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Smart Farming System Using Node MCU

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ABSTRACT: He proposed system has been designed to overcome the unnecessary water flow into the agricultural lands. Moisture readings are continuously monitored by using a moisture sensor and send these values to the assigned IP address. An Android application continuously collects the data from that assigned IP address. Once the soil moisture values are exceeded the particular limit then the relay, which is connected to the Node MCU microcontroller controls the motor. The Android application is a simple menu-driven application. This includes motor status, moisture values. The motor status indicates the current status of the pump.

I. INTRODUCTION

IoT-based smart irrigation systems using NodeMCU ESP8266 & Adafruit I2S smart irrigation technology use weather data or soil moisture data to determine the irrigation need of the landscape. Smart irrigation technology includes: These products maximize irrigation efficiency by reducing water waste, while maintaining plant health and quality. Farmers across the world face a lot of difficulties in growing crops because of unpredictable weather conditions and shortage of water. The traditional irrigation system uses a large amount of water and supplies uneven water to crops. This affects the quality of crops. Many farmers already start using greenhouse farming and smart irrigation systems. Emerging IoT technologies and sensors are used to develop the irrigation system that can automatically supply water according to climate conditions like moisture.

Most of the farmers use large portions of farming land and it becomes very difficult to reach and track each corner of large lands. Sometime there is a possibility of uneven water sprinkles. This results in the bad quality crops which further leads to financial losses. In this scenario the smart irrigation system using latest IoT technology is helpful and leads to ease of farming. The smart irrigation system has wide scope to automate the complete irrigation system. Here we are building an IoT-based irrigation system using ESP8266 NodeMCU module and DHT11 sensor. It will not only automatically irrigate the water based on the moisture level in the soil but also send the data to ThingSpeak server to keep track of the land condition. The system will consist of a water pump which will be used to sprinkle water on the land depending upon the land environmental condition such as moisture, temperature and humidity.

We previously built a similar automatic plant irrigation system which sends alerts on mobile but not on IoT cloud. Apart from this, rain alarm and soil moisture detector circuit can also be helpful in building a smart irrigation system. In this project, we are building an IoT-based smart irrigation system using NodeMCU, moisture sensor, and LDR. It will automatically sprinkle water to plants when the moisture value goes below a particular value. It will also send the moisture data to Adafruit IO server to keep track of the land condition. Adafruit IO dashboard will also have some buttons to manually turn on/off the solenoid valve and lights. This project uses a solenoid valve to supply water to the plants. You can change the moisture value at which the solenoid valve should turn on according to your plant's requirement. Here we are using NodeMCU ESP8266 which is a very popular Wi-Fi module for IoT-based projects. Smart irrigation system. The automatic irrigation structure is based on IoT technology means of managing the pump for water storage of groundwater to the farmer's field and tracking the soil humidity, pressure and temperature conditions of a farm field.

