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# AUTOMATIC DRIP IRRIGATION USING SOIL MOISTURE SENSOR

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**ABSTRACT:** Water is a vital component of human life. Water is used in irrigation fields to the tune of 80 percent to 90 percent. Water use is increasing as a result of daily globalization and population growth. Today, one of the most important functions in agriculture is automation. In our country, agriculture is the most common occupation. Agriculture is India's primary source of income, so its growth is critical. The majority of irrigation systems are still run manually today. Drip irrigation, sprinkler irrigation, and other conventional irrigation techniques are available. We can save water and fertilizer given to the crops by using drip irrigation. When there is a change in soil moisture or the current status of rain in the surrounding area, these sensors detect the change and send an interrupt signal to the NodeMCU. This project focuses on reducing water waste and minimizing manual labour on the field for irrigation in order to save the farmer's time, money, and electricity.

***Index Terms:*** Drip irrigation, Node MCU, IOT Microcontroller, IOT Cloud, moisture sensor.

## I. INTRODUCTION

India is a village-based nation, and agriculture is critical to the country's growth. Agriculture in our country is reliant on the monsoons, which are in short supply. As a result, irrigation is used in agriculture. Water is delivered to plants in an irrigation system based on the soil type. In agriculture, two items are critical: first, obtaining information about soil fertility, and second, measuring soil moisture content. Different techniques are now available for irrigation, which are used to reduce the reliance on rain. Electrical control and on/off timing are the primary drivers of this technique. Water level indicators are mounted in water reservoirs, and soil moisture sensors are placed near the root zone of plants. The module device manages sensor data and transmits it to the controller, which controls the flow of water through the valves.

## II. LITERATURE SURVEY

### [1] Automated Irrigation System-IoT Based Approach.

The management of the water supply can be improved by implementing a programmed watering system. This paper suggests a terrain-specific programmed water infrastructure with a structure that will minimize manual labour while both maximizing waters use and increasing corps efficiency.

The Arduino package is combined with a moisture sensor and a Wi-Fi module to create the setup. Our experimental configuration is linked to a cloud framework, and data is collected. After that, cloud providers analyze the data and make relevant recommendations.

### [2] IoT based crop-field monitoring and automation irrigation system.

The proposed device is based on the data collected from the sensors and estimates the amount of water required. The humidity and temperature of the soil, as well as the humidity, temperature, and duration of sunshine each day, are all measured by two sensors and sent to the base station. The suggested schemes could measure the water quantity for irrigation depending on these values.

### [3] IoT based smart irrigation monitoring and controlling system.

The proposed framework in this paper is based on IoT and uses real-time input data. The smart farm irrigation system uses an Android phone to track and manage drips remotely using a wireless sensor network.

For contact between sensor nodes and base stations, Zigbee is used. A web-based java graphical user interface is used to handle and display real-time sensed data on the server.

**[4] IoT enabled Drip Irrigation System with weather Forecasting.**

The demand for skilled farming, especially in developing countries like India, has increased significantly. Investigate IoT-based remote sensor-based agribusiness, such as observing ecological conditions such as temperature, encompassing humidity, and soil dampness, and so on.

The aim of the proposed structure is to improve the water system organization of Indian horticulture and to provide adequate water to specific regions. Nowadays, each mechanism is computerized in order to meet new challenges. Mechanized frameworks have fewer manual service, adaptability, unwavering accuracy, and exactness.

## III. EXISTING SYSTEM

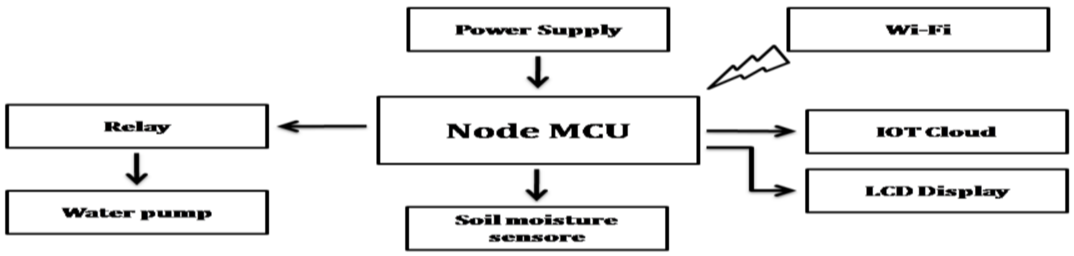
- There is no real-time control of soil moisture in the current scheme.
- There is no real-time data log.
- No data is captured on the IoT cloud, and there is no visual indicator or table.
- There is no visible sign of the show.
- The device is inefficient.
- Assistance from humans is needed.

