Edison 4WD Auto Robotic Platform

From Wiki 来自痴汉的爱

Contents

About

The 4WD Auto Robotic Platform is a powerful mobile unit with the Intel Edison Arduino kit, to control this platform you have to use a smart phone or a computer with wifi capable to connect to its wifi accessible piont, open a web browser input the address http://192.168.42.1:8000 than a operation dashboard comes up. This is a primary project if you are a maker and ability to hack this platform welcome to do a stronger remake.

Getting Started

Part List

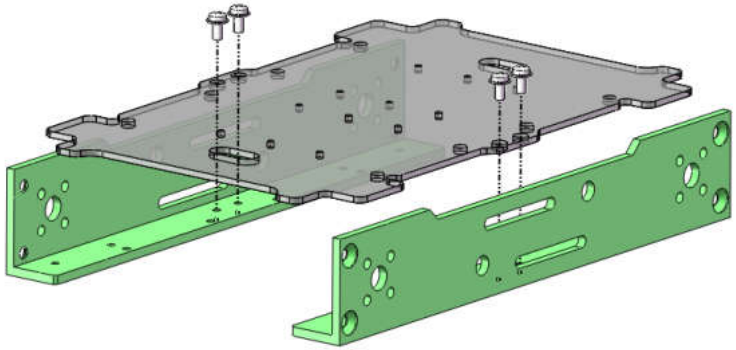
	Parts	Specification	Mat
1	Bracket 1	200*35*20mm*3.0mm	Alum
2	Bracket 2	135*35*20mm*3.0mm	Alum
3	Angle Joint Structure	29*12*10mm*2.0mm	Me
4	Top Plate	200*132*1.5mm	Alum
5	Bottom Board	199*129*2.0mm	Acr
6	Battery Fixer	67*15*2.0mm	Acr
7	Upper Board	184*132*2.0mm	Acr
8	Wheel	Φ85mm*W31mm	Plast Rub
9	Shaft Coupler	for Φ4mm shaft	Me
10	DC Motor	Spec (http://www.seeedstudio.com/wiki/File:Edison_4WD_Auto_Robotic_Platform_DC_Motor_Spec.pdf)	

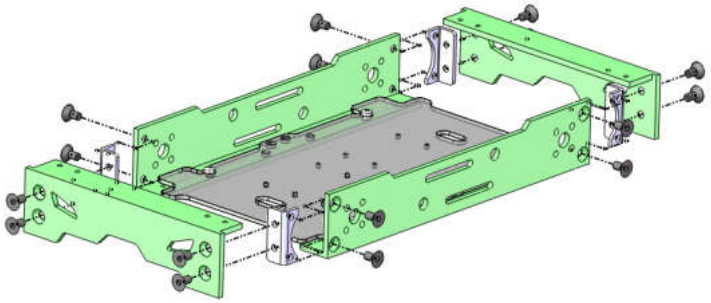
11	DC Motor (Encoder Included)	Spec (http://www.seeedstudio.com/wiki/File:Edison_4WD_Auto_Robotic_Platform_DC_Motor_with_Encoder_Spec.pdf)	
12	Distance Holder	M3.0*H45+6.0mm	Me
13	Distance Holder	M3×10mm	Me
14	Distance Holder	M2*10mm	Me
15	Hexagon socket Countersunk Head Screw	M4.0*H8.0mm	Me
16	Cross Recessed Pan Head Screw	M4.0*H8.0mm	Me
17	Cross Recessed Pan Head Screw	M3*35mm	Me
18	Cross Recessed Pan Head Screw	M3*8mm	Me
19	Cross Recessed Pan Head Screw with Washer	M3.0*H6.0mm	Me
20	Screw, Spring Lock Washer and Plain Washer assemblies	M2*8mm	Me
21	Hexagon Nut	M3	Me
22	Spring Lock Washer	M4	Me
23	Plain Washer	M3*7*0.5	Me
24	Screw Driver		Met Pla
25	Hexagonal Head Wrench		Me
26	Grove - I2C Motor Driver (http://www.seeedstudio.com/depot/Grove-I2C-Motor-Driver-p-907.html)		PC
27	Base Shield V2 (http://www.seeedstudio.com/depot/base-shield-v13-p-1378.html?cPath=132_134)		PC
28	Grove - Universal 4 Pin Buckled 20cm Cable (http://www.seeedstudio.com/depot/Grove-Universal-4-Pin-Buckled-20cm-Cable-5-PCs-pack-p-936.html)		Cab
29	Dean Parallel Adapter	Plug	
30	Male of Dean Power Cable		Cab
31	Dean to DC Power Cable		Cab
32	TRX to Dean Power Cable		Cab
33	Cable Tie	3*60mm	Pla
34	Assembly Instruction	A4	Co Pa

How to Assemble It

Assembly Instruction.pdf (http://www.seeedstudio.com/wiki/File:Assembly_Instruction_02.pdf)

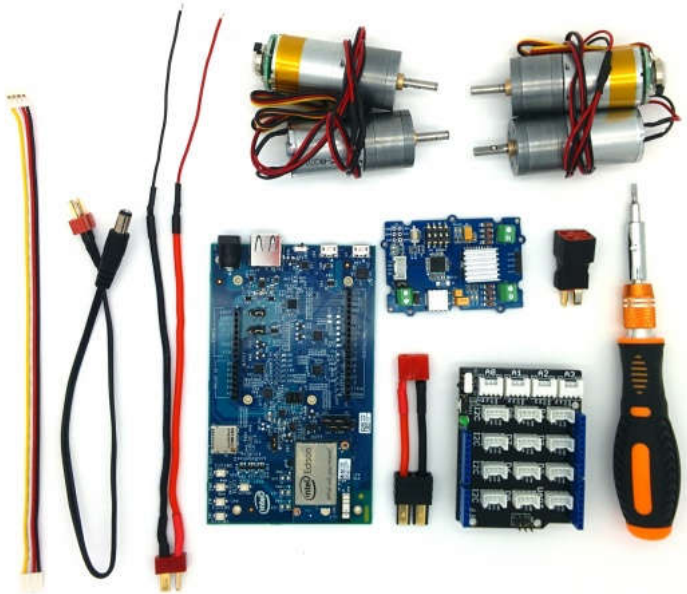
1.Assemble the main body.



