Shrewd Water system Framework Utilizing IoT

Pavithran.M
Electrical and electronics Engineering,
Cyber Forensics Applied lab student.
Francis Xavier Engineering College,
Tirunelveli – Tamil Nadu – India
pavithranm.ug20.ee@francisxavier.ac.in

Mohamed Rizwan.M
Civil Engineering,
Cyber Forensics Applied lab student.
Francis Xavier Engineering College,
Tirunelveli – Tamil Nadu – India,
mohamedrizwanm.ug20.ci@francisxavier.ac.in

Pasunkili S
Civil Engineering,
Cyber Forensics Applied lab student.
Francis Xavier Engineering College
Tirunelveli– Tamil Nadu – India,
pasunkilis.ug20.ci@francisxavier.ac.in

Dr. R. Ravi,
Department of Computer Science and Engineering,
Cyberforensics Applied Lab,
Francis Xavier Engineering College,
Tirunelveli – Tamil Nadu – India,
fxhodcse@gmail.com

Abstract:

Irrigation is a traditional method that uses a higher proportion of laborer's than other daily agricultural practices. Sensors and microcontrollers are used to automatically irrigate the plants. identify when the plants need to be watered.Automation entails accelerating production, cutting costs, and making efficient use of resources. The primary objective of this project is to create a microcontroller irrigation system that sends information to farmers while autonomously watering plants.

Keywords: Smart irrigation,water level sensor, Soil moisture sensor, DC motor,power.

Introduction:

India's economy is largely based on agriculture, and the country ranks second globally in terms of farm production. 50% of Indian workers as of 2018 rely onAgriculture generates between 17% and 18% of the GDP of our nation.The majority of the irrigation system in India is run manually. Our nation is in a position to save every drop as water becomes scarcer. So, by utilizing modern technology, the conventional way of watering may be replaced with automated irrigation. With this method, the soil moisture sensor is placed close to the plant roots, where it detects moisture and sends the information to the microcontroller, which regulates the water supply to the plants.

When a farmer uses a manual operation but forget off the engine, water and power are wasted. The Smart Irrigation System can automatically turn on and off the motor in order to fix these issues. The atmosphere, the state of the soil, and the moisture level are the key factors affecting this motor's performance. Many sensors, including soil moisture sensors, temperature sensors, and humidity sensors, are utilized to calculate the values. In addition, by regularly checking the field's moisture level for a better cropping strategy, soil conditions are updated. The cultivation will be enhanced by this.

To water the plants, additional laborers are needed in our traditional farming approach. Many sensors, including temperature and soil moisture sensors, are employed, and the output of these sensors is connected to the microcontroller to decrease the amount of farmer interaction and make this process automated.

The complexity and risks associated with the procedure are decreasing as technology advances daily. Several issues

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can be solved using embedded and microcontroller systems. A sensor-based microcontroller system is used in this system to autonomously regulate the irrigation water system. This may be accomplished by installing sensors on agricultural land to monitor soil temperature and soil moisture sensor, which sends data to the microcontroller. The soil moisture sensor is used by this system to automatically supply the water flow. This research applies wireless sensor networks to a sensor-based irrigation system that employs renewable energy as a source. The plants in this project are watered using wireless sensor networks.

The goal of this smart irrigation system is to create a fully automated irrigation system that automatically switches on and off the motor by sensing the moisture content of the agricultural field using a soil moisture sensor without the use of any manual labor. Operating system for an automated irrigation system that uses an ESP8266 chip and the internet. With the help of this smart irrigation system project, the user receives a message, and the motor turns on and off. The farming industry has always used this strategy. Water resource utilization in the farming environment may be achieved with the use of IoT-based smart irrigation management systems. This irrigation method aids in the accurate irrigation of the field and the effective use of water.

PROBLEM STATEMENT.

Many individuals forget to water their plants throughout daily activities, making it difficult for them to maintain the health and life of their plants. Automated irrigation systems are created to eliminate these issues and enhance plant development. To develop a smart irrigation system to water the plants and to alert the user through the message, this is the goal of our project. Also, this project informs the user of the water level in the tank and the soil's moisture content. This research also aids in calculating the environment's temperature and humidity.

PROPOSED SYSTEM.

The Arduino UNO Microcontroller was used to create the Smart Irrigation System,Ruban Kingston et al. (2015) proposed that the reduction of Area by minimizing transistors in an operating Frequency [1] which is a key component of this automated system. The microprocessor is linked to many sensors, including those for temperature, water level, and soil moisture. Consequently,

