#include <Wire.h>

#include <LiquidCrystal\_I2C.h>

#include <OneWire.h>

#include <DallasTemperature.h>

// Pin sensor dan relay

#define PH\_PIN A1

#define ONE\_WIRE\_BUS A0

#define RELAY\_KIPAS 8

#define RELAY\_LAMPU 7

#define RELAY\_POMPA 2

// Objek library

OneWire oneWire(ONE\_WIRE\_BUS);

DallasTemperature sensors(&oneWire);

LiquidCrystal\_I2C lcd(0x27, 20, 4); // LCD 20x4

// Batas suhu dan pH

float suhuThreshold = 23.0;

float pHMin = 6.5;

float pHMax = 7.5;

// Blinking lampu

unsigned long prevMillisLampu = 0;

bool lampuStatus = false;

const unsigned long intervalLampu = 10000; // 10 detik

void setup() {

Serial.begin(9600);

sensors.begin();

lcd.init();

lcd.backlight();

pinMode(RELAY\_KIPAS, OUTPUT);

pinMode(RELAY\_LAMPU, OUTPUT);

pinMode(RELAY\_POMPA, OUTPUT);

digitalWrite(RELAY\_KIPAS, HIGH);

digitalWrite(RELAY\_LAMPU, LOW);

digitalWrite(RELAY\_POMPA, HIGH);

lcd.clear();

lcd.setCursor(0, 0);

lcd.print("Monitoring dimulai");

delay(2000);

lcd.clear();

}

// Fungsi bantu untuk padding teks

String padRight(String text, int length) {

while (text.length() < length) text += " ";

if (text.length() > length) text = text.substring(0, length);

return text;

}

void loop() {

unsigned long currentMillis = millis();

// === SENSOR SUHU ===

sensors.requestTemperatures();

float suhu = sensors.getTempCByIndex(0);

// === SENSOR PH ===

int phRaw = analogRead(PH\_PIN);

float voltage = phRaw \* (5.0 / 1023.0);

float pH = 7 + ((2.5 - voltage) / 0.18); // Kalibrasi kasar

// === KONTROL KIPAS ===

bool kipasStatus = false;

if (suhu >= suhuThreshold) {

digitalWrite(RELAY\_KIPAS, LOW); // ON

kipasStatus = true;

} else {

digitalWrite(RELAY\_KIPAS, HIGH); // OFF

}

// === KONTROL POMPA + NOTIFIKASI pH ===

bool pompaStatus = false;

bool notifPH = false;

String notifText = "";

if (pH < pHMin) {

digitalWrite(RELAY\_POMPA, LOW); // ON

pompaStatus = true;

notifPH = true;

notifText = "pH RENDAH! Ganti Air";

} else if (pH > pHMax) {

digitalWrite(RELAY\_POMPA, LOW); // ON

pompaStatus = true;

notifPH = true;

notifText = "pH TINGGI! Ganti Air";

} else {

digitalWrite(RELAY\_POMPA, HIGH); // OFF

}

// === LAMPU BLINK 10 DETIK ===

if (currentMillis - prevMillisLampu >= intervalLampu) {

prevMillisLampu = currentMillis;

lampuStatus = !lampuStatus;

digitalWrite(RELAY\_LAMPU, lampuStatus ? LOW : HIGH); // Aktif LOW

}

// === SERIAL MONITOR ===

Serial.print("Suhu: ");

if (suhu == -127) Serial.print("Error");

else Serial.print(suhu, 1);

Serial.print(" C | pH: ");

Serial.print(pH, 2);

Serial.print(" | Lampu: ");

Serial.print(lampuStatus ? "ON" : "OFF");

Serial.print(" | Kipas: ");

Serial.print(kipasStatus ? "ON" : "OFF");

Serial.print(" | Pompa: ");

Serial.println(pompaStatus ? "ON" : "OFF");

// === LCD DISPLAY ===

lcd.clear();

// Baris 0: SUHU

lcd.setCursor(0, 0);

if (suhu == -127)

lcd.print(padRight("Sensor Suhu Error", 20));

else

lcd.print(padRight("Suhu: " + String(suhu, 1) + " C", 20));

// Baris 1: PH

lcd.setCursor(0, 1);

lcd.print(padRight("pH: " + String(pH, 2), 20));

// Baris 2: Lampu dan Kipas

lcd.setCursor(0, 2);

String line2 = "Lampu:" + String(lampuStatus ? "ON " : "OFF");

line2 += " Kipas:" + String(kipasStatus ? "ON " : "OFF");

lcd.print(padRight(line2, 20));

// Baris 3: Notifikasi + Status Pompa

lcd.setCursor(0, 3);

if (notifPH) {

lcd.print(padRight(notifText, 20));

delay(5000); // tampilkan notifikasi 2 detik

lcd.setCursor(0, 3);

lcd.print(padRight("Pompa: " + String(pompaStatus ? "ON " : "OFF"), 20));

} else {

lcd.print(padRight("Pompa: " + String(pompaStatus ? "ON " : "OFF"), 20));

}

delay(10000); // Delay untuk pembacaan ulang

}