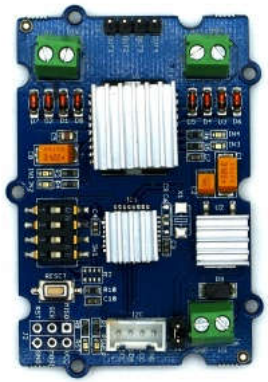


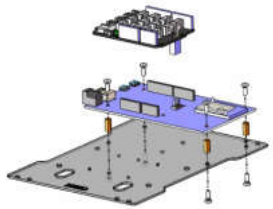
2.Connect the cables

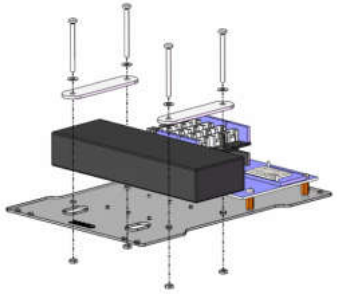
1) Below are the parts with cables to be connected, you need a 2.5mm Slotted head screwdriver to srew the motor driver.

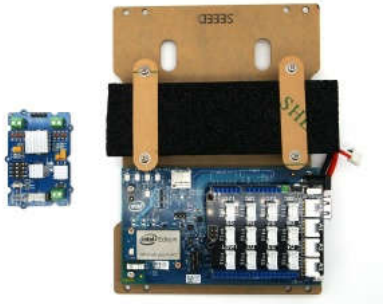


2)Stick the aluminum heatsinks to the chips on the motor driver, and assemble the middle board.

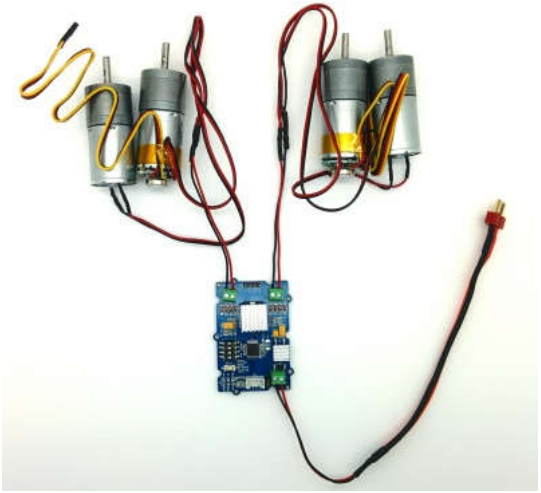


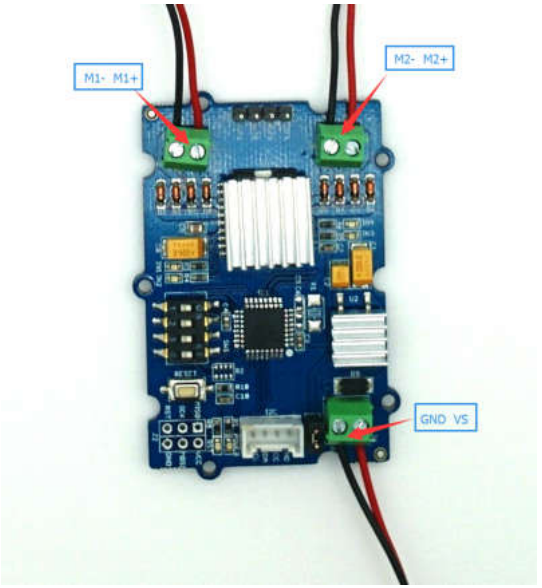




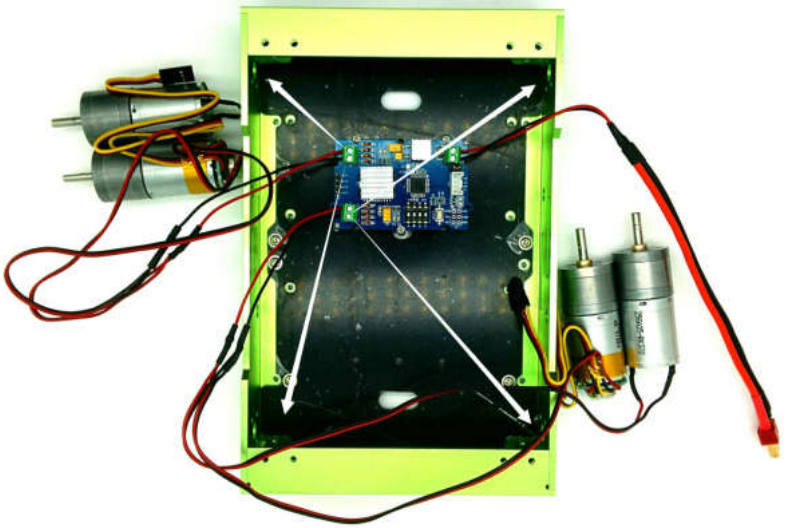


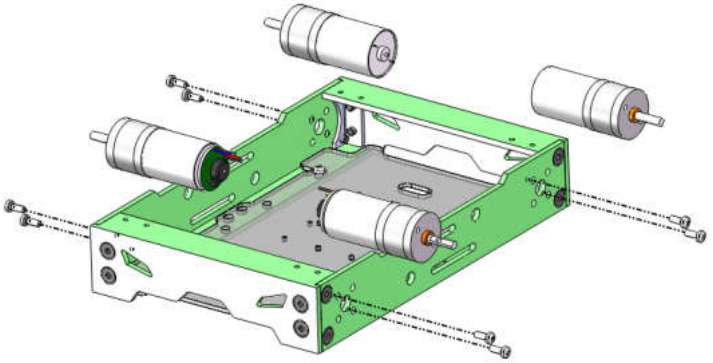
3)Connect the motor driver , the motor group's black cables connect to "M1-" "M2-" and the red ones connect to "M1+" "M2+", connect the power cable,the black cable to "GND", the red one to "VS".

