**Smart Compost System Arduino Code**

#include <LiquidCrystal.h>

#include <Servo.h>

// Initialize the LCD (RS, E, DB4, DB5, DB6, DB7)

LiquidCrystal lcd(7, 8, 9, 10, 11, 12);

// Define pins for components

#define MOISTURE\_SENSOR A0

#define TEMP\_SENSOR A1       // Simulated analog pin for temperature sensor

#define PH\_SENSOR A2         // Simulated analog pin for pH sensor

#define BUZZER\_PIN 13

#define TEMP\_LED\_PIN 2

#define MOIST\_LED\_PIN 3

#define MOTOR\_EN 5           // Motor Driver Enable Pin

#define MOTOR\_IN1 4          // Motor Driver Input 1

#define MOTOR\_IN2 6          // Motor Driver Input 2

#define SERVO\_PIN 9          // Servo Motor Pin

Servo servoMotor;            // Servo motor object

bool compostReady = false;   // Flag to track compost readiness

void setup() {

  // Initialize LCD

  lcd.begin(16, 2); // 16x2 LCD

  lcd.print("System Initializing");

  delay(2000); // Display initialization message for 2 seconds

  lcd.clear();

  // Setup pins

  pinMode(MOISTURE\_SENSOR, INPUT);

  pinMode(TEMP\_SENSOR, INPUT);

  pinMode(PH\_SENSOR, INPUT);

  pinMode(BUZZER\_PIN, OUTPUT);

  pinMode(TEMP\_LED\_PIN, OUTPUT);

  pinMode(MOIST\_LED\_PIN, OUTPUT);

  pinMode(MOTOR\_EN, OUTPUT);

  pinMode(MOTOR\_IN1, OUTPUT);

  pinMode(MOTOR\_IN2, OUTPUT);

  // Initialize Servo

  servoMotor.attach(SERVO\_PIN);

  servoMotor.write(0); // Move servo to initial position

  // Initialize LCD display

  lcd.print("System Reading");

  delay(2000);

  lcd.clear();

  Serial.begin(9600); // For debugging

}

void loop() {

  // Read sensors

  digitalWrite(BUZZER\_PIN, HIGH);

  int moistureLevel = analogRead(MOISTURE\_SENSOR);

  int tempLevel =analogRead(TEMP\_SENSOR); // Simulated temperature sensor

  int pHLevel = analogRead(PH\_SENSOR);

  // Simulated temperature conversion (adjust as needed)

  int temperature = map(tempLevel, 0, 1023, -10, 50); // Example: -10°C to 50°C

  float pH = (pHLevel / 1023.0) \* 14.0; // Example: Map analog value to 0-14 pH scale

  digitalWrite(BUZZER\_PIN, HIGH);

  // Determine compost readiness condition

  if (moistureLevel > 700 && temperature > 25 && temperature < 40 && pH > 11 && pH < 14) {

    compostReady = true; // Compost is ready

    digitalWrite(TEMP\_LED\_PIN, HIGH); // Turn on LED to indicate readiness

    digitalWrite(MOIST\_LED\_PIN, HIGH);

  } else {

    compostReady = false; // Compost is not ready

    digitalWrite(TEMP\_LED\_PIN, LOW);

    digitalWrite(MOIST\_LED\_PIN, LOW);

  }

  // Display sensor values on LCD

  lcd.setCursor(0, 0);

  lcd.print("Temp: ");

  lcd.print(temperature);

  lcd.print("C");

  lcd.setCursor(0, 1);

  lcd.print("Moist: ");

  lcd.print(moistureLevel);

  delay(5000);

  lcd.clear();

  lcd.setCursor(0, 0);

  lcd.print("pH: ");

  lcd.print(pH);

  lcd.setCursor(0, 1);

  lcd.print("Moist: ");

  lcd.print(moistureLevel);

  delay(2000);

  lcd.clear();

  // Control Buzzer

  if (compostReady) {

    lcd.print("Compost Ready");

    digitalWrite(BUZZER\_PIN, HIGH); // Turn on buzzer

    delay(10000); // Keep buzzer on for 30 seconds

    digitalWrite(BUZZER\_PIN, LOW); // Turn off buzzer

    compostReady = false; // Reset compostReady flag to avoid repeated buzzing

  }

  // Control Servo Motor (Simulate blade movement)

  if (moistureLevel < 300) { // Example: Blade activation condition

    servoMotor.write(90); // Rotate servo to 90 degrees

    delay(2000);

    servoMotor.write(0); // Return to initial position

  }

  // Control Motor (Simulate a motor-driven component, e.g., compost mixing)

  if (pH < 6 || pH > 8) { // Example: Motor activation condition

    digitalWrite(MOTOR\_EN, HIGH); // Enable motor

    digitalWrite(MOTOR\_IN1, HIGH); // Rotate motor in one direction

    digitalWrite(MOTOR\_IN2, LOW);

    delay(10000); // Run motor for 5 seconds

    digitalWrite(MOTOR\_EN, LOW); // Turn off motor

  }

}