底盘控制接口chassis_controller.proto使用文档

说明：此项目集成grpc server端与ros2 publisher端

1.依赖相关

选择操作系统框架，将grpc相关依赖放入

/usr/local/bin
/usr/local/include
/usr/local/lib

grpc_redist_x86_64.tar.gz
42.26MB

grpc_redist_aarch64.tar.gz
41.53MB

2.CMakeList相关

代码块

```
cmake_minimum_required(VERSION 3.16)
project(grpc_navi LANGUAGES CXX)

set(CMAKE_CXX_STANDARD 20)
set(CMAKE_CXX_STANDARD_REQUIRED ON)

option(BUILD_TESTING "Enable building tests" ON)

# find dependencies
find_package(ament_cmake REQUIRED)
find_package(rclcpp REQUIRED)
find_package(cmd_navi REQUIRED)
find_package(Protobuf CONFIG REQUIRED)
find_package(gRPC CONFIG REQUIRED)

include_directories(include)

file(GLOB SRC "src/*.cpp" "src/*.cc")
add_executable(${PROJECT_NAME} ${SRC})
target_link_libraries(${PROJECT_NAME} gRPC::grpc++_reflection protobuf::libprotobuf)

ament_target_dependencies(${PROJECT_NAME}
  rclcpp
  cmd_navi
)

if(BUILD_TESTING)
  add_subdirectory(test)
endif()

install(TARGETS ${PROJECT_NAME} DESTINATION lib/${PROJECT_NAME})

ament_package()

```

3.chassis_controller `.proto` 接口说明

chassis_controlle… 454 B	chassis_controlle… 39.75KB	chassis_controlle… 13.35KB
	chassis_controlle… 42.14KB	chassis_controlle… 4.59KB

这个proto文件定义了一个名为ChassisController的gRPC服务，主要用于控制机器人底盘的运动和相关配置。

消息类型定义

控制相关消息：

Command：包含线速度、角速度、是否踏步、z方向上升下降

代码块

```
message Command {
    Descartes linear = 1; // linear.x = vx, linear.y = vy
    Descartes angular = 2; // angular.z = wz
    int32 tap = 3;
    float zOff = 4;
}
```

响应消息：

Response：包含操作是否成功的布尔值和消息字符串

服务定义：

ChassisController服务提供了1个RPC方法：

控制命令：sendCommand

ros2消息定义：

Vector3.msg
29 B

CmdNavi.msg
46 B

4.grpc客户端说明

1. 发送

使用**UnaryGrpc**数据发送端为客户端

2.客户端创建方式

> 🏆 DEMO示例
> http://192.168.112.189/HumanoidShanghai/perception_grpc/src/branch/main/src/grpc_navi/test

请注意，区别与ros2/dds通信，现所有控制接口合并，机器人内服务端有且只能接入1个客户端，客户端代码编写时，请注意例如在PDA在接入手动单轴模式时才可创建客户端，摇操设备在设备接入机器人内部程序时才可创建客户端，**任何设备断开即客户端需断开，不可长期占用。**

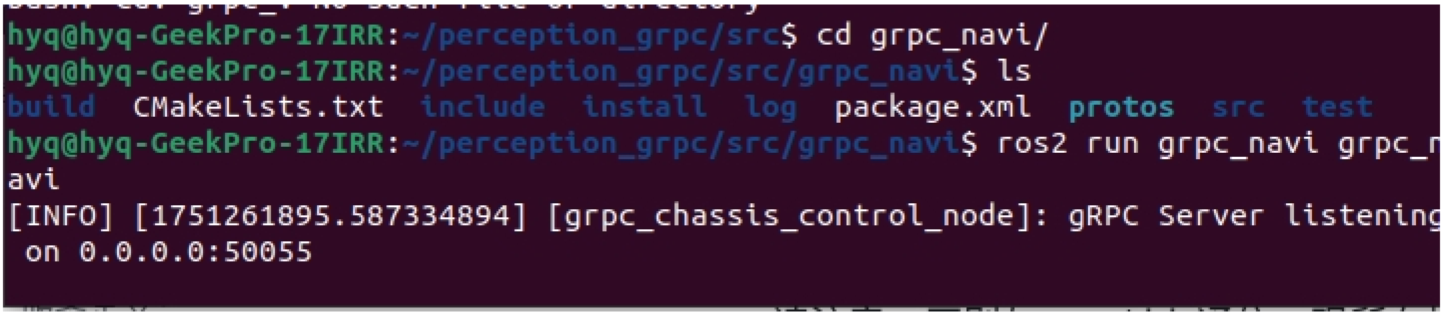
代码块

```
    ChassisControllerClient client(grpc::CreateChannel("localhost:50055", grpc::InsecureChannelCredentials()));

    // 循环发送 Command 请求，每次模拟不同的值
    double ax = 1.0, ay = 2.0, az = 3.0;
    double lx = 4.0, ly = 5.0, lz = 6.0;
    bool tap = true;
    int cnt = 0;
    while (true) {
        // 每次循环模拟变化
        client.sendCommand(ax, ay, az, lx, ly, lz, tap);
        ax += 0.1;
        ay += 0.2;
        az += 0.3;
        lx += 0.1;
        ly += 0.2;
        lz += 0.3;
        tap = (cnt % 2 == 0);
        cnt++;
        std::this_thread::sleep_for(std::chrono::seconds(1));
    }
```

