

作业1.1

1. 行业认知

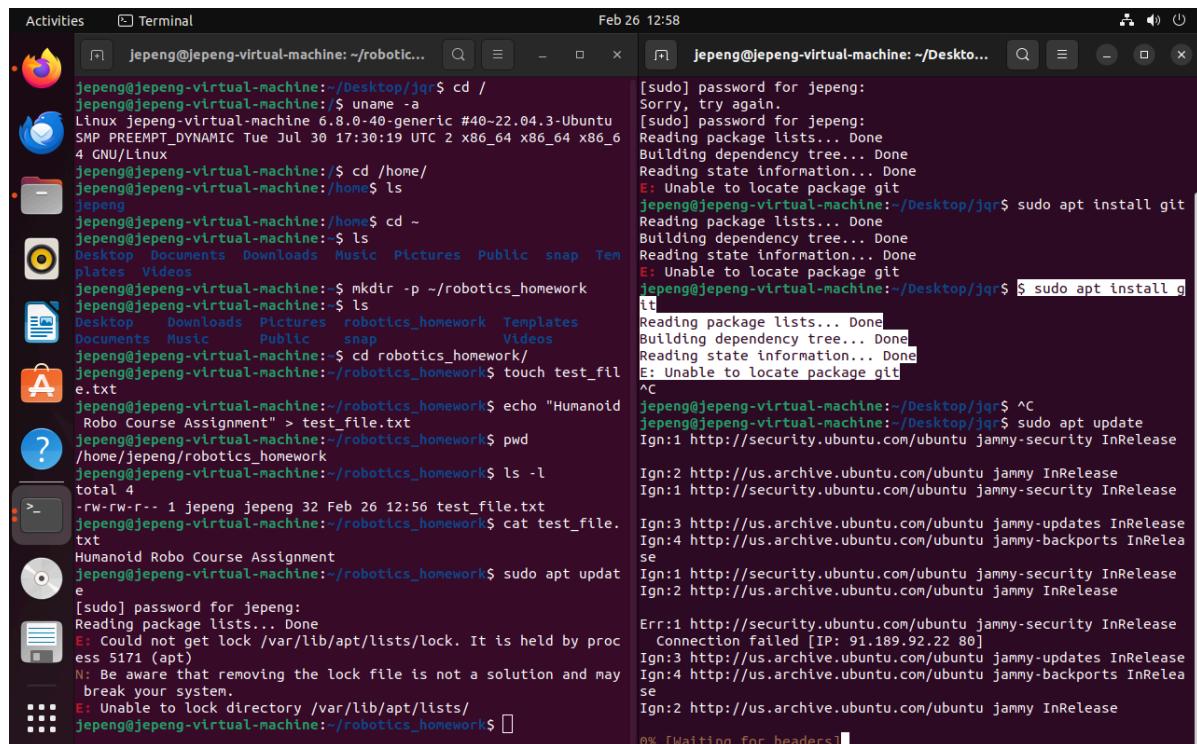
1、Unitree H1是宇树科技下面的一款机器人，其关键参数如下：

- 1、单腿自由度是5（髋关节×3+膝关节×1+踝关节×1），单手臂自由度是4（可拓展）。
- 2、3D激光雷达+深度相机

2、技术线路是：

使用Intel Core i5（平台功能） Intel Core i7（用户开发）的平台。使用M107电机，超强动力性能，显著提升，运动灵活度、速度、负载能力、续航等等。

2. 环境部署



The screenshot shows a dual-terminal window in a desktop environment. The left terminal window is titled 'jepeng@jepeng-virtual-machine: ~/robotic...' and the right window is titled 'jepeng@jepeng-virtual-machine: ~/Desktop/jqr...'. Both windows show command-line sessions.