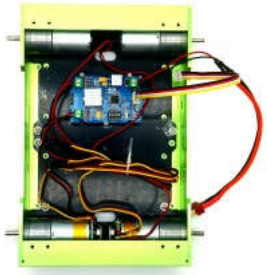




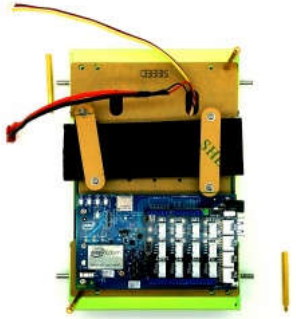
4)Assemble the motor group into the main body, the motor in the same group must assemble to the same side. Use a nylon cable to tie up the wires,then plug the grove cable.



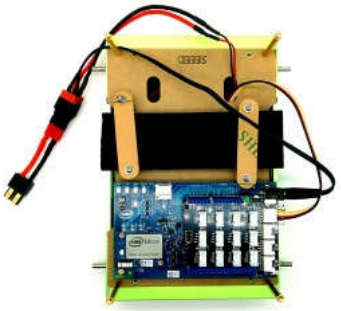




5)Put on the middle board, the power cable and the grove cable were to across the right hole.

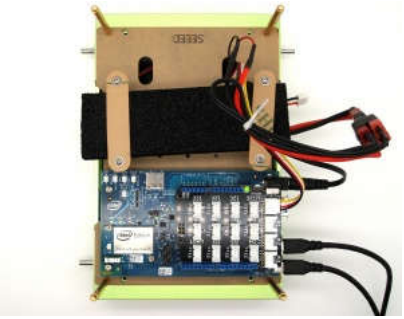


6)Plug the 1-to-2 power connector the battery adapter cable and the arduino board power cable, the grove cable connect to A0 pin of the Base Shield.

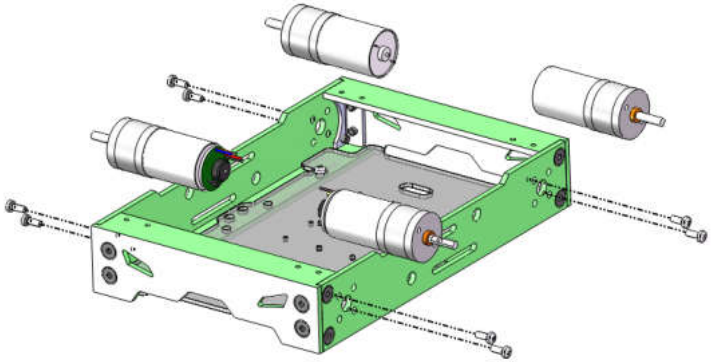


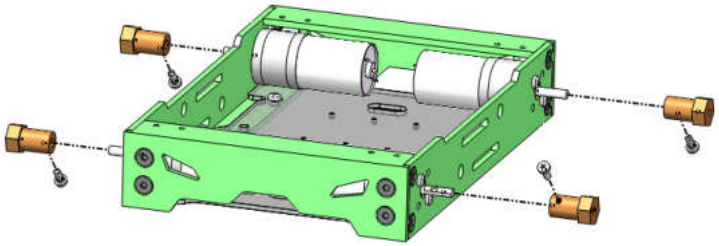
7)Carefully plug the battery connector to get power up, test if it was right done now, if no led light up you must check the problem.

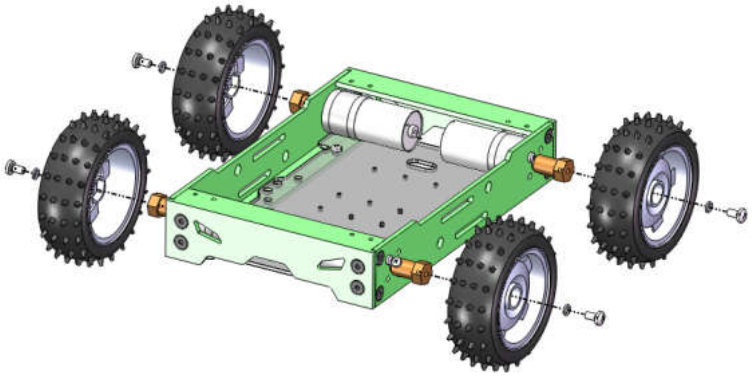
8)Plug the USB cables to test the software.

