Smart Irrigation to automate water pump

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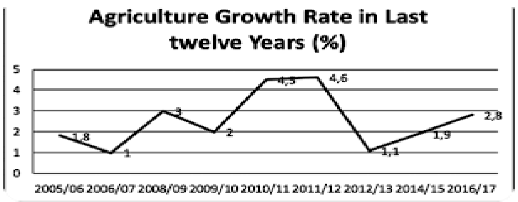
***Abstract*— Around 38 percent of the total land area of the planet is categorized as cultivable land or Agricultural land. Due to this, a large fraction of people earns their living through farming and take agriculture as their primary source of income. So, we use IoT which is a popular collection of technologies used, which can help us in the automates processes. The development of a smart irrigation helps us in monitoring environmental conditions is the key factor to improve the yield of crops and to grow seasonal crops. It involves automated checking of moisture. Automatic irrigation facility is provided for irrigation if and when required. Moisture sensor sense the moisture content in the soil and when there is no moisture in the soil. The water pump is connected, will turn on automatically when there is no moisture in soil .**

Keywords—IoT, moisture monitoring, real time, moisture sensor, node mcu, temperature sensor

I. Introduction

Growers all around the world are utilising the Internet of Things to minimise their water and fertiliser usage, cut waste, and increase the quality or quantity of their goods, from large agribusiness heavyweights like Cargill to tiny organic farms. Examples include monitoring temperature variations and humidity levels as perishable commodities migrate from the field to the warehouse to the shop in order to increase their shelf life and reduce waste, as well as tracking microclimates across agriculture. Many producers were driven to look for ways to use less water as a result of the recent severe drought in California. Technology suppliers are assisting them with technologies like soil sensors that assess conditions in real time. The Nature Conservancy claims that such precision agriculture can help farmers use less water and fertiliser.



II. Literature Review

The soil moisture sensor can be used to detect the moisture in the soil and send the data to the cloud and it turns on the motor automatically. this can be helpful for reducing the man power and water wastage.

Moisture sensors are instered into the field of vehicles/machines whose water consumption is to be monitored. They are positioned such that the sensitive element's axis is as close as feasible to the water tank's. After that, the moisture sensor the motors after the water release if moisture is detected then the moter stops automatically. After everything is set up and connected to the monitoring system, data is transferred to the software or application platform where further analysis is done.

Based on the detecting the temperature, humadity, moisture the water pump on and off are performed methods used such as cloud for storing the data and monitoring the data for the iot irrigation.

III. METHODOLOGY

3.1 Proposed system:

In this Proposed System, both the sensors DHT-11 temperature sensor and soil moisture sensors are connected to the input pins of ESP32 microcontroller board. The Analog values produced from the sensors are converted to a digital output value by the ESP32 microcontroller. The water motor gets switch-off/on automatically based on the sensedvalue with respect to an already fixed minimum value

This section explains, in detail, the various methods and techniques used to build this system.

3.2 Algorithm

The steps that the system undergoes:

Step 1: Soil moisture sensor senses the moisture level of the soil (less than or more than).

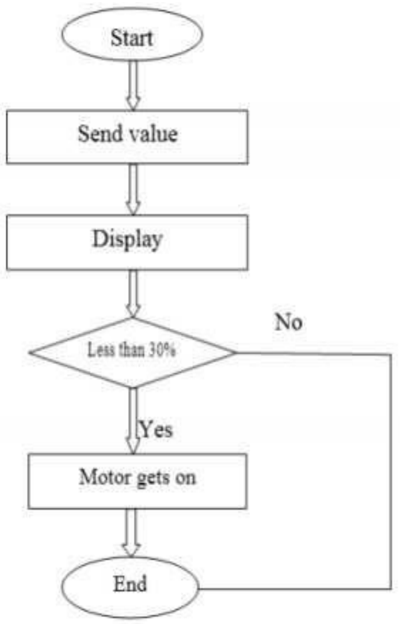
Step 2: If the moisture sensed value is greater than the minimum value than no need to switch on the motor.

Step 3: If the Moisture level is less than the minimum value,then the water motor is switch-on automatically.

