3.2 Download official image and create Jetbot Mini firmware

Component Environment Analysis:

```
NVIDIA Jetson Nano (Developer Kit Version) - Jetpack UNKNOWN [L4T 32.4.4]

 - Up Time:          0 days 2:8:39            Version: 3.0.1
 - Jetpack:          UNKNOWN [L4T 32.4.4]      Author: Raffaello Bonghi
 - Board:                                      e-mail: raffaello@rnext.it
   * Type:           Nano (Developer Kit Version)
   * SOC Family:     tegra210     ID: 33
   * Module:         P3448-0003   Board: P3542-000
   * Code Name:      batuu
   * Cuda ARCH:      5.3
   * Serial Number:  1423720060227
   * Board ids:      3448
 - Libraries:                          - Hostname:    jetson-desktop
   * CUDA:           10.2.89            - Interfaces:
   * OpenCV:         4.1.1  compiled CUDA: NO * l4tbr0:    192.168.55.1
   * TensorRT:       7.1.3.0               * wlan0:     192.168.2.84
   * VPI:            0.4.4                 * docker0:   172.17.0.1
   * VisionWorks:    1.6.0.501
   * Vulkan:         1.2.70
   * cuDNN:          8.0.0.180
```

The version information shown in the figure above is downloaded from NVIDIA's official website on October 2020 21. The updated component environment of Jetson nano official image is also the official firmware component environment of yahboom intelligent jetbotmini . This component version environment has passed the full function test. If the user needs to download the new firmware environment from the official to build the jetbotmini firmware environment according to the official tutorial given by yahboom, in order to avoid various unknown abnormal problems caused by version compatibility in the built environment, please use 2020.10 as far as possible 21 official updated image environment.

Jetson nano NVIDIA official developer kit SD card image download address:

Search address： https://developer.nvidia.com/embedded/downloads

3.2.1 Write image

*Note: *
If you purchased the Jetbotmini with Jetson NANO 4GB SUB, you don't need to write any system files, you can directly use the U disk provided to start the robot.

If you are using the NVIDIA Jetson NANO 4GB B01 board, you do not need to write any system files, after removing the TF from the card slot on Jetson NANO 4GB B01 board, you can directly use the U disk provided to start the robot.

If you purchased Jetbotmini without Jetson NANO 4GB SUB, and have purchased Yahboom Jetson NANO 4GB SUB separately, then you need to write EMMC boot file to Jetson NANO 4GB SUB board.

Part 1---For Jetson NANO 4GB version

*Note: *

1. The system version of the Jetson Nano 4GB core board must correspond to the system version of the U disk.

   For example, the U disk has been programmed with V4.5.1, then the system version of the Jetson Nano's core board must also be V4.5.1, otherwise the USB will not work. start up.

2. The system in the core board needs to use SDKManger to write the system, and the system in the U disk needs to use Win32DiskImager to write the system.

Note: If you are using the virtual machine provided by Yahboom.

The virtual machine user name: yahboom, password: yahboom

 1. Writing the EMMC boot file

1.1 Jetson Nano is connected to the virtual machine, prepare the Jetson nano board, jumper cap, display screen, mouse and keyboard, etc.

1.2 Let the jetson Nano enter the system REC flashing mode.

Connect the jumper caps to the FC REC and GND pins, i.e. to the second and third pins of the carrier board below the core board, as shown below:
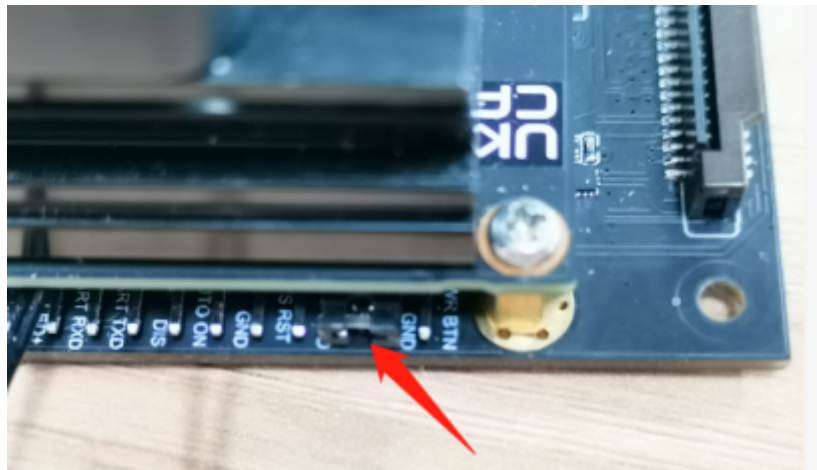
Connect the line, connect the HDMI display, mouse, and keyboard to the Jetson Nano, then plug in the power supply, and finally plug in the microUSB data cable. Since the jumper cap has been connected to the FC REC and GND pins in the previous step, it will automatically enter the REC flashing mode after power on.
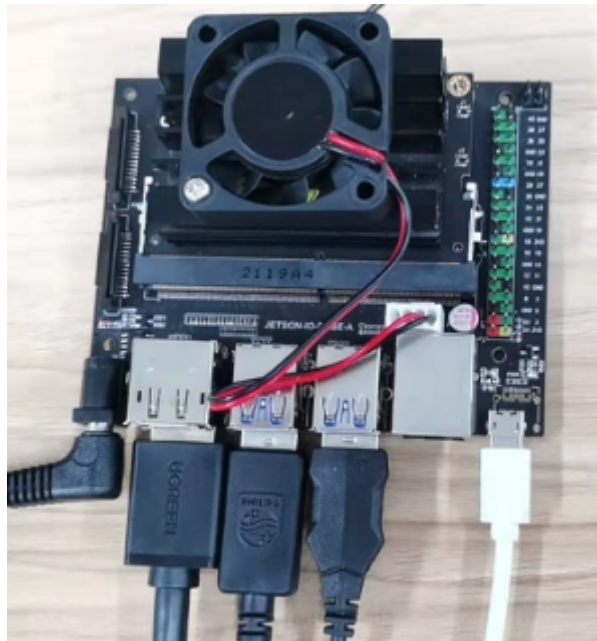
In normally, the following window will pop up after connecting Jeston NANO to your computer(virtual machine) by micro USB cable.
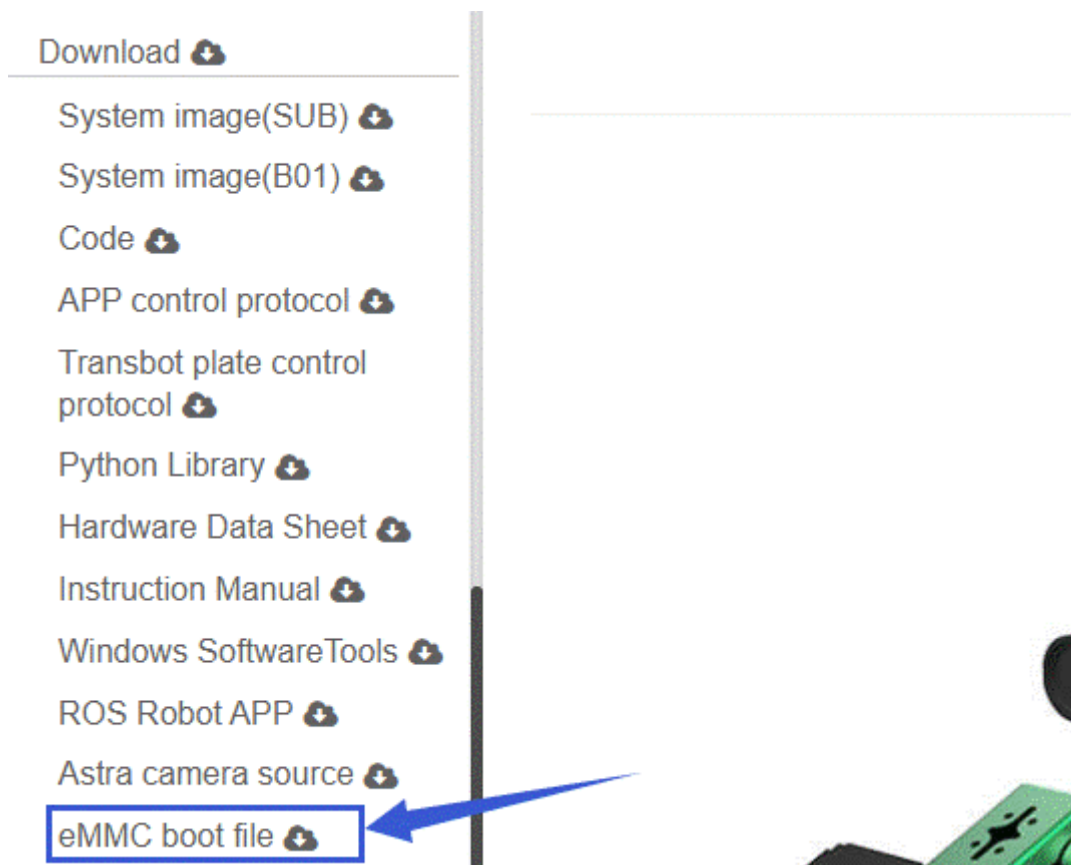
We need to choose "connect this device to virtual machine(VMWare)".

