

3. Ultrasonic following

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1. Learning objectives

Take the Mailun car drive as an example, and realize the ultrasonic following of the car by combining the ultrasonic module with the car.

2. Experimental preparation

The car wiring has been installed and installed correctly

3. Implementation principle

We get the distance between the car and the obstacle through ultrasound. We set a following distance interval for the car. When the distance between the car and the obstacle is detected in the distance interval we set, the car follows. When the distance detected by the car is greater than the maximum value of the following distance interval we set, the car stops following. When the distance detected by the car is less than the minimum value of the following distance interval we set, the car retreats.

4. Code analysis

Source code path:

/home/pi/project_demo/05.Comprehensive_gameplay/3.ultrasonic_followup.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 = 150 # 定义近距离阈值（毫米） Define near distance threshold
(millimeters)
MID_DISTANCE = 300 # 定义中间距离阈值（毫米） Define mid distance threshold
(millimeters)
FAR_DISTANCE = 500 # 定义远距离阈值（毫米） Define far distance threshold
(millimeters)

def car_follow():
    # Read the distance from the 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
```

```

# Print distance
#print(f"Ultrasonic Distance: {dis} mm")

if dis < NEAR_DISTANCE:
    print(f"Obstacle is very close, distance: {dis} mm")
    move_backward(speed)
    # time.sleep(0.1)
elif NEAR_DISTANCE <= dis <= MID_DISTANCE:
    print(f"Obstacle is at medium distance, distance: {dis} mm")
    stop_robot()
elif MID_DISTANCE < dis < FAR_DISTANCE:
    print(f"Obstacle is at far distance, distance: {dis} mm")
    move_forward(speed)
elif dis >= FAR_DISTANCE:
    print(f"No obstacle, distance: {dis} mm")
    stop_robot()
else:
    print("Unknown situation, stopping")
    stop_robot()

speed = 50 # 设定车速 Set vehicle speed

try:
    # 开启超声波测距功能 Turn on ultrasonic ranging function
    bot.Ctrl_Ulatist_Switch(1)
    time.sleep(0.1) # 给超声波传感器一些时间来测量 Give the ultrasonic sensor some
time to measure
    while True:
        car_follow()
        time.sleep(0.1) # 每秒检查一次 Check once every second

except KeyboardInterrupt:
    # 当用户中断程序时，确保所有电机停止 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. We can use our hands as obstacles. When we put our hands in front of the ultrasonic wave, the car will move back when we get close to it. When we slowly move away from the car, the car will follow us and move slowly. When we take our hands away and there are no other objects within 50cm, the car will stop following.