RUMBA Users Manual

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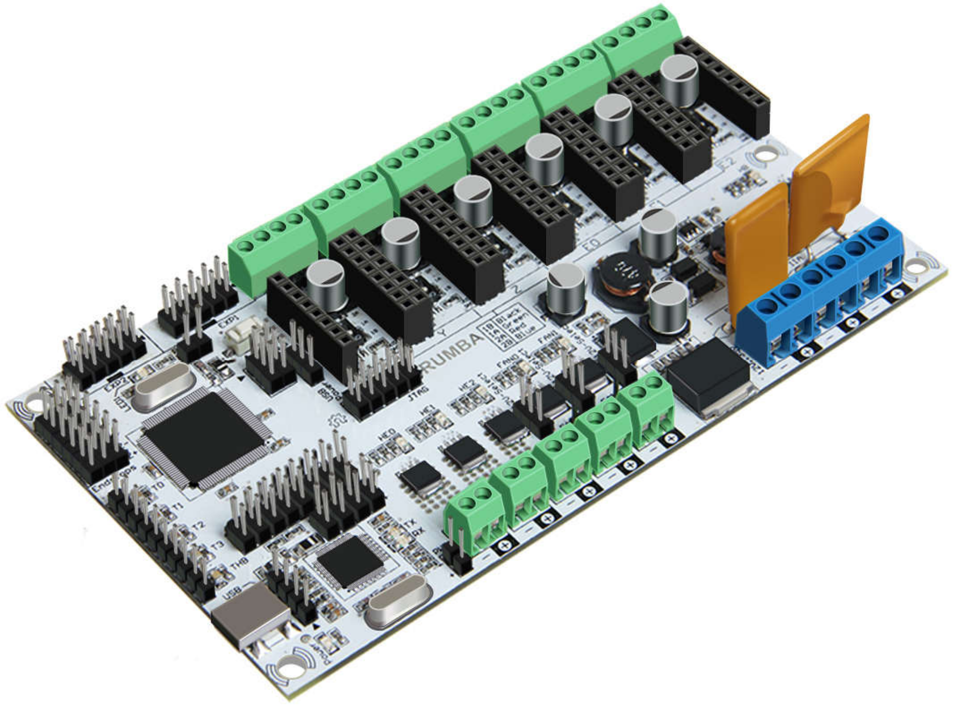
Reviewer: Rocky.Liu **Date:** Jul 8,2014

Approver: Crystal.Zhao **Date:** Jul 8,2014



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Technical Support

If you are interested in the technology of 3 D printing, flight control and U-home, welcome to Geeetech, we have series of made-up products, main boards, modules and a variety of peripherals for you. Or if you are looking for relevant information or technical support, please login our forum where you can find anything you want about open source. To know more about our new products, please visit www.geeetech.com, we will serve you wholeheartedly.

1 Introduction

As the core of 3D printer, Rumba's running is controlled by electric part. Rumba uses the integrated control board on the base of ATmega's AVR processor. The circuit board is developed for 3D printer, carver, laser cutter and other CNC. Controlling the 3Dprinter with USB or printing through SD memory card. With integrated design, it is easy to install and debug. Using Arduino IDE as the development software, the firmware update and parameter configuration are both easy to use. Compared with other 3D Printer control board, Rumba has one more motor driver and less plug-in part so that it can improve the connectivity and stability. Detailed parameters are as follows.

1,Use the same CPU as that of Arduino MEGA as main control chip, Atmega2560 cooperates with high-performance USB chip in order that it is compatible with all RAMPS relevant firmware;

2,Five interfaces as input for temperature sensor.

3,All pins being drawn out to permit more function expansion.

4,With expanding interface, it can connect the LCD displayed and the development board.

5,Servo's expanding interface to make the automatic leveling easier to add

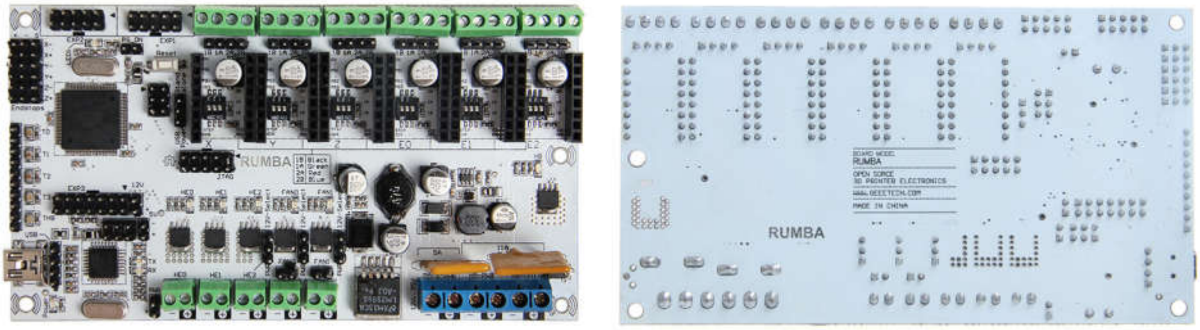
6,Supporting 6 pieces of 16 micro stepping drivers of A4988。

7,PWM DC output(heating pipe ,fan), six channels of output(1 channel of high current, 3 channels of medium current and 2 channels of low current). Use low on-resistance MOS Varactor as driver and LED tests each output.

8,Power-supply: power input 12v-35v, dual power to avoid interaction; hot bed connects 11A, 12V, other sections connect 5A, 12V and add a 12V cooler to reduce the high temperature from the high current of Mega controller.