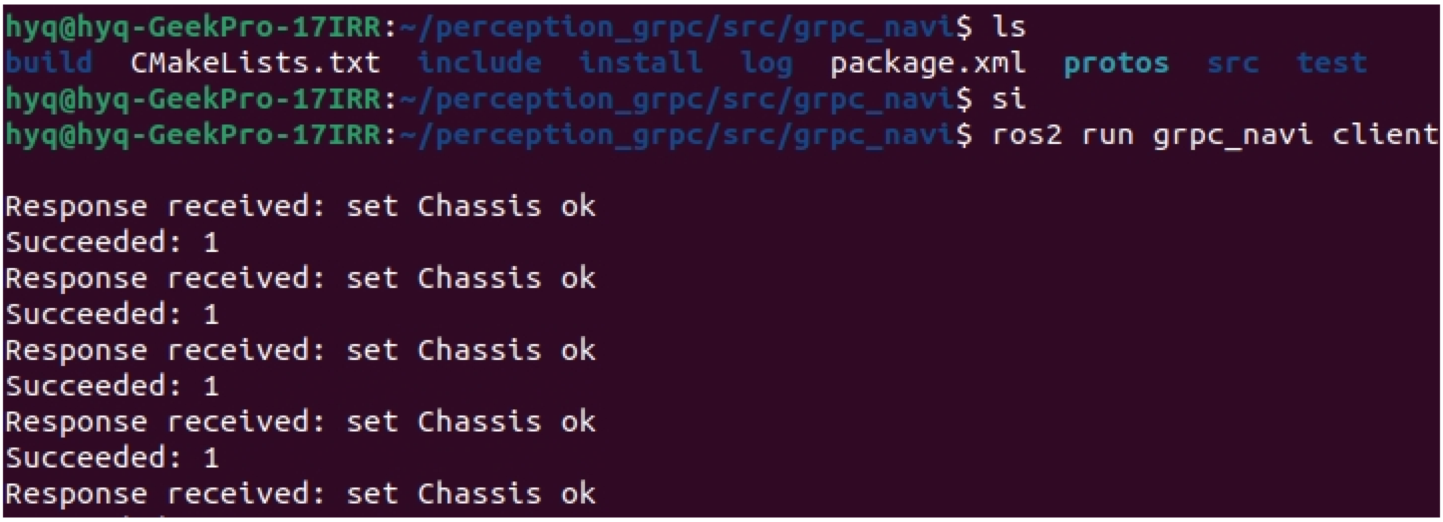
5.测试

首先启动grpc_navi节点服务端



```
hyq@hyq-GeekPro-17IRR:~/perception_grpc/src$ cd grpc_navi/
hyq@hyq-GeekPro-17IRR:~/perception_grpc/src/grpc_navi$ ls
build  CMakeLists.txt  include  install  log  package.xml  protos  src  test
hyq@hyq-GeekPro-17IRR:~/perception_grpc/src/grpc_navi$ ros2 run grpc_navi grpc_n
avi
[INFO] [1751261895.587334894] [grpc_chassis_control_node]: gRPC Server listening
 on 0.0.0.0:50055
```