Left Terminal Session:

```
jepeng@jepeng-virtual-machine:~/robotics_hw$ cd /  
jepeng@jepeng-virtual-machine:~$ uname -a  
Linux jepeng-virtual-machine 6.8.0-40-generic #40~22.04.3-Ubuntu SMP PREEMPT_DYNAMIC Tue Jul 30 17:30:19 UTC 2 x86_64 x86_64 x86_6  
4 GNU/Linux  
jepeng@jepeng-virtual-machine:~$ cd /home/  
jepeng@jepeng-virtual-machine:/home$ ls  
jepeng  
jepeng@jepeng-virtual-machine:/home$ cd ~  
jepeng@jepeng-virtual-machine:~$ ls  
Desktop Documents Downloads Music Pictures Public snap Tem  
plates Videos  
jepeng@jepeng-virtual-machine:~$ mkdir -p ~/robotics_hw  
jepeng@jepeng-virtual-machine:~$ ls  
Desktop Downloads Pictures robotics_hw Templates  
Documents Music Public snap Videos  
jepeng@jepeng-virtual-machine:~$ cd robotics_hw  
jepeng@jepeng-virtual-machine:~/robotics_hw$ touch test_file.txt  
jepeng@jepeng-virtual-machine:~/robotics_hw$ echo "Humanoid  
Robo Course Assignment" > test_file.txt  
jepeng@jepeng-virtual-machine:~/robotics_hw$ pwd  
/home/jepeng/robotics_hw  
jepeng@jepeng-virtual-machine:~/robotics_hw$ ls -l  
total 4  
-rw-rw-r-- 1 jepeng jepeng 32 Feb 26 12:56 test_file.txt  
jepeng@jepeng-virtual-machine:~/robotics_hw$ cat test_file.  
txt  
Humanoid Robo Course Assignment  
jepeng@jepeng-virtual-machine:~/robotics_hw$ sudo apt updat  

```

Right Terminal Session:

```
[sudo] password for jepeng:  
Sorry, try again.  
[sudo] password for jepeng:  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
E: Unable to locate package git  
jepeng@jepeng-virtual-machine:~/Desktop/jqr$ sudo apt install git  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
E: Unable to locate package git  
jepeng@jepeng-virtual-machine:~/Desktop/jqr$ $ sudo apt install g  
it  
Reading package lists... Done  
Building dependency tree... Done  
Reading state information... Done  
E: Unable to locate package git  
^C  
jepeng@jepeng-virtual-machine:~/Desktop/jqr$ ^C  
jepeng@jepeng-virtual-machine:~/Desktop/jqr$ sudo apt update  
Ign:1 http://security.ubuntu.com/ubuntu jammy-security InRelease  
Ign:2 http://us.archive.ubuntu.com/ubuntu jammy InRelease  
Ign:1 http://security.ubuntu.com/ubuntu jammy-security InRelease  
Ign:3 http://us.archive.ubuntu.com/ubuntu jammy-updates InRelease  
Ign:4 http://us.archive.ubuntu.com/ubuntu jammy-backports InRelea  
se  
Ign:1 http://security.ubuntu.com/ubuntu jammy-security InRelease  
Ign:2 http://us.archive.ubuntu.com/ubuntu jammy InRelease  
Err:1 http://security.ubuntu.com/ubuntu jammy-security InRelease  
Connection failed [IP: 91.189.92.22 80]  
Ign:3 http://us.archive.ubuntu.com/ubuntu jammy-updates InRelease  
Ign:4 http://us.archive.ubuntu.com/ubuntu jammy-backports InRelea  
se  
Ign:2 http://us.archive.ubuntu.com/ubuntu jammy InRelease  
0% [Waiting for headers]
```