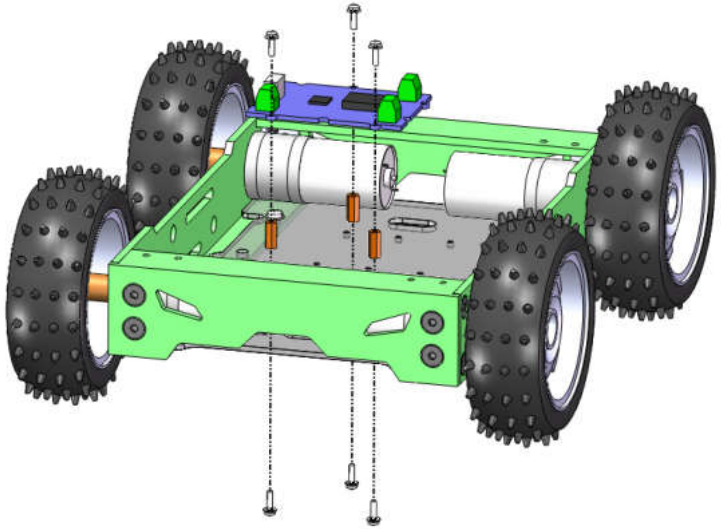


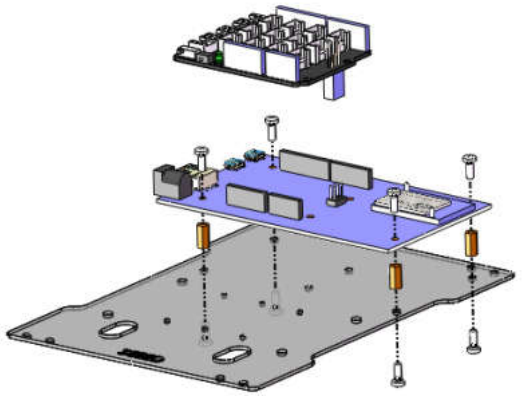
3.Continue assembling

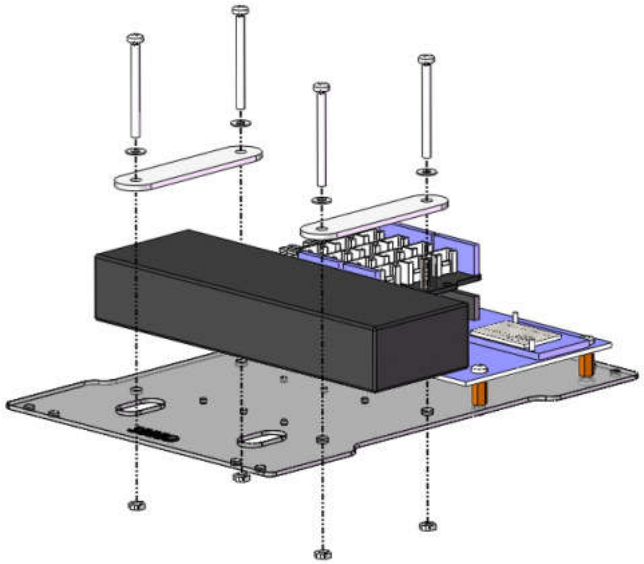


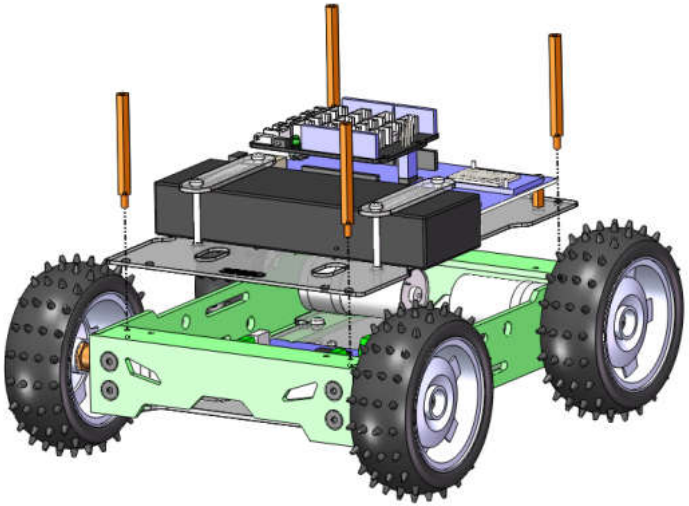


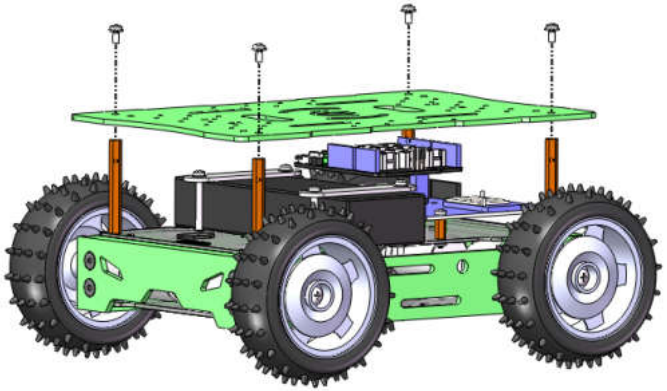


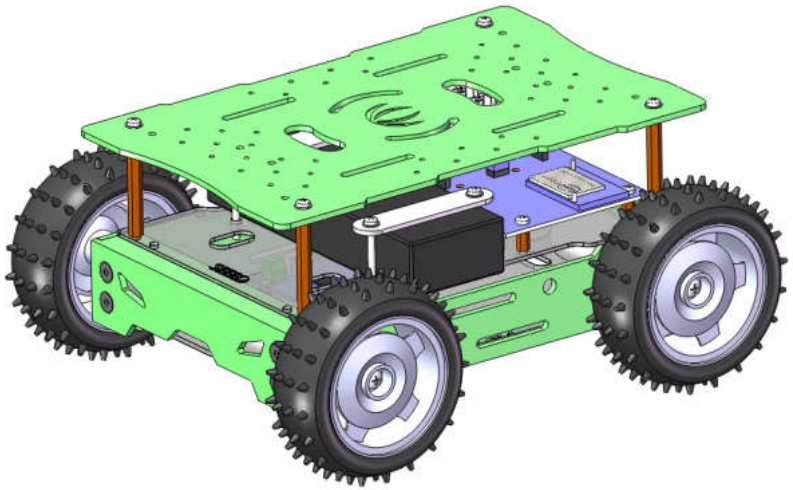












Development Environment

Although the Edsion Arduino can be programed by arduino IDE but for stronger development we got into the linux system to do some low level development. The most important resource is the mraa library which provided by Intel, things aren' t that idealized that there are difficulties in our early development, in order to build a convenient development Environment we copy the partition of rootfs out of the linux file system in which we have already configured all the needed resource and built the 4WD platform project. The only thing you should do to have this platform work is to flash a new firmware into Edison. If you want to know what we have done in the linux system and how to do your own project see the github repository:

