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SMART IRRIGATION SYSTEM USING IOT

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ABSTRACT:

A Smart Irrigation System leverages the power of the Internet of Things (IoT) to transform traditional watering methods. IoT creates a connected network of sensors, devices, and software that gathers real-time data to automate irrigation based on specific needs. The smart irrigation model is a real time monitoring system and it monitors the soil properties like temperature, humidity etc. It helps to control many operations of the field remotely from anywhere, anytime by using IOT. It offers a futuristic way of life in which individual gets to control his electronic devices using a smart phone. It also offers an efficient use of energy.

INTRODUCTION :

The Smart Irrigation System helps to maintain the plants quite easily. This project automates irrigation through smart sensors that detect soil moisture. By eliminating manual intervention, farmers can achieve water conservation. The system only activates the pump when necessary, ensuring water is delivered precisely when the soil needs it.

EXISTING SYSTEM

In most existing System the threshold value of moisture is not taken into consideration and the field is irrigated at random time intervals, leading to over irrigation or under irrigation of field and this in turn affects the crop productivity.

PROPOSED SYSTEM

Soil Moisture Sensor is connected to the Node MCU ESP8266 microcontroller, which is also a Wi-Fi module.
Sensor readings are uploaded to the cloud and displayed as clear values within the Blynk app.
The sensor readings act as a safeguard, automatically shutting down the irrigation pump in case of emergencies, such as excessive moisture levels.
If the moisture level falls Below the set threshold, the NodeMCU Triggers the relay connected to the water Pump to turn it on.

HARDWARE SPECIFICATION

In this section, various hardware components being used for development is discussed:

- Soil Moisture Sensor Module
- Node MCU ESP8266 : CP2102 Wifi Development Board
- Relay : 5V
- Water Pump : 3V to 12V Mini DC
- Breadboard : 830 Points
- Jumper Wires

SOFTWARE SPECIFICATION

These Specification play a crucial role in ensuring smart irrigation system.

- Blynk Application
- Arudino IDE

FRONTEND

The frontend is the face of a website. It includes all the visual components like text, images, buttons, and layouts that users encounter when they visit.

BLYNK APPLICATION

Blynk simplifies creating user interfaces for your hardware projects. This drag-and-drop platform allows you to build attractive dashboards on your phone or tablet to control and monitor devices like Arduino and Raspberry Pi.

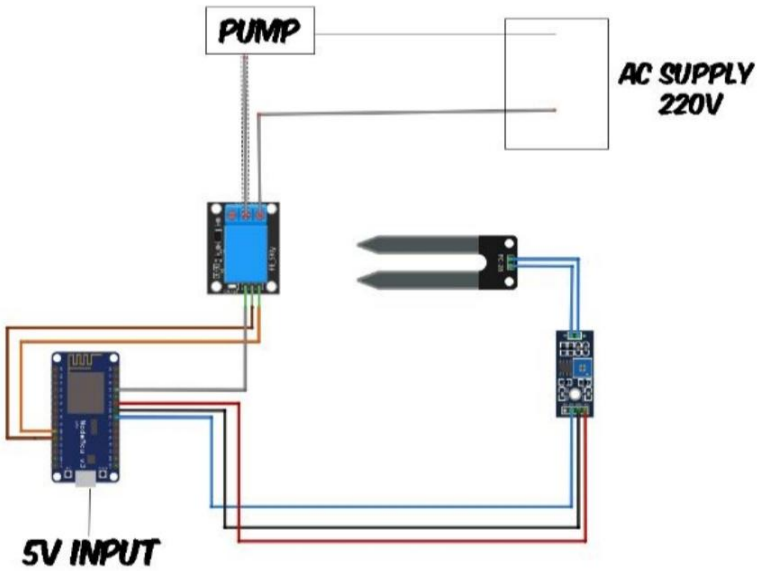
BACKEND

The back end is a combination of servers and databases. Servers control how users access files. Databases are organized and structured collections of data.

ARUDINO IDE

Arduino IDE serves as a pivotal tool in the development of a smart irrigation system leveraging NodeMCU and Blynk integration. This IDE provides an intuitive platform for programming NodeMCU, an ESP8266-based microcontroller widely used for IoT applications. By harnessing the capabilities of Arduino IDE, developers can seamlessly interface NodeMCU with various sensors and actuators essential for smart irrigation.