更新源和系统

Activities Terminal Feb 26 13:17

```
jepeng@jepeng-virtual-machine:~/Desktop/jqr$ sudo apt update
[sudo] password for jepeng:
Ign:1 http://security.ubuntu.com/ubuntu jammy-security InRelease
Ign:2 http://us.archive.ubuntu.com/ubuntu jammy InRelease
Ign:3 http://us.archive.ubuntu.com/ubuntu jammy-updates InRelease
Ign:4 http://security.ubuntu.com/ubuntu jammy-security InRelease
[Waiting for headers]^C
jepeng@jepeng-virtual-machine:~/Desktop/jqr$ ^C
jepeng@jepeng-virtual-machine:~/Desktop/jqr$ ^C
jepeng@jepeng-virtual-machine:~/Desktop/jqr$ ^C
jepeng@jepeng-virtual-machine:~/Desktop/jqr$ ^C
jepeng@jepeng-virtual-machine:~/Desktop/jqr$ sudo apt update
Get:1 http://mirrors.aliyun.com/ubuntu jammy InRelease [270 kB]
Get:2 http://mirrors.aliyun.com/ubuntu jammy-security InRelease [129 kB]
Get:3 http://mirrors.aliyun.com/ubuntu jammy-updates InRelease [128 kB]
Get:4 http://mirrors.aliyun.com/ubuntu jammy-proposed InRelease [279 kB]
Get:5 http://mirrors.aliyun.com/ubuntu jammy-backports InRelease [127 kB]
Get:6 http://mirrors.aliyun.com/ubuntu jammy/universe Sources [17 .8 MB]
Get:7 http://mirrors.aliyun.com/ubuntu jammy/multiverse Sources [304 kB]
Get:8 http://mirrors.aliyun.com/ubuntu jammy/main Sources [1,340 kB]
Get:9 http://mirrors.aliyun.com/ubuntu jammy/restricted Sources [23.7 kB]
Get:10 http://mirrors.aliyun.com/ubuntu jammy/main i386 Packages [1,040 kB]
Get:11 http://mirrors.aliyun.com/ubuntu jammy/main amd64 Packages [1,395 kB]
Get:12 http://mirrors.aliyun.com/ubuntu jammy/main Translation-en [510 kB]
Get:13 http://mirrors.aliyun.com/ubuntu jammy/main amd64 DEP-11 M etadata [423 kB]
Get:14 http://mirrors.aliyun.com/ubuntu jammy/main DEP-11 48x48 I cons [100.0 kB]
Get:15 http://mirrors.aliyun.com/ubuntu jammy/main DEP-11 64x64 I cons [148 kB]
```

安装和使用tree

Activities Terminal Feb 26 13:18

```
jepeng@jepeng-virtual-machine:~ Reading state information... Done
373 packages can be upgraded, Run 'apt list --upgradable' to see them.
jepeng@jepeng-virtual-machine:~/Desktop/jqr$ sudo apt install tree -y
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  tree
0 upgraded, 1 newly installed, 0 to remove and 373 not upgraded.
Need to get 47.9 kB of archives.
After this operation, 116 kB of additional disk space will be used.
Get:1 http://mirrors.aliyun.com/ubuntu jammy/universe amd64 tree amd64 2.0.2-1 [47.9 kB]
Fetched 47.9 kB in 0s (371 kB/s)
Selecting previously unselected package tree.
(Reading database ... 163563 files and directories currently installed.)
Preparing to unpack .../tree_2.0.2-1_amd64.deb ...
Unpacking tree (2.0.2-1) ...
Setting up tree (2.0.2-1) ...
Processing triggers for man-db (2.10.2-1) ...
jepeng@jepeng-virtual-machine:~/Desktop/jqr$ tree -L 2 .
0 directories, 0 files
jepeng@jepeng-virtual-machine:~/Desktop/jqr$ cd ~
jepeng@jepeng-virtual-machine:~$ tree -L 2
.
  |-- Desktop
  |    `-- jqr
  |-- Documents
  |-- Downloads
  |-- Music
  |-- Pictures
  |-- Public
  |-- robotics_hw
      `-- test_file.txt
```

Software Updater

Updated software has been issued since Ubuntu released. Do you want to install it now?