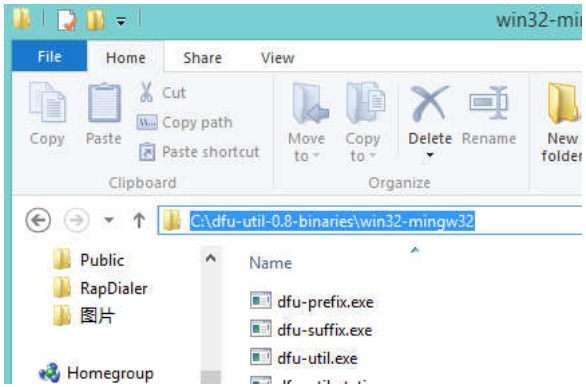
https://github.com/Seeed-Studio/Edison_WiFi_Car

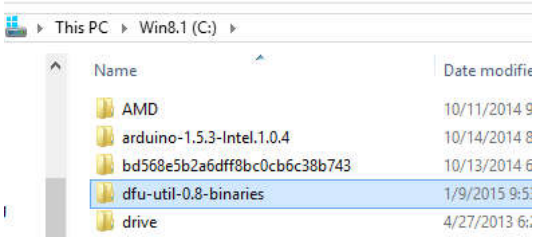
For windows user

Install tools

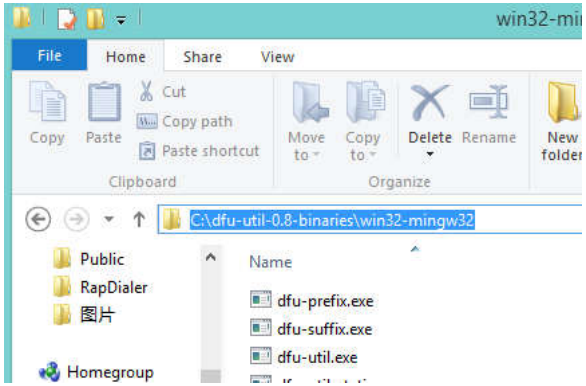
Follow the Edison official web site getting started (https://communities.intel.com/docs/DOC-23147) to install required drivers and the terminal emulator PuTTy.

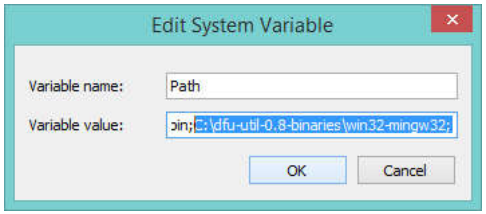
Download dfu-util - Device Firmware Upgrade Utilities (http://dfu-util.sourceforge.net/releases/dfu-util-0.8-binaries.tar.xz) and extract the xz file to "C:\" or any other directory.





Add Environment Variables
Right click This PC > Advanced system setting > Environment Variables > copy the path of dfu-util.exe to catch the "Path" environment variable.

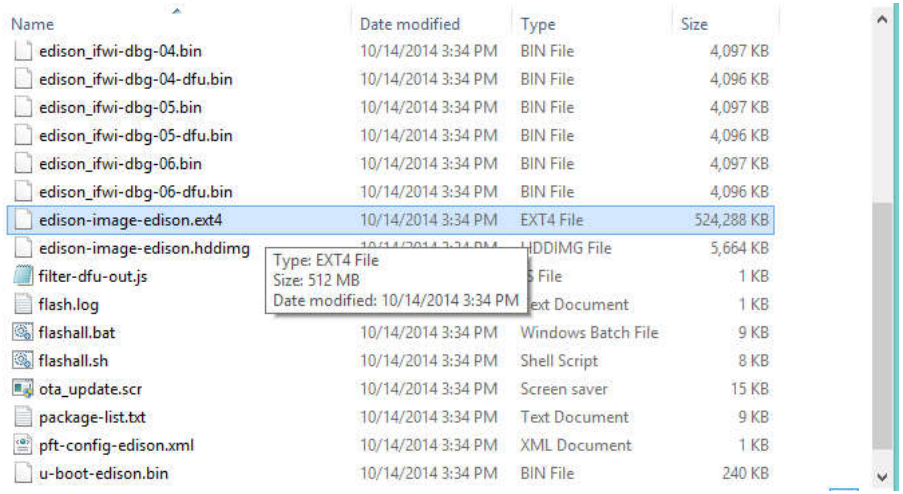




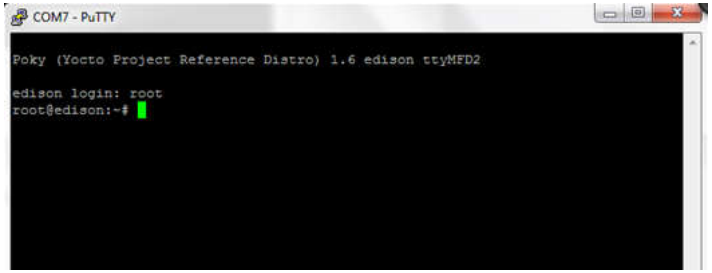
Flash new firmware

1.Download and unzip
Download customized firmware from seeed wiki (http://www.seeedstudio.com/wiki/images/a/a6/Edison-image-rel1-maint-rel1-ww42-14-for-wificar.zip)
Download customized firmware from google drive (https://drive.google.com/file/d/0B-7TGxMT8HvFaXJ2amlMOEkteE0/view?usp=sharing)

