An Efficient Indoor Nursery Controlled by IOT and Monitored by Android App.

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Abstract: Gardening is one of the greatest hobbies or mind relaxing activities for all age groups, which kindles them to make nursery management system. Nowadays also most of the nursery owners using a manual system to water and monitor their plants. There are many difficulties or challenges for nursery owners to take care of the plants growth, so that they need to check the moisture of the soil, monitor the air humidity and temperature, and others parameters. This paper offers a solution to combine the Internet of Things (IoT) system and Android apps to monitor the plant's growth with a real-time data monitoring and also provides the system control. In this paper, the sensors are used to sense the moisture of soil, check the air humidity and temperature, discover the light intensity and measure the soil temperature. This system allows nursery owners to monitor and control the irrigation system where they can water their plants using mobile application. The sensor checks the condition of the plant and updates the data in every one hour. Other than that, Indoor nursery often faces the issue of inadequate sunlight. Natural light coming through windows may not be as strong as outdoor sunlight, which is essential for photosynthesis. Therefore, this system offers a solution that allows nursery owners to control a specific light-emitting diode (LED) or UV LED to simulate sunlight. This ensures that plants receive the necessary light for photosynthesis and grow healthy. Growth of Plants contribute towards air purification providing fresher air to breathe.

I. SYSTEM DESIGN

- System Architecture
Soil Moisture Sensor Architecture

Fig 2 Soil Moisture Sensor Architecture

Application Architecture

Fig 3 Application Architecture

Modules Description
- Soil Moisture Sensor Integration
- Temperature and Humidity Sensor Module
- Automated Irrigation Controller Module
- Integrating IOT Components Control
- Alert and Notification Module

II. SOIL MOISTURE SENSOR INTEGRATION

Digital soil moisture sensor is easy to use by inserting it in the soil and it can measure moisture level in it. It gives a digital output of 5V when moisture level is high and 0V when the moisture level is low in the soil. The sensor can be controlled using potentiometer to set the desired moisture threshold. When the sensor measures more level of moisture content than the set threshold, the digital output goes high and an LED indicates the output. When the moisture level in the soil is less than the set threshold, the output becomes low. The digital output can be connected to a microcontroller to monitor or sense the moisture level.

Temperature and Humidity Sensor Module
DHT11 is a Temperature and humidity sensing module, which uses for Digital Signal Acquisition, which converts the Temperature and Humidity to a digital reading, which can be easily read by a Microcontroller. Operating range of DHT11 sensor is 0 to 50 degree Celsius which is sufficient for home purposes. This sensor has 3 pins that are Vcc, Data and Ground pins directly we can connect to the Arduino.

Automated Irrigation Controller Module
Irrigation is the most important for gardening. Here we are sensing the moisture level of the soil and based on the output, it sprinkles the water from the motor pump connected to the system.

Integrating IOT Components Control
This project aims on enabling control over electrical appliances via an Android phone. In this project we utilize Wi-Fi communication between the Android phone and a receiver connected to the appliances. ESP8266 is a commonly used Wi-Fi module that provides seamless connectivity for IOT applications.
III. ALERT AND NOTIFICATION MODULE

To create an alerts and notification module for a water supply irrigation system using the Blynk app, you can follow these steps:

- **Set Up Blynk App:**
  Download the Blynk app on your smartphone from the respective app store. Create an account and log in to the Blynk app.

- **Create a New Blynk Project:**
  In the Blynk app, create a new project. Choose the appropriate hardware (e.g., Arduino, Raspberry Pi) and connection type (Wi-Fi, Bluetooth, etc.) for your irrigation system. Blynk will generate an authentication token that you'll need to use in your hardware setup.

- **Connect Hardware to Blynk:**
  Set up your hardware (Arduino, Raspberry Pi, etc.) and connect it to the internet. Use the Blynk libraries and your authentication token to establish a connection between your hardware and the Blynk app.

- **Implement Alert Logic:**
  Write code on your hardware to monitor relevant parameters such as water levels, flow rates, or system malfunctions. Define thresholds for these parameters. When thresholds are exceeded, trigger alerts.

- **Integrate Notification Widget:**
  In your Blynk project, add the Notification widget. Configure the Notification widget to send alerts when specific conditions are met. You can customize the message content and recipient(s).

- **Test and Deploy:**
  Test your setup to ensure that alerts and notifications are triggered correctly. Deploy your hardware in the irrigation system environment.

- **Monitor and Adjust:**
  Continuously monitor the system to ensure proper functioning. Adjust thresholds and notification settings as needed based on real-world performance and user feedback.

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**Fig 4** Screen Shots Front View

**Fig 5** Side View

**An Efficient Nursery Controlled by the Circuit**

**Fig 6** Soil Moisture Sensor

**Fig 7** Soil Moisture Sensors Measures the Volumetric Water Content.
IV. CONCLUSION

This system details the design and implementation of an Efficient Nursery controlled by IoT technology. The system effectively responds to commands provided by the user, ensuring optimal care for indoor plants. Upon designing the circuit, individuals with physical disabilities can control this system using android application on their smartphones. The system has undergone through testing and validation. In comparison to existing market offerings, our system remains affordable. It stands as a testament to our commitment to accessibility and innovation in IoT Solutions. Hence, we can confidently label it as a "Low-cost Efficient Nursery system controlled by IoT for individuals with disabilities and elderly individuals.

REFERENCES


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