IoTRICITY S02

Innovatrix

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ESTABLISHING AN IOT SOIL-MONITORING NETWORK

Precision Agriculture with Moisture and Nutrient Sensors

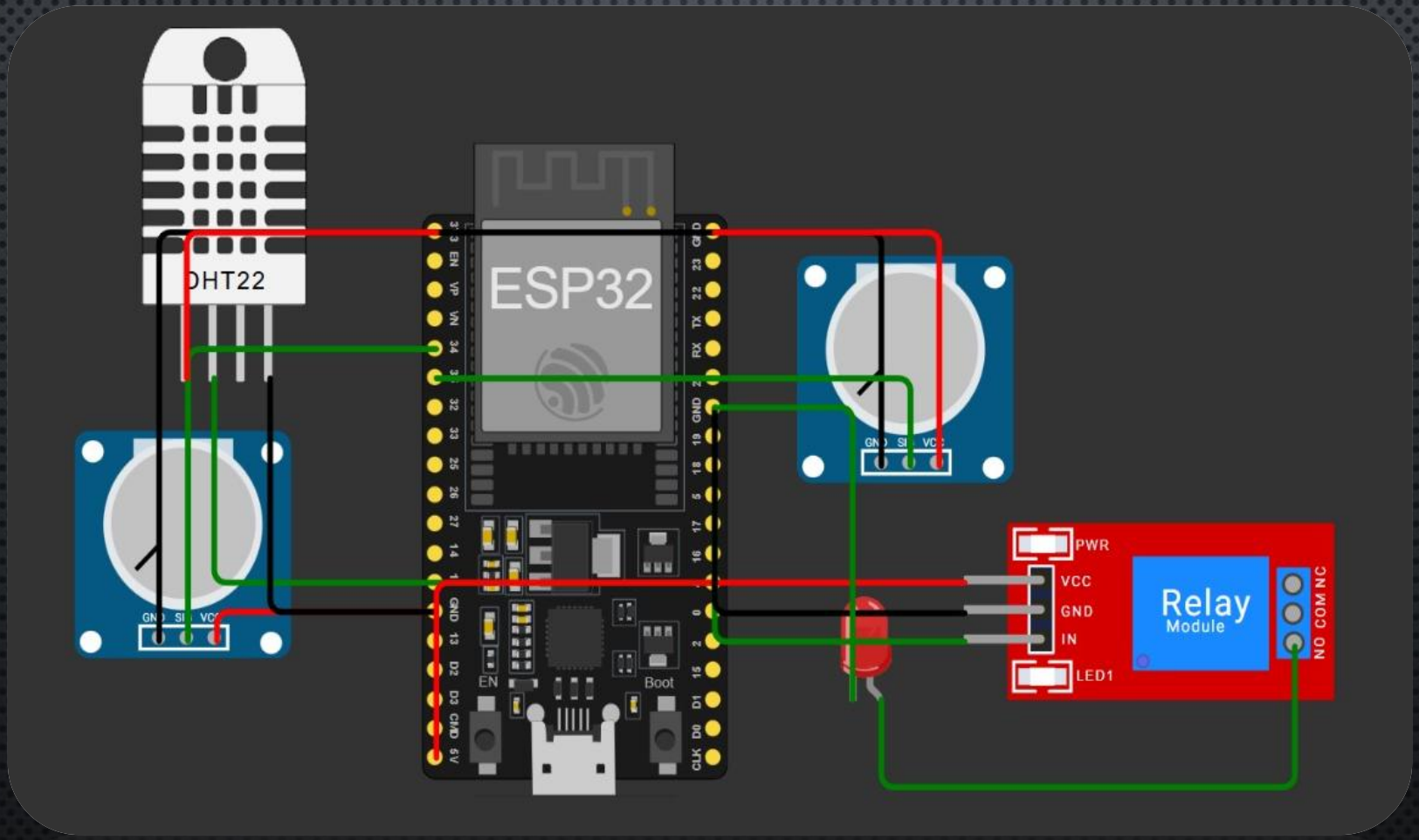
Overview of IoT Soil Monitoring

- Real-time data collection from soil sensors
- Improves crop yield and resource efficiency
- Supports precision agriculture practices
- Enables remote monitoring and control

