#include <Wire.h>

#include <LiquidCrystal\_I2C.h>

#include <WiFi.h>

#include <FirebaseESP32.h>

// WiFi credentials

const char\* ssid = "HMI";

const char\* password = "12345678";

// Firebase configuration

FirebaseConfig config;

FirebaseAuth auth;

FirebaseData firebaseData;

// LCD setup: I2C address (0x27), 16 columns, 2 rows

LiquidCrystal\_I2C lcd(0x27, 16, 2);

// Define LED and Buzzer pins

#define BUZZER\_PIN 27

#define LED\_PIN1 25   // Water - White

#define LED\_PIN2 26   // Food - Blue

#define LED\_PIN3 32   // Medicine - Green

#define LED\_PIN4 13   // Emergency - Red

#define LED\_PIN5 33   // Sanitation - Yellow (Updated)

void setup() {

  Serial.begin(115200);

  // Initialize LCD

  lcd.init();

  lcd.backlight();

  lcd.setCursor(0, 0);

  lcd.print("Starting...");

  // Set pin modes for LEDs and buzzer

  pinMode(BUZZER\_PIN, OUTPUT);

  pinMode(LED\_PIN1, OUTPUT);

  pinMode(LED\_PIN2, OUTPUT);

  pinMode(LED\_PIN3, OUTPUT);

  pinMode(LED\_PIN4, OUTPUT);

  pinMode(LED\_PIN5, OUTPUT);

  // Ensure all outputs are initially off

  digitalWrite(BUZZER\_PIN, LOW);

  digitalWrite(LED\_PIN1, LOW);

  digitalWrite(LED\_PIN2, LOW);

  digitalWrite(LED\_PIN3, LOW);

  digitalWrite(LED\_PIN4, LOW);

  digitalWrite(LED\_PIN5, LOW);

  // Connect to WiFi

  WiFi.begin(ssid, password);

  Serial.print("Connecting to WiFi");

  while (WiFi.status() != WL\_CONNECTED) {

    Serial.print(".");

    delay(500);

  }

  Serial.println("\nWiFi Connected ✅");

  lcd.clear();

  lcd.setCursor(0, 0);

  lcd.print("WiFi Connected");

  // Set Firebase configuration

  config.host = "hmi1-99e38-default-rtdb.asia-southeast1.firebasedatabase.app";

  config.signer.tokens.legacy\_token = "8pI4cyLRZUtMvmOj6qbbs8ta301iSmVis0iQfWDB";

  // Initialize Firebase

  Firebase.begin(&config, &auth);

  Firebase.reconnectWiFi(true);

  lcd.clear();

}

void loop() {

  // Read detected gesture from Firebase

  if (Firebase.getString(firebaseData, "/detected\_gesture")) {

    if (firebaseData.dataType() == "string") {

      String detectedGesture = firebaseData.stringData();

      Serial.println("Detected Gesture: " + detectedGesture);

      // Turn off all LEDs and buzzer initially

      digitalWrite(BUZZER\_PIN, LOW);

      digitalWrite(LED\_PIN1, LOW);

      digitalWrite(LED\_PIN2, LOW);

      digitalWrite(LED\_PIN3, LOW);

      digitalWrite(LED\_PIN4, LOW);

      digitalWrite(LED\_PIN5, LOW);

      // Display detected gesture on LCD

      lcd.clear();

      lcd.setCursor(0, 0);

      lcd.print("G:" + detectedGesture);

      // Control LEDs and buzzer based on detected gesture

      if (detectedGesture == "Water") {

        digitalWrite(LED\_PIN4, HIGH);   // Emergency LED (Red)

      } else if (detectedGesture == "Medicine") {

        digitalWrite(LED\_PIN5, HIGH);   // Sanitation LED (Yellow)

      } else if (detectedGesture == "Emergency") {

        digitalWrite(LED\_PIN2, HIGH);   // Food LED (Blue)

        digitalWrite(BUZZER\_PIN, HIGH);

      } else if (detectedGesture == "Sanitation") {

        digitalWrite(LED\_PIN1, HIGH);

          // Water LED (White)

      } else if (detectedGesture == "Food") {

        digitalWrite(LED\_PIN3, HIGH);   // Medicine LED (Green)

      } else {

        Serial.println("Unknown Gesture: " + detectedGesture);

      }

    }

  } else {

    Serial.println("❌ Failed to retrieve data: " + firebaseData.errorReason());

    lcd.setCursor(0, 1);

    lcd.print("Firebase Error");

  }

  delay(1000);  // Check Firebase every second

}