

به نام خدا

گزارش اول درس آز سخت افزار

گروه ۶

آرمان زارعی

کیوان رضائی

سید محمد سیدجوادى

نحوه وصل شدن به Raspberry Pi

ابتدا با کابل micro usb به usb دستگاه را به لپتاپ وصل کردیم و آن را روشن کردیم. سپس با کابل Ethernet دستگاه را به اینترنت متصل کردیم و در نهایت با دستور `ssh pi@raspberrypi.local` به آن دسترسی پیدا کردیم.

```
pi@raspberrypi:~$ ssh pi@raspberrypi.local
Microsoft Windows [Version 10.0.22000.593]
(c) Microsoft Corporation. All rights reserved.

C:\Users\Keivan>ssh pi@raspberrypi.local
The authenticity of host 'raspberrypi.local (fe80::3733:fcf:2451:2870%30)' can't be established.
ECDSA key fingerprint is SHA256:I2tKXSoeqetBuSg5Wx1Tz5gZUMzY6Eji4mEK7aK07cc.
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'raspberrypi.local,fe80::3733:fcf:2451:2870%30' (ECDSA) to the list of known hosts.
pi@raspberrypi.local's password:
Linux raspberrypi 4.14.34-v7+ #1110 SMP Mon Apr 16 15:18:51 BST 2018 armv7l

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Wed Feb  9 16:29:01 2022

SSH is enabled and the default password for the 'pi' user has not been changed.
This is a security risk - please login as the 'pi' user and type 'passwd' to set a new password.

pi@raspberrypi:~$ ls
Desktop  Documents  Downloads  Music  Pictures  product_key.txt  Public  python_games  Templates  Videos
pi@raspberrypi:~$ cat product_key.txt
```

همانطور که می بینید سیستم عامل نصب شده یک نوع لینوکس مخصوص Raspbian است.

```
pi@raspberrypi:~$ lsb_release -a
No LSB modules are available.
Distributor ID: Raspbian
Description:    Raspbian GNU/Linux 9.4 (stretch)
Release:        9.4
Codename:       stretch
```

وصل شدن به Wifi

با دستور `sudo raspi-config` به منوی زیر رسیدیم.

```
pi@raspberrypi ~  
Upon receiving commands from server, a client must execute those commands. In our case, the server can send a buzz request or an LED blink request. The server is authenticated via the same token client uses to identify itself to server. That is, the server must send the client's PRODUCT_KEY making sure that this request has been issued from server.  
  
### Running the client  
To run the client make sure you have all dependencies installed and then simply run:  
'''bash  
...  
$ python3 client/server.py  
...  
### Other configurations  
Client's config file is located at /client/config.ini. This file contains server's address and PRODUCT_KEY and other  
  
# Server  
  
Server is a django application. There is a docker-compose file to run the server.  
First please make sure docker and docker-compose are installed on your system.  
(You can see installation guide in https://docs.docker.com/) Docker </a> website)  
Then just simply enter below command in the server root directory:  
'''bash  
...  
$ docker-compose up -d --build  
...  
This will deploy server backend with postgres database beside it, in a containerized fashion.  
  
To run the client make sure you have all dependencies installed and then simply run  
'''bash  
...  
$ python3 client/server.py  
...  
pi@raspberrypi:~/Desktop/final_project-shateri-ghasemi-rahimi $ ls  
client Documentation proposal README.md server  
pi@raspberrypi:~/Desktop/final_project-shateri-ghasemi-rahimi $ cd ../../  
pi@raspberrypi:~ $ ls  
Desktop Documents Downloads Music Pictures product_key.txt Public python_games Templates Videos  
pi@raspberrypi:~ $ nmcli dev wifi  
-bash: nmcli: command not found  
pi@raspberrypi:~ $ nmcli dev wifi sudo raspi-config  
pi@raspberrypi:~ $ sudo raspi-config
```

سپس به network options رفتیم و به بخش wifi و مشخصات wifi را وصل کردیم.

```
pi@raspberrypi ~  
Raspberry Pi 3 Model B Rev 1.2  
  
Raspberry Pi Software Configuration Tool (raspi-config)  
  
1 Change User Password Change password for the current user  
2 Network Options Configure network settings  
3 Boot Options Configure options for start-up  
4 Localisation Options Set up language and regional settings to match your location  
5 Interfacing Options Configure connections to peripherals  
6 Overclock Configure overclocking for your Pi  
7 Advanced Options Configure advanced settings  
8 Update Update this tool to the latest version  
9 About raspi-config Information about this configuration tool  
  
<Select> <Finish>
```