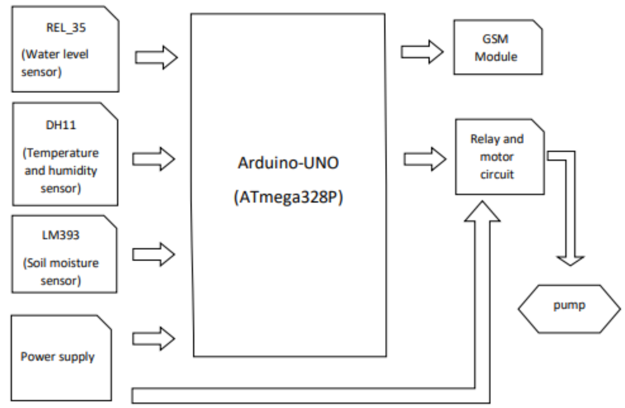

Fig.No:1 Block Diagram

the Arduino UNO receives the output from these sensorsWhen such sensors send a signal, the microcontroller responds with the appropriate output, turning on the relay in accordance with the soil and atmospheric conditions and driving the water pump [5]. The soil condition is assessed by this soil moisture sensor, and it is expressed in terms of voltage.The output voltage is then contrasted with the reference voltage. The pump turns on and the agricultural area is automatically irrigated by the signal that is delivered by the relay if the reference voltage is greater than the soil condition specified in voltage. In the opposite scenario, the relay is inactive, and the pump is still turned off.

The microcontroller receives an analogue signal from the soil moisture sensor, which is transformed into a digital signal. The relay circuit receives the signal after the programmed has already been completed in the microcontroller [2]. The motor is ON or OFF depending on the signal sent to the relay circuit. When the temperature drops, the soil gets moist, the voltage rises beyond the reference voltage, and a low signal ("logic 0") is sent to the microcontroller, which turns off the motor and causes it to stop pumping water. The comparator, which is housed inside the sensor, provides the voltage. There will be conductivity in the field when the sensor is positioned there. Given that water is an excellent conductor of electricity, good conduction indicates the existence of moisture.The signal is then transmitted, and the required signals switch the engine OFF[7]. And when there is no conduction, it shows that there is no water present; as a result, the Arduino generates the appropriate signals to switch on the motor. The relay switch closes, the motor is attached to the circuit, and the water is pumped to the plants as soon as the control signal to turn on the motor is transmitted. Like this, if the control signal instructs the motor to be switched OFF, the relay switch is opened, cutting off power to the motor, which causes it to be turned OFF[10].As a result, the plants receive the water they require when they do, thanks to the Arduino software that has been burnt into its memory. Here, regular observation is not necessary.

The primary mobile communication system is called the Global System for Mobile Communication. The user can receive information on the pump's ON and OFF states with the use of GSM. This GSM module employs the TDMA technology to transmit the message to the user [8]. The relay is crucial to this irrigation system because it tells the pump whether or not to turn it on by providing the information it needs. When necessary, these relays serve as switches that open and close. A motor that transforms electrical energy into mechanical energy makes up a pump, a component. The water pressure in the tank or well is raised by this circular action. As the pressure is great it draws the \swatter from the well and it is used in the agricultural area.

Fig.No:2 Arduino UNO

By employing a different characteristic of the soil, such as electrical resistance, the dielectric constant, or interaction with neutrons, as a stand-in for the moisture content, it is possible to determine the volumetric water content of the soil. It is necessary to calibrate the relationship between the measured property and soil moisture since it can change based on the environment, such the type of soil, temperature, or electric conductivity.

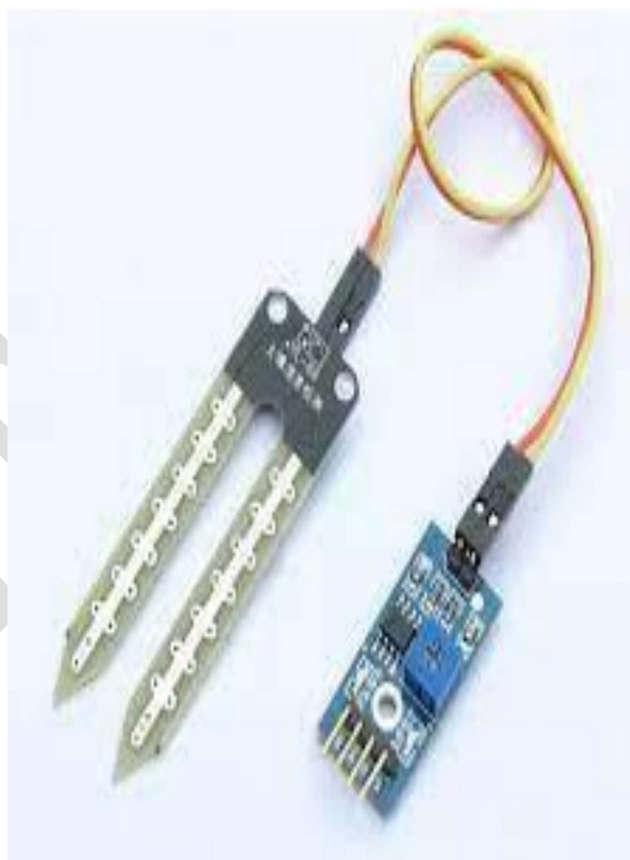

Fig.No:3 Soil Moisture Sensor

Determines the water levels in the tank. To gauge the level of the water, a water level sensor is put within the tank. The sensor is provided with the reference value as the minimal necessary level. The user is provided with information about the water level if the water level drops below the reference level elevation [6].

elA crucial component of this irrigation system is Arduino. All of the sensors' outputs have been sent to the Arduino as analogue inputs. Analog inputs are converted to digital outputs by this microcontroller. There is a relay attached to these digital output signals. The GSM Module is once more given the output. These digital outputs are produced by the microcontroller's already-burned-in software.

