT

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***Abstract*--**The proposed system is focused on water management in agricultural land. Water is the primary and predominant supplementary for agricultural land and over 69% of the world's freshwater are committed to agricultural purposes. Therefore, it's high time to Conserve and utilize water resources efficiently with the assistance of ingenious technology like IoT and Automation. In this regard, we have come up with a solution of conserving water by IoT based Water recycling and Irrigation system as "Smart Water management in Agricultural land". .

***Keywords*---** Recycling, Reuse, Conservation, Arduino, IoT, Irrigation, Sensors.

I.INTRODUCTION

In the Indian economy agricultural sector is the major contributor in the GDP. Water scarcity has become a major threat. India has about 1.2 million populations, because of the growing population requirement of natural resources is also increasing drastically. And agricultural uses almost 69% of the world's fresh water. The agriculture also depends on the monsoons at a higher rate than the conserved resources. Because of the unpredictable climatic condition, agriculture is facing adverse effects. Natural calamity also adds up as a bane. Therefore, it is important to implement technology in agriculture. At present, innovative ideas from all over the world concerned on agriculture. The same way, our proposed also revolves around the conservation of water resources with a unique methodology.

II. LITERATURE SURVEY

In this paper K. K. Namala [4] has made use of a water flow sensor to calculate the amount of water dispatched in the field. The paper talked about the webpage style storing of the data which can be reviewed when required. Along with this, the paper discusses the Raspberry Pi2 and Arduino integration so that communication can be made easy. Arduino communicates with

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the sensors and get the data. XBee module is used to send data to Raspberry Pi from Arduino for further processing. .In the paper [1] "Automatic irrigation with data log system", author Abilash Shrivastava, Dept of CSE, Bangalore has proposed a system which makes the work of the farmer easy by sending SMS alerts to turn ON and OFF the motor when the required watering is done. It reduces and saves time and cost. Raspberry pie is used and it makes the system sustainable. It works based on the data fetched from soil and the storage tank.

III.PROPOSED SYSTEM

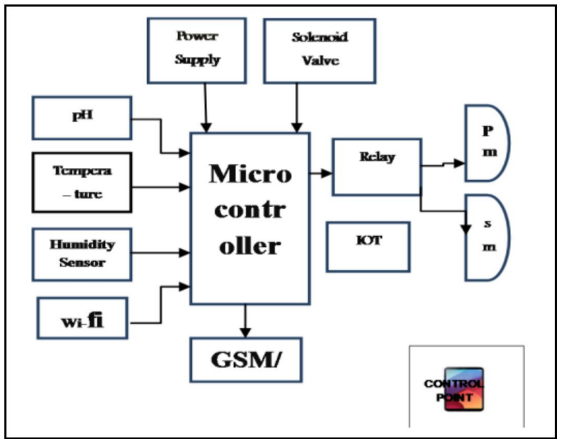

Fig.1 shows the architecture of the proposed system.

The design of this system explains the operations of temperature, humidity, pH, and moisture sensor used via a flowchart.

A.Temperature Sensor

LM35 is used in this module. Temperature sensor is used to predict the real time temperature value of agricultural land. The irrigation activity is carried out by validating the temperature against threshold condition. When the temperature is greater than 32 degree centigrade the irrigation motor gets turned ON.

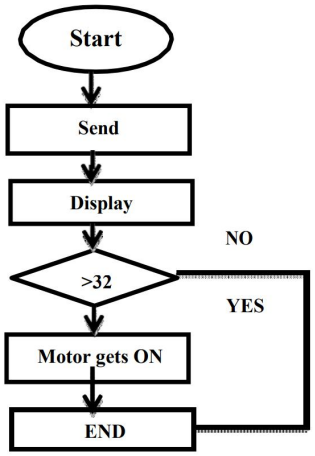

Fig.2

B. Humidity Sensor:

DHT11 is the humidity sensor used in this module. The purpose of it is to detect the humidity value of the soil and validate against the standard threshold condition. When the humidity of the soil is less than 30 percent, it turns on the irrigation motor.

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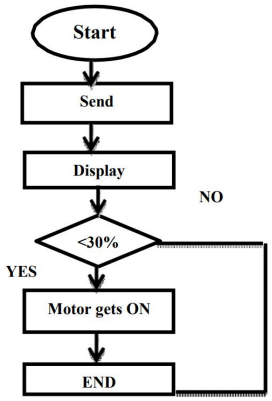

Fig.3

C. pH Sensor

pH Sensor is used to measure Hydrogen-ion activity in solution. It acts like a voltmeter which measures the acidity of the solution of the agricultural land. When pH value is less than 7 it shows acidic and the land requires watering based on acidic level.

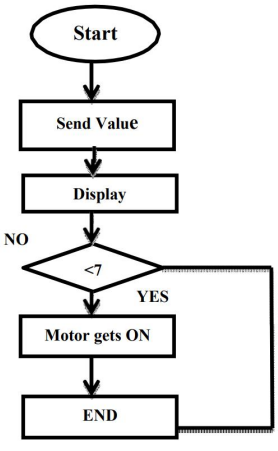

Fig.4

D. Suck Motor

The water gets drained in a filter from the steep. So the humidity and the water level of the drain is frequently assessed to turn on suck motor. Thus motor sucks the water from the drain, process, and stores it in the tank.