## IV. PROPOSED SYSTEM

- The whole device is made up of an IoT microcontroller, a soil moisture monitor, a relay, a 5V adaptor, and an LCD display.
- The primary focus is on soil moisture analysis and real-time data uploading to the IoT server.
- The device detects the soil moisture level and, depending on that, turns on the water pump if the soil moisture falls below a certain threshold.
- Here, the soil moisture level is sensed, and the response is sent to a microcontroller, which then uploads the data to the IoT cloud, triggering the relay to turn on the water pump.
- The LCD monitor I used to show the state of the water pump and the soil moisture level.

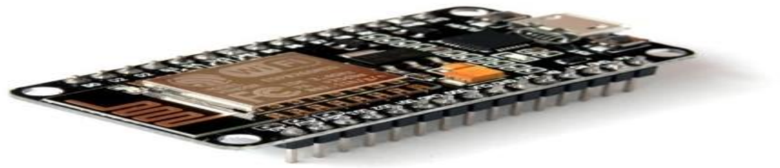
## V. SYSTEM ARCHITECTURE

**Block Diagram**




- **Node MCU**

Node MCU is an open-source firmware and development kit that can be used to test or install Internet of Things (IoT) products. It contains firmware that runs on Express if Systems' ESP8266 Wi-Fi SoC and hardware that is built on the ESP-12 board. The Lua scripting language is used in the firmware. It is built on the Express if Non-OS SDK for ESP8266 and is based on the eLua project. This is the component that governs all of the mechanisms and is used to communicate with the robotic arm, battery, and motor ICs, among other things.



- **Relay**

The module is triggered, with a high trigger current of less than 5mA and a portion of the 51 single-chip IO port output capacity that is small. Pull or raise the circuit's drive capability.

- **Water pump**

Mini water pump for fountain garden mini water circulating machine diy project micro dc 3-6v micro submersible pump This is a low-cost, small-size submersible pump motor that runs on a 3-volt power supply. With a very low current intake of 220ma, it can take up to 120 litre per hour. Simply add a tube pipe to the engine outlet, immerse it in water, and turn it on. Be sure the water level is higher than the engine at all times. Due to the heat generated by the dry run, the motor will be damaged and noise will be produced.

- **Soil moisture sensor**

For Arduino, this is a soil moisture metre, soil humidity sensor, water sensor, and soil hygrometer. You can tell when your plants need watering by how damp the soil in your container, greenhouse, or yard is with this module. The sensor's two probes double as variable resistors. Use it in a home automatic watering machine, link it to the Internet of Things, or just use it to figure out when your plant wants some TLC. Once you've installed this sensor and its PCB, you'll be well on your way to developing a green thumb. Two probes are used to test the volumetric content of water in the soil moisture sensor. The two probes allow current to flow through the soil, and the resistance value is used to calculate the moisture content.

When there is more water in the soil, the soil conducts more energy, resulting in less resistance. As a result, the moisture content would be higher. Since dry soil conducts electricity poorly, as there is less humidity, the soil conducts less electricity, resulting in increased resistance. As a result, the moisture content would be lower.

- **LCD Display**

This LCD 1602 Parallel LCD Display is a convenient and affordable way to incorporate a 162 White on Liquid Crystal Display into your project. The monitor is a 16 character by 2-line display of white text on a blue background/backlight that is very transparent and high contrast.

