#include <NewPing.h>

// Define pins

const int trigPin = 9;

const int echoPin = 10;

const int flowPin = 2;

const int levelPin = A0;

// Constants

unsigned long previousMillis = 0;

const unsigned long interval = 5000; // 5-second interval in ms

const unsigned long MIN\_IN\_MILLIS = 60000;

const int MAX\_DISTANCE = 500; // Maximum distance (in cm) to measure

const float WATER\_SENSOR\_HEIGHT = 15.0; // the height on which the water sensor is fixed

const float ULTRA\_SENSOR\_HEIGHT = 25.0; // the height on which the ultrasonic sensor is fixed

const float FLOW\_METER\_PULSES\_L\_PER\_MIN = 450.0;

// Sensors

NewPing sonar(trigPin, echoPin, MAX\_DISTANCE);

void setup() {

  // Setup for Serial Monitor

  Serial.begin(9600);

  // Ultrasonic sensor setup

  pinMode(trigPin, OUTPUT);

  pinMode(echoPin, INPUT);

  // Water flow sensor setup

  pinMode(flowPin, INPUT);

  attachInterrupt(digitalPinToInterrupt(flowPin), flowPulseCounter, RISING);

  // Water level sensor setup

  pinMode(levelPin, INPUT);

}

// saving the values

volatile int pulseCount = 0; // Water flow pulse count ( 450 pulses for 1 L/min )

float waterLevelAnalog = 0; // the analog value of the sensor ( 0 -> 1023 means 0V -> 5V )

float waterLevel = 0;     // the water level sensor reading in CM

float clayLevel = 0;    // the ultra sonic sensor reading in CM

float waterAndClay = 0; // both water and Clay

float waterHeight = 15.0; // water without clay

void loop() {

  // Check if interval seconds have passed

  unsigned long currentMillis = millis();

  if (currentMillis - previousMillis >= interval) {

    previousMillis = currentMillis;

    float litersPerMinute = (pulseCount / (FLOW\_METER\_PULSES\_L\_PER\_MIN \* float(interval) / float(MIN\_IN\_MILLIS) )); // counted pulses / (450 \* 5000/60000) // as we read only for 5 seconds

    // Reset pulse count after reading

    pulseCount = 0;

    waterLevelAnalog = analogRead(levelPin);

    waterLevel =  float(map(waterLevelAnalog, 0, 1023, 0, 400)) / 100.0; // converting analog into distance

    clayLevel = ULTRA\_SENSOR\_HEIGHT - sonar.ping\_cm(); // the fixing position - the reading = clay height

    waterAndClay = WATER\_SENSOR\_HEIGHT  + waterLevel; // the fixing position + reading = total liquid with clay at buttom

    waterHeight = waterAndClay - clayLevel;  //  water without clay

    String jsonString = "{\n\"WaterLevel\":" + String(waterAndClay) +

//                        ",\n\"WaterAndClay\":" + String(waterAndClay) +

                        ",\n\"ClayLevel\":" + String(clayLevel) +

//                        ",\n\"WaterHeight\":" + String(waterHeight) +

                        ",\n\"waterFlow\":" + String(litersPerMinute) + "\n}";

    Serial.println(jsonString);

  }

}

// Interrupt service routine for water flow sensor

void flowPulseCounter() {

  pulseCount++;

  //  Serial.println(pulseCount);

}