2. Ultrasonic obstacle avoidance

1. Learning objectives

Take the Mailun car drive as an example, by combining the ultrasonic module with the car, the car's ultrasonic obstacle avoidance is realized.

2. Experimental preparation

The car wiring has been installed and installed correctly

3. Implementation principle

We obtain the distance between the car and the obstacle through ultrasound. When it is detected that the distance between the car and the obstacle is less than the distance we set, the car turns left to avoid the obstacle.

4. Code analysis

Source code path:

/home/pi/project_demo/05.Comprehensive_gameplay/2.ultrasonic_obstacle_avoidance.ipynb

```
#!/usr/bin/python3
# -*- coding: UTF-8 -*-
import sys
sys.path.append('/home/pi/project_demo/lib')
#导入麦克纳姆小车驱动库 Import Mecanum Car Driver Library
from McLumk_Wheel_Sports import *

# Constants related to the ultrasonic sensor
NEAR_DISTANCE = 200  # Define near distance threshold (millimeters)
FAR_DISTANCE = 425   # Define far distance threshold (millimeters)

def car_avoid():


    # 读取超声波传感器的距离 Reading distance from ultrasonic sensor
    diss_H =bot.read_data_array(0x1b,1)[0]
    diss_L =bot.read_data_array(0x1a,1)[0]
    dis = diss_H << 8 | diss_L

    # 打印距离 Printing distance
    #print(f"Ultrasonic Distance: {dis} mm")
    time.sleep(0.05)  # 每隔1秒读取一次距离 Read the distance every 1 second
```

```
    if dis < NEAR_DISTANCE:
        print(f"Obstacle is very close, distance: {dis} mm")
        move_backward(speed)
        time.sleep(0.1)
    elif NEAR_DISTANCE <= dis <= FAR_DISTANCE:
        print(f"Obstacle is at medium distance, distance: {dis} mm")
        stop_robot()
        time.sleep(0.2)
        rotate_left(speed)
        time.sleep(0.15)
    elif FAR_DISTANCE < dis:
        print(f"No obstacle, distance: {dis} mm")
        move_forward(speed)

    else:
        print("Unknown situation, stopping")
        stop_robot()
        time.sleep(0.2)

speed = 20  # Set vehicle speed

try:
    # 打开超声波测距功能 Turn on the ultrasonic ranging function
    bot.Ctrl_Ulatist_Switch(1)
    time.sleep(0.1)  # 给超声波传感器一点时间来测量 Give the ultrasonic sensor some
time to measure
    while True:
        car_avoid()

except KeyboardInterrupt:
    # When the user interrupts the program, ensure all motors stop
    bot.Ctrl_Ulatist_Switch(0)
    time.sleep(0.1)
    stop_robot()
    print("Ending")
```

5. Experimental results

We put the car on the ground and run the program. The car will keep moving forward. When there is an obstacle in front and the distance is less than the set distance, the car will turn left to avoid the obstacle.