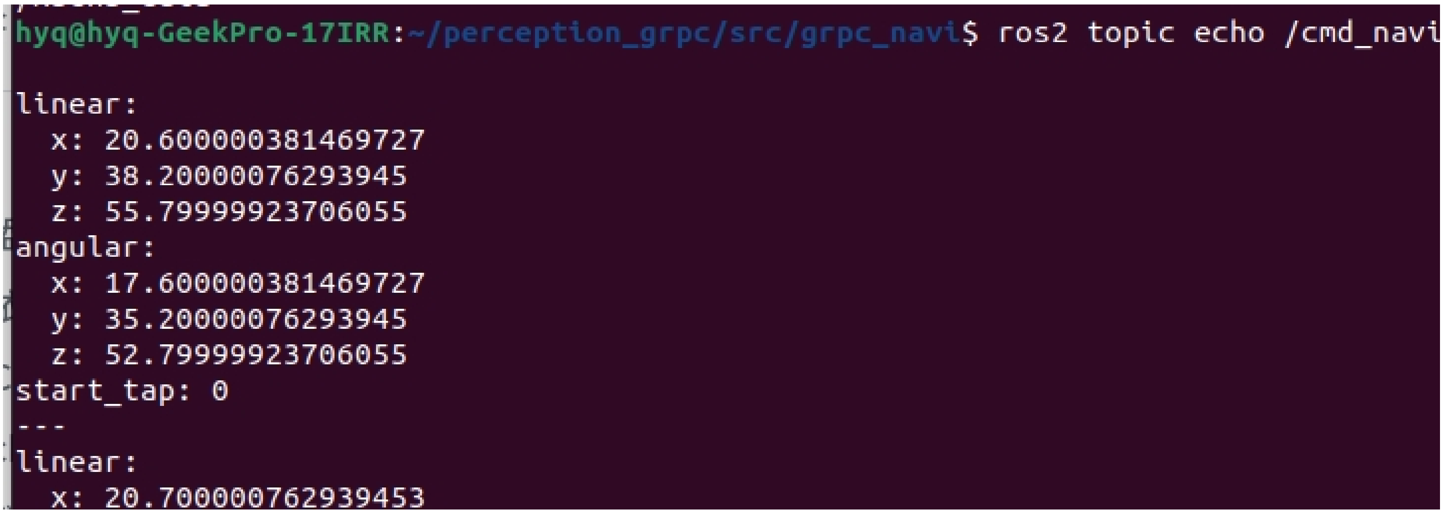
启动grpc测试的客户端



```
hyq@hyq-GeekPro-17IRR:~/perception_grpc/src/grpc_navi$ ls
build  CMakeLists.txt  include  install  log  package.xml  protos  src  test
hyq@hyq-GeekPro-17IRR:~/perception_grpc/src/grpc_navi$ si
hyq@hyq-GeekPro-17IRR:~/perception_grpc/src/grpc_navi$ ros2 run grpc_navi client

Response received: set Chassis ok
Succeeded: 1
Response received: set Chassis ok
Succeeded: 1
Response received: set Chassis ok
Succeeded: 1
Response received: set Chassis ok
Succeeded: 1
Response received: set Chassis ok
```

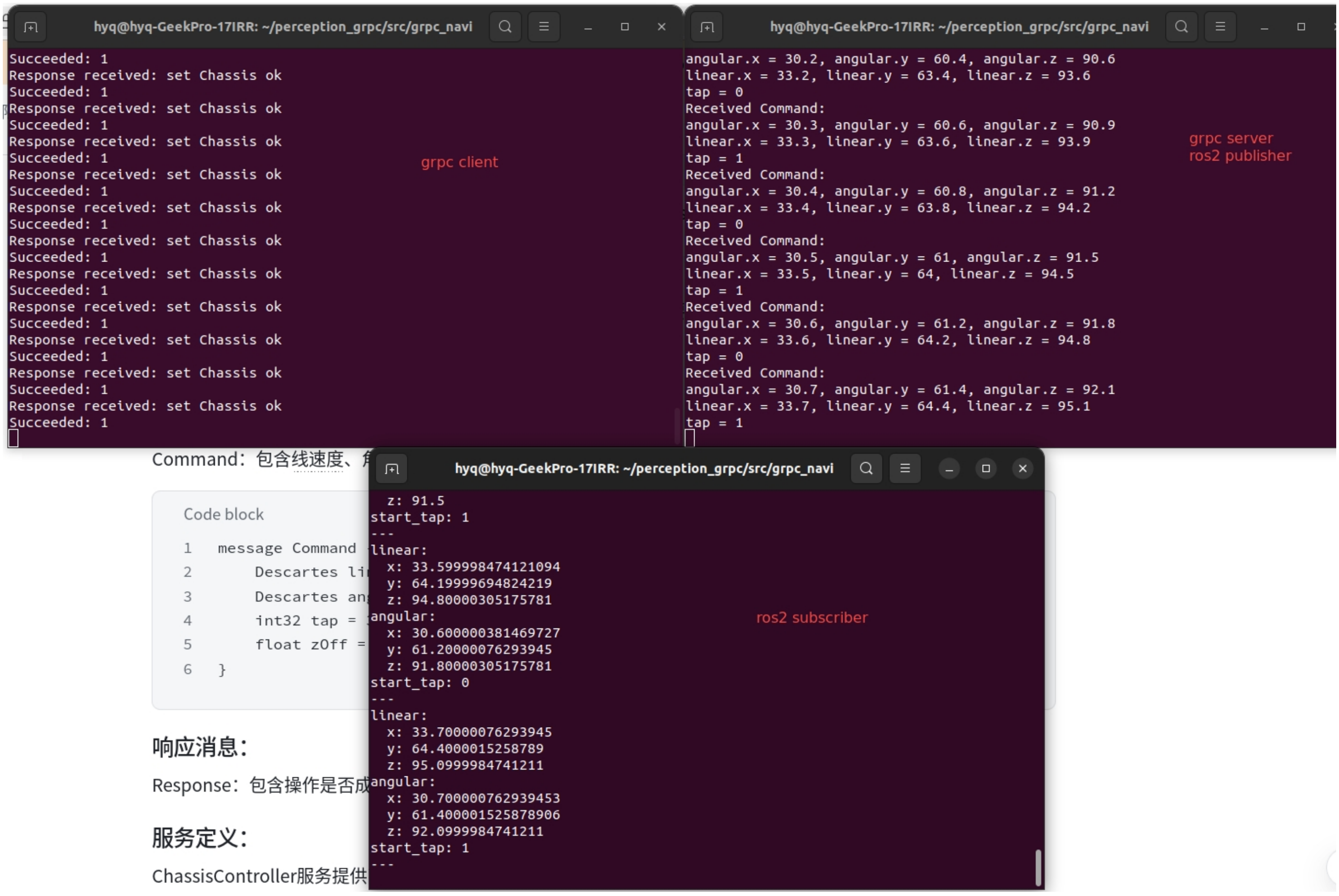
最后打印ros2话题信息



```
hyq@hyq-GeekPro-17IRR:~/perception_grpc/src/grpc_navi$ ros2 topic echo /cmd_navi

linear:
  x: 20.600000381469727
  y: 38.20000076293945
  z: 55.79999923706055
angular:
  x: 17.600000381469727
  y: 35.20000076293945
  z: 52.79999923706055
start_tap: 0
---
linear:
  x: 20.700000762939453
```

