Alchol sensing system with engine cutoff using fingerprint and gps

#include <Adafruit\_Fingerprint.h>

#include <SoftwareSerial.h>

#include <LiquidCrystal\_I2C.h>

#include <TinyGPS++.h>

// --- Pins ---

const int alcoholPin = A0;

const int relayPin = 7;

const int buzzerPin = 5;

const int threshold = 400; // Adjust based on real-time values

// --- Modules ---

SoftwareSerial fingerSerial(2, 3); // Fingerprint

Adafruit\_Fingerprint finger(&fingerSerial);

SoftwareSerial gpsSerial(8, 9); // GPS

TinyGPSPlus gps;

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

// --- State ---

bool motorRunning = false;

void setup() {

pinMode(relayPin, OUTPUT);

pinMode(buzzerPin, OUTPUT);

Serial.begin(9600);

gpsSerial.begin(9600);

finger.begin(57600);

lcd.init();

lcd.backlight();

// Fingerprint check

if (finger.verifyPassword()) {

Serial.println("Fingerprint sensor initialized.");

} else {

lcd.setCursor(0, 0);

lcd.print("Fingerprint Err");

Serial.println("Fingerprint sensor not found.");

while (true); // Halt

}

// Warm-up Sensor

lcd.setCursor(0, 0);

lcd.print("Warming MQ-3...");

delay(15000);

lcd.clear();

// Start motor

digitalWrite(relayPin, LOW); // Motor ON

motorRunning = true;

lcd.setCursor(0, 0);

lcd.print("Motor Started");

beep();

delay(2000);

lcd.clear();

}

void loop() {

int alcoholValue = analogRead(alcoholPin);

Serial.print("Alcohol Value: ");

Serial.println(alcoholValue);

lcd.setCursor(0, 0);

lcd.print("Alcohol:");

lcd.setCursor(9, 0);

lcd.print(" "); // Clear old digits

lcd.setCursor(9, 0);

lcd.print(alcoholValue);

// If alcohol exceeds threshold

if (motorRunning && alcoholValue > threshold) {

lcd.setCursor(0, 1);

lcd.print("Alcohol Detected");

Serial.println(">> Alcohol detected");

delay(2000);

// Stop motor

digitalWrite(relayPin, HIGH); // Motor OFF

motorRunning = false;

beep();

lcd.clear();

lcd.setCursor(0, 0);

lcd.print("Motor Stopping");

delay(2000);

lcd.clear();

lcd.setCursor(0, 0);

lcd.print("Show Fingerprint");

Serial.println(">> Waiting for fingerprint...");

if (getFingerprint(15000)) {

lcd.clear();

lcd.setCursor(0, 0);

lcd.print("Fingerprint OK");

Serial.println(">> Fingerprint matched");

delay(2000);

lcd.clear();

lcd.setCursor(0, 0);

lcd.print("Rechecking...");

delay(2000);

int recheck = analogRead(alcoholPin);

Serial.print("Recheck Alcohol: ");

Serial.println(recheck);

if (recheck <= threshold) {

lcd.clear();

lcd.setCursor(0, 0);

lcd.print("Alcohol Cleared");

lcd.setCursor(0, 1);

lcd.print("Motor Restarted");

digitalWrite(relayPin, LOW); // Motor ON

motorRunning = true;

beep();

Serial.println(">> Alcohol cleared. Motor ON");

delay(3000);

} else {

lcd.clear();

lcd.setCursor(0, 0);

lcd.print("Alcohol Still HI");

lcd.setCursor(0, 1);

lcd.print("Motor OFF");

Serial.println(">> Alcohol still high. Motor OFF");

delay(3000);

}

} else {

lcd.clear();

lcd.setCursor(0, 0);

lcd.print("No Fingerprint");

lcd.setCursor(0, 1);

lcd.print("Activating GPS");

Serial.println(">> No fingerprint. Sending GPS");

beep();

delay(2000);

printGPSLocation();

}

lcd.clear();

}

// Feed GPS data

while (gpsSerial.available()) {

gps.encode(gpsSerial.read());

}

delay(300); // Fast loop for quicker detection

}

bool getFingerprint(unsigned long timeout) {

unsigned long start = millis();

while (millis() - start < timeout) {

if (finger.getImage() == FINGERPRINT\_OK) {

if (finger.image2Tz() != FINGERPRINT\_OK) continue;

if (finger.fingerSearch() == FINGERPRINT\_OK) {

Serial.print("Fingerprint ID: ");

Serial.println(finger.fingerID);

return true;

}

}

delay(100);

}

return false;

}

void printGPSLocation() {

unsigned long start = millis();

bool found = false;

while (millis() - start < 5000) {

while (gpsSerial.available()) {

gps.encode(gpsSerial.read());

}

if (gps.location.isValid()) {

float lat = gps.location.lat();

float lon = gps.location.lng();

lcd.clear();

lcd.setCursor(0, 0);

lcd.print("Lat:");

lcd.print(lat, 2);

lcd.setCursor(0, 1);

lcd.print("Lon:");

lcd.print(lon, 2);

Serial.print("Latitude: ");

Serial.println(lat, 6);

Serial.print("Longitude: ");

Serial.println(lon, 6);

found = true;

delay(4000);

break;

}

}

if (!found) {

lcd.clear();

lcd.setCursor(0, 0);

lcd.print("No GPS Signal");

Serial.println(">> No valid GPS data.");

delay(3000);

}

}

void beep() {

digitalWrite(buzzerPin, HIGH);

delay(200);

digitalWrite(buzzerPin, LOW);

}