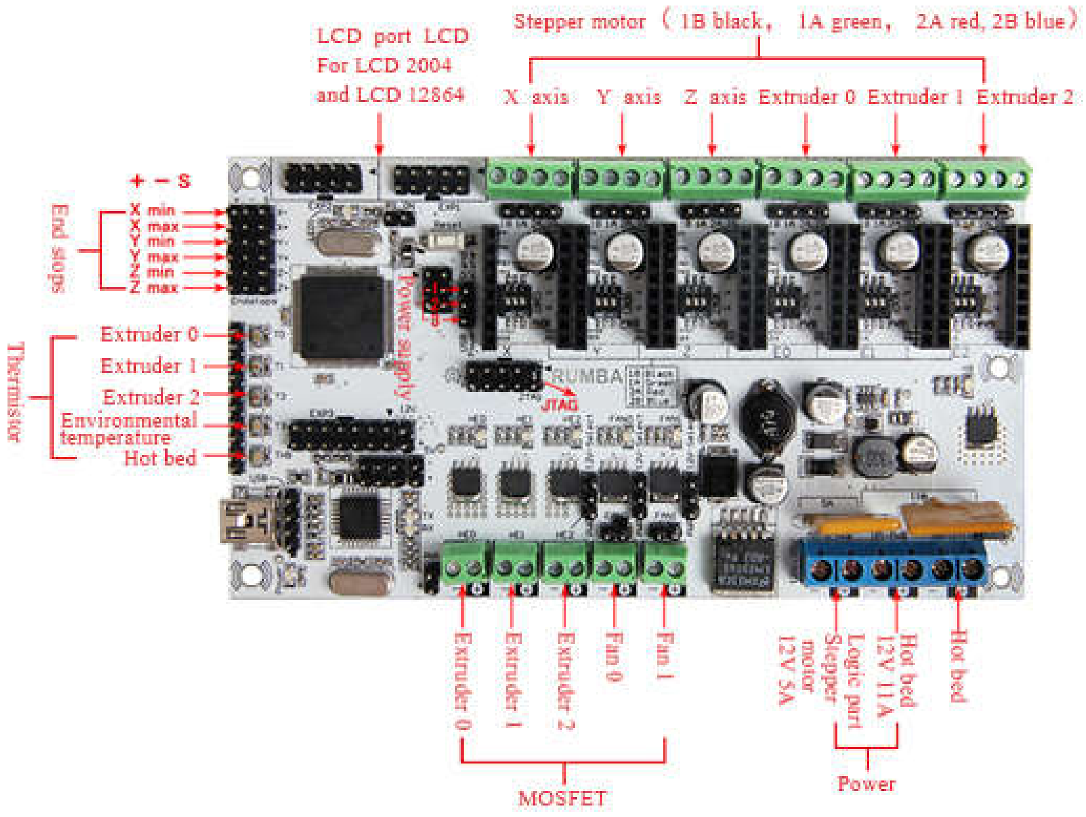
***Note: the voltage of the heatbed and extruder heater should match with that of the power input, or the control board will be burned out.**

9,Adopt the popular control board firmware-Marlin, which has good stability, usability and function.



1-1

1.1 Overview and Hardware Resources



1-2

Size:　135*175mm

Weight:　90g

1.2 Software Resources

Compiling environment:　Arduino IDE

Firmware:　Marlin

Host Computer Software:　printrun Repetier-Host (supporting Chinese)

1.3 Source

Printrun Media:Printrun-Win-Slic3r-10Mar2014.zip

Repetier-Host Media:SetupRepetierHost_1_00.zip

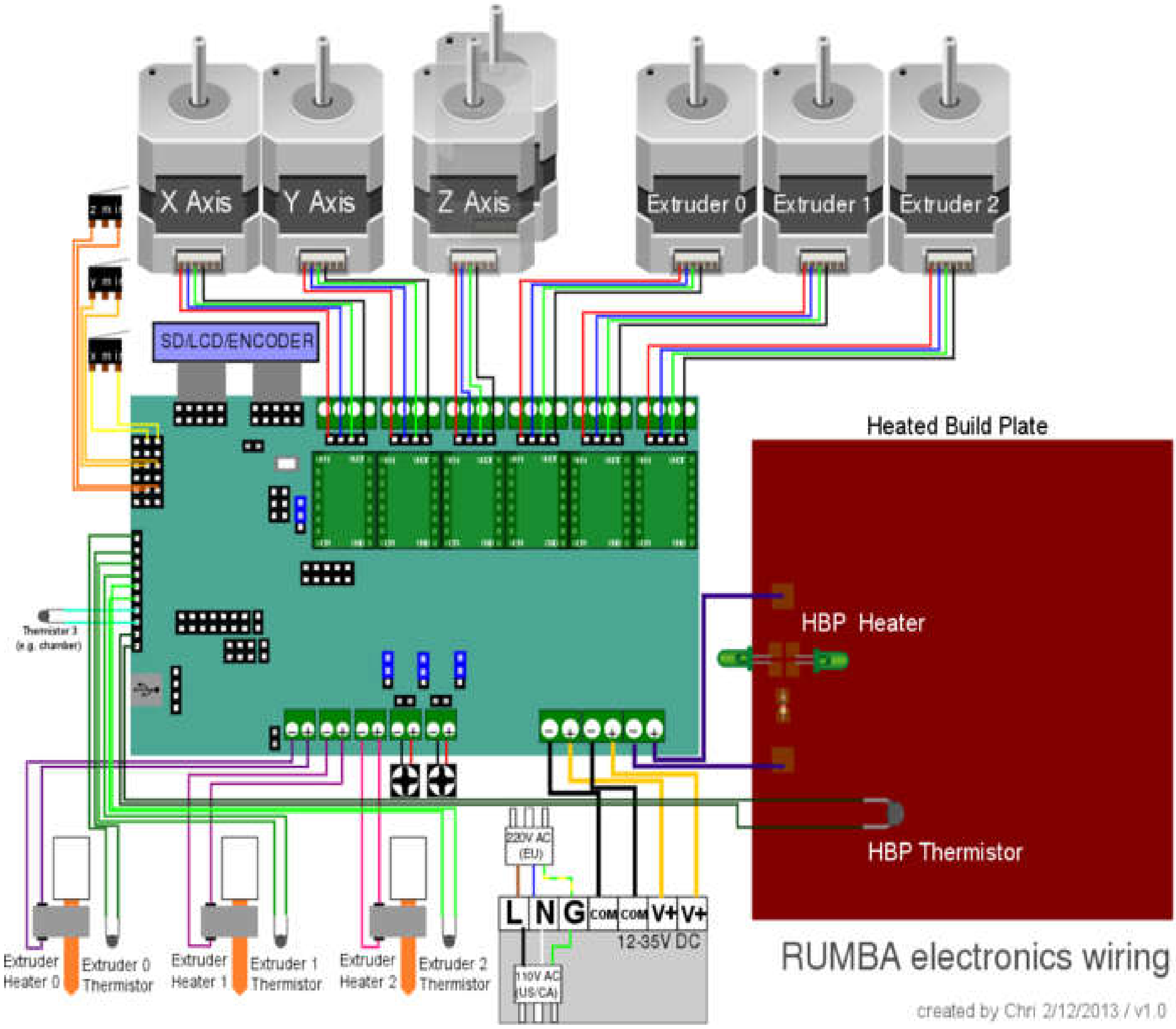
Arduino IDE Media:Arduino-1.0.5-r2-windows.zip

