

1. 实验名称及目的

1.1 实验名称

Ubuntu通过mavros控制SILT无人机实验

1.2 实验目的

通过Ubuntu中启动Mavros，对windows对软件在换进行控制。

1.3 关键知识点

无

2. 实验效果

通过在Ubuntu中发送指令，可以观察到windows端的软件在环仿真无人机解锁启动。

3. 文件目录

例程目录：[\[安装目录\]](#)\RflySimAPIs\6.RflySimExtCtrl\0.ApiExps\e18_MavrosExps

文件夹/文件名称	说明
SITLRunMAVLink.bat	软件在换一键启动脚本
mavros_offboard_posctl_test.py	Mavros控制offboard例程
MavrosTest.py	Mavros测试程序

4. 运行环境

4.1 软件要求

Windows 10及以上版本；RflySim工具链；Ubuntu虚拟机。

①：若使用Pixhawk 6X飞控，平台安装时的编译命令为：px4_fmu-v6x_default，推荐PX4固件版本为：1.12.3。其他配套飞控及编译命令请见：

<https://rflysim.com/doc/zh/1/Hardware.html>

4.2 硬件要求

笔记本/台式电脑① 1台。

①：推荐配置请见：<https://rflysim.com/>

5. 实验步骤

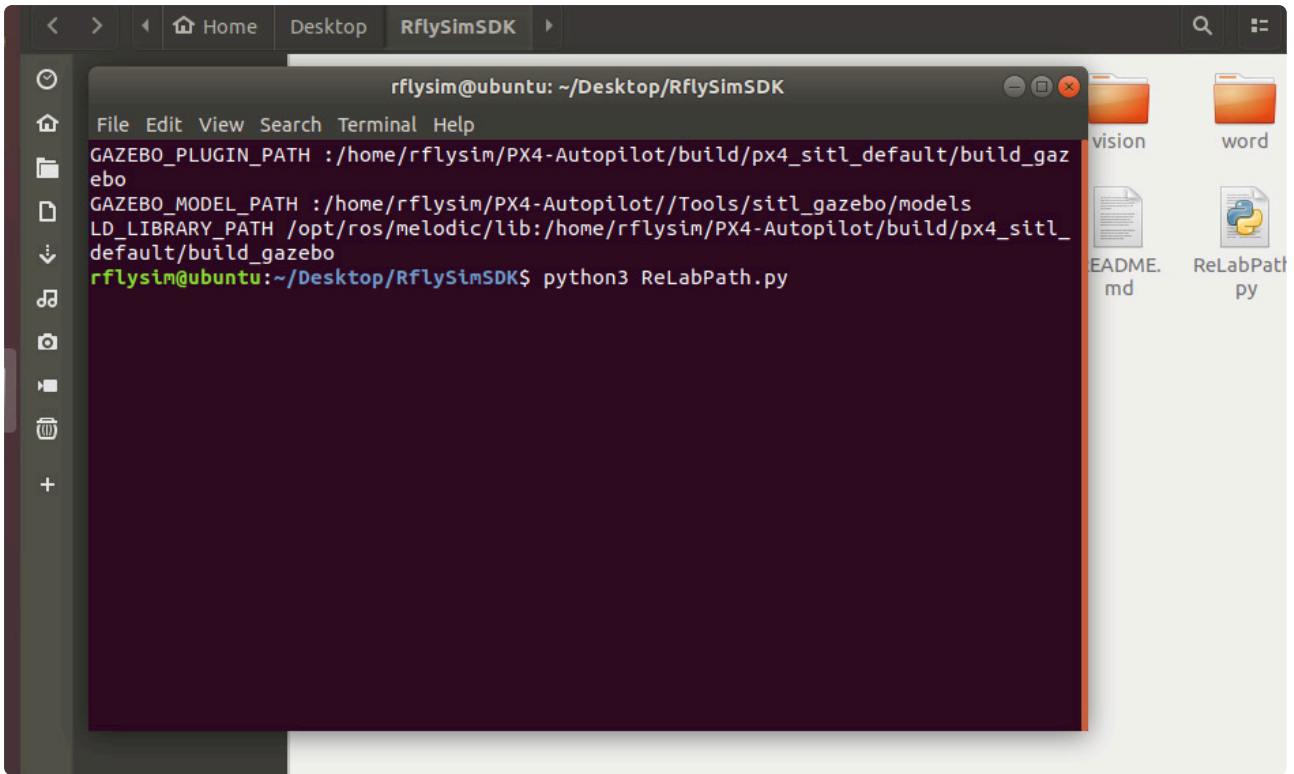
Step 1

拷贝C:\PX4PSP\RflySimAPIs\RflySimSDK到Linux系统下。RflySim工具链支持的虚拟机镜像可见：<https://pan.baidu.com/s/10MDjINKG20k4mWUYz0Nm1A?pwd=78r7>，注该镜像中已安装有RflySim相关程序运行的所有环境及功能包，可直接下载使用。