Step 4: Once moisture level moves above the minimum value, it moves to its initial state (switch-off the water motor).

Step 5: End the process.

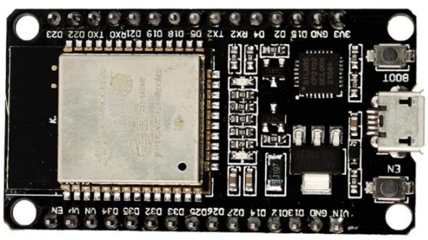
3.3 Flow chart:



lV *COMPONENTS DESCRIPTION*

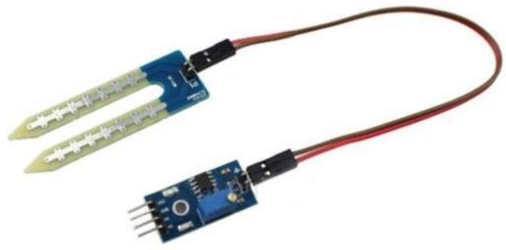
4.1 ESP32

ESP32 is a series of low-cost, low-power system on a chip microcontrollers with integrated Wi-Fi and dual-mode Bluetooth. The ESP32 series employs either a Tensilica Xtensa LX6 microprocessor in both dual-core and single-core variations, Xtensa LX7 dual-core microprocessor or a single-core RISC-V microprocessor and includes built-in antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power-management modules.



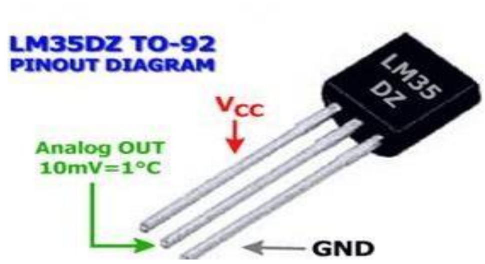
4.*2 Sensors:*

4.2.1 Soil moisture sensor: Soil moisture sensor has two probes which are used to sense the water level of the plants. The current is passed from these two probes them it estimates the resistance value of the moisture level. If the water level of the soil is then the resistance value is less and vice versa.



Soil moisture sensor

4.2.2 Temperature sensor: The Temperature Sensor LM35 used to measure temperature in Celsius. The advantage of usingthe LM35 temperature sensor does not require any extra or external calculations.

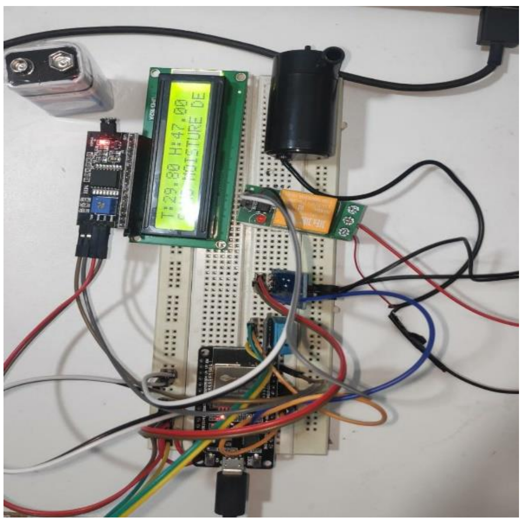


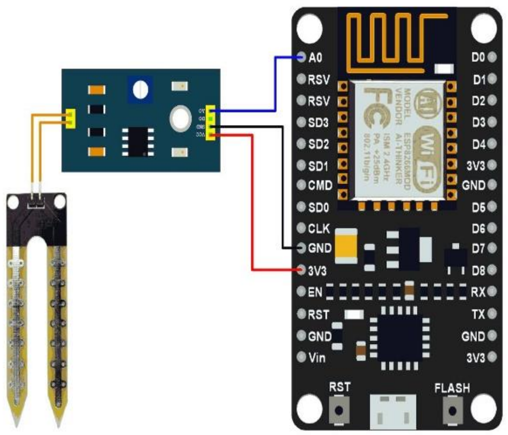
Temperature sensor

V *System Architecture*

In this model, we use an moisture sensor to measure the level of fuel. The sensed data is processed by the Node MCU and published to the cloud service i.e Blynk . The data is analyzed in the MQTT platform. If the moisture is below the predetermined minimum value, motor starts automatically when the moisture reaches the minimum value.

