Jose Rizal University

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SUMOBOT

CPE C312 – EMBEDDED SYSTEMS

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Code:

```
// SUMOBOT Robot

#include <AFMotor.h>
#include <Servo.h>

const int MOTOR_1 = 1;
const int MOTOR_2 = 2;
const int MOTOR_3 = 3;
const int MOTOR_4 = 4;

const int IR_Rear = A0;
const int IR_Front = A1;

const int echo_Pin = A2; // echo pin
const int trig_Pin = A3; // trigger pin

Servo servo;
const int servo_right = 30;
const int servo_front = 90;
const int servo_left = 150;

int distance_Front;
int detected = 20;

int speed = 150;

AF_DCMotor motor1(MOTOR_1, MOTOR12_64KHZ); // create motor object, 64KHz pwm
AF_DCMotor motor2(MOTOR_2, MOTOR12_64KHZ); // create motor object, 64KHz pwm
AF_DCMotor motor3(MOTOR_3, MOTOR12_64KHZ); // create motor object, 64KHz pwm
AF_DCMotor motor4(MOTOR_4, MOTOR12_64KHZ); // create motor object, 64KHz pwm

//============================================================================
//  Initialization
//============================================================================



void setup() {
  // Initialize serial port
  Serial.begin(9600);
  Serial.println("Start");

  // Declare pins for IR Sensors
  pinMode(IR_Rear, INPUT);
  pinMode(IR_Front, INPUT);

  // Attach servo
  servo.attach(10);

  // Declare pins for Ultrasonic Sensor
  pinMode (trig_Pin, OUTPUT);
  pinMode (echo_Pin, INPUT);

  // Set the motor speed: 0-255
  motor1.setSpeed(speed);
  motor2.setSpeed(speed);
  motor3.setSpeed(speed);
  motor4.setSpeed(speed);

  delay(5000);
}
```

```
void loop() {

  // 0 = WHITE
  // 1 = BLACK

  distance_Front = calculate_Distance();

  // rotate while distance < 20
  robot_right();

  // while distance > 20
  while (distance_Front < 30){
    robot_forward();

    distance_Front = calculate_Distance();

    if(digitalRead(IR_Front)==0 || digitalRead(IR_Rear)==0){
      robot_stop();
      delay(50);
      robot_backward();
      delay(300);

      Serial.println("IR Front detected");
      break;
    }

    delay(10);
  }

  if(digitalRead(IR_Front)==0){
    robot_stop();
    delay(50);
    robot_backward();
    delay(300);

    Serial.println("IR Front detected");
  }

  if(digitalRead(IR_Rear)==0){
    robot_forward();
    delay(300);

    Serial.println("IR Rear detected");
  }

  Serial.print("Distance: ");
  Serial.println(distance_Front);

  delay(10);
}

int calculate_Distance(){
  digitalWrite(trig_Pin, LOW);
  digitalWrite(trig_Pin, HIGH);
  digitalWrite(trig_Pin, LOW);
  int detect = pulseIn(echo_Pin, HIGH);
  int distance = detect*0.034/2;
  return distance;
}


void robot_forward(){
  motor1.run(FORWARD);
  motor2.run(FORWARD);
  motor3.run(FORWARD);
```

```
  motor4.run(FORWARD);
  Serial.println("Move FORWARD.");
}

void robot_right(){
  motor1.run(FORWARD);
  motor2.run(FORWARD);
  motor3.run(BACKWARD);
  motor4.run(BACKWARD);
  Serial.println("Turn RIGHT.");
}

void robot_left(){
  motor1.run(BACKWARD);
  motor2.run(BACKWARD);
  motor3.run(FORWARD);
  motor4.run(FORWARD);
  Serial.println("Turn LEFT.");
}

void robot_backward(){
  motor1.run(BACKWARD);
  motor2.run(BACKWARD);
  motor3.run(BACKWARD);
  motor4.run(BACKWARD);
  Serial.println("Move BACKWARD.");
}

void robot_stop(){
  motor1.run(RELEASE);
  motor2.run(RELEASE);
  motor3.run(RELEASE);
  motor4.run(RELEASE);
  Serial.println("Stop.");
}
```

Output: