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Automatic Irrigation System

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Abstract As part of an automatic irrigation system, a soil moisture sensor is inserted into the plant's soil, and a water level sensor is mounted in the water container from which water will be pumped to the plants for irrigation. to assess the water level in tanks and manage the amount of water in the soil, an algorithm with threshold values for soil moisture sensors has been developed. An Arduino board with an ATMega328 microcontroller is needed for this project. An automated irrigation system uses a soil moisture sensor to determine the soil's moisture content, which controls whether the pumping motor is on or off.Better resource management and minimal power usage are features of the design. In this project, an 8051 family microcontroller is used. This programmable microcontroller accepts input signals that are then converted by soil moisture sensors into values of soil moisture. As soon as the microcontroller begins to receive the signals, it produces an output that causes a relay to open, activating the water pumping motor.The soil and water pump's moisture levels are shown on an LCD that is also connected to the microcontroller. To make sure there is enough water in the tank to efficiently irrigate crops, the tank's level is determined by the water level sensor.

Keywords: Microcontroller, water level sensor, Arduino UNO, soil moisture sensor.

Introduction This is a microcontroller-based control system used for data processing. The activation of the pump to supply water through the tunings connected to the pump depends upon the signals received through the sensing mechanism. To prevent plants from going without water, water regulation and flow optimization are goals. When water is scarce in the summer, this is very helpful. The water flow can be adjusted based on demand throughout the monsoon and winter months, saving precious water.As the technology is improving day by day,the main goal of this project is to create a new gadget called the GSM, or global controlled soil moisture sensor. The soil moisture sensor is run by a GSM module. The system takes analog input from the sensor and according to it, the action takes place. The mechanism starts the motor when the moisture level is low and shuts it off when the moisture level is high.

I. LITERATURE SURVEY

Joaquin Gutierrez (2013) describes a gateway device that controls actuators, manages sensor data, and provides data to a web application. It has a cellular internet interface-based bidirectional communication link that enables Setting up data inspection and irrigation scheduling through a website. It is powered by photovoltaic panels. [1].

In the root zone of the plant are sensors for soil moisture and humidity, according to Archana and Priya (2016).The microcontroller is utilized to regulate the water distribution to the field based on the measured data. The farmer is not informed about the state of the field using this method. [2].

Dinesh V. Rojatkar and Sonali D. Gainwar (2015) In a piece of paper that measures soil factors for high soil yield, including pH, humidity, moisture, and temperature. This fully automated device regulates the motor pump's ON/OFF status based on the amount of soil moisture. The current condition of the field is unknown to the farmer. [3].

In a piece by M. Sudha and V. R. Balaji (2016), photovoltaic cells in the system utilize sunlight as their energy source. There is no reliance on electricity for this method. The PIC microcontroller is utilized to ON/OFF the motor pump based on the measured values after the soil moisture sensor has been employed. This method does not include weather forecasting. [4].

R. Subalakshmi (2016)the complexity of irrigation is reduced with the use of an automation system that uses GSM and a microcontroller. On the basis of the observed readings from the soil moisture, temperature, and humidity sensors, the GSM alerts the farmer when the parameters surpass the predetermined threshold value..This technique does not determine the number of nutrients in the soil. [5].

Karan Kanara (2015) is an irrigation system that measures the soil's temperature and humidity with humidity and temperature sensors, and a microcontroller to manage the water flow based on those measurements. GSM will be used to notify the farmer. The quantity of nutrients in the soil is not monitored by this method. [6].

P.V. Kanade and Prof. C.H. Chavan (2014)) a sophisticated wireless network of Zigbee sensors for tracking environmental variables.These nodes wirelessly transmit data to a centralized server, which compiles, saves, and enables data analysis and display as required in addition to sending data to the client's mobile.
In this system, neither weather prediction nor nutritional content is calculated. [7].

K.Sivaprasath and G. Parameswaran (2016) IOT-pH, humidity, and temperature sensors for a smart drip irrigation system. A personal computer is used to update the server or local host's irrigation status. Without the internet, the farmer cannot learn about the state of the field. [8].

