#include <WiFi.h>

#include <ESPAsyncWebServer.h>

#include <AsyncTCP.h>

const char\* ssid = "V30+\_6936";

const char\* password = "doraboots";

//const char\* ssid = "Ishanvi's iPhone";

//const char\* password = "Test1234";

// motor 1 pins

int motor1Pin1 = 27;

int motor1Pin2 = 26;

int enable1Pin = 14;

// motor 2 pins

int motor2Pin1 = 25;

int motor2Pin2 = 33;

int enable2Pin = 32;

const int freq = 30000;

const int pwmChannel1 = 0;

const int pwmChannel2 = 1;

const int resolution = 8;

int dutyCycle = 0;

const int turnDutyCycle = 150; // set early for turns

const int maxDutyCycle = 255;

const int accelerationStep = 5;

const int decelerationStep = 5;

int currentDutyCycle = 0;

AsyncWebServer server(80);

AsyncWebSocket ws("/ws");

unsigned long lastCommandTime = 0; // Store last command timestamp

const unsigned long commandTimeout = 2000; // 2-second timeout

unsigned long boostStartTime = 0;

const unsigned long boostDuration = 5000; // 5 seconds

void setup() {

pinMode(motor1Pin1, OUTPUT);

pinMode(motor1Pin2, OUTPUT);

pinMode(motor2Pin1, OUTPUT);

pinMode(motor2Pin2, OUTPUT);

ledcSetup(pwmChannel1, freq, resolution);

ledcAttachPin(enable1Pin, pwmChannel1);

ledcSetup(pwmChannel2, freq, resolution);

ledcAttachPin(enable2Pin, pwmChannel2);

Serial.begin(115200);

connectToWiFi();

ws.onEvent(onWebSocketEvent);

server.addHandler(&ws);

server.begin();

Serial.println("Started Server");

}

void connectToWiFi() {

WiFi.mode(WIFI\_AP);

WiFi.softAP(ssid, password);

// Serial.print("Access Point Started. IP address: ");

// Serial.println(WiFi.softAPIP());

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

// delay(1000);

// Serial.println("Connecting to WiFi...");

// }

// Serial.println("Connected to WiFi");

}

void onWebSocketEvent(AsyncWebSocket \*server, AsyncWebSocketClient \*client,

AwsEventType type, void \*arg, uint8\_t \*data, size\_t len) {

if (type == WS\_EVT\_CONNECT) {

// check if client connected

Serial.println("Client connected");

}

else if (type == WS\_EVT\_DISCONNECT) {

Serial.println("Client disconnected");

// check if client disconnected

}

else if (type == WS\_EVT\_DATA) {

// if data is received

// debugging code

unsigned long startTime = millis(); // Log start time

String message = (const char \*)data;

Serial.println("Received message: " + message);

// lastCommandTime = millis(); // Update last command timestamp

Serial.println("Time since last command (ms): " + String(startTime - lastCommandTime));

lastCommandTime = startTime; // Update last command timestamp

if (message == "UP") {

accelerateForward();

delay(50); // Short delay to allow buffer processing

} else if (message == "DOWN") {

accelerateBackward();

delay(50);

} else if (message == "LEFT") {

turnLeft();

delay(50);

} else if (message == "RIGHT") {

turnRight();

delay(50);

} else if (message == "STOP") {

decelerate();

delay(50);

}

// } else if (message = "BOOST") {

// boostForward();

// }

// debugging code

unsigned long endTime = millis(); // Log end time

Serial.println("Command processing time (ms): " + String(endTime - startTime));

}

}

void accelerateForward() {

digitalWrite(motor1Pin1, LOW);

digitalWrite(motor1Pin2, HIGH);

digitalWrite(motor2Pin1, LOW);

digitalWrite(motor2Pin2, HIGH);

// if (currentDutyCycle < maxDutyCycle) {

// currentDutyCycle += accelerationStep;

// delay(5); // for smoother acceleration

// }

ledcWrite(pwmChannel1, maxDutyCycle);

ledcWrite(pwmChannel2, maxDutyCycle);

}

void accelerateBackward() {

// debugging lines

unsigned long startTime = millis(); // Log start time

digitalWrite(motor1Pin1, HIGH);

digitalWrite(motor1Pin2, LOW);

digitalWrite(motor2Pin1, HIGH);

digitalWrite(motor2Pin2, LOW);

// if (currentDutyCycle < maxDutyCycle) {

// currentDutyCycle += accelerationStep;

// }

ledcWrite(pwmChannel1, maxDutyCycle);

ledcWrite(pwmChannel2, maxDutyCycle);

// debugging lines

unsigned long endTime = millis(); // Log end time

Serial.println("Accelerate forward execution time (ms): " + String(endTime - startTime));

}

void turnLeft() {

ledcWrite(pwmChannel1, turnDutyCycle / 2);

ledcWrite(pwmChannel2, turnDutyCycle);

}

void turnRight() {

ledcWrite(pwmChannel1, turnDutyCycle);

ledcWrite(pwmChannel2, turnDutyCycle / 2);

}

void decelerate() {

// if (currentDutyCycle > 0) {

// currentDutyCycle -= decelerationStep / 2; // decellerates slower than acceleration

// delay(5);

// ledcWrite(pwmChannel1, currentDutyCycle);

// ledcWrite(pwmChannel2, currentDutyCycle);

// }

ledcWrite(pwmChannel1, 0);

ledcWrite(pwmChannel2, 0);

}

//void boostForward() {

// boostStartTime = millis();

//

// digitalWrite(motor1Pin1, LOW);

// digitalWrite(motor1Pin2, HIGH);

// digitalWrite(motor2Pin1, LOW);

// digitalWrite(motor2Pin2, HIGH);

//

// currentDutyCycle = maxDutyCycle;

// ledcWrite(pwmChannel1, currentDutyCycle);

// ledcWrite(pwmChannel2, currentDutyCycle);

//

// Serial.println("BOOST");

//}

void failsafeCheck() {

if (millis() - lastCommandTime > commandTimeout) {

// Stop the motors if no command is received within the timeout

ledcWrite(pwmChannel1, 0);

ledcWrite(pwmChannel2, 0);

currentDutyCycle = 0; // Reset duty cycle to 0

delay(10); // allow time for motors to settle

}

// if (boostStartTime > 0 && millis() - boostStartTime > boostDuration) {

// decelerate();

// boostStartTime = 0; // Reset boost

// Serial.println("Boost ended.");

// }

}

void loop() {

ws.cleanupClients();

failsafeCheck();

// Reconnect to WiFi if disconnected

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

connectToWiFi();

}

}