Download customized firmware from onedrive (https://onedrive.live.com/?cid=b24d52d93861663f&id=B24D52D93861663F%212178&ithint=file,7z&authkey=!AIH0ajk2jCZzTFE)

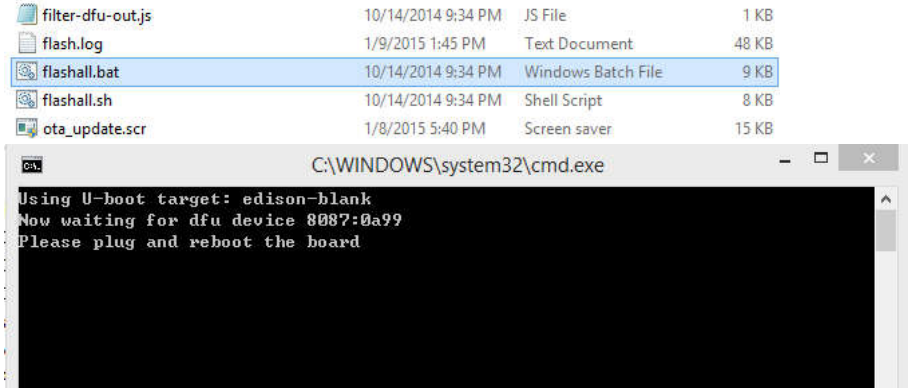


2.Use the PuTTy
Follow the official Edison Getting Started Guide to log in edison with PuTTy.



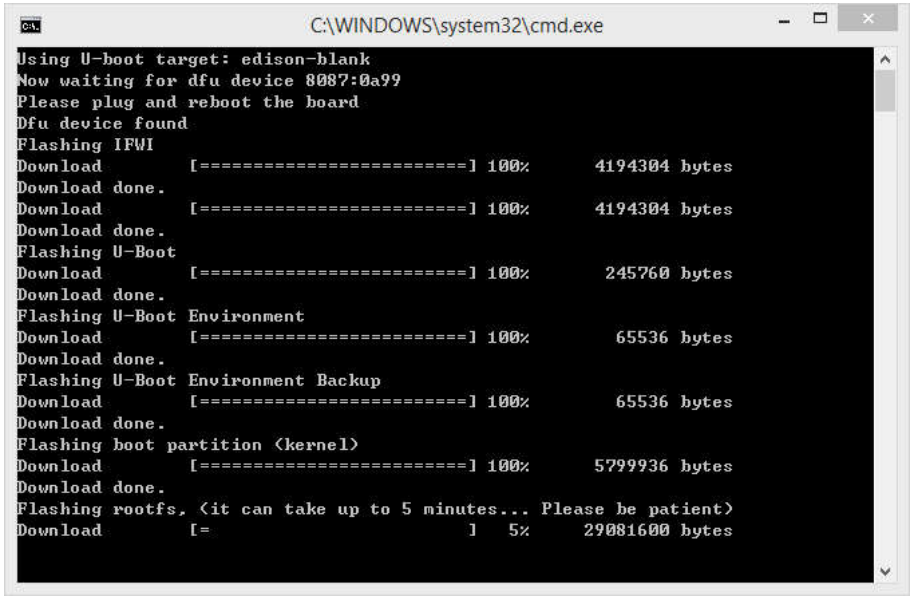
3.Flash firmware
Follow the below steps.

Step 1. Double click flashall.bat

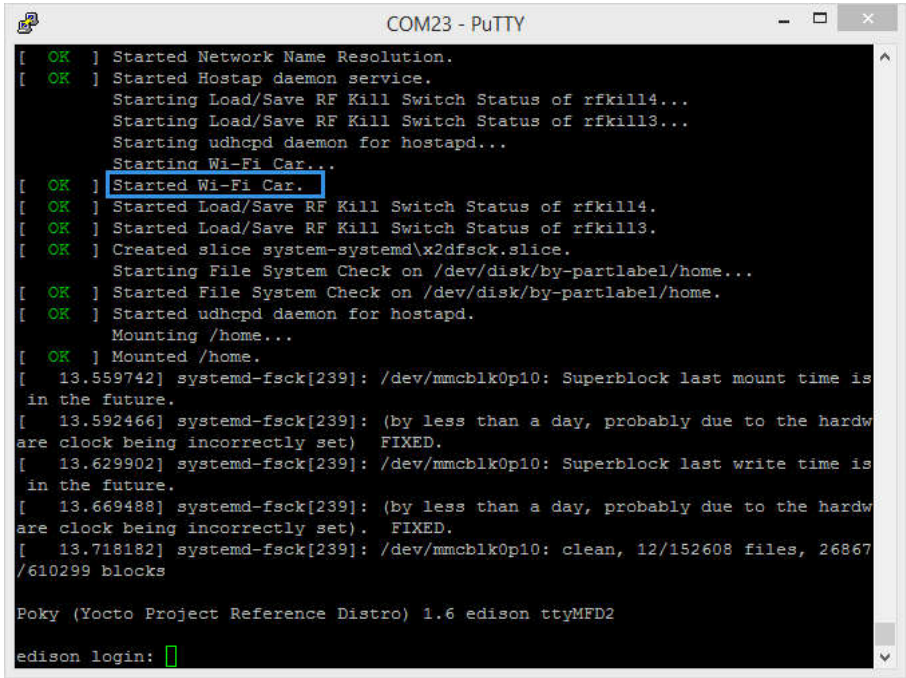


Step 2. Go to PuTTy input command line reboot or press the RESET button on the Edison Arduino board.