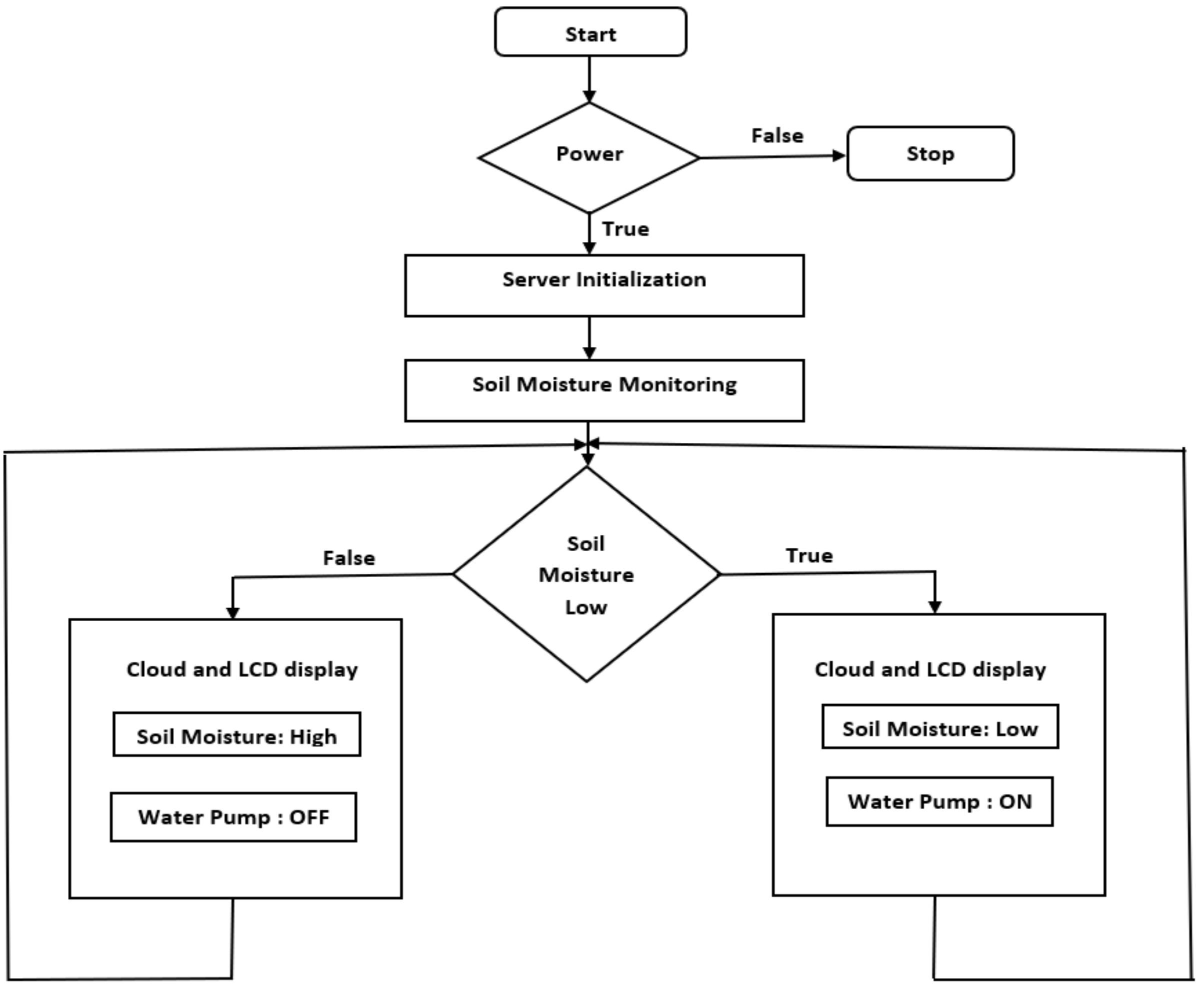
This is a fantastic LCD monitor with a blue backlight. It's excellent for Arduino-based projects. This LCD1602 LCD Display connects easily to Arduino or other microcontrollers. This monitor overcomes the drawback of the LCD 1602 Parallel LCD Display in that it needs approximately 8 pins on your Arduino to operate. Fortunately, this package has an I2C adapter that is directly soldered to the display pins. All you have to do now is connect the I2C pins, demonstrating a good library and minimal coding.

Philips invented the I2C serial bus, which uses two bidirectional lines called SDA (Serial Data Line) and SCL (Serial Control Line) (Serial Clock Line). Pull-up resistors must be used to bind the two. 5V and 3.3V are the normal operating voltages.

The wiring is simple if the I2C connector is already soldered onto the circuit, as it is in this product. Just four pins can be connected in most cases. Of default, there's VCC and GND. The LCD monitor is powered by 5 volts. As a result, we opt for the 5V Pin. The values shown on the monitor may be plain text or numerical values read from the sensors, such as temperature or pressure, or even the number of cycles performed by the Arduino.

