Smart Water management

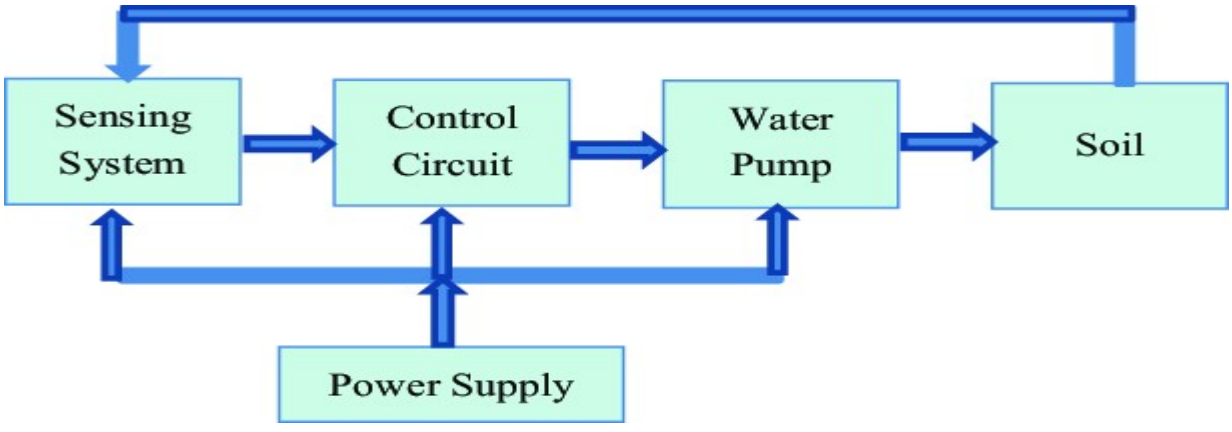
Smart Irrigation System

why smart irrigation system is needed.?!

Smart irrigation systems are needed to save water, reduce costs, promote environmental sustainability, enhance plant health, provide convenience, adapt to weather conditions, offer data insights, and enable remote control for efficient water management.

Creating a smart irrigation system using NodeMCU ESP8266, a soil moisture sensor, water pump, relay module, and a battery involves several hardware connections, Blynk integration, and Python code for project simulation. I'll provide a high-level overview of the steps involved and then you can find detailed information for each step online or in relevant documentation, as it's a complex project that might require specific details.

Functional block diagram



Hardware Connections:

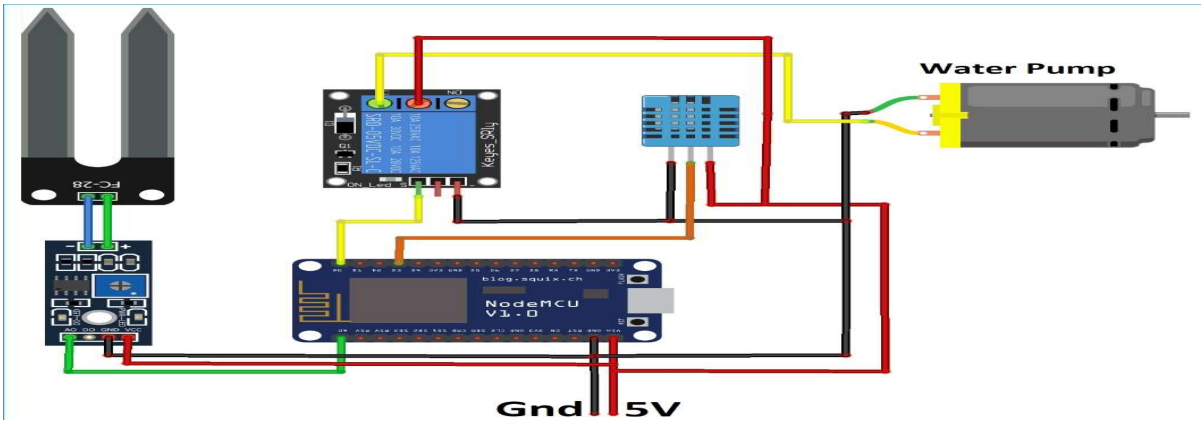
1. NodeMCU ESP8266: Connect the following pins on the NodeMCU:
   - VCC to 3.3V
   - GND to GND
   - D1 (or any other suitable GPIO) to the signal pin of the Soil Moisture Sensor
   - A digital GPIO pin to the IN pin of the Relay Module (for controlling the water pump)
   - A power supply or battery to the 3.3V and GND pins

2. Soil Moisture Sensor: Connect the sensor to the NodeMCU, as mentioned above.

3. Water Pump: Connect the pump to the Relay Module. The Relay Module should have connections for VCC, GND, and an IN pin, which should be connected to the NodeMCU as mentioned above.