1.3 Note: If you are using the virtual machine provided by Yahboom, and the Jetson_Boot_USB file is already included in the virtual machine file, you do not need to transfer it to the system again.

Users name: yahboom

Password: yahboom

Download EMMC boot file.

Please transfer the Jetson_Boot_USB.tar.gz file in the data to the Ubuntu 18.04 system, and open the terminal to run the decompression command.

```
tar xzvf Jetson_Boot_USB.tar.gz
```

```
yahboom@YAB:~$ tar xzvf Jetson_Boot_USB.tar.gz
./Jetson_Boot_USB/
./Jetson_Boot_USB/jetson-nano-devkit.conf
./Jetson_Boot_USB/jetson-nano-devkit-emmc.conf
./Jetson_Boot_USB/jetson-tx1-devkit.conf
./Jetson_Boot_USB/nv_tools/
./Jetson_Boot_USB/nv_tools/scripts/
```

1.4 After the extract is complete, enter the following command to enter the Jetson_Boot_USB folder,

```
cd Jetson_Boot_USB/
```

```
ls
```

```
yahboom@YAB:~$ cd Jetson_Boot_USB/
yahboom@YAB:~/Jetson_Boot_USB$ ls
apply_binaries.sh                p2597-0000+p2180-1000-24x7.conf
bootloader                       p2597-0000+p2180-1000.conf
build_l4t_bup.sh                 p3448-0000.conf.common
flash.sh                         p3448-0000-max-spi.conf
hybrid-qspi.conf                 p3448-0000-max-spi-sd.conf
jetson-nano-2gb-devkit.conf      p3449-0000+p3448-0000-qspi.conf
jetson-nano-devkit.conf          p3449-0000+p3448-0000-qspi-sd.conf
jetson-nano-devkit-emmc.conf     p3449-0000+p3448-0002.conf
jetson-nano-emmc.conf            p3450.conf
jetson-nano-qspi.conf            p3542-0000+p3448-0003-qspi.conf
jetson-nano-qspi-sd.conf         p3542-0000+p3448-0003-qspi-sd.conf
jetson-tx1.conf                  p3542.conf
jetson-tx1-devkit.conf           README_Autoflash.txt
kernel                           README_Massflash.txt
l4t_generate_soc_bup.sh          rootfs
nvautoflash.sh                   source
nvmassflashgen.sh                source_sync.sh
nv_tegra                         tools
nv_tools                         TX1_boot-firmware-redundancy.txt
p2371.conf
```

1.5 Enter the following command to run he EMMC boot file.

```
sudo ./flash.sh -r jetson-nano-devkit-emmc mmcblk0p1
```

```
yahboom@YAB:~/Jetson_Boot_USB$ sudo ./flash.sh -r jetson-nano-devkit-emmc mmcblk0p1
[sudo] password for yahboom:
################################################################################
# L4T BSP Information:
# R32 , REVISION: 5.2
################################################################################
# Target Board Information:
# Name: jetson-nano-devkit-emmc, Board Family: t210ref, SoC: Tegra 210,
# OpMode: production, Boot Authentication: ,
# Disk encryption: disabled ,
```

1.6 Be patient, the file is written on the EMMC.

If the writing is successful, the system will prompt "The target t210ref has been flashed successfully. Reset the board to boot from internal eMMC."

As shownn below.

```
[   8.3892 ]
*** The target t210ref has been flashed successfully. ***
Reset the board to boot from internal eMMC.
```

If an error message appears, please confirm whether the Jetson Nano is connected normally and whether it has entered the flashing mode.

Repeat the above steps.