B.A.Sarath and S.Reshma (2016) is a wireless sensor network used by an automated irrigation system driven by the internet of things to gauge the soil's characteristics. The user of this system can remotely monitor and control the device using a web interface. This system does not monitor the weather.
[9].

II. METHODOLOGY

The major components used in this project include a control system with a regulated power supply that is based on a microcontroller.

i. Soil moisture sensor and temperature sensor take input from the soil.
ii. The sensors take values from soil and display them on the user's Android phone, thingspeak application also.
iii. If temperature and moisture are low water flow automatically starts to the yield.

III. PROPOSED METHOD

The proposed system is the hardware of the module. A microcontroller has a connected Water level sensor, DHT 11 sensor for sensing temperature and humidity and a Moisture sensor. Outputs of all the sensors given to the microcontroller, the controller takes the input and takes action according to it. The output will display on LCD and give updates through the SMS and also on the Application. Which is done by GSM. In comparison to the microprogrammed Complex Instruction Set, mechanisms are significantly simpler.

IV.HARDWARE DESIGN

1. Arduino uno

An Arduino UNO is being used as the microcontroller. A microcontroller board called the UNO is based on the ATMEGA 328P. ATMEGA328P has 32kB of memory. Flash memory is used to store the Code. A board features a 16 MHz quartz crystal, an ICSP circuit, 6 analog inputs, 14 digital input and output pins, USB, and a reset button. The Arduino software allows the programming of the UNO.

2. Gsm module

The European Telecommunication Standards Institute (ETSI) created the GSM (Global System for Mobile Communication) standard to outline the protocols for second-generation (2G) digital cellular networks utilized by mobile phones.GSM is the name of a digital, circuit-switched network is optimized for full duplex phone telephony and has since been upgraded to provide data communications, such as GPRS-based packet data transmission (General Packet Radio Services). The GSM standard can allow a practical distance of up to 35 kilometers (22mi).

3. DHT 11 sensor

The proportional amount of hydrogen (H+) or hydroxyl (OH-) ions present determines the pH, which is a measure of the acidity or alkalinity of a water solution. An acidic pH value is below 7, whereas a basic pH value is above 7. Temperature and pH can both fluctuate in a solution.

4. Moisture sensor

To measure the moisture content of the soil, it comprises a probe made up of moisture sensors that can be put into the ground. When the field is dry, the sensor device detects the soil's state and to the microcontroller, the signal is sent. As a result, the motor starts to run. Now, only the dry areas are irrigated with water that is pumped there. A moisture sensor gadget is used for this. The irrigation process will halt when there is moisture in the soil and vice versa. The amount of water in the soil is measured by soil moisture sensors.