Arduino IDE Media:Arduino-1.5.6-r2-windows.zip

Marlin Media:Marlin-Marlin v1.zip

2 Interfaces

2.1 Interface Layout



2-1

2.2 Interface specifications

1. Five interface for temperature measurement: three for extruders, one for hot bed and one for

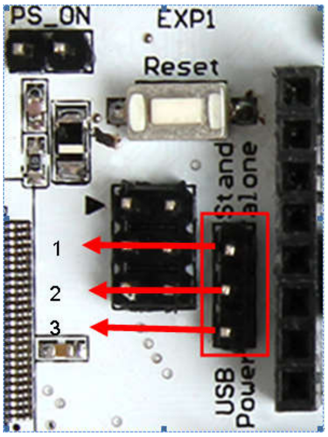
environment.

2. Five PWM: three for the heating of extruder and hot bed, one for Fan rotation and one for lighting.

3. Six end stops: Xmin/Xmax/Ymin/Ymax/Zmin/Zmax, which can connect ends tops of machinery and optics or the Hall Sensor.

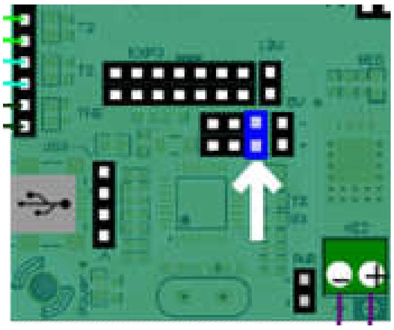
4. Supporting JTAG makes it possible to conduct software development.

2.3 Jumper Instruction



2-2

1. MCU power options: connect the jumper cap of 1 and 2 to provide external power. Connect the jumper cap of 2 and 3 to provide USB power.



2-3

2. Pulling out Jumper cap to make MCU into Mode DFU.

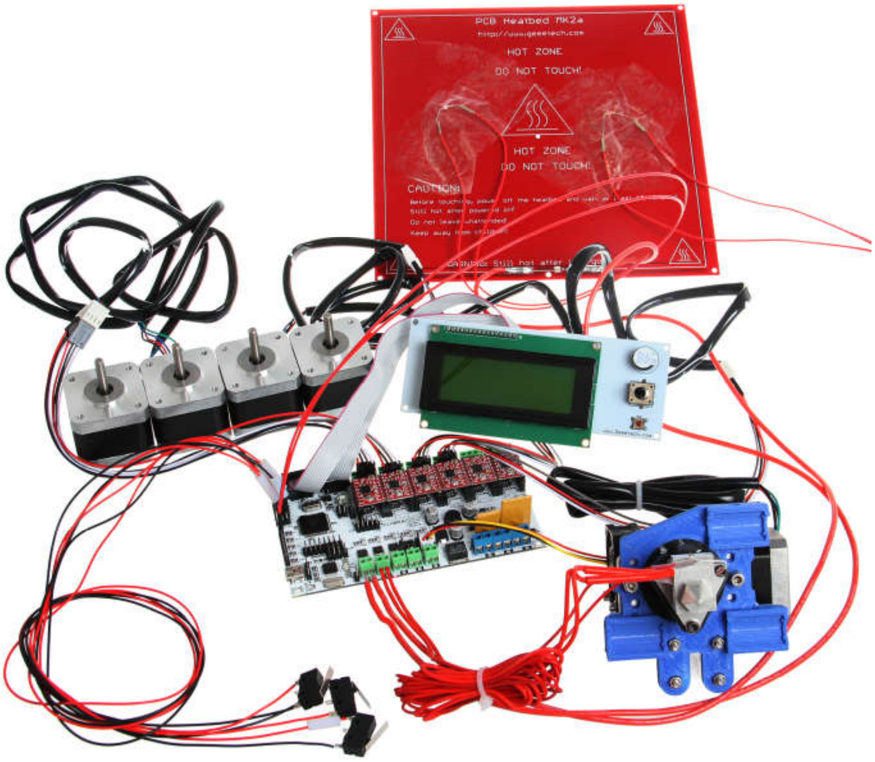
3. Rumba supports 12V-35V voltage (we often use 12V and 24V), for HE2,FAN0 and FAN1,

voltage is often fixed to 12V or that of the power input.