بعد از کندن کابل Ethernet و خاموش روشن کردن دستگاه توانستیم از طریق wifi به اینترنت وصل شویم و numpy را دانلود کنیم.

```
pi@raspberrypi: ~  
1547 cat gps_listener.py  
1548 clear  
1549 python3 server.py  
1550 cat /home/pi/product_key.txt  
1551 clear  
1552 vim config.ini  
1553 python3 server.py  
1554 cat config.ini  
1555 vim server.py  
1556 cat config.py  
1557 cat server.py  
1558 vim config.py  
1559 cat config.ini  
1560 cat config.  
1561 cat config.py  
1562 cat config.ini  
1563 vim server.py  
1564 python3 server.py  
1565 vim led.py  
1566 python3 server.py  
1567 sudo shutdown now  
1568 history  
pi@raspberrypi:~ $ pip install numpy  
Collecting numpy  
^COperation cancelled by user  
pi@raspberrypi:~ $ pip install numpy  
Collecting numpy  
  Downloading https://files.pythonhosted.org/packages/b7/6f/24647f014eef9b67a24adfcabcd4f4928349b4a0f8393b3d7fe648d4d2de3/numpy-1.16.6.zip (5.1MB)  
98% | 5.1MB 15kB/s eta 0:00:05
```

```
pi@raspberrypi:~ $ ifconfig  
eth0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500  
    ether b8:27:eb:21:82:a6 txqueuelen 1000 (Ethernet)  
    RX packets 0 bytes 0 (0.0 B)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 0 bytes 0 (0.0 B)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
lo: flags=73<UP,LOOPBACK,RUNNING> mtu 65536  
    inet 127.0.0.1 netmask 255.0.0.0  
    inet6 ::1 prefixlen 128 scopeid 0x10<host>  
    loop txqueuelen 1000 (Local Loopback)  
    RX packets 0 bytes 0 (0.0 B)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 0 bytes 0 (0.0 B)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  
  
wlan0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  
    inet 192.168.1.110 netmask 255.255.255.0 broadcast 192.168.1.255  
    inet6 fe80::a517:ea63:daf0:fac8 prefixlen 64 scopeid 0x20<link>  
    ether b8:27:eb:74:d7:f3 txqueuelen 1000 (Ethernet)  
    RX packets 6028 bytes 5740439 (5.4 MiB)  
    RX errors 0 dropped 0 overruns 0 frame 0  
    TX packets 5823 bytes 701760 (685.3 KiB)  
    TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0
```