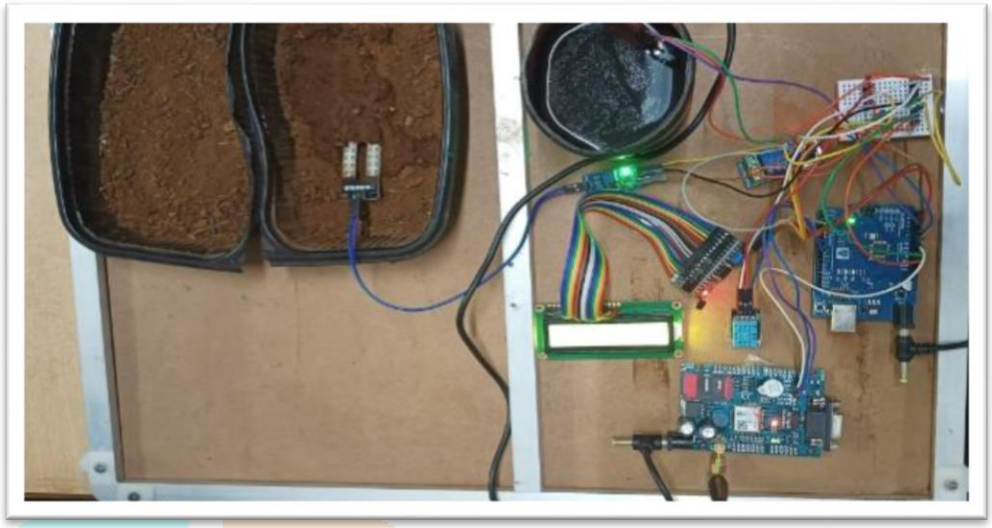

Fig.1.Hardware design

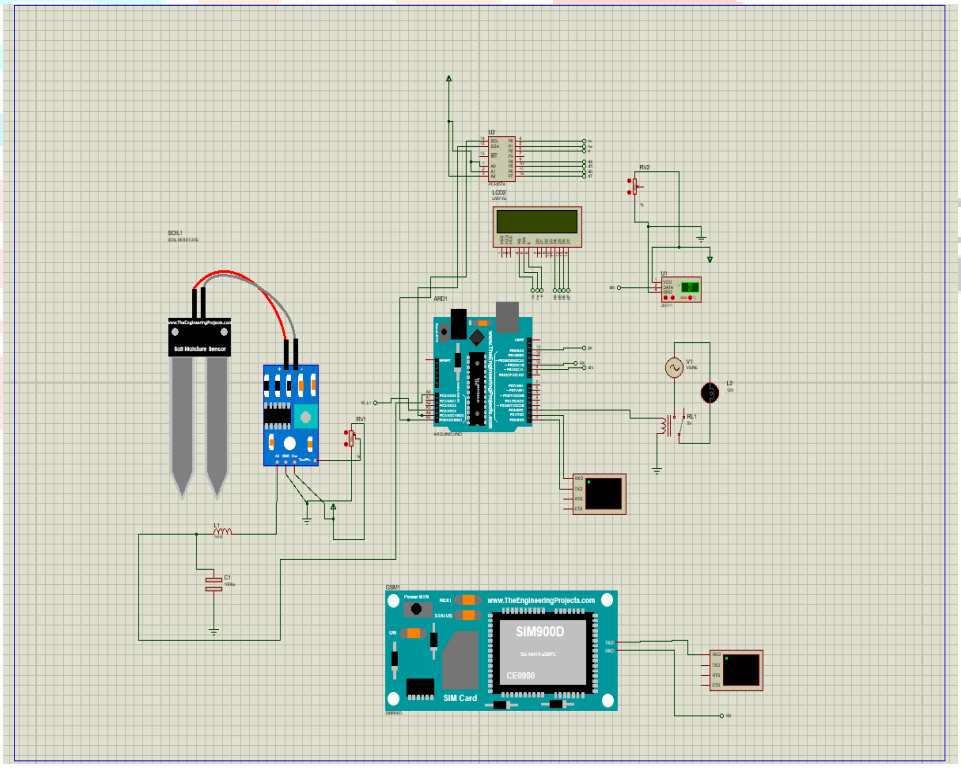

Fig.2. Circuit Diagram

IV. RESULTS AND DISCUSSION

After successful implementation of the hardware and uploading the code to the microcontroller, we obtain the Temperature, Humidity, Soil moisture, and water level on App, SMS and also on LCD.

V. CONCLUSION AND FUTURE SCOPE

In emerging nations like India, irrigation is essential for the economy. Professionals working in irrigation have used the manual method of irrigation over the years. For irrigation of large regions, the manual approach has a lot of shortcomings and is fairly unreliable. Irrigation directly affects the price and output of the finished product. This technology intends to replace the outdated manual irrigation method, which will eventually need to be updated. This prototype has a lot of benefits that make it a good replacement for the present methods since it enables farmers to help them with their daily demands for monitoring and controlling the field environmental parameters with little expense and ease of use. Successful development and test of the "Automatic Irrigation System Using GSM Module" has taken place. This system can be modified to include a variety of other possibilities, such as mobile application control of the motor and WI-FI controlled monitoring, using it as a foundation. These will increase the prototype's operational capacity and effectiveness. Using the This system can be modified to include a variety of other possibilities, such as mobile application control of the motor and WI-FI controlled monitoring, using it as a foundation. These will increase the prototype's operational capacity and effectiveness. Using the sprinkler concept can be utilized not only in agriculture but also in gardens anywhere. Its application is extremely broad when combined with IoT. This will give automation a new level.

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