***Note: the voltage of the heatbed and extruder heater should match with that of the power input, or the control board will be burned out.**

3 Development Environment setting

3.1 Interface Connecting and Setting

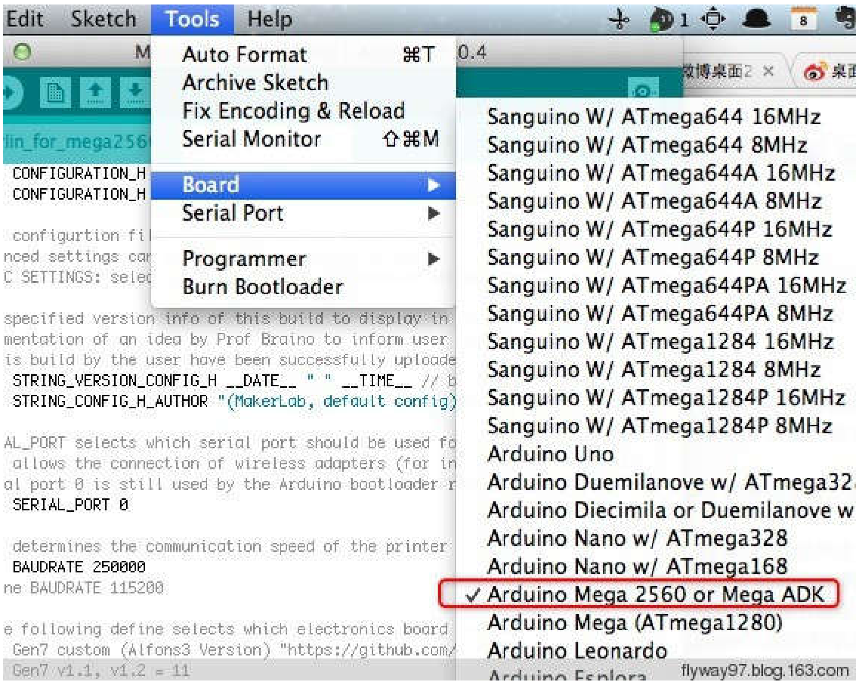


3-1

3.2 File Burning

Windows users need install driver before uploading. The board: Tools > Board > Arduino

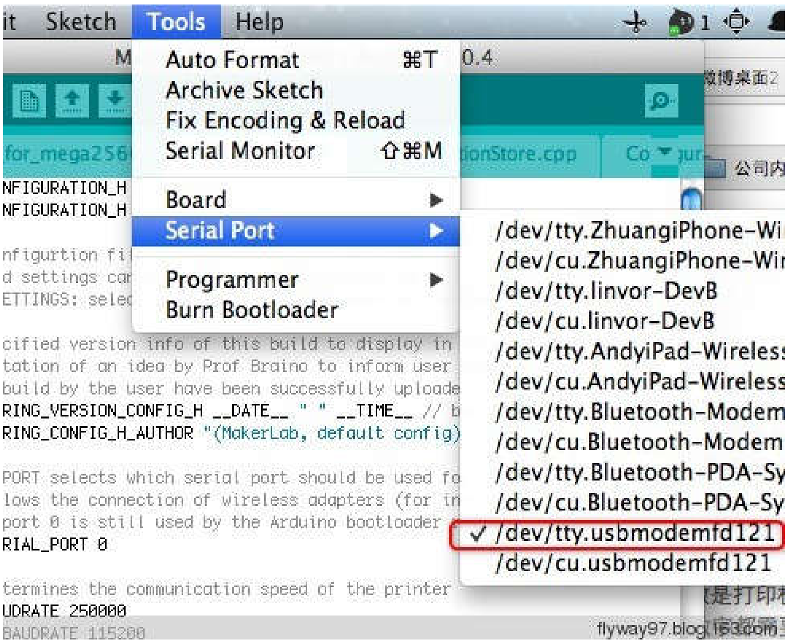
Mega 2560 or Mega ADK as shown below.


Edit
Sketch
Tools
Help
Auto Format ⌘T
Archive Sketch
Fix Encoding & Reload
Serial Monitor ⇧⌘M
Board
Serial Port
Programmer
Burn Bootloader
0.4
Sanguino W/ ATmega644 16MHz
Sanguino W/ ATmega644 8MHz
Sanguino W/ ATmega644A 16MHz
Sanguino W/ ATmega644A 8MHz
Sanguino W/ ATmega644P 16MHz
Sanguino W/ ATmega644P 8MHz
Sanguino W/ ATmega644PA 16MHz
Sanguino W/ ATmega644PA 8MHz
Sanguino W/ ATmega1284 16MHz
Sanguino W/ ATmega1284 8MHz
Sanguino W/ ATmega1284P 16MHz
Sanguino W/ ATmega1284P 8MHz
Arduino Uno
Arduino Duemilanove w/ ATmega32
Arduino Diecimila or Duemilanove w
Arduino Nano w/ ATmega328
Arduino Nano w/ ATmega168
✓ Arduino Mega 2560 or Mega ADK
Arduino Mega (ATmega1280)
Arduino Leonardo
Arduino Esplora
lin_for_mega256
flyway97.blog.163.com

```
CONFIGURATION_H
CONFIGURATION_H

configurtion fi
nced settings ca
C SETTINGS: selec

specified version info of this build to display in
mentation of an idea by Prof Braino to inform user
is build by the user have been successfully uploade
STRING_VERSION_CONFIG_H __DATE__ " " __TIME__ // b
STRING_CONFIG_H_AUTHOR "(MakerLab, default config)

AL_PORT selects which serial port should be used fo
 allows the connection of wireless adapters (for in
al port 0 is still used by the Arduino bootloader r
SERIAL_PORT 0

determines the communication speed of the printer
BAUDRATE 250000
ne BAUDRATE 115200

e following define selects which electronics board
Gen7 custom (Alfons3 Version) "https://github.com/
Gen7 v1.1, v1.2 = 11
```