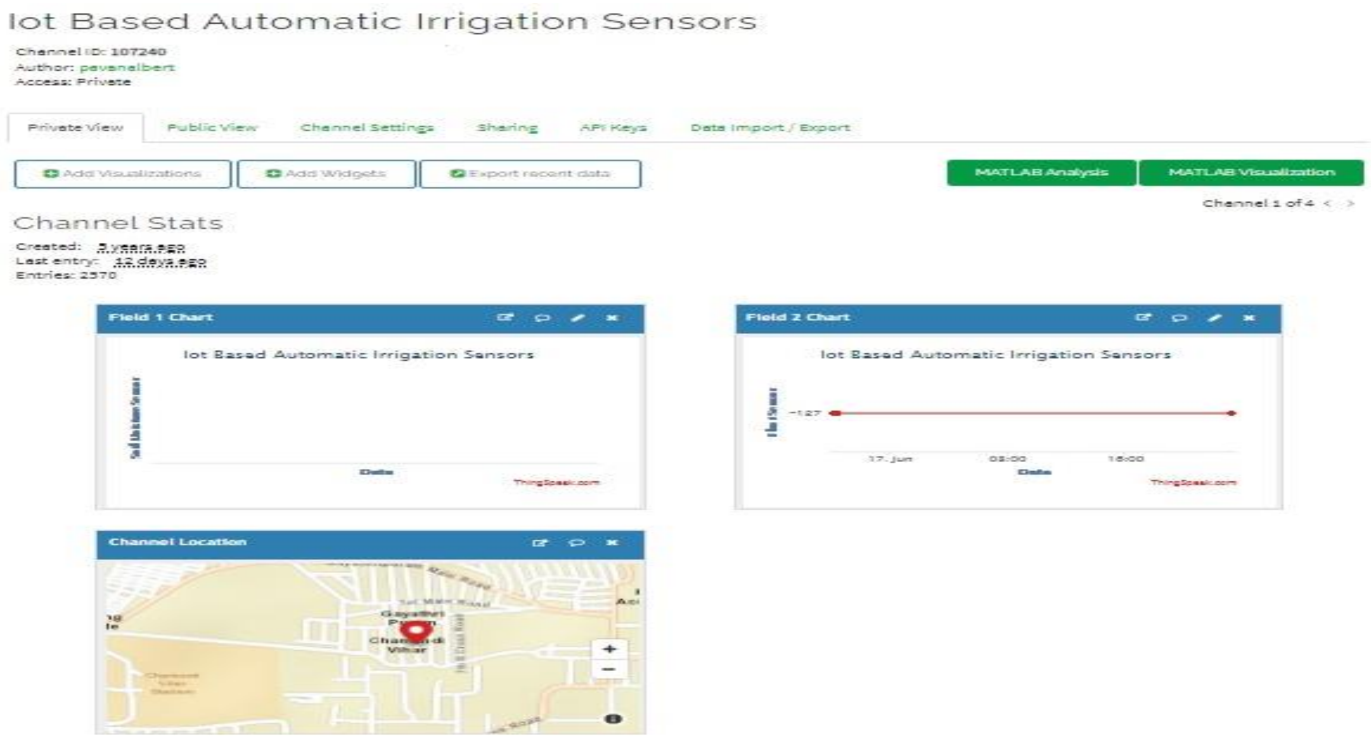
## VI. IMPLEMENTATION

**FLOW CHART:**




**SYSTEM:**

**SNAPSHOT OF THING SPEAK IOT CLOUD PLATFORM :**




**SNAPSHOT OF CODE :**


## VII. CONCLUSION

Agriculture is establishing itself as the country's backbone. Irrigation has been done in conventional ways since the beginning of time. The irrigation is now carried out by automated systems. The proposed Automated Irrigation System is created with the farmer's best interests in mind. This system is defined as a real-time feedback control system that aids in the efficient irrigation of soil. This method is extremely dependable and simple to use. This system can be accessed at any time and from any place. In the base station, the moisture and temperature sensors will be tracked. The use of a cellular network and mobile networking (GSM) eliminates the need for field control on a daily basis. The use of Bluetooth aids in the removal of SMS charges within a short range of space. The proposed framework is modular, allowing different users to deduce other parameters such as nitrogen content and CO2 level by upgrading wireless sensor networks.

## VIII. REFERENCES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