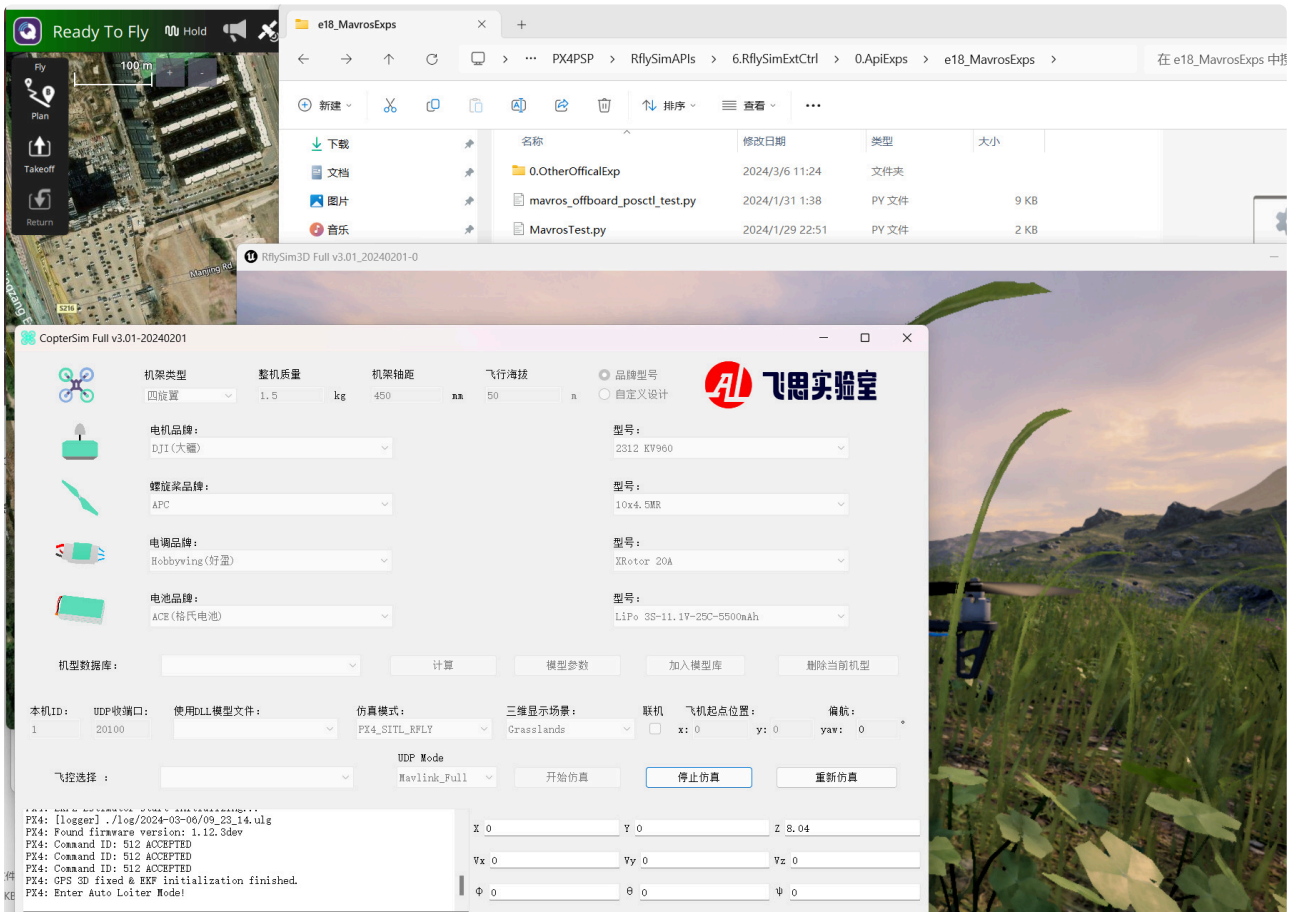
Step 2

在RflysimSDK下打开终端，并输入如下命令来关联RflySim库文件：`python3 ReLabPath.py`。



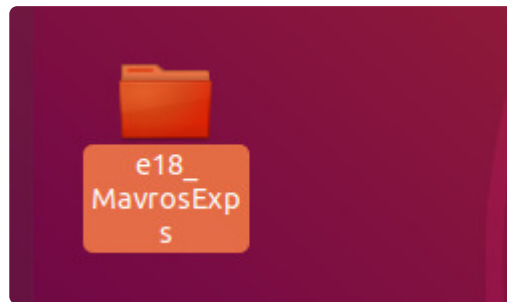
Step 3

在windows系统下运行SITLRunMAVLink.bat，输入飞机数量1，等待fixed。



Step 4

将C:\PX4PSP\RflySimAPIs\6.RflySimExtCtrl\0.ApiExps\e18_MavrosExps文件夹复制到ubuntu系统下。



在虚拟机中，打开e18_MavrosExps文件夹，并在该文件夹中打开终端，运行MavrosTest.py可以看到mavros成功启动，并发送解锁命令，以及接收位置数据。

```
rflsim@ubuntu:~/Desktop/e18_MavrosExps$ python3 MavrosTest.py
```

```
rflsim@ubuntu: ~/Desktop/e18_MavrosExps
File Edit View Search Terminal Help
[ WARN] [1709717370.571280012]: Shutdown request received.
[ WARN] [1709717370.571381285]: Reason given for shutdown: [[/mavros] Reason: new node registered with same name]
[ WARN] [1709717371.002821832]: CMD: Unexpected command 520, result 0
=====
REQUIRED process [mavros-1] has died!
process has finished cleanly
log file: /home/rflsim/.ros/log/5f217f80-db8b-11ee-9955-000c29d18ade/mavros-1*.log
Initiating shutdown!
=====
None
killing /mavros
[ WARN] [1709717389.822611096]: Shutdown request received.
[ WARN] [1709717389.822701199]: Reason given for shutdown: [user request]
killed
rflsim@ubuntu:~/Desktop/e18_MavrosExps$ =====
=====REQUIRED process [mavros-2] has died!
process has finished cleanly
log file: /home/rflsim/.ros/log/0873b52a-db9c-11ee-9955-000c29d18ade/mavros-2*.log
Initiating shutdown!
=====
```

```

CopterSim: Got CopterSimMsg from 192.168.227.128.
CopterSim: New IP list:
CopterSim: 127.0.0.1.
CopterSim: 192.168.227.128.
CopterSim: Got CopterSimMsg from 192.168.227.128.
CopterSim: Reset UDP_Mode 2.
PX4: Command REQUEST_AUTOPILOT_VERSION ACCEPTED

```

Step 5

关闭上述程序。

重新运行 [SITLRunMAVLink.bat](#)，输入飞机数量1，等待fixed。

The screenshot displays the MAVROS simulation environment. On the left, there is a 'Ready To Fly' interface with a map and flight controls. The main window shows the 'CopterSim Full v3.01-20240201' configuration panel. The configuration includes:

