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IOT BASED SMART FARMING

SOIL SENSOR WITHOUT WIFI

/*

Plant Watering Sytem

The circuit:

- Water pump

Power supply: 4.5~12V DC

Interface: Brown +; Blue -

- Temperature/moisture sensor

Power supply: 3.3-5v

- Moisture sensor

Power supply: 3.3-5v

*/

```
#include "DHT.h"
```

```
#define DHTPIN 2    // what digital pin we're connected to
```

```
#define DHTTYPE DHT22 // DHT 22 (AM2302), AM2321
```

```
DHT dht(DHTPIN, DHTTYPE);
```

```
const int SOIL_MOISTURE_SENSOR_PIN = A0;
```

```
const int WATER_PUMP_PIN = 4;
```

```
const int dry = 520;
```

```
const int wet = 270;
```

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

```
// TODO: Should we have a counter so if it waters for X times, then take a  
break?
```

```
// OPTIMIZE: how dry to start watering and for how long.
```

```
const int soilMoistureStartWatering = 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()
```

```
{ mainLoop
```

```
();
```

```
}
```

```
void mainLoop() {
```

```
    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){
    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 (isFahrenheit = true)  
    float temperature = dht.readTemperature(true);  
    if (isnan(temperature)) {  
        Serial.println("Failed to read from DHT 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);  
}
```

OUTPUT :