II. LITERATURE SURVEY

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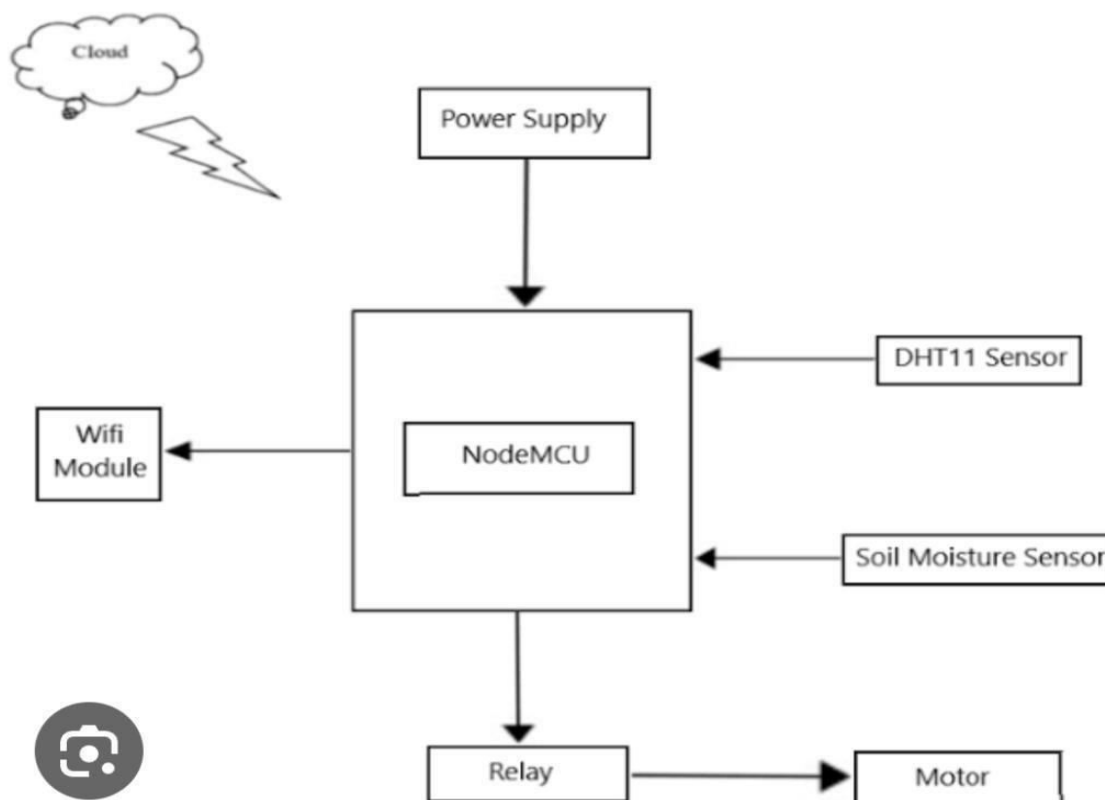
Here we are building a IoT based Irrigation System using ESP8266 NodeMCU Module and DHT11 Sensor. It will not only automatically irrigate the water based on the moisture level in the soil but also send the Data to ThingSpeak Server to keep track of the land condition. The System will consist a water pump which will be used to sprinkle water on the land depending upon the land environmental condition such as Moisture, Temperature and Humidity. We previously build similar Automatic Plant Irrigation System which sends alerts on mobile but not on IoT cloud. Apart from this, Rain alarm and soil moisture detector circuit can also be helpful in building Smart Irrigation system. Soil moisture information plays an important role in environmental monitoring. Before starting, it is important to note that the different crops require different Soil Moisture, Temperature and Humidity Condition. So in this tutorial we are using such a crop which will require a soil moisture of about 50-55%.

When the soil loses its moisture to less than 50% then Motor pump will turn on automatically to sprinkle the water and it will continue to sprinkle the water until the moisture goes upto 55% and after that the pump will be turned off. The sensor data will be sent to ThingSpeak Server in defined interval of time so that it can be monitored from anywhere in the world. Internet of Things (IoT) is a technology where a mobile device can be used to monitor the function of a device. The Internet of Things (IoT) is concerned with interconnecting communicating objects that are installed at different locations that are possibly distant from each other. Internet of Things (IoT) is a type of network technology, which senses the information from different sensors and make anything to join the Internet to exchange information. It can also be used to modify the status of the device.

The central processing unit will also include communication device to receive data from the sensors and to be relayed to the user's device. This will be done using a higher communication device such as a Wi-Fi module. The data processed by the central module is converted to meaningful data and relayed to the user. The user can view the data with the help of a handheld device such as a mobile phone or a tablet. No scarcity is a big concern for farming. This project helps the farmers to irrigate the farmland in an efficient nowadays water