5.1 *Circuit Diagram*





VI TECHNOLOGY USED:

6.1 ***CLOUD****:*

This smart irrigation solution uses blynk as its cloud service. The depth information that the Node MCU and Soil Moisture Sensor process is stored in Blynk . On the basis of the analysis or retrieval of this data from the cloud, several control actions may be carried out. Using the dashboard, the collected data is shown in real time and can be represented as a chart, graph, text, slider, image, stream, and many other formats.

6.2 MICROCONTROLLER:

A complex semiconductor integrated circuit (IC) called an MCU includes a CPU, memory modules, communication interfaces, and peripherals. MCU technology is used in a wide range of gadgets, including robotics, drones, radios, and game controllers.

Node mcu was chosen as the microcontroller for this project because of its built-in wifi chip and ease of implementation.

6.3 Sensor :

A physical attribute like temperature, humidity, moisture, etc. is detected and recorded by the sensor. We employ a soil moisture sensor in our application. It is a gadget that determines the percentage of moisture by using soil moisture.

6.4 MQTTT Protocol:

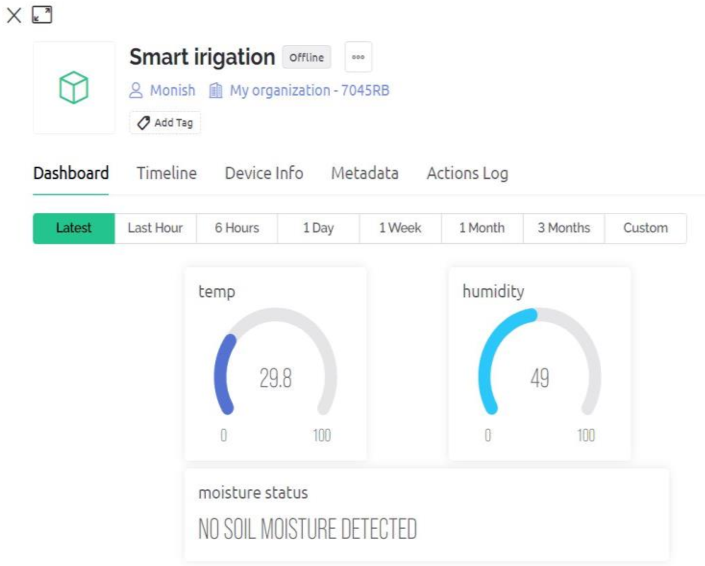
The message queuing telemetry transport protocol is a lightweight messaging protocol used to send and receive data between devices. Its is a simple

VII Project Discription:

The remaining hardware is put together during this phase, together with the soil moisture sensor and node mcu. Blynk and MQTTT are two software programmes that are integrated with this hardware. The system prototype is then put to the test, with the results being recorded and explained.

Result :

When the code is executed using the Arduino IDE, the output that is shown on the serial monitor display matches the data that is uploaded to the Blynk cloud service. The results of serial monitor and Blynk cloud data are shown below:



The report shown in the Blynk dashboard is tempature and humidity by using the DHT11 sensor and **NO SOIL MOISTURE DETECTED** is shown using the moisture sensor

VIII Benefits of smart irrigation system:

one of the advantages of installing an automatic irrigation system *is that it will do the watering work for you. So, instead of investing your time watering your garden with a hose, you can allow your sprinkler system to step out and do the work for you.*

Another advantages of installing an automatic irrigation system is that it saves a lot of water. This is one of the best benefits of this type of system; at the same time,

X Conclusion:

This automated Smart Irrigation System using IoT is found tobe cost-effective for enhancing the techniques to preserve water resources and to optimize them for agriculture production. This system helps the farmer by working automatically and smartly. With placing multiple sensors in the soil, water can be only provided to the required piece of land. This system requires lessmaintenance so it is easily affordable by all farmers. This system helps to reduce water consumption. With using thissystem the crop production increases to a great extent.

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