After the writing is completed, please unplug the jumper cap of the Jetson NANO, then insert the U disk with Yahboom Jetbot mini system, and open the power switch.
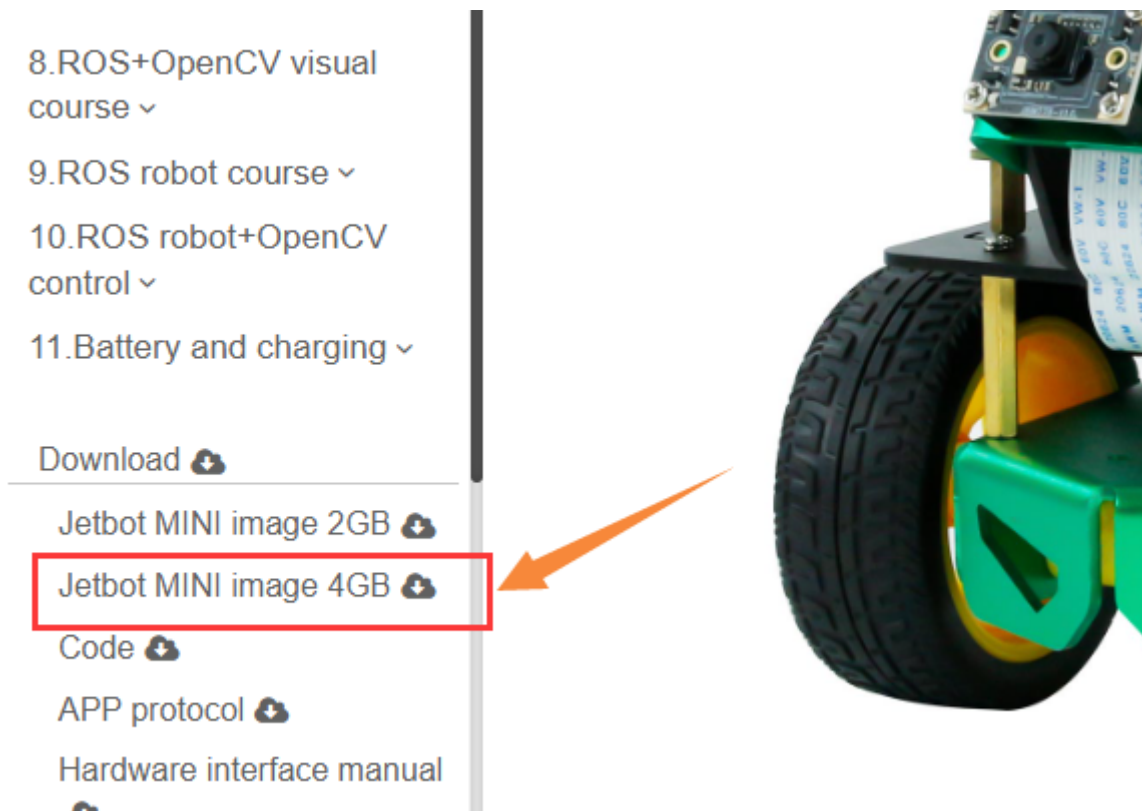
Jetson NANO board and robot will start up normally.

2. Writing the U disk image

Note: If you are using the Jetbot mini U disk provided by Yahboom, you can skip this step.

Because the dedicated system files have been written in the jetbot mini U disk we provided.

2.1Download the system file from our website.

Beginners can use this Yahboom Jetbot mini system image file directly.

user name: jetson, password: yahboom

For windows computer

2.2 Format U disk

Format U disk by "SD Card Formatter.exe"

Install Formatter: Path of package : [JetBot-Mini-Robot-Car] --> [Annex] --> [Tools]--> [SD Card Formatter]
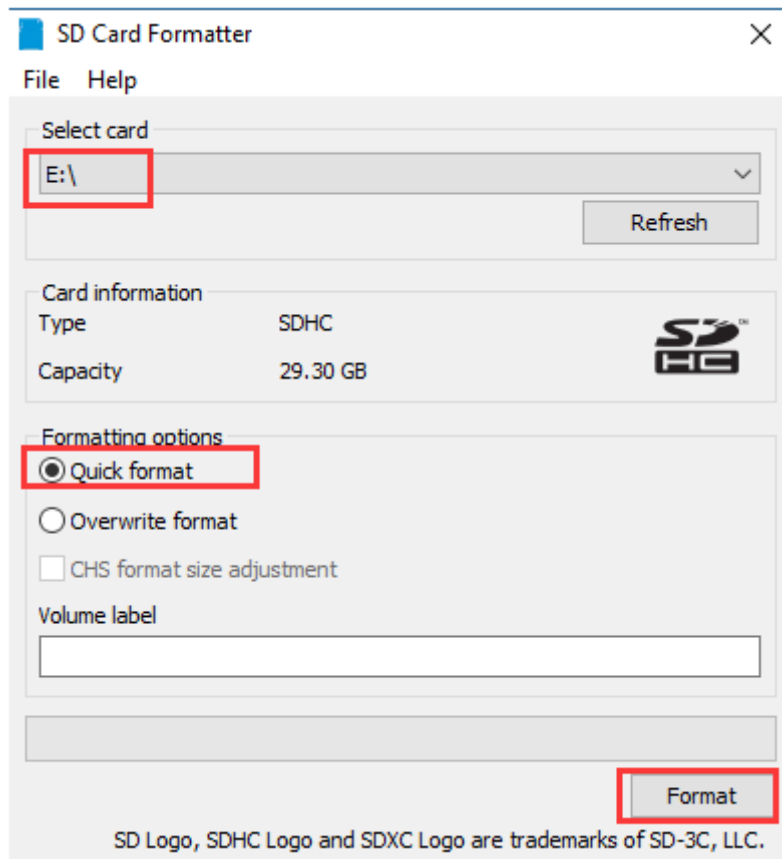
2.3 Writing system file into U disk.

1)Extract the downloaded system zip file to get the img image file.

2)Insert the U disk into the computer USB port.