4. Battery: Connect the battery to the NodeMCU for power. Ensure you have the appropriate voltage regulator if your battery voltage is higher than 3.3V.

Circuit diagram



Blynk Integration:

1. Install the Blynk app on your mobile device.

2. Create a new project in the Blynk app and obtain an authentication token.

3. Add a button or a slider widget to your Blynk project to control the water pump.

4. In your NodeMCU code (Python script), you'll need to integrate with Blynk. Use the Blynk library to connect to the Blynk server using the authentication token and map the widget to the relay control.

Explanation:

1. Import necessary libraries.

2. Set your Blynk authentication token.

3. Initialize Blynk and specify the GPIO pin for the relay.

4. Define a Blynk virtual pin handler to control the relay.

5. In the main loop, run the Blynk service, and periodically check for Blynk commands to control the water pump.

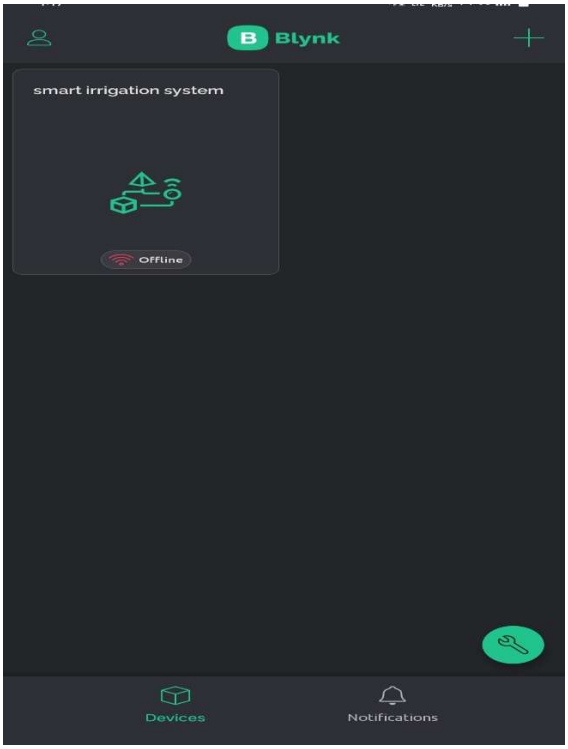
Remember to install the `blynklib` library on your ESP8266 and make any necessary adjustments for your specific hardware and requirements.

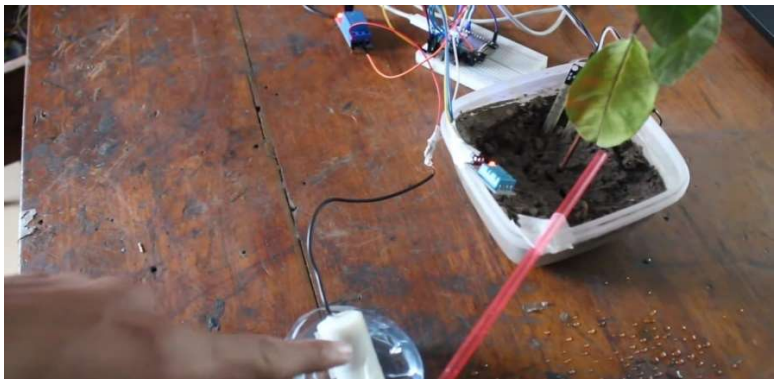
This is a simplified overview, and you may need to delve into more detailed tutorials and documentation for each component and library used in your project. Always consider safety and power management aspects when working with hardware components.