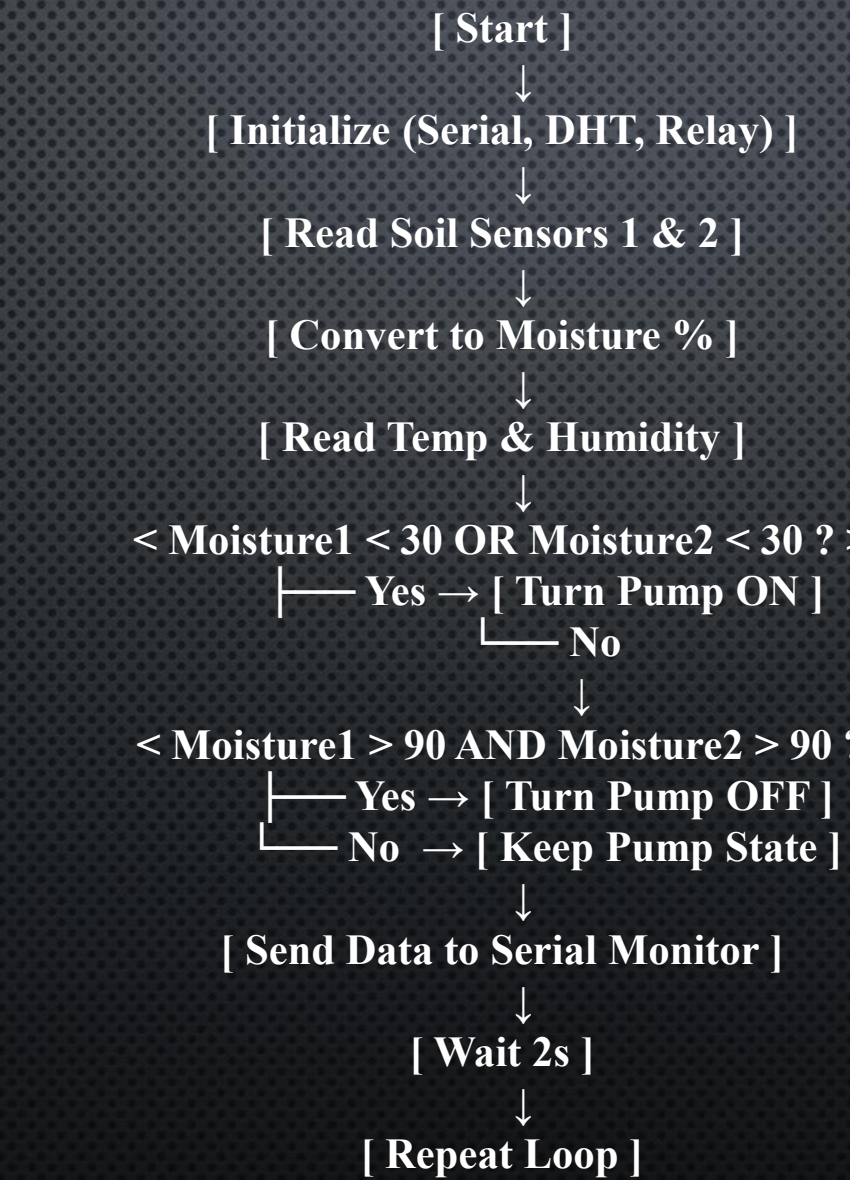
Key Components of the System

- Soil moisture and nutrient sensors
- Microcontroller (e.g., Arduino, ESP32)
- Communication protocols (LoRa, Wi-Fi, Zigbee)
- Power supply (solar, battery)
- Cloud platform for data storage
- Dashboard for visualization and alerts

CIRCUIT DIAGRAM



Flowchart


[Start]
[Initialize (Serial, DHT, Relay)]
[Read Soil Sensors 1 & 2]
[Convert to Moisture %]
[Read Temp & Humidity]
< Moisture1 < 30 OR Moisture2 < 30 ? >
Yes → [Turn Pump ON]
No
< Moisture1 > 90 AND Moisture2 > 90 ? >
Yes → [Turn Pump OFF]
No → [Keep Pump State]
[Send Data to Serial Monitor]
[Wait 2s]
[Repeat Loop]

Simulation

https://wokwi.com/projects/440833601525655553

Technology Stack

Hardware

- *ESP32 Board*
- *Soil Moisture Sensors (×2)*
- *DHT22 Temperature & Humidity Sensor*
- *Relay Module (for pump control)*
- *Water Pump*
- *Power Supply (5V/12V as per pump)*
- *Jumper Wires & Breadboard*

Software

- *Arduino IDE with ESP32 boards installed.*
- *Libraries:*
    - DHT.h (for DHT22)
    - WiFi.h
    - HTTPClient.h

Data Analytics and Decision Support

- Analyze soil data trends over time
- Generate actionable insights for irrigation and fertilization
- Integrate with weather forecasts
- Support decision-making with predictive models

IMPLEMENTATION STEPS

- Identify monitoring objectives
- Select appropriate sensors and hardware
- Design system architecture
- Develop data collection and transmission logic
- Set up cloud storage and dashboard
- Test and calibrate sensors
- Deploy and monitor

Benefits of IoT Soil Monitoring

- Optimized irrigation and fertilization
- Reduced resource wastage
- Improved crop health and yield
- Real-time alerts and remote access
- Data-driven agricultural practices

Further Reading Resources

- Precision Agriculture Journal
- IEEE IoT in Agriculture Publications
- FAO Reports on Smart Farming
- Books: 'Internet of Things for Agriculture'
- Online courses on IoT and Smart Farming