**TEAM ID: PNT2022TMID23510**

**Smart Farmers – IOT BASED SMART FARMING**

SOIL SENSOR WITHOUT WIFI

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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

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#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 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()

{ 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 :