نصب OpenCV

برای این کار ما نیاز به OpenCV داشتیم. برای همین آن را در دستگاه نصب کردیم.

```
pi@raspberrypi:~ $ sudo apt-get update
Get:1 http://raspbian.raspberrypi.org/raspbian stretch InRelease [15.0 kB]
Get:2 http://raspbian.raspberrypi.org/raspbian stretch/main armhf Packages [11.7 MB]
0% [Connecting to archive.raspberrypi.org (93.93.135.141)]
0% [Connecting to archive.raspberrypi.org (93.93.135.141)]

0% [Connecting to archive.raspberrypi.org (93.93.135.141)]

Get:3 http://archive.raspberrypi.org/debian stretch InRelease [25.3 kB]
Get:4 http://archive.raspberrypi.org/debian stretch/main armhf Packages [192 kB]
Fetched 11.9 MB in 2min 2s (97.3 kB/s)
Reading package lists... Done
```

```
pi@raspberrypi:~ $ sudo apt-get install python-opencv
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libavcodec57 libavformat57 libavutil55 libopencv-calib3d2.4v5 libopencv-contrib2.4v5 libopencv-core2.4v5 libopencv-features2d2.4v5 libopencv-flann2.4v5
  libopencv-highgui2.4-deb0 libopencv-imgproc2.4v5 libopencv-legacy2.4v5 libopencv-ml2.4v5 libopencv-objdetect2.4v5 libopencv-photo2.4v5 libopencv-video2.4v5
  libswresample2 libswscale4
The following NEW packages will be installed:
  libopencv-contrib2.4v5 libopencv-legacy2.4v5 libopencv-ml2.4v5 libopencv-photo2.4v5 python-opencv
The following packages will be upgraded:
  libavcodec57 libavformat57 libavutil55 libopencv-calib3d2.4v5 libopencv-core2.4v5 libopencv-features2d2.4v5 libopencv-flann2.4v5 libopencv-highgui2.4-deb0
  libopencv-imgproc2.4v5 libopencv-objdetect2.4v5 libopencv-video2.4v5 libswresample2 libswscale4
13 upgraded, 5 newly installed, 0 to remove and 407 not upgraded.
Need to get 8,634 kB of archives.
After this operation, 3,524 kB of additional disk space will be used.
Do you want to continue? [Y/n] Y
0% [Working]
```

```
Unpacking libopencv-photo2.4v5:armhf (2.4.9.1+dfsg1-2+deb9u1) ...
Selecting previously unselected package python-opencv.
Preparing to unpack .../17-python-opencv_2.4.9.1+dfsg1-2+deb9u1_armhf.deb ...
Unpacking python-opencv (2.4.9.1+dfsg1-2+deb9u1) ...
Setting up libavutil55:armhf (7:3.2.16-1+deb9u1) ...
Setting up libopencv-core2.4v5:armhf (2.4.9.1+dfsg1-2+deb9u1) ...
Setting up libswresample2:armhf (7:3.2.16-1+deb9u1) ...
Processing triggers for libc-bin (2.24-11+deb9u3) ...
Setting up libswscale4:armhf (7:3.2.16-1+deb9u1) ...
Setting up libopencv-flann2.4v5:armhf (2.4.9.1+dfsg1-2+deb9u1) ...
Setting up libopencv-imgproc2.4v5:armhf (2.4.9.1+dfsg1-2+deb9u1) ...
Setting up libopencv-ml2.4v5:armhf (2.4.9.1+dfsg1-2+deb9u1) ...
Setting up libavcodec57:armhf (7:3.2.16-1+deb9u1) ...
Setting up libopencv-photo2.4v5:armhf (2.4.9.1+dfsg1-2+deb9u1) ...
Setting up libopencv-video2.4v5:armhf (2.4.9.1+dfsg1-2+deb9u1) ...
Setting up libavformat57:armhf (7:3.2.16-1+deb9u1) ...
Setting up libopencv-highgui2.4-deb0:armhf (2.4.9.1+dfsg1-2+deb9u1) ...
Setting up libopencv-objdetect2.4v5:armhf (2.4.9.1+dfsg1-2+deb9u1) ...
Setting up libopencv-features2d2.4v5:armhf (2.4.9.1+dfsg1-2+deb9u1) ...
Setting up libopencv-calib3d2.4v5:armhf (2.4.9.1+dfsg1-2+deb9u1) ...
Setting up libopencv-legacy2.4v5:armhf (2.4.9.1+dfsg1-2+deb9u1) ...
Setting up libopencv-contrib2.4v5:armhf (2.4.9.1+dfsg1-2+deb9u1) ...
Setting up python-opencv (2.4.9.1+dfsg1-2+deb9u1) ...
Processing triggers for libc-bin (2.24-11+deb9u3) ...
```

Repo کردن Clone

در انتها نیز ریپوزیتوری گیت‌هاب مربوط به گروه را کلون کردیم.


```
pi@raspberrypi:~/Desktop/project $ git clone git@github.com:Sharif-University-ESRLab/project-team-6.git
Cloning into 'project-team-6'...
Permission denied (publickey).
fatal: Could not read from remote repository.
```

Please make sure you have the correct access rights
and the repository exists.

```
pi@raspberrypi:~/Desktop/project $ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/pi/.ssh/id_rsa):
/home/pi/.ssh/id_rsa already exists.
Overwrite (y/n)? y
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/pi/.ssh/id_rsa.
Your public key has been saved in /home/pi/.ssh/id_rsa.pub.
The key fingerprint is:
SHA256:YAXw1YVdS+wQVA/81JEP01tnZdKkQAMZokyIsCYeEFU pi@raspberrypi
The key's randomart image is:
```

```
+---[RSA 2048]-----+
|++..oE.+oo.+@B**=O|
|... .+ o..+ o+=00|
|oo  =      oo**|
|+ . . .    ..o|
|.      S      |
|_|
+-----[SHA256]-----+
```

```
pi@raspberrypi:~/Desktop/project $ git clone git@github.com:Sharif-University-ESRLab/project-team-6.git
Cloning into 'project-team-6'...
remote: Enumerating objects: 10, done.
remote: Counting objects: 100% (10/10), done.
remote: Compressing objects: 100% (6/6), done.
remote: Total 10 (delta 0), reused 8 (delta 0), pack-reused 0
Receiving objects: 100% (10/10), done.
```