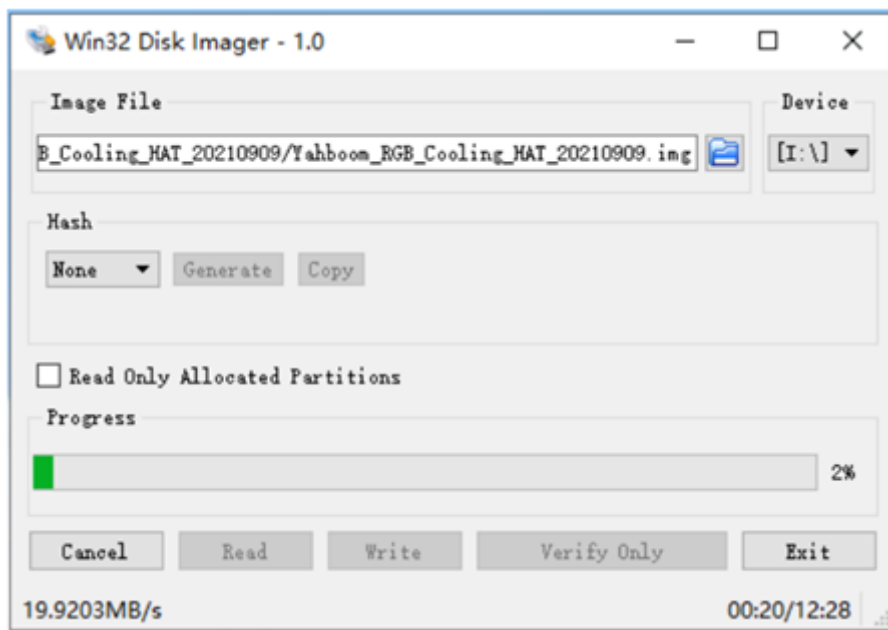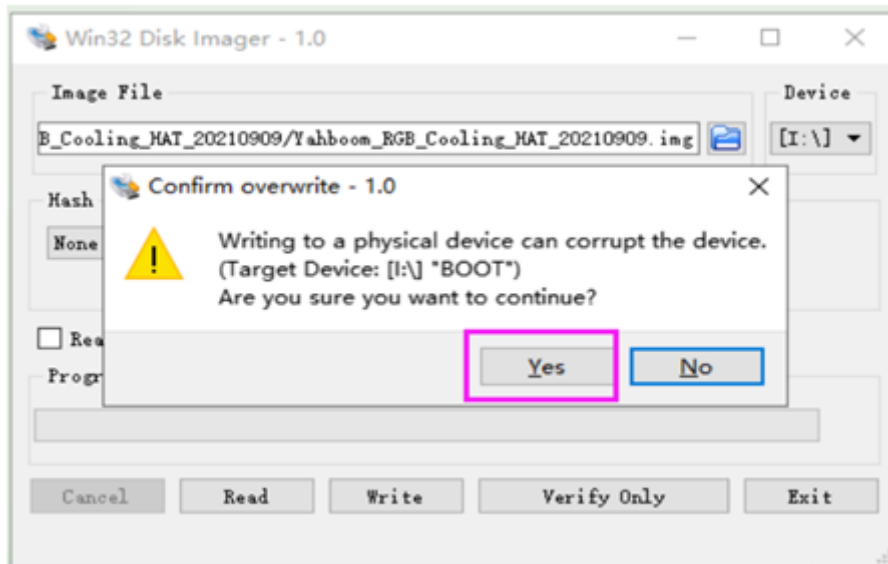3)Install and run Win32DiskImager software.

This software download link: https://sourceforge.net/projects/win32diskimager/

4)Insert the formatted U disk into the computer, write the .img file we provided to the U disk by win32 sofware.

Select the downloaded image file. Click "Write"
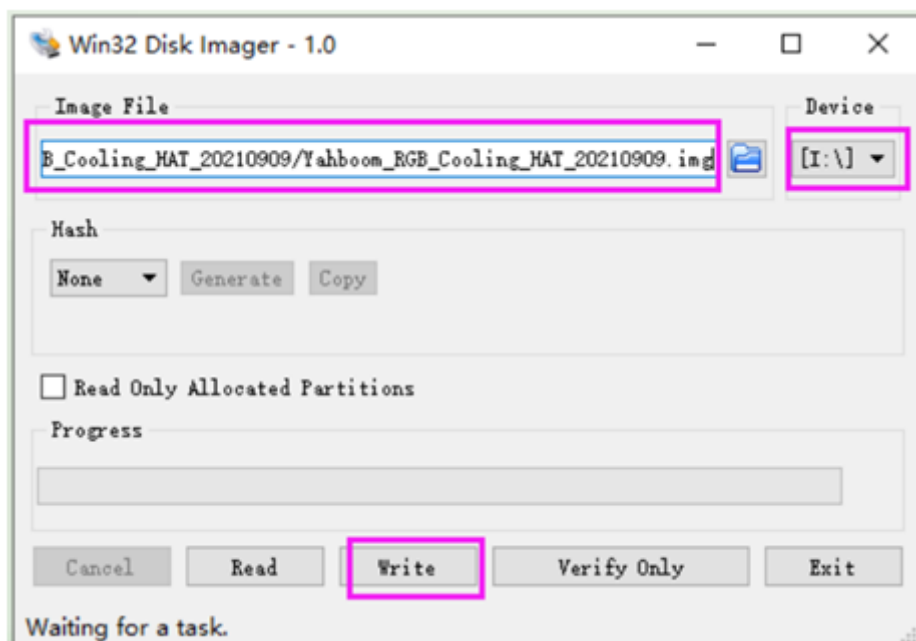
5)Click "Yes". Wait for the image be written into U disk.

6)When you see the interface as shown in the figure below, it means that the image file has been successfully written to the U disk.

7)If the computer prompts that the U disk needs to be formatted, click "Cancel".

 For MAC computer

First. Do not insert u disk into MAC computer.

  2. 2Download and install and start the Etcher.

2.3 Click "Select Image" and select the compressed image file you downloaded earlier.

2.4 **Insert the micro SD card.** If your Mac displays this window, click "Ignore":
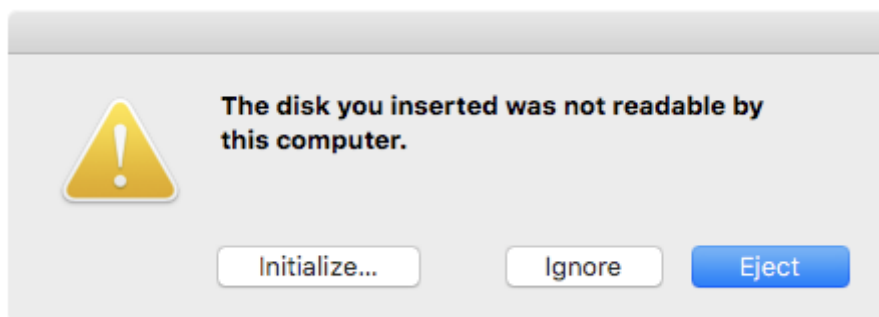
2.5 If you are not connected to another external drive, Etcher will automatically select the microSD card as the target device. Otherwise, click "Select Drive" and select the correct device.