> Details of updates

935.9 MB will be downloaded.

Settings... Remind Me Later

3. 仿真器复现

```
[Log] Pose: 20.91 m | Battery: 30.0% | Status: Running
[Log] Pose: 22.32 m | Battery: 25.0% | Status: Running
[Log] Pose: 23.89 m | Battery: 20.0% | Status: Running
[Log] Pose: 25.47 m | Battery: 15.0% | Status: Running
[WARNING] Low Battery! System Shutting Down...
system shutdown.
jepeng@jepeng-virtual-machine:~/robotics_homework$ cat spimple_simulator.py
"""
author: jepeng
"""

import time
import random

robot_name = "Jepeng H1"
battery = 100.0
position = 0.0
is_running = True

print("----system start[robot_name]----")

def move_forward(current_pose, speed):
    noise = random.uniform(-0.1, 0.1)
    distance = speed + noise
    new_pose = current_pose + distance
    return new_pose

while is_running:
    if battery < 20:
        print("[WARNING] Low Battery! System Shutting Down...")
        is_running = False
        break
    position = move_forward(position, 1.5)
    battery -= 5.0
    print(f"[Log] Pose: {position:.2f} m | Battery: {battery:.1f}% | Status: Running")
    time.sleep(0.5)

print("system shutdown.")
jepeng@jepeng-virtual-machine:~/robotics_homework$
```

```
jepeng@jepeng-virtual-machine:~/Desktop/jqr$ sudo apt install tree -y
[sudo] password for jepeng:
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
E: Unable to locate package tree
jepeng@jepeng-virtual-machine:~/Desktop/jqr$ sudo cp /etc/apt/sources.list /etc/ap
apg.conf      apparmor/   apport/          apt/
apm/          apparmor.d/  apstream.conf
jepeng@jepeng-virtual-machine:~/Desktop/jqr$ sudo cp /etc/apt/sources.list /etc/apt/sources.list.bak
jepeng@jepeng-virtual-machine:~/Desktop/jqr$ sudo nano /etc/apt/sources.list
jepeng@jepeng-virtual-machine:~/Desktop/jqr$ cd ~/robotics_homework/
jepeng@jepeng-virtual-machine:~/robotics_homework$ nano spimple_simulator.py
jepeng@jepeng-virtual-machine:~/robotics_homework$ python3 spimple_simulator.py
----system startJepeng H1--
[Log] Pose: 1.60 m | Battery: 95.0% | Status: Running
[Log] Pose: 3.00 m | Battery: 90.0% | Status: Running
[Log] Pose: 4.55 m | Battery: 85.0% | Status: Running
[Log] Pose: 5.96 m | Battery: 80.0% | Status: Running
[Log] Pose: 7.44 m | Battery: 75.0% | Status: Running
[Log] Pose: 8.98 m | Battery: 70.0% | Status: Running
[Log] Pose: 10.49 m | Battery: 65.0% | Status: Running
[Log] Pose: 12.03 m | Battery: 60.0% | Status: Running
[Log] Pose: 13.61 m | Battery: 55.0% | Status: Running
[Log] Pose: 15.02 m | Battery: 50.0% | Status: Running
[Log] Pose: 16.51 m | Battery: 45.0% | Status: Running
[Log] Pose: 17.95 m | Battery: 40.0% | Status: Running
[Log] Pose: 19.46 m | Battery: 35.0% | Status: Running
[Log] Pose: 20.91 m | Battery: 30.0% | Status: Running
[Log] Pose: 22.32 m | Battery: 25.0% | Status: Running
[Log] Pose: 23.89 m | Battery: 20.0% | Status: Running
[Log] Pose: 25.47 m | Battery: 15.0% | Status: Running
[WARNING] Low Battery! System Shutting Down...
system shutdown.
jepeng@jepeng-virtual-machine:~/robotics_homework$
```