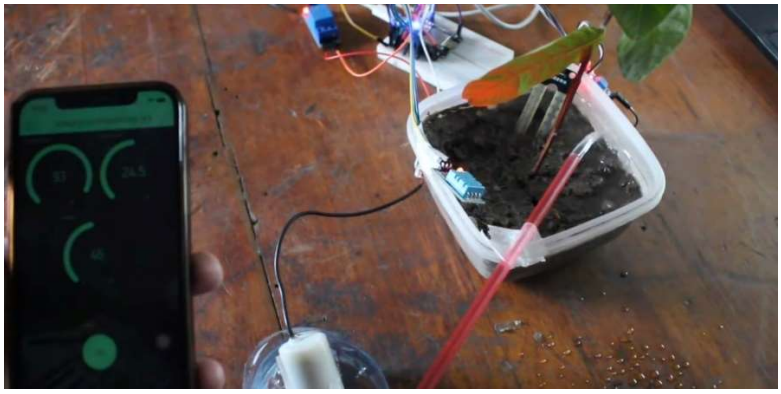
Here's a simplified Python script to stimulate your project. You'll need to adapt and expand it to suit your specific needs. The example uses the `blynklib` library for Blynk integration.

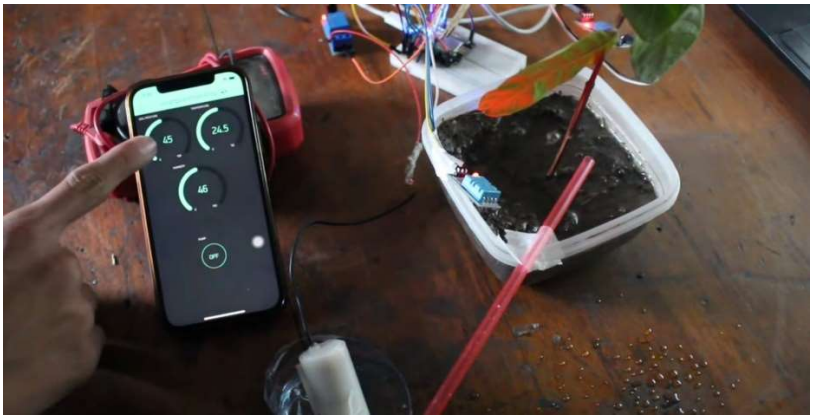
```
import BlynkLib
import time


BLYNK_AUTH = 'ly6gQPT3fOv6GRG6e9Km3_T2d5Ek2_zX'


blynk = BlynkLib.Blynk(BLYNK_AUTH)


def check_soil_moisture():
    # Read the soil moisture sensor value
    moisture_level = read_moisture_sensor()
```

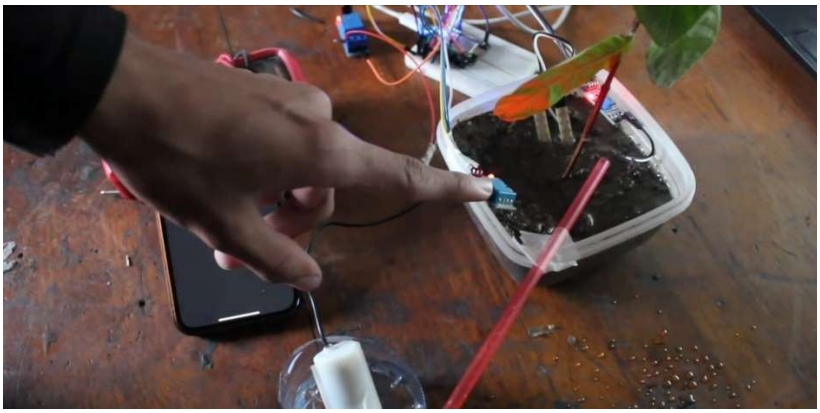
```
    if moisture_level < 30: # Adjust this threshold as needed
        blynk.virtual_write(0, "Irrigation needed")
        turn_on_water_pump()
    else:
        blynk.virtual_write(0, "Soil is moist")

def turn_on_water_pump():
# Code to activate the water pump
    # Add your water pump control logic here

@blynk.VIRTUAL_WRITE(1)
def manual_control(pin, value):
    if int(value[0]) == 1:
        turn_on_water_pump()
    else:
        # Turn off the water pump
        pass

while True:
    blynk.run()
    check_soil_moisture()
    time.sleep(300) # Check moisture level every 5 minutes
```











Conclusion

In conclusion, a smart irrigation system offers numerous benefits for efficient water management in agriculture and landscaping. By utilizing real-time data and automation, it conserves water resources, reduces operational costs, and enhances crop yields. Additionally, it promotes sustainability and environmental conservation.