III. METHODS AND METHODOLOGY

3.1 Block Diagram



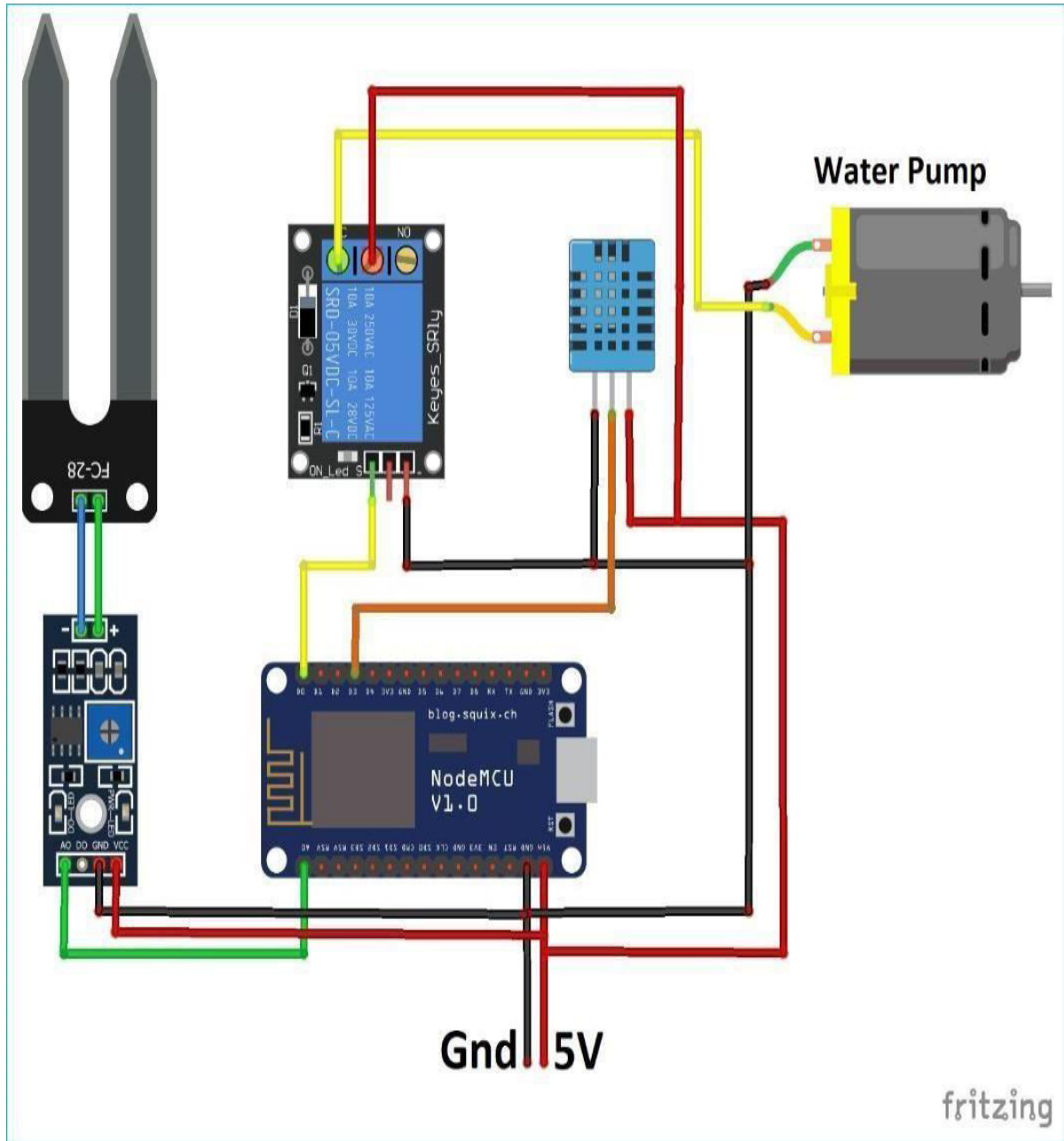
❖ Components Required

1. NodeMCU ESP8266
2. Soil Moisture Sensor Module
3. Water Pump Module
4. Relay
5. ModuleDHT11
6. Connecting Wires

You can buy all the component required for this project.

❖ Circuit Diagram

Circuit diagram for this IoT Smart Irrigation System is given below:



In this circuit, the Soil sensor is connected to the A0 pin of NodeMCU. LDR sensor is connected to the D1 pin, and the Relay module is connected to the D0 pin of NodeMCU. Solenoid Valve is connected to the relay module, so whenever NodeMCU generates a trigger, it will sprinkle water. In this project, we are building an IoT based smart irrigation System using NodeMCU, Moisture sensor, and LDR. It will automatically sprinkle the water to plants when the moisture value goes below a particular value. It will also send the moisture data to Adafruit IO Server to keep track of the land condition. Adafruit IO dashboard will also have some buttons to manually turn on/off the solenoid valve and lights. This project uses a solenoid valve to supply the water to the plants. You can change the moisture value at which the solenoid valve should turn on according to your plant's requirement.

This last step finishes the complete tutorial on IoT based Smart Irrigation System Note that it is important to switch off the motor when the soil moisture has reached the required level after water sprinkle. You can make a more smart system which can contain different control for different crops. If you face any issues while doing this project then comment below or reach to our forums for more relevant questions and their answers.

V. CONCLUSION

Considerable progress has been made in the development of irrigation scheduling methods and there is a gradual increase in the adoption of irrigation scheduling tools by farmers. The technology level of the farm will determine the choice of the irrigation scheduling method. Industry farms and farms with high value cash crops are more likely to adopt and invest in sophisticated scheduling methods. The support and collaboration of the expert irrigation adviser will determine the rate of success in the adoption of the irrigation scheduling technology. Volumetric water control and distribution uniformity, particularly in surface irrigation, are essential factors in achieving accurate water applications.

Performance of sprinkler and drip irrigation systems prove strongly dependent on the quality of design and materials selected. Inadequate management and variations in pressure are other main causes of low performance of these potentially efficient methods. Restrictions in flow deliveries in surface irrigation systems due to rotation, fixed deliveries and unknown discharges, are the main constraints in introducing accurate field applications and irrigation scheduling in those systems.

5.1 Future Scope

The proposed agricultural system is designed to solve to find an optimal solution to the water crisis. The design implements IoT technology using an android device, a main controlling unit (NodeMCU), sensors to measure various parameters and a water pump, which will be used to

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