IOT BASED SMART FARMING SOIL SENSOR

Watering System Circuit for crops:

Circuit Components:

1) Motor (In place of water pump) :
   Power supply: 4.5 - 12V DC

2)Temperature sensor

3)Moisture sensor

4) Arduino

5) Wifi module

Code:

```
#include<dht.h>

const int SOIL_MOISTURE_SENSOR_PIN = A0;

const int TEMPERATURE_SENSOR_PIN = 7;

const int WATER_PUMP_PIN = 4;

const int dry = 520;

const int wet = 270;

const int moistureLevels = (dry - wet) / 3;

const int soilMoistureSartWatering = 400;

 const int soilMoistureStopWatering = 300;        // 60 seconds

const long waterDuration = 1000L * 60L;           // 60 seconds

const long sensorReadIntervals = 1000L * 60L;    // 2 hr

const long waterIntervals = 1000L * 60L * 60L * 2;

 long lastWaterTime = -waterIntervals - 1;

boolean isWatering = false;


 void setup() {

        Serial.begin(9600);

        pinMode(WATER_PUMP_PIN, OUTPUT);

        waterPumpOff();

         dht.begin();

 }
```

```
void loop() {

        float temperature = getTemperature();

      float humidity = getHumidity();

       long soilMoisture = analogRead(SOIL_MOISTURE_SENSOR_PIN);

      Serial.println("Soil Moisture: " + readableSoilMoisture(soilMoisture) + ", " + soilMoisture);

       Serial.println("Temperature: " + String(temperature) + " *F");

      Serial.println("Humidity: " + String(humidity) + " %");

       if (millis() - lastWaterTime > waterIntervals) {

              waterPlants(soilMoisture);

              lastWaterTime = millis();

              }

      delay(sensorReadIntervals);

      }

      void waterPlants(int soilMoisture) {

      // Should this take a moving avg of the soilMoisture?

      // Can get outliers on the right after watering.

              if (soilMoisture > soilMoistureSartWatering) {

                     isWatering = true;

                     }

               else if (soilMoisture < soilMoistureStopWatering) {

                     isWatering = false;

                      }

      Serial.println(isWatering ? "Starting to water" : "Skipping water");

      if (isWatering) {

              waterPumpOn();

             delay(waterDuration);

              waterPumpOff();

             Serial.println("Done watering");

              }

      }

String readableSoilMoisture(int soilMoisture){
```

```cpp
        if (soilMoisture <= wet)
                { return "Water"; }
        else if (soilMoisture > wet && soilMoisture < (wet + moistureLevels))
                {return "Very Wet"; }
        else if (soilMoisture > (wet + moistureLevels) && soilMoisture < (dry - moistureLevels))
                { return "Wet"; }
        else if (soilMoisture < dry && soilMoisture > (dry - moistureLevels))
                {return "Dry"; }
        else
                { return "Air"; }
}
float getTemperature() {
        // Read temperature as Fahrenheit
         float temperature = dht.readTemperature(true);
        if (isnan(temperature)) {
                Serial.println("Failed to read from temperature sensor!");
                }
        return temperature;
}
float getHumidity() {
        float humidity = dht.readHumidity();
         if (isnan(humidity)) {
                Serial.println("Failed to read from DHT sensor!");
                }
        return humidity;
 }
 void waterPumpOn() {
        Serial.println("Water pump on");
        digitalWrite(WATER_PUMP_PIN, LOW);
}
 void waterPumpOff() {
```

```
        Serial.println("Water pump off");

        digitalWrite(WATER_PUMP_PIN, HIGH);

}
```

Circuit Diagram