Lesson 21 Automatic Obstacle Avoidance and Follow Car

21.1 Overview

In this course, we will delve into the automatic obstacle avoidance and following functions of Adeept Robot Cars, enabling them to autonomously move in complex environments and automatically avoid obstacles while following objects ahead, laying a solid foundation for further development of robot applications.

21.2 Principle Introduction

21.2.1 Principle of obstacle avoidance

The obstacle avoidance function is mainly achieved through ultrasonic modules. The ultrasonic module measures the distance between the car and obstacles by emitting and receiving ultrasonic signals. When the ultrasonic module of the car detects that it is close to an obstacle, it will quickly transmit a signal to the Arduino control board. The control board makes a judgment based on the preset distance threshold. If the distance is less than the threshold, it will control the car to move to the left and right sides to avoid obstacles and ensure that the car can safely travel in the environment.

21.2.2 Follow car function principle

The following car function is based on the collaborative work of infrared remote control and ultrasonic module. When the "0" button on the infrared remote control is pressed, the car starts the following mode. In this mode, the ultrasonic module continuously measures the distance between the car and the object ahead. The car will automatically adjust its speed and direction based on the measurement results, always maintaining a distance of 30-40cm from the object in front, achieving linear following function.

21.3 Main code for Obstacle Avoidance

```
01  void Avoid_Obstacles(){
02    distance = GetDistance();
03    Serial.println(distance);
```

```
04    if (distance > avoid_Dist){
05        Servo_Angle(1, 90);
06        Motor(1,1*dir,motor_speed);
07        Motor(2,1*dir,motor_speed);
08        Motor(3,1*dir,motor_speed);
09        Motor(4,1*dir,motor_speed);
10    }
11    else if (distance >= minDist and distance <=avoid_Dist){
12        Motor(1,1,0);
13        Motor(2,1,0);
14        Motor(3,1,0);
15        Motor(4,1,0);
16        Servo_Angle(1, 135);
17        delay(200);
18        leftDist = GetDistance();
19        Servo_Angle(1, 45);
20        delay(200);
21        rightDist = GetDistance();
22        if (leftDist >= rightDist){
23          Motor(1,-1*dir,motor_speed);
24          Motor(2,-1*dir,motor_speed);
25          Motor(3,1*dir,motor_speed);
26          Motor(4,1*dir,motor_speed);
27        }
28        else{
29            Motor(1,1*dir,motor_speed);
30            Motor(2,1*dir,motor_speed);
31            Motor(3,-1*dir,motor_speed);
32            Motor(4,-1*dir,motor_speed);
33        }
34        delay(200);
35    }
36    else {
37      Motor(1,-1*dir,motor_speed);
38      Motor(2,-1*dir,motor_speed);
39      Motor(3,-1*dir,motor_speed);
40      Motor(4,-1*dir,motor_speed);
41      delay(200);
42    }
43
44 }
```

21.4 Main Code of Follow Car

```
01 void Keep_Distance(){
02    Servo_Angle(1, servo_Angle1);
03    distance = GetDistance();
04    if (distance <= 20){
05        Servo_Angle(1, servo_Init + deviation);
06        Motor(1,-1*dir,motor_speed);
07        Motor(2,-1*dir,motor_speed);
08        Motor(3,-1*dir,motor_speed);
09        Motor(4,-1*dir,motor_speed);
```

```
10          }
11      else if (distance > 30){
12          Servo_Angle(1, servo_Init + deviation);
13          Motor(1,1*dir,motor_speed);
14          Motor(2,1*dir,motor_speed);
15          Motor(3,1*dir,motor_speed);
16          Motor(4,1*dir,motor_speed);
17      }
18      else {
19          Motor(1,1,0);  // stop
20          Motor(2,1,0);
21          Motor(3,1,0);
22          Motor(4,1,0);
23      }
24  }
```

For the complete code, please refer to the "IR_Control.ino" and "Adeept_Car_For_Arduino.cpp"

files.