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#include <SoftwareSerial.h>
#include "VoiceRecognitionV3.h"
#include <Servo.h>

// ---------------- VR3 Setup ----------------
VR myVR(12, 13);  // RX=12, TX=13

uint8_t records[7];
uint8_t buf[64];

// ---------------- ESP32 Communication ----------------
SoftwareSerial espSerial(A4, A5);  // RX=A4, TX=A5 (ESP32 TX=17, RX=16)

// ---------------- Ultrasonic Setup ----------------
const int trigPin1 = 2;
const int echoPin1 = 3;
const int trigPin2 = 4;
const int echoPin2 = 5;

float distance1, distance2;

// ---------------- Servo Setup ----------------
Servo servo1, servo2, servo3, servo4, servo5, servo6;
int servoPin1 = 6, servoPin2 = 7, servoPin3 = 8, servoPin4 = 9, servoPin5
= 10, servoPin6 = 11;
bool servo1AtRight=false, servo2AtRight=false, servo3AtRight=false,
servo4AtRight=false, servo5AtRight=false, servo6AtRight=false;

// ---------------- Setup ----------------
void setup() {
  Serial.begin(9600);
  espSerial.begin(9600);

  myVR.begin(9600);
  Serial.println("VR3 Module Initialized...");
  if (myVR.load((uint8_t)0, records, 7) >= 0) {
    Serial.println("Voice commands loaded successfully.");
  } else {
    Serial.println("Load failed.");
  }

  pinMode(trigPin1, OUTPUT);
  pinMode(echoPin1, INPUT);
  pinMode(trigPin2, OUTPUT);
  pinMode(echoPin2, INPUT);

  servo1.attach(servoPin1);
  servo2.attach(servoPin2);
  servo3.attach(servoPin3);
  servo4.attach(servoPin4);
  servo5.attach(servoPin5);
  servo6.attach(servoPin6);

  servo1.write(0); servo2.write(0); servo3.write(0);
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  servo4.write(0); servo5.write(0); servo6.write(0);
}

// ---------------- Distance Function ----------------
float measureDistance(int trigPin, int echoPin) {
  digitalWrite(trigPin, LOW); delayMicroseconds(2);
  digitalWrite(trigPin, HIGH); delayMicroseconds(10);
  digitalWrite(trigPin, LOW);

  long duration = pulseIn(echoPin, HIGH, 30000);
  float distance = (duration * 0.0343) / 2;
  if (distance <= 0 || distance > 40) return -1;
  return distance;
}

// ---------------- Loop ----------------
void loop() {
  int ret = myVR.recognize(buf, 50);
  if (ret > 0) {
    String command = "";
    switch (buf[1]) {
      case 0: command = "HELLO"; break;
      case 1: command = "RICE"; break;
      case 2: command = "SUGAR"; break;
      case 3: command = "SALT"; break;
      case 4: command = "OIL"; break;
      case 5: command = "ONION"; break;
      case 6: command = "POTATO"; break;
    }
    if (command != "") {
      Serial.println(command);
      espSerial.println(command);
    }
  }

  distance1 = measureDistance(trigPin1, echoPin1);
  distance2 = measureDistance(trigPin2, echoPin2);

  // --- Servo 1 ---
  if (distance1 > 0 && distance1 <= 11) {
    if (!servo1AtRight) {
      servo1.write(90); servo1AtRight = true;
      espSerial.println("SERVO1_ACTIVE"); Serial.println("SERVO1_ACTIVE
sent");
    }
    servo2.write(0); servo3.write(0); servo4.write(0); servo5.write(0);
servo6.write(0);

servo2AtRight=servo3AtRight=servo4AtRight=servo5AtRight=servo6AtRight=fal
se;
  }
  // --- Servo 2 ---
  else if (distance1 >= 15 && distance1 <= 26) {
    if (!servo2AtRight) {
```

```
      servo2.write(90); servo2AtRight = true;
      espSerial.println("SERVO2_ACTIVE"); Serial.println("SERVO2_ACTIVE
sent");
    }
    servo1.write(0); servo3.write(0); servo4.write(0); servo5.write(0);
servo6.write(0);

servo1AtRight=servo3AtRight=servo4AtRight=servo5AtRight=servo6AtRight=fal
se;
  }
  // --- Servo 3 ---
  else if (distance1 >= 30 && distance1 <= 40) {
    if (!servo3AtRight) {
      servo3.write(90); servo3AtRight = true;
      espSerial.println("SERVO3_ACTIVE"); Serial.println("SERVO3_ACTIVE
sent");
    }
    servo1.write(0); servo2.write(0); servo4.write(0); servo5.write(0);
servo6.write(0);

servo1AtRight=servo2AtRight=servo4AtRight=servo5AtRight=servo6AtRight=fal
se;
  }
  // --- Servo 4 ---
  else if (distance2 > 0 && distance2 <= 11) {
    if (!servo4AtRight) {
      servo4.write(90); servo4AtRight = true;
      espSerial.println("SERVO4_ACTIVE"); Serial.println("SERVO4_ACTIVE
sent");
    }
    servo1.write(0); servo2.write(0); servo3.write(0); servo5.write(0);
servo6.write(0);

servo1AtRight=servo2AtRight=servo3AtRight=servo5AtRight=servo6AtRight=fal
se;
  }
  // --- Servo 5 ---
  else if (distance2 >= 15 && distance2 <= 26) {
    if (!servo5AtRight) {
      servo5.write(90); servo5AtRight = true;
      espSerial.println("SERVO5_ACTIVE"); Serial.println("SERVO5_ACTIVE
sent");
    }
    servo1.write(0); servo2.write(0); servo3.write(0); servo4.write(0);
servo6.write(0);

servo1AtRight=servo2AtRight=servo3AtRight=servo4AtRight=servo6AtRight=fal
se;
  }
  // --- Servo 6 ---
  else if (distance2 >= 30 && distance2 <= 40) {
    if (!servo6AtRight) {
      servo6.write(90); servo6AtRight = true;
```

```
      espSerial.println("SERVO6_ACTIVE"); Serial.println("SERVO6_ACTIVE
sent");
    }
    servo1.write(0); servo2.write(0); servo3.write(0); servo4.write(0);
servo5.write(0);

servo1AtRight=servo2AtRight=servo3AtRight=servo4AtRight=servo5AtRight=fal
se;
  }
  else {
    servo1.write(0); servo2.write(0); servo3.write(0);
    servo4.write(0); servo5.write(0); servo6.write(0);

servo1AtRight=servo2AtRight=servo3AtRight=servo4AtRight=servo5AtRight=ser
vo6AtRight=false;
  }

  delay(200);
}
```