3-2

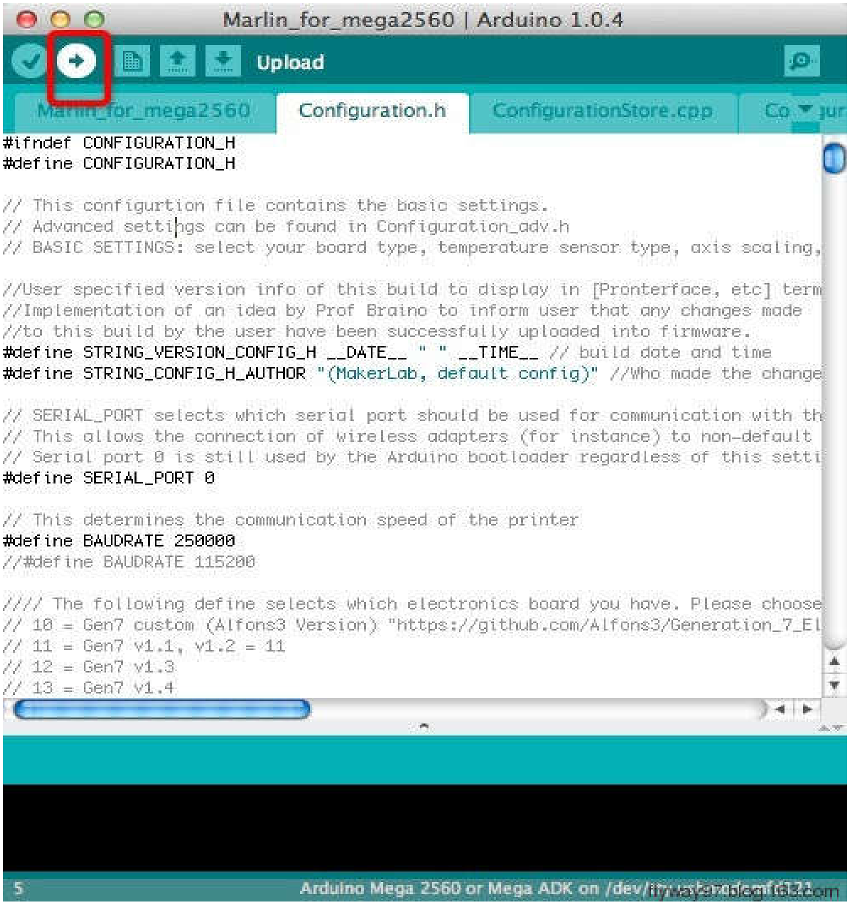
Configuring serial interface: Tools > Serial Port > your corresponding CommPort of mega board of is the last one usually. As shown below.



```
NFIGURATION_H
NFIGURATION_H

nfigurtion fi
d settings ca
ETTINGS: selec

cified version info of this build to display in
tation of an idea by Prof Braino to inform user
build by the user have been successfully uploade
RING_VERSION_CONFIG_H __DATE__ " " __TIME__ // b
RING_CONFIG_H_AUTHOR "(MakerLab, default config)

PORT selects which serial port should be used fo
lows the connection of wireless adapters (for in
port 0 is still used by the Arduino bootloader
RIAL_PORT 0

termines the communication speed of the printer
UDRATE 250000
BAUDRATE 115200
```

3-3

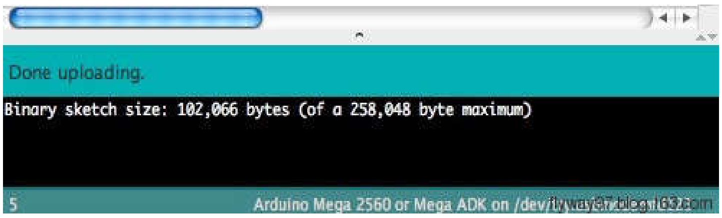
Click the “check (✓)” button to check if it is right or wrong and then click the “➔” button to upload firmware, as shown below.



```
#ifndef CONFIGURATION_H
#define CONFIGURATION_H

// This configurtion file contains the basic settings.
// Advanced settings can be found in Configuration_adv.h
// BASIC SETTINGS: select your board type, temperature sensor type, axis scaling,

//User specified version info of this build to display in [Pronterface, etc] term
//Implementation of an idea by Prof Braino to inform user that any changes made
//to this build by the user have been successfully uploaded into firmware.
#define STRING_VERSION_CONFIG_H __DATE__ " " __TIME__ // build date and time
#define STRING_CONFIG_H_AUTHOR "(MakerLab, default config)" //Who made the change

// SERIAL_PORT selects which serial port should be used for communication with th
// This allows the connection of wireless adapters (for instance) to non-default
// Serial port 0 is still used by the Arduino bootloader regardless of this setti
#define SERIAL_PORT 0

// This determines the communication speed of the printer
#define BAUDRATE 250000
//#define BAUDRATE 115200

//// The following define selects which electronics board you have. Please choose
// 10 = Gen7 custom (Alfons3 Version) "https://github.com/Alfons3/Generation_7_El
// 11 = Gen7 v1.1, v1.2 = 11
// 12 = Gen7 v1.3
// 13 = Gen7 v1.4
```

3-4

Upon uploading the correspondent LED to TX, RX and L will blink, if they stop blinking, the uploading completed.



Done uploading.

```
Binary sketch size: 102,066 bytes (of a 258,048 byte maximum)
```

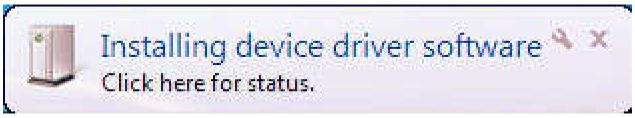
3-5

After uploading, you could go on to the next step. If you cannot upload, check the dialog box below IDE to identify the problem and solve it. The common mistakes of board type include the select error, serial port selection error, etc.

3.3 Software Setting

Arduino IDE Installation

You can notice USB identification "Arduino Mega 2560" on your computer when connecting the Rumba to computer with USB.