Step 3. Flashing firmware



Step 4. Edison reboot and Wi-Fi Car service started.



Step 5: Restart the power
Disconnect and reconnect the battery.

For Mac user

See Intel Edison official web site (https://communities.intel.com/docs/DOC-23193) "Alternate Flashing Method".

For Linux user

1.Download customized image

```
>>wget http://www.seeedstudio.com/wiki/images/a/a6/Edison-image-rel1-maint-rel1-ww42-14-for-wificar.zip
>>unzip edison-image-rel1-maint-rel1-ww42-14-for-wificar.zip
>>7z x edison-image-rel1-maint-rel1-ww42-14-for-wificar.7z
```

2.Flash image
1)Intall dfu-util

```
sudo apt-get install dfu-util
```

2)Check which device is for edison:

```
>>ls /dev/ttyUSB*
```

3)Open serial terminal

```
>>sudo screen /dev/ttyUSB0 115200
```

4)Run flashall.sh

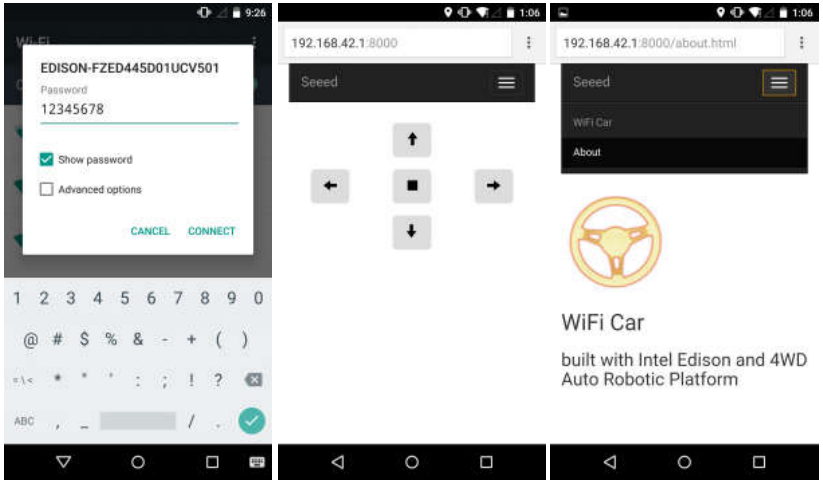
```
>>cd edison-image-rel1-maint-rel1-ww42-14-for-car
>>sudo ./flashall.sh
```

5)Goto edison type in reboot

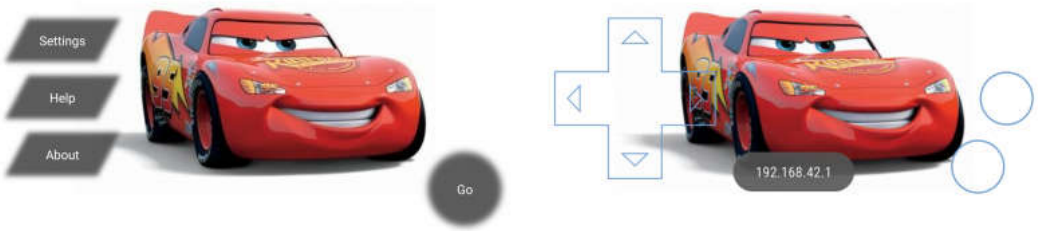
```
>>reboot
```

Application

Now use a smart phone or computer to search the WiFi accessible point, the SSID was named in a unique serier numbers by the S/N id on every edison main board like EDISON-FZED445001UCV501, and the passphrase is 12345678. After connected to the WiFi, open any web browser visit http://192.168.42.1:8000 you'll see a dashboard with which to controll the 4WD Platform.



Wi-Fi car Android apk (http://www.seeedstudio.com/wiki/File:WiFi%20Car%20cn.xiongyihui.wificar%202.apk.zip)



How to program it

Navigate to /usr/share/car you'll see the project, these files are:

```
>>cd /usr/share/wificar
>>ls
```

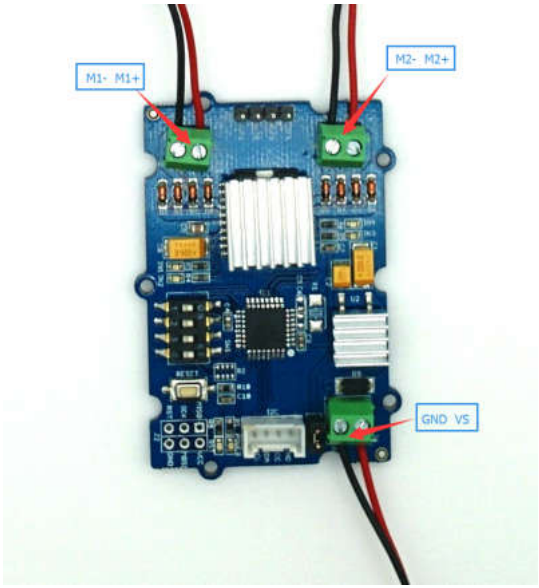
```
edison login: root
root@edison:~# cd /usr/share/wificar/
root@edison:/usr/share/wificar# ls
car.py                  i2c_motor.py            software_i2c.py
car.pyc                 i2c_motor.pyc           software_i2c.pyc
car_httpd.py            pseudo_software_i2c.py  www
root@edison:/usr/share/wificar#
```

car.py	Car action class
car_httpd.py	Webserver process
i2c_motor.py	The i2c Motor driver
softi2c.py	The softi2c driver for Edison
www	Webserver source file

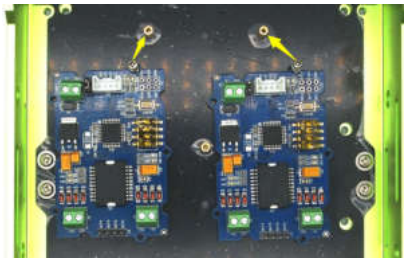
Enhancement - two Motor Driver

1. The wiring.
Here you'll need a wire stripper a soldering iron and scissors to cut down the motors' extension wires, and use one of them to make a new one-to-two motor power cable.