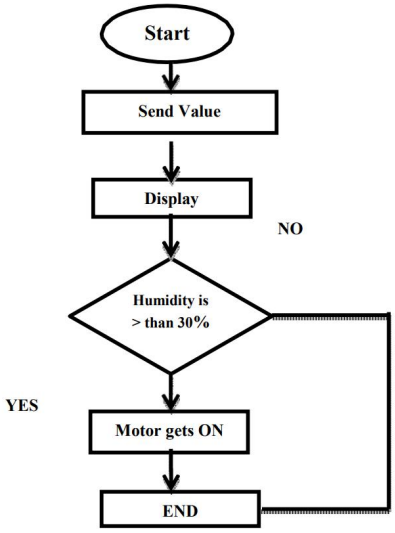

Fig.5

The system uses sensors which collects information from the soil. The readings are compared with the threshold value to determine the watering activity and watering is done based on the condition of the agricultural land. The filter is used to collect the water drained from the The project mainly aims in water conversation, In order to achieve water reuse recycling module is added to the system. The system executes its aim in two stages. Arduino based irrigation prevents excessive use of water and auto recycling supports reuse of water. This method uses Arduino has its central unit which fetches data like pressure, Temperature, pH, and humidity

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from the soil and governs the activity based on information obtained from sensors. Sensors are placed on soils core which updates microcontroller with Real-time data. The water that gets drained from the steep land is collected, filtered and processed using automatic recycling. Automatic recycling uses sucking motor, recycling module, and storage reservoir. This recycled water will be stored and used for the next set of irrigation. Thus at the end of the process, the system provides an efficient way in conserving water and has high efficiency in preventing excess utilization and also paves a way for reuse of water resource. All this information on a timely basis will be intimated to the user via the app interface. The communication will be carried out by using both GSM, Online broadcasting. The user can either manually turn ON/OFF using the web server or proceed with the automation process.The system uses Arduino as its microcontroller and various hardware components are interfaced with the module. The information is processed and the actions are determined based on the algorithm. The actions are controlled by the value which is obtained as a result from the soil. The values are forwarded to the relay which is then intimated to the water controller and suck motor. The water is sucked and recycled. The processed water is stored for future purpose in the storage reservoir. This information can be viewed by mobile app interface which collects information from IP address from Wi-Fi module. Then the real-time data is forwarded to the user via SMS/ Online message by GSM/GPRS and Wi-Fi. The project mainly aims in water conversation, In order to achieve water reuse and irrigation system by automation and IoT, steep farming is chosen. The system executes its aim in two stages. Arduino based irrigation prevents excessive use of water and auto recycling supports reuse of water. This method uses Arduino has its central unit which fetches data like pressure, Temperature, pH, and humidity from the soil and governs the activity based on information obtained from sensors. Sensors are placed on the root of the soil which updates microcontroller with Real-time data. The water that gets drained from the steep land is collected, filtered and processed using automatic recycling. Automatic recycling uses sucking motor, recycling module, and storage reservoir. This recycled water will be stored and used for the next set of irrigation. Thus at the end of the process,

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the system provides an efficient way in conserving water and has high efficiency in preventing excess of the soil. The automatic recycling setup detects the water that's drained and uses suck motor to collect the water for further recycling. The recycled water gets stored in a storage reservoir which can be later used for irrigation purposes. This method when implemented, excessive usage of water can be eliminated by automatic irrigation practices and via parallel conservation practices. This shows the utmost productivity, groundwater depletion can also be prevented at a considerable rate. IoT is used for interconnecting devices and plays a vital role in this system. A mobile or handheld device is used to view the operations like recycling, watering and storing of water in the land. The purpose of the Iot is to establish a communication between sensors and Arduino. The activities of the sensors are programmed and the information is processed based on it. The processed information is basically used to control the activities. Wi-Fi module is employed to transfer the information from Arduino to the user. The user can receive the information via SMS/online broadcasting using GSM/GPRS technology. The mobile/handheld device is supported with web server/app interface where live data of field can be viewed. All these information is stored in online cloud storage for future references. The microcontroller generates a service set identifier password which is used to create a hotspot with Wi-Fi module. The controller generates a default IP address .on which runs the web server. The web server is designed based on the needs of the user with various options to view the status of the irrigation and level of the storage tank. Hence, this project serves as a productive and efficient water management system. utilization and also paves a way for reuse of water resource. All this information on a timely basis will be intimated to the user via the app interface. The communication will be carried out by using both GSM, Online broadcasting. The user can either manually turn ON/OFF using the web server or proceed with the automation process.

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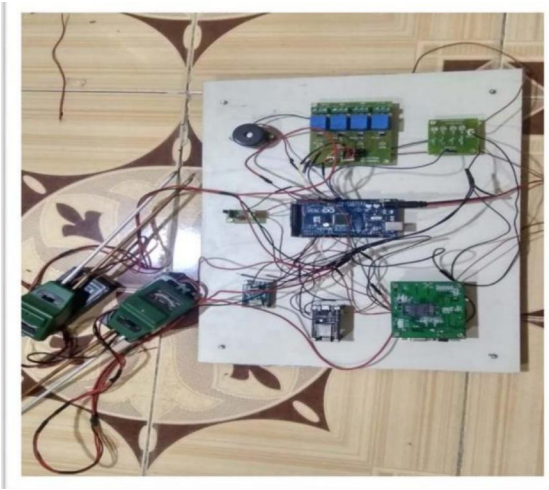

Fig.6

Fig.6 shows the prototype model of the system. The values are displayed to the user via app interface which shows the real time information of the land and the activities can be controlled from the user end either manually or automatically based on the requirement.

V.RESULTS We have developed a module concerning the water scarcity and causes due to inefficient utilization of water resources with recycling system. Hence, based on the results and experiments conducted this module is found to serve its purpose of water management resourcefully.

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