2.6 Click on "Flash!" Your Mac may prompt you for a username and password before allowing Etcher to continue.
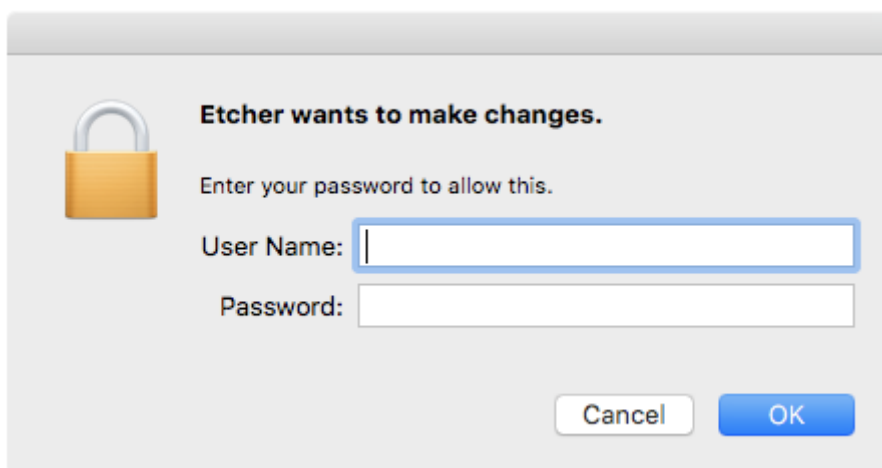
If your microSD card is connected via USB3, Etcher will take about 10 minutes to write and verify the image.

2.7 After the Etcher is finished, if Mac prompts you to use the following dialog, please click "Ignore" (according to this description):
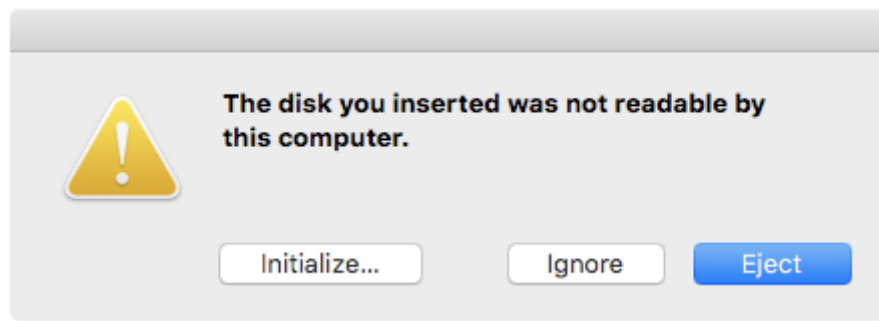
2.8 Physically remove the microSD card from the computer.

Part 2---For Jetson NANO 2GB version

1.Download the system file from our website.
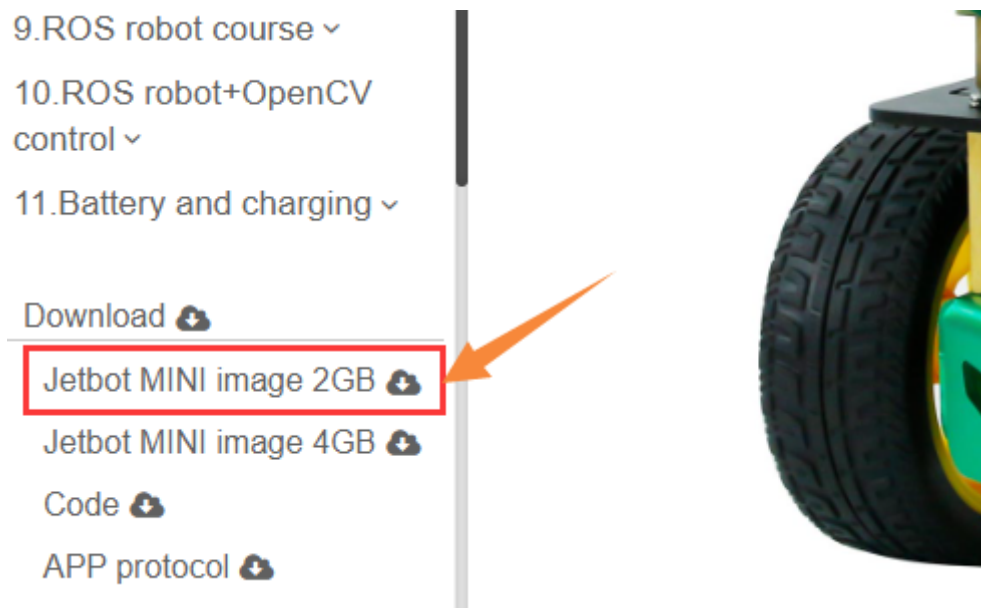
Beginners can use this Yahboom Jetbot mini system image file directly.

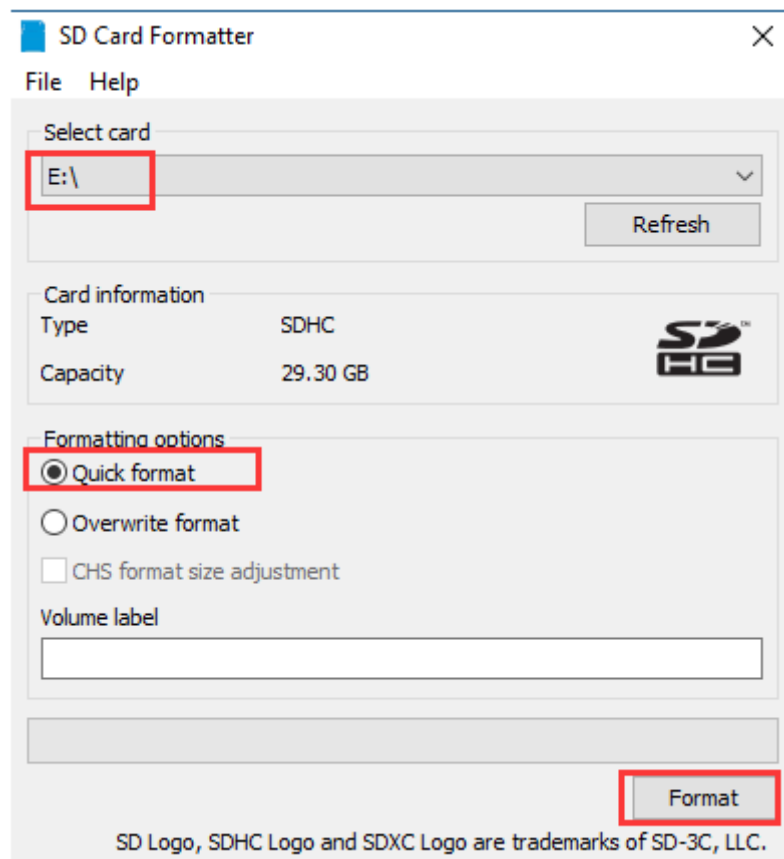user name: jetson, password: yahboom

 For windows computer

2.Format SD card:

Before writing the system image, you need to format your SD card by SD Card Formatter.