2. Assemble
Step 1. Connect the motors.



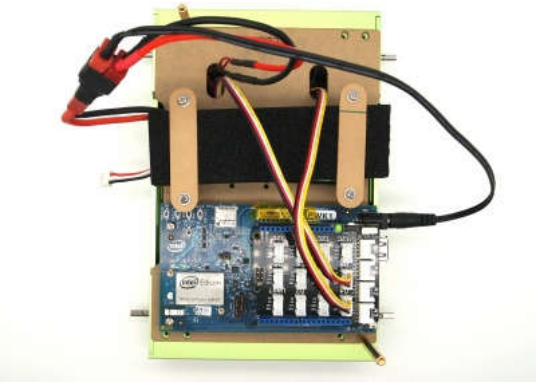
Step 2.Assemble the motor and the motor driver , pay attention to the yellow arrows, two motor drivers are screwed with only two screw.



Step 3.Connect the power wire and two grove cables.

Step 4. Put on the middle board.

Step 5. Plug the grove cables to D4(D4,D5) D8(D8,D9) with no special definition, test the connection by plug the battery.



3. Software modification

Goto the virtual terminal open car.py do the below change.

```
Poky (Yocto Project Reference Distro) 1.6 edison ttyMFD2

edison login: root
root@edison:~# cd /usr/share/wificar/
root@edison:/usr/share/wificar# ls
car.py                  i2c_motor.py            software_i2c.py
car.pyc                 i2c_motor.pyc           software_i2c.pyc
car_httpd.py            pseudo_software_i2c.py  www
root@edison:/usr/share/wificar# vi car.py
```

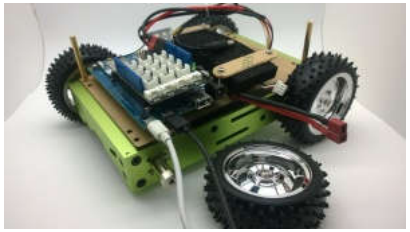
```
    def run(self):
        print('car thread is running')
        self.motor = Motor(4, 5)
        self.motor_ = Motor(8, 9)
        while not self.exit.isSet():
```

```
            elif self.action == self.ACTION_LEFT:
                self.motor.setDirection(self.DIRECTION_STOP)
                self.motor.setSpeed(255,255)
                self.motor.setDirection(self.DIRECTION_LEFT)

                self.motor_.setDirection(self.DIRECTION_STOP)
                self.motor_.setSpeed(255,255)
                self.motor_.setDirection(self.DIRECTION_LEFT)

            elif self.action == self.ACTION_RIGHT:
                self.motor.setDirection(self.DIRECTION_STOP)
                self.motor.setSpeed(255,255)
                self.motor.setDirection(self.DIRECTION_RIGHT)

                self.motor_.setDirection(self.DIRECTION_STOP)
                self.motor_.setSpeed(255,255)
                self.motor_.setDirection(self.DIRECTION_RIGHT)
            else:
                pass
```

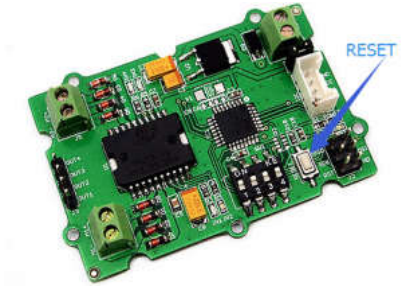
FAQ

1.If you have connected the Edison’ s WiFi and the dashboard was shown but can’ t controll the rover.
A:Try to restart the power.

2.The two USB ports on Edison Arduino board were blocked by a wheel what to do to connect USB cables?
A:You have to take down the wheel when you want to connect USB cables. If you want only to visit the linux system you can connect its WiFi AP and visit via SSH tools, the PuTTy is capable of SSH .



3.Have run the Wi-Fi car server and smart phone received the dashboard but can’ t controll the rover. Why?
A:The i2c Motor Driver has a bug that if a complete byte of orders sending was interrupted the motor driver will lose controll. You have to reset the driver board by pressing the reset button on it.



Support

- github-Edison_WiFi_Car (https://github.com/Seeed-Studio/Edison_WiFi_Car)
- The Intel Edsion official web site (http://www.intel.com/content/www/us/en/do-it-yourself/edison.html)
- Edison - Software Downloads (https://communities.intel.com/docs/DOC-23242)
- Intel official Forum (https://communities.intel.com/community/makers/edison/forums)
- intel-iot-devkit/mraa (https://github.com/intel-iot-devkit/mraa)
- Intel Edison Getting Start (https://communities.intel.com/docs/DOC-23147)
- Flashing Edison(wired) - Windows(Mac, Linux) (https://communities.intel.com/docs/DOC-23192)
- Edison 4WD Auto Robotic Platform DC Motor Spec (http://www.seeedstudio.com/wiki/File:Edison_4WD_Auto_Robotic_Platform_DC_Motor_Spec.pdf)
- Edison 4WD Auto Robotic Platform DC Motor with Encoder Spec (http://www.seeedstudio.com/wiki/File:Edison_4WD_Auto_Robotic_Platform_DC_Motor_with_Encoder_Spec.pdf)

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