最终测试效果如下：


hyq@hyq-GeekPro-17IRR: ~/perception_grpc/src/grpc_navi
grpc client
hyq@hyq-GeekPro-17IRR: ~/perception_grpc/src/grpc_navi
grpc server
ros2 publisher
hyq@hyq-GeekPro-17IRR: ~/perception_grpc/src/grpc_navi
ros2 subscriber

```
Succeeded: 1
Response received: set Chassis ok
Succeeded: 1
Response received: set Chassis ok
Succeeded: 1
Response received: set Chassis ok
Succeeded: 1
Response received: set Chassis ok
Succeeded: 1
Response received: set Chassis ok
Succeeded: 1
Response received: set Chassis ok
Succeeded: 1
Response received: set Chassis ok
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Succeeded: 1
Response received: set Chassis ok
Succeeded: 1
Response received: set Chassis ok
Succeeded: 1
Response received: set Chassis ok
Succeeded: 1
```

```
angular.x = 30.2, angular.y = 60.4, angular.z = 90.6
linear.x = 33.2, linear.y = 63.4, linear.z = 93.6
tap = 0
Received Command:
angular.x = 30.3, angular.y = 60.6, angular.z = 90.9
linear.x = 33.3, linear.y = 63.6, linear.z = 93.9
tap = 1
Received Command:
angular.x = 30.4, angular.y = 60.8, angular.z = 91.2
linear.x = 33.4, linear.y = 63.8, linear.z = 94.2
tap = 0
Received Command:
angular.x = 30.5, angular.y = 61, angular.z = 91.5
linear.x = 33.5, linear.y = 64, linear.z = 94.5
tap = 1
Received Command:
angular.x = 30.6, angular.y = 61.2, angular.z = 91.8
linear.x = 33.6, linear.y = 64.2, linear.z = 94.8
tap = 0
Received Command:
angular.x = 30.7, angular.y = 61.4, angular.z = 92.1
linear.x = 33.7, linear.y = 64.4, linear.z = 95.1
tap = 1
```

```
  z: 91.5
start_tap: 1
---
linear:
  x: 33.599998474121094
  y: 64.19999694824219
  z: 94.80000305175781
angular:
  x: 30.600000381469727
  y: 61.20000076293945
  z: 91.80000305175781
start_tap: 0
---
linear:
  x: 33.70000076293945
  y: 64.4000015258789
  z: 95.0999984741211
angular:
  x: 30.700000762939453
  y: 61.400001525878906
  z: 92.0999984741211
start_tap: 1
---
```

Command：包含线速度、角

Code block

```
message Command
    Descartes li
    Descartes an
    int32 tap = 
    float zOff =
}
```

响应消息：

Response：包含操作是否成

服务定义：

ChassisController服务提供