Install Formatter:

Path of package : [JetBot-Mini-Robot-Car] --> [Annex] --> [Tools]--> [SD Card Formatter]

Insert the SD card into the computer by the card reader, you will see that the computer has one more drive letter.
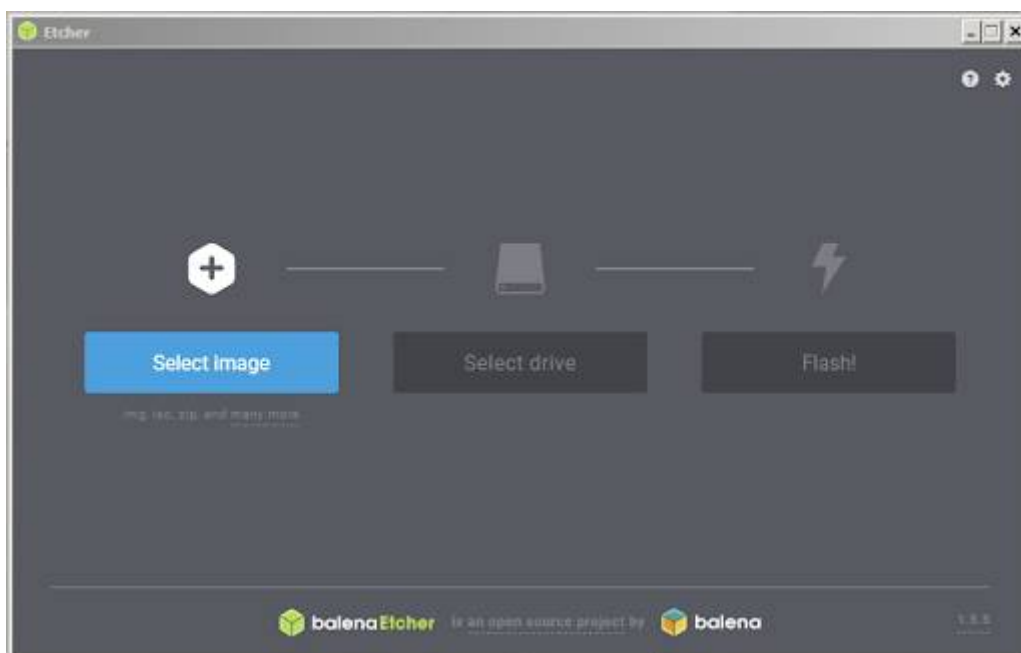
Note: If any warnings appear, please select"Yes/OK".

3.Writing system file into SD card by Etcher.

Install Etcher:

Path of package : [JetBot-Mini-Robot-Car] --> [Annex] --> [Tools]--> [balenaEtcher-Portable]

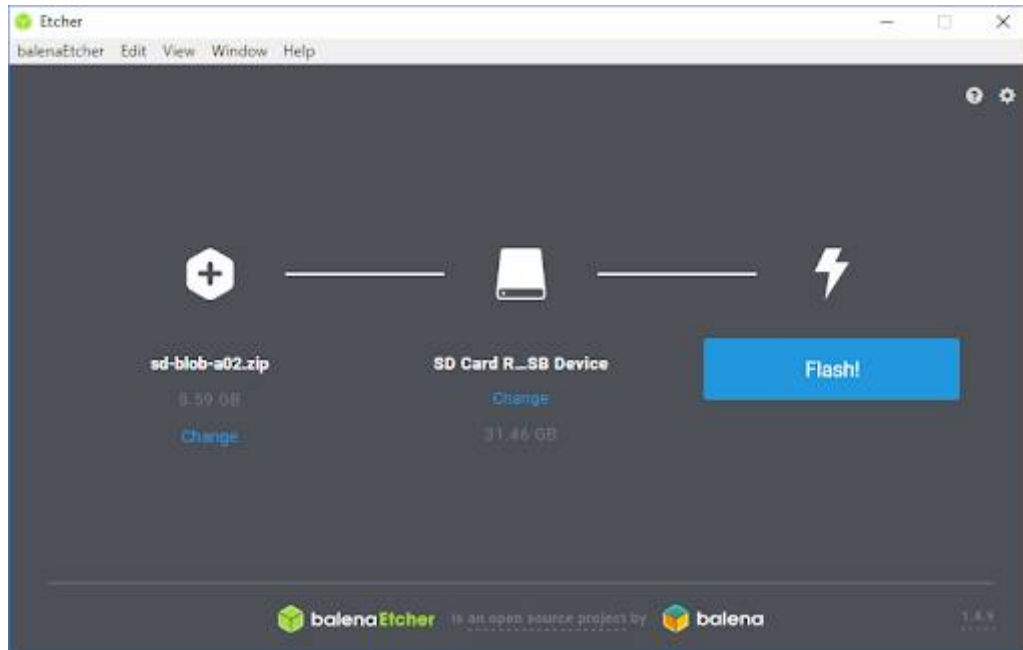3.1 Insert the formatted SD card into the computer through the card reader.

3.2 Click "Select image" and select the compressed image file you downloaded earlier.

3.2 If need to insert microSD card. If Windows prompts you to use the following dialog, please click "Cancel" (according to this description):
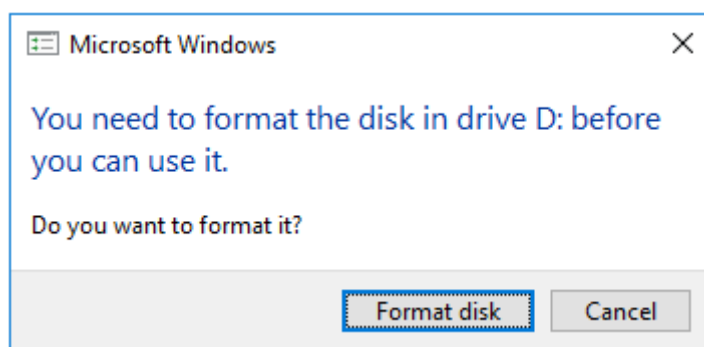
3.4 Click "Select Drive" and select the correct device.

3.5 Click on "Flash!" If your microSD card is connected via USB3, Etcher will take about 10 minutes to write and verify the image.