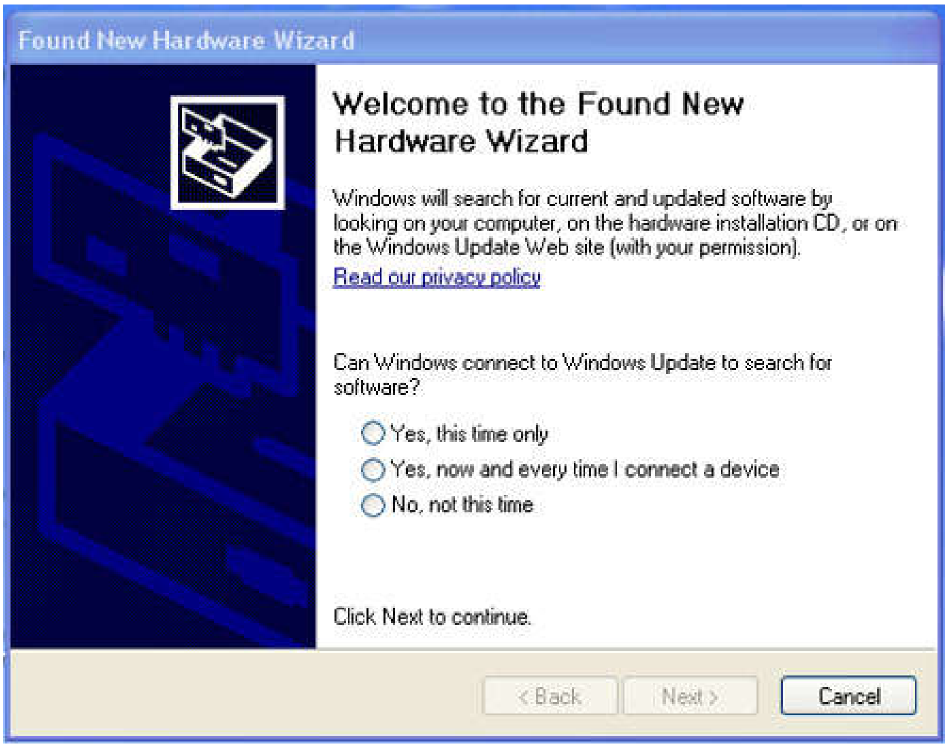


Installing device driver software

Click here for status.

3-6

Then, windows will open the dialog box "found new hardware guide", check "no, not this time", then click "next".



Found New Hardware Wizard

Welcome to the Found New Hardware Wizard

Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or on the Windows Update Web site (with your permission).

Read our privacy policy

Can Windows connect to Windows Update to search for software?

○ Yes, this time only

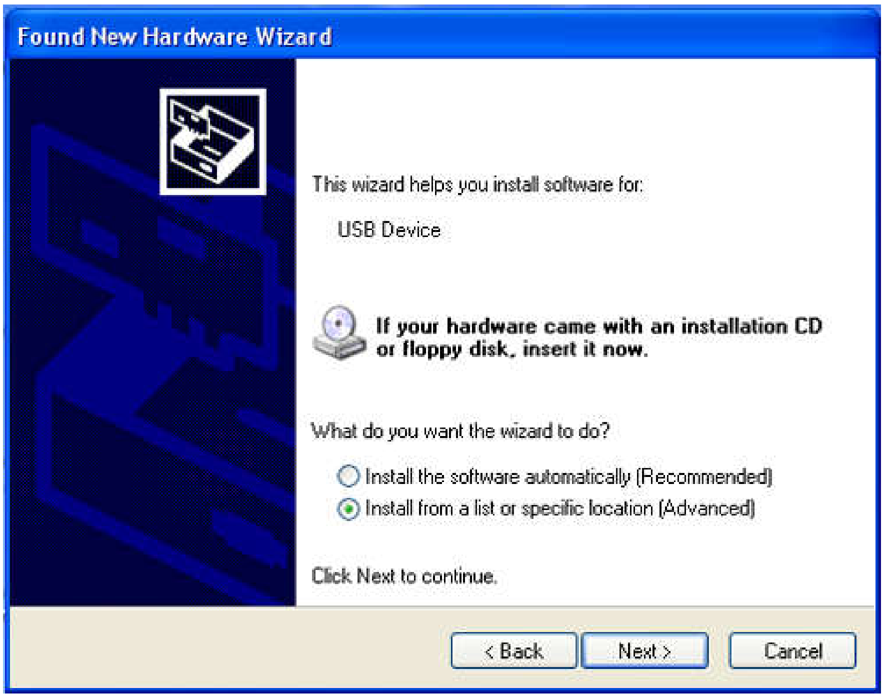
○ Yes, now and every time I connect a device

○ No, not this time

Click Next to continue.

3-7

Check "install from lists or specific location (advanced)", then click "next".



Found New Hardware Wizard

This wizard helps you install software for:

USB Device

If your hardware came with an installation CD or floppy disk, insert it now.

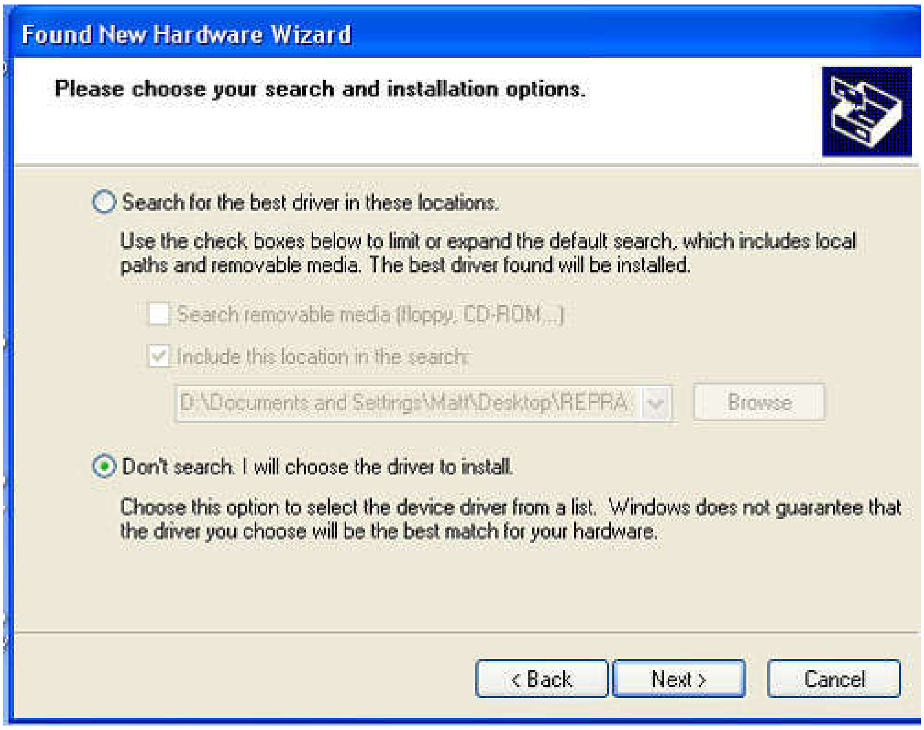
What do you want the wizard to do?