The soil moisture sensor is described. The moisture content of the soil is detected using a soil moisture sensor. The resistance determines how this moisture level sensor responds. Low resistance values indicate that the soil has a high moisture content. High resistance indicates that the soil is dry. The microcontroller receives this signal, which causes it to operate the relay.

Fig.No:4 Water Level Sensor

.explains the sensor for temperature and humidity.The sensor will alert a mobile device if the water level is over or below the stated value. The photoelectric water level sensor uses optical principles to function. Because of its benefits, including superior sensitivity and the lack of mechanical components, it is employed in current applications. The corrosion resistance probe is simple to attach and can tolerate extremely high pressureandtemperature [4].

A reasonably priced sensor that tracks changes in the atmosphere to gauge temperature and moisture [3]. It runs between 3.3 and 5.5 volts. The measurement of humidity goes from 20% to 90%. The range for measuring temperature is 0 to 50 C. Three pins make up the temperature and humidity sensor. It features power supply, power ground, and a communication port.

Fig.No:5Temperature and Humidity Sensor

CASESTUDY;

The number of soil moisture sensors needed for each lane in the irrigation system process has been determined by survey. The kind of moisture sensor we employ is mostly responsible for this. Considering current technology, the Every 6 inches to 48 inches of depth, moisture is measured, however occasionally only at 12, 24, and 36 inches. Depending on the manufacturing firms, different numbers of sensors may be used [9] .The soil moisture sensor has two probes, each measuring over 3 inches in width and 4 inches in length. A forward-thinking farmer in a community installed a completely automated irrigation system for growing sugarcane. His farm is in the Karur area, while he lives in Chennai. He controls the farm's operations through scheduled phone calls. The entire machine has a backup power supply that runs continuously.Let's take a banana plant as an example. Its total water needs over the course of its life are roughly between 900 and 1200 mm, and either rainfall or an automated irrigation system may provide these needs. In general, it is advisedto irrigate banana plantations every three to four days during the summer and every seven to eight days during the winter. Thus irrigation is dependent on the kind of soil, the crops, and the weather.

RESULT AND DISCUSSION

Agriculture fields use intelligent irrigation systems.The arduino receives analogue signals from the water level sensor, temperature sensor, and humidity sensor in addition to the analogue signals from the moisture sensor, which is buried in the soil. The motor is turned on when the analogue impulses are transformed into digital signals. The user receives the message signals as a message and is informed if the motor is switched ON or OFF.

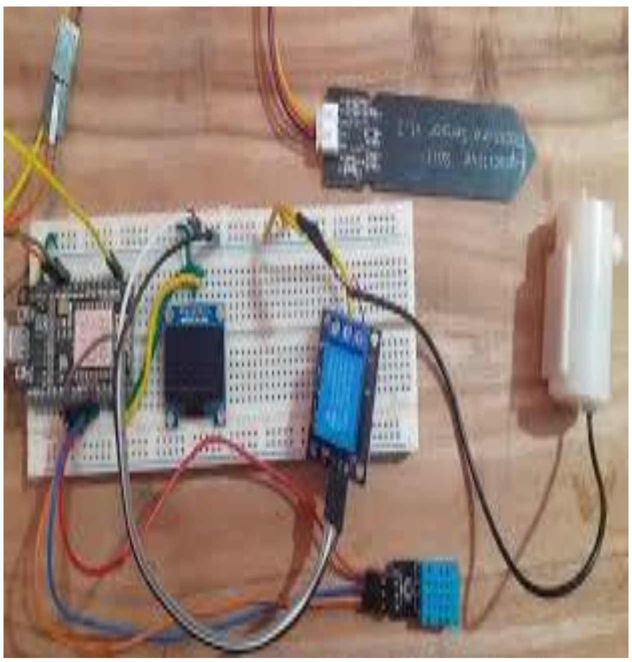

Fig.No:6Experimental setup

CONCLUSION;

The smart irrigation system may be utilised extensively to decrease water waste and to supply farmers with healthy plants. In our project, a relay that regulates this allows the motor to be automatically turned ON and OFF.The smart irrigation system may be utilised extensively to decrease water waste and to supply farmers with healthy plants. In our project, the relay that regulates this operation allows the motor to be automatically turned ON and OFF. The water tank or water storage that is attached to the motor provides the plants with the necessary amount of water. This project effectively monitors the water level for the plants. When necessary, it gives plants the right amount of water. The plants' development and vitality can be preserved.When farmers are not obliged to regularly examine the irrigation operation, menwork and labour costs are decreased. Water wastage has decreased, which has numerous positive economic effects; as a result, this project has positive economic effects as well. The greatest way to prevent water problems in agriculture is through smart irrigation.

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