3.6 After the Etcher is complete. If Windows prompts you to use the following dialog, please click "Cancel" (according to this description):

3.7 Physically remove the microSD card from the computer.
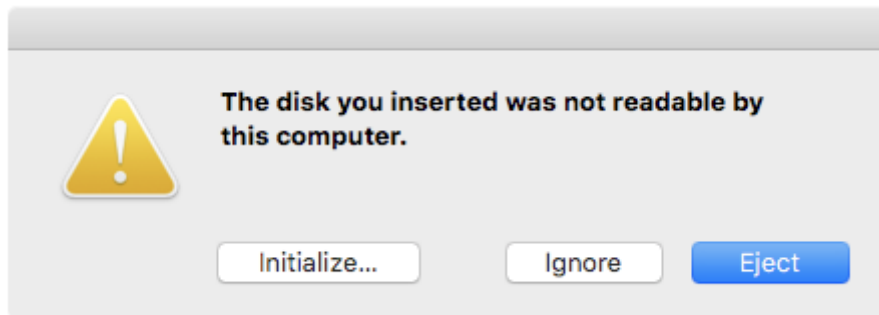
For MAC computer

First. Do not insert a microSD card.

   2. Download, install and start the Etcher.

3. Click "Select Image" and select the compressed image file you downloaded earlier.

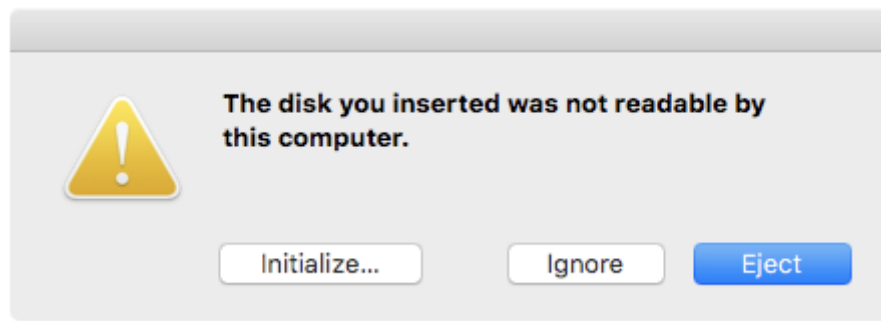4. **Insert the micro SD card.** If your Mac displays this window, click "Ignore":

5. If you are not connected to another external drive, Etcher will automatically select the microSD card as the target device. Otherwise, click "Select Drive" and select the correct device.

6. Click on "Flash!" Your Mac may prompt you for a username and password before allowing Etcher to continue.

If your microSD card is connected via USB3, Etcher will take about 10 minutes to write and verify the image.

7. After the Etcher is finished, if Mac prompts you to use the following dialog, please click "Ignore" (according to this description):
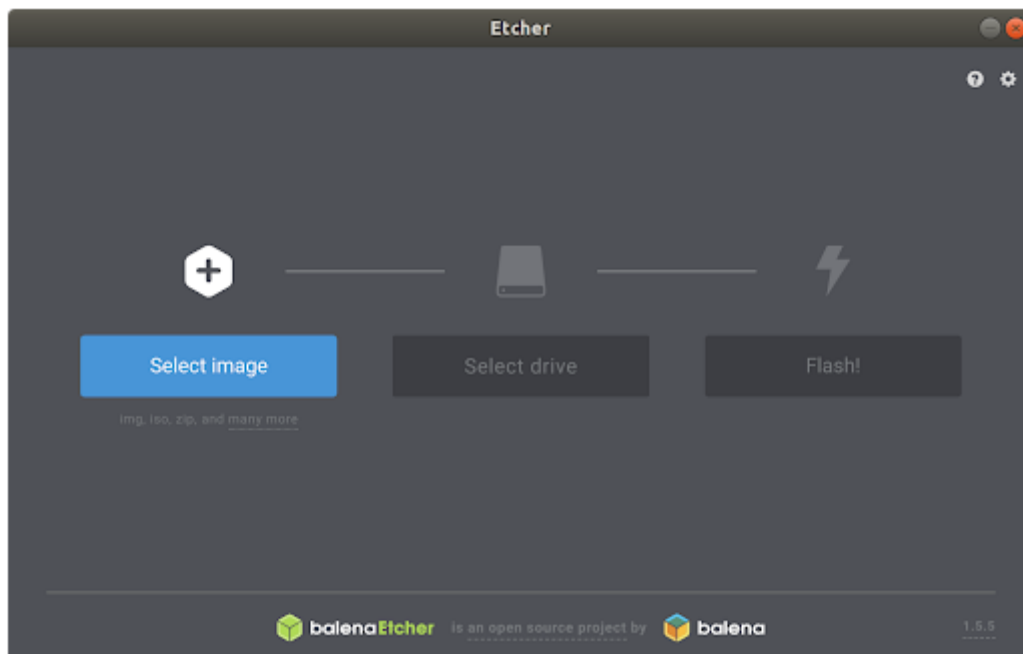
The disk you inserted was not readable by this computer.

Initialize...   Ignore   Eject

8. Physically remove the microSD card from the computer.

LINUX:

You can write an SD card image using a graphics program such as Etcher or a command line.

Method 1--- Etcher

1)Download, install and start the Etcher.