- 机架类型: 四旋翼
- 整机质量: 1.5 kg
- 机架轴距: 450 mm
- 飞行海拔: 50 m
- 电机品牌: DJI (大疆)
- 螺旋桨品牌: APC
- 电调品牌: Hobbywing (好盈)
- 电池品牌: ACE (裕氏电池)
- 品牌型号: 飞思实验室
- 自定义设计: 型号: 2312 KV960
- 螺旋桨型号: 10x4.5MR
- 电调型号: XRotor 20A
- 电池型号: LiPo 3S-11.1V-25C-5500mAh

At the bottom, there is a terminal window showing the following output:

```

PX4: [logger] ./log/2024-09-09/09_23_14.ulg
PX4: Found firmware version: 1.12.3dev
PX4: Command ID: 512 ACCEPTED
PX4: Command ID: 512 ACCEPTED
PX4: Command ID: 512 ACCEPTED
PX4: GPS 3D fixed & EKF initialization finished.
PX4: Enter Auto Loiter Mode!

```

Step 6

在虚拟机中，运行 [mavros_offboard_posctl_test.py](#) 可以看到mavros成功启动，并发送解锁命令，以及通过mavros进行位姿控制。

```
rflsim@ubuntu:~/Desktop/e18_MavrosExps$ python3 mavros_offboard_posctl_test.py
```

```

manual_input: False
mode: "AUTO.LOITER"
system_status: 3
[INFO] [1709717881.983646]: =====
[INFO] [1709717881.984408]: setting PX4 parameter: COM_RCL_EXCEPT with value 4
[INFO] [1709717881.989406]: param COM_RCL_EXCEPT set to 4 | seconds: 0.0 of 5
[INFO] [1709717881.990310]: setting FCU mode: OFFBOARD
[ WARN] [1709717882.010852979]: CMD: Unexpected command 176, result 0
[INFO] [1709717882.735182]: mode changed from AUTO.LOITER to OFFBOARD
[INFO] [1709717882.992739]: set mode success | seconds: 1.0 of 5
[INFO] [1709717882.994875]: setting FCU arm: True
[INFO] [1709717883.735682]: armed state changed from False to True
[INFO] [1709717883.737717]: system_status changed from MAV_STATE_STANDBY to MAV_
STATE_ACTIVE
[INFO] [1709717883.998858]: set arm success | seconds: 1.0 of 5
[INFO] [1709717884.001522]: run mission
[INFO] [1709717884.003415]: attempting to reach position | x: 0, y: 0, z: 0 | cu
rrent position x: 0.04, y: 0.12, z: 0.03
[INFO] [1709717884.004964]: position reached | seconds: 0.0 of 30
[INFO] [1709717884.006202]: attempting to reach position | x: 50, y: 50, z: 20 |
current position x: 0.04, y: 0.12, z: 0.03
[INFO] [1709717885.736373]: landed state changed from MAV_LANDED_STATE_ON_GROUND
to MAV_LANDED_STATE_IN_AIR

```

```

PX4: Enter Auto Loiter Mode!
CopterSim: Got CopterSimMsg from 192.168.227.128.
CopterSim: New IP list:
CopterSim: 127.0.0.1.
CopterSim: 192.168.227.128.
CopterSim: Got CopterSimMsg from 192.168.227.128.
CopterSim: Reset UDP_Mode 2.
PX4: Command REQUEST_AUTOPILOT_VERSION ACCEPTED

```

注意：

1. [mavros_offboard_posctl_test.py](#)是修改自官方例程0.OtherOfficialExp

而官方例程来自：Firmware\integrationtests\python_src\px4_it\mavros

2. 本程序主要是使用RflySimSDK\ctrl\RflyRosStart.py

来自动启动mavros，实际也可以手动启动，即在命令行中输入：

```
roslaunch mavros px4.launch tgt_system:=1
```

```
fcu_url:="udp://:20101@192.168.31.68:20100"
```

其中，tgt_system对应CopterID，20101和20100对应CopterSim的发送和接收端口

3. [mavros_offboard_posctl_test.py](#)，还在官方基础上，对“from tf.transformations
import

quaternion_from_euler”语句进行了处理，否则会报错。我们自己创建了一个
EulerToQuat函数，来实现同样功能

| 6.参考资料

1. 无

| 7.常见问题

Q1: ***

A1: ***