○ Install the software automatically (Recommended)
● Install from a list or specific location (Advanced)

Click Next to continue.

3-8

Specify “drivers” in Arduino 0021 installation directory to install driver.



Found New Hardware Wizard

Please choose your search and installation options.

○ Search for the best driver in these locations.

Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.

□ Search removable media (floppy, CD-ROM...)
☑ Include this location in the search:
D:\Documents and Settings\Matt\Desktop\REPRA

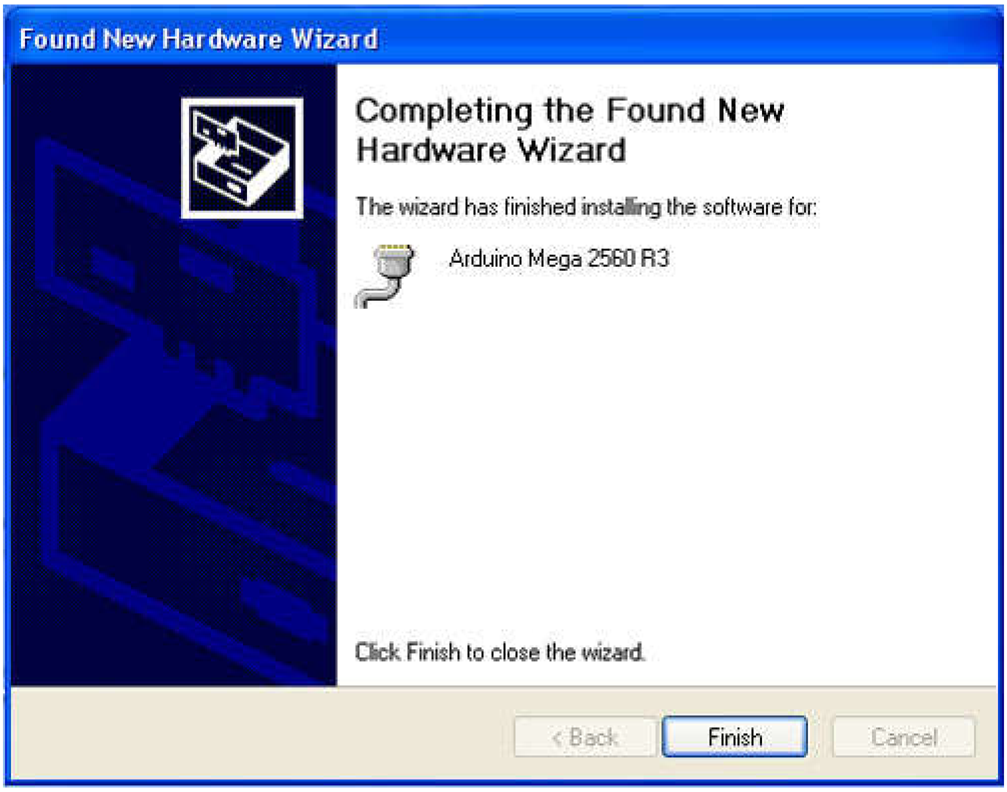
● Don't search. I will choose the driver to install.

Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.

3-9

If every goes well, windows will install the corresponding driver.

The graph below shows installation completed.



Found New Hardware Wizard

Completing the Found New Hardware Wizard

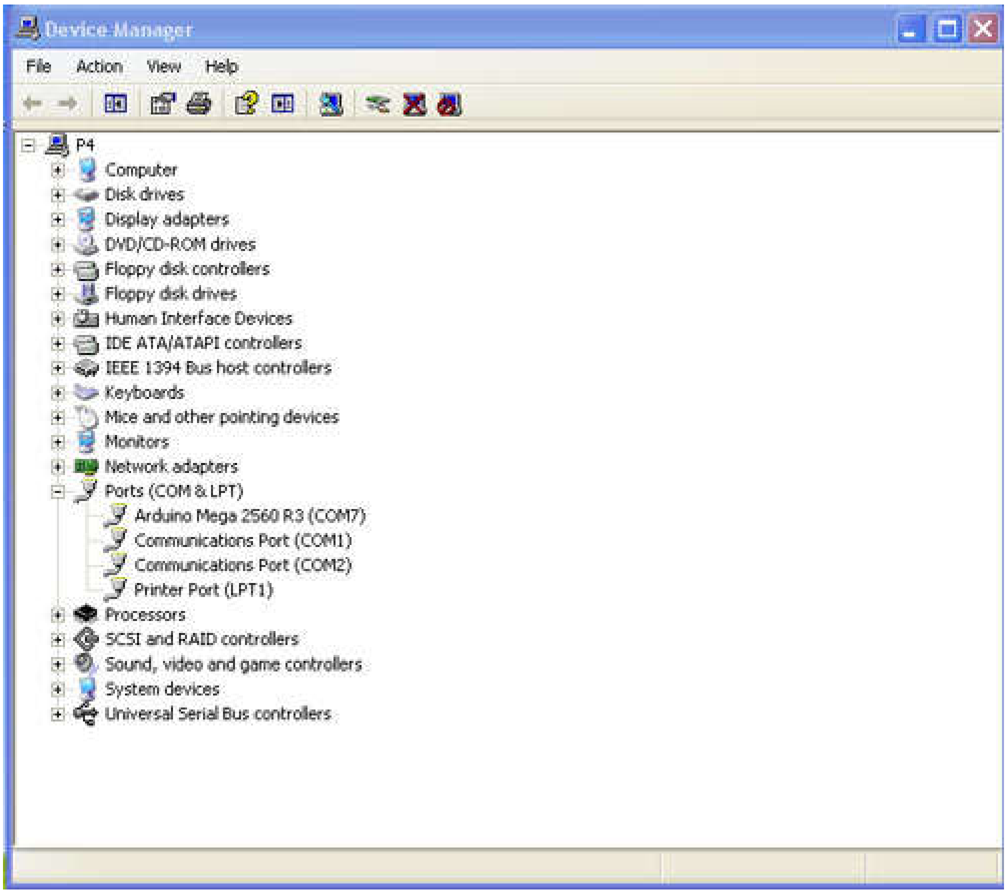
The wizard has finished installing the software for:

Arduino Mega 2560 R3

Click Finish to close the wizard.

3-11

At this time we could find the corresponding Arduino MEGA 2560 device in device manager of windows.


Device Manager
File Action View Help
P4
Computer
Disk drives
Display adapters
DVD/CD-ROM drives
Floppy disk controllers
Floppy disk drives
Human Interface Devices
IDE ATA/ATAPI controllers
IEEE 1394 Bus host controllers
Keyboards
Mice and other pointing devices
Monitors
Network adapters
Ports (COM & LPT)
Arduino Mega 2560 R3 (COM7)
Communications Port (COM1)
Communications Port (COM2)
Printer Port (LPT1)
Processors
SCSI and RAID controllers
Sound, video and game controllers
System devices
Universal Serial Bus controllers

3-12

4 Get Started

Rumba board to 3D printer is just like the brain to human. Rumba fulfill the complicated printing through dominating all 3D Printer Accessories。It cannot operate directly without uploading firmware.

1. Download firmware-Marlin. Marlin firmware is born with powerful features and easy to use, therefore we just introduce Marlin firmware.
2. Configure Firmware parameter.

   The following parameter need configured, others default.

   #define BAUDRATE 250000

It configures for SERBAUD. Note: the successful communication can be realized when the upper computer Baud rate is identical with Firmware Baud. The Baud can't be modified freely. The common Baud : 2400，9600，19200，38400，57600，115200，250000. The last three are frequently used by 3D Printer.

#define MOTHERBOARD 80

The parameter is used to configure board type. 3D Printer has many types of main board, but the IOs of all boards are different, therefore, the parameter has to correspond to the type of your board, or it can't operate normally. The configuration of Rumba should be 80(single nozzle configuration). If it is other board, you can choose a suitable parameter with the annotation beside the board.

#define TEMP_SENSOR_0 3

#define TEMP_SENSOR_BED 3

The two parameters configure the type of temperature sensor respectively. They are the critical parameter to check if the sensor read temperature normally. It is can't operate even has potential risk (burn the device and others) when the temperature readout is normal. You must modify depends on circumstance if you used other temperature sensors.

#define EXTRUDE_MINTEMP 170

The parameter is to avoid the potential risks when the extrusion operates before reaching the appropriate temperatures. If it is used for other 3D Printer, such as printer of Chocolates, 45℃ is appropriate, so that the parameter configured to a lower value(such as 40℃).

const bool X_ENDSTOPS_INVERTING = true;

const bool Y_ENDSTOPS_INVERTING = true;

const bool Z_ENDSTOPS_INVERTING = true

The three parameters configure the end stops types of three axes. The configuration is true, the end stop outputs 1 in default condition and outputs 0 in trigger condition. That is, mechanical end stop connects the AOF. If it connects the AON, true should be changed to false.

```
#define INVERT_X_DIR false
#define INVERT_Y_DIR true
```

It is easily to make mistakes in the above two parameters. The parameters are different in different machinery. However, in principle, the origin should be at lower-left corner of the print platform (origin: 0, 0), or at up-right corner (origin: max, max).then, the model printed is correct, otherwise, the printed is the mirror image of one axis, with the result that the wrong model direction.

```
#define X_HOME_DIR -1
#define Y_HOME_DIR -1
#define Z_HOME_DIR -1
```

If the origin is the minimum, the parameter is -1; if it is the maximum, the configuration is 1.

```
#define X_MAX_POS 205
#define X_MIN_POS 0
#define Y_MAX_POS 205
#define Y_MIN_POS 0
#define Z_MAX_POS 200
#define Z_MIN_POS 0
```

These parameters are crucial to the printing size configuration. Fill in parameters by reference to the coordinate graphs. It is important to note that the origin is not the printing center and the real printing center usually at [(x.max - x.min)/2, (y.max -y.min/2)]. The coordinate of central position will be used in the slice tool. The printing center's coordinate must correspond to the parameter configuration, or it will print to the outside of the platform.

#define HOMING_FEEDRATE {50*60, 50*60, 4*60, 0}

The rate of configuration back to origin, unit: mm/min. This parameter could be set default when you use the x-axis, y-axis synchronous belt drive and z-axis screw drive.

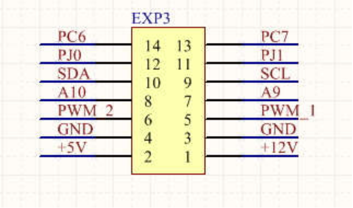
#define DEFAULT_AXIS_STEPS_PER_UNIT {85.3333, 85.3333, 2560, 158.8308}

These parameters are crucial to check if the printing size is correct. Parameters means that the pulse number needed at every axis when operating 1mm. they are correspond to x, y, z and e respectively. In most cases these number should be computed by yourself, but you can refer to: http://calculator.josefprusa.cz/#steppers

So far we have configured the common parameters and could operate it. In addition, if the 2004LED need verifying, you should delete the “//” from “//#define REPRAP_DISCOUNT_SMART_CONTROLLER” to ensure the normal working.

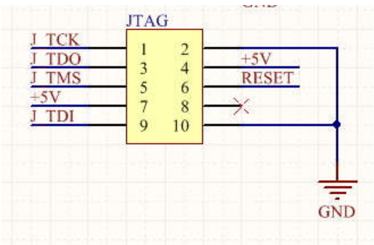
5 Extensible Applications

Exp：IIC、PWM、GPIO



5-1

JTAG:



5-2

6 FAQS

1. Q: The LED light is off when connected USB and external 5V power.

A:The jumper cap of MCU power options has not plugged.

The LED does not work or not weld correctly.

2. Q: LCD screen does not display.