2)Click "Select Image" and select the compressed image file you downloaded earlier.
3)**Insert the micro SD card.** If you are not connected to another external drive, Etcher will automatically select the microSD card as the target device. Otherwise, click "change" and select the correct device.
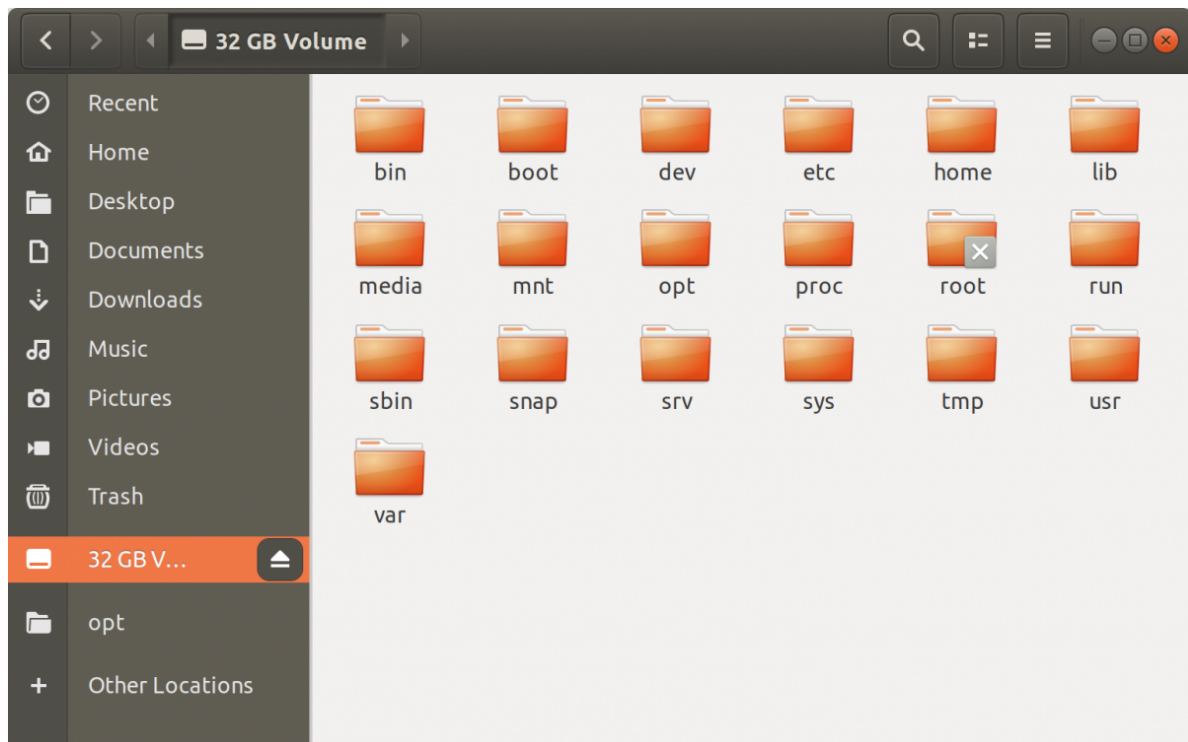
4. Click on "Flash!" Your operating system may prompt you for a username and password before allowing Etcher to continue.
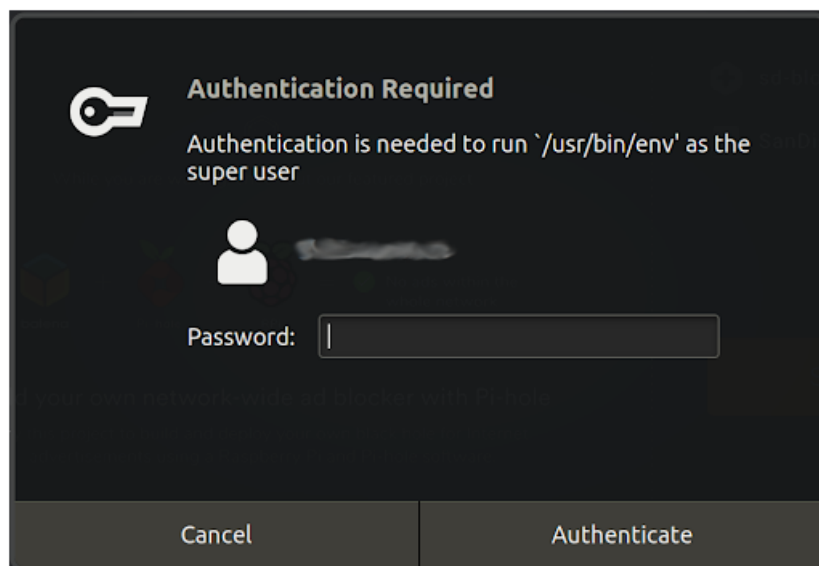
If your microSD card is connected via USB3, Etcher will take about 10 minutes to write and verify the image.

5. After the Etcher is finished, use the Files application to eject the SD card:

6. Physically remove the microSD card from the computer.

Method 2--- command line

1. Press **Ctrl+Alt+t** to open the terminal application.
2. Insert the microSD card and use the command to display the disk device assigned to it:

```
dmesg | tail | awk '$3 == "sd" {print}'
```

In this example, we can see that the 16GB micro SD card is assigned /dev/sda:

3. Use this command to write the compressed image to the microSD card:

```
/usr/bin/unzip -p ~/Downloads/jetson_nano_devkit_sd_card.zip | sudo /bin/dd
of=/dev/sd<x> bs=1M status=progress
```

E.g:

After the command is completed, eject the disk device from the command line:

```
sudo eject /dev/sd<x>
```

4)Physically remove the microSD card from the computer.

3.2.2 Install the required components

Note: if you write the Yahboom jetbotmini system, you can choose to skip this part of the configuration, because the required software has been configured in the factory image of jetbotmini.

0.The system needs to be updated before installation

  Note: you need to connect WiFi or network cable before performing the following steps.

  sudo apt-get update

  sudo apt-get full-upgrade

  sudo apt-get install nano

1.Install pip

Because Python 3.6 is already installed in Jetson Nano, installing pip is relatively simple.

```
sudo apt-get install python3-pip python3-dev
```

After installation, pip is version 9.0.1, you need to upgrade it to the latest version.

```
python3 -m pip install --upgrade pip #upgrade pip
```



```
sudo nano /usr/bin/pip3
```

  Original

```python
from pip import main
if __name__ == '__main__':
    sys.exit(main())
```

  After modification

```python
from pip import __main__
if __name__ == '__main__':
    sys.exit(__main__._main())
```

  Save after modification. Display after running PIP3 - V:

2.Install Jetbot Mini Dependency package

Here are the packages that need to be installed when Jetbot Mini is running:

Name	Version
Adafruit-GPIO (Local installation)	1.0.4
Adafruit-MotorHAT (Local installation)	1.4.0
Adafruit-PureIO	0.2.3
Adafruit-SSD1306	1.6.2
Flask	1.1.2
Jetson.GPIO	1.0.0
numpy	1.16.4
traitlets (Local installation)	3.4
pillow	5.2.0

Local installation：

If you use the command to find the package in the source or the network environment is not good, we have provide the Jetbot Mini dependency package, transfer the local package to the Jetbot Mini file system by WinSCP.

Path of package : [JetBot-Mini-Robot-Car] --> [Annex] --> [Jetbot Dependency package]

Then, we can input: cd xxxx jumps to the directory where you need to install the package (the directory with the setup.py file)

Input this command:

```
sudo python3 setup.py install
```

Install the package.

Online installation:

Use the following command to install the corresponding package, (xxx is name of package you need to install)

```
sudo pip3 install xxx
```

If there is a compatibility issue with the new version of the installation, you can use the following command to install the dependencies of the version specified in the above listed package.

```
sudo pip3 install package==version0
```

(For example, you need to specify numpy 1.16.4 , you need to input command: **sudo pip install numpy==1.16.4**)

Install the cmake software:

```
sudo apt-get install cmake
```