SYSTEM DESIGN



INPUT DESIGN

Connect the VCC and GND pins of the soil moisture sensor to 3.3V and GND of NodeMCU, respectively. Connect the soil moisture sensor's OUT pin directly to the A0 analog input of the NodeMCU. Connect the IN1 pin of the relay module to the D1 pin of NodeMCU. Connect the VCC and GND pins of the relay module to 5V and GND of NodeMCU, respectively. For the water pump/solenoid valve to operate, connect its power terminals (VCC and GND) directly to your chosen 12V power supply. To complete the circuit, connect the negative terminal (GND) of your external power supply to the GND pin on the NodeMCU. This establishes a shared ground between them.

OUTPUT DESIGN

In the Blynk app, under datastreams add a gauge widget and link it to the Virtual Pin V0. A gauge widget that clearly displays the real-time soil moisture level, and a slider widget that allows you to easily set the desired moisture threshold for irrigation activation. Add a switch and link it to the Virtual Pin V1. This switch will turn on automatically when The soil moisture drops below the threshold As the soil moisture drops below the threshold, the relay will trigger the water pump/ valve Start watering the plant.

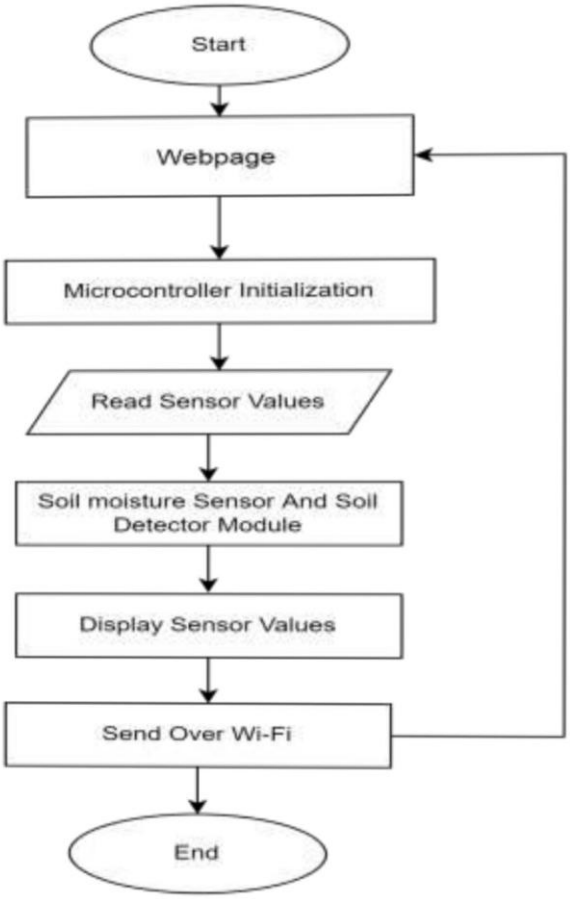
MODULES

The soil moisture sensor can measure the volumetric content of water inside the soil. This sensor consists of mainly two parts, one is Sensing Probs and another one is the Sensor Module. NodeMCU is an open-source firmware for the ESP8266 WiFi SOC from Espressif Systems.It uses an on-module flash-based SPIFFS file system and is implemented in C, layered on the Espressif NON-OS SDK. A relay is an electromechanical switch that allows a low-power circuit to control a high-power circuit.

TESTING AND IMPLEMENTATION

Fire up your NodeMCU and link it to the Blynk app by hitting "Play" within the app. Carefully insert the soil moisture sensor directly into your plant's soil. Blynk keeps you informed. The gauge shows real-time moisture levels, and the slider lets you adjust the automatic watering threshold. As the soil moisture drops below the threshold, the relay will trigger the water pump/valve to start watering the plant.

DATA FLOW DIAGRAM



CONCLUSION

The application of agriculture networking technology is need of the fashionable Agricultural development, but also an important symbol of the future level of agricultural Development; it will be the future direction of agricultural development. After building the Agricultural water irrigation system hardware and analyzing and researching the network Hierarchy features, functionality and therefore the corresponding software architecture of Precision agriculture water irrigation systems, actually applying the web of things to the Highly effective and safe agricultural production has a significant impact on ensuring the Efficient use of water resources also as ensuring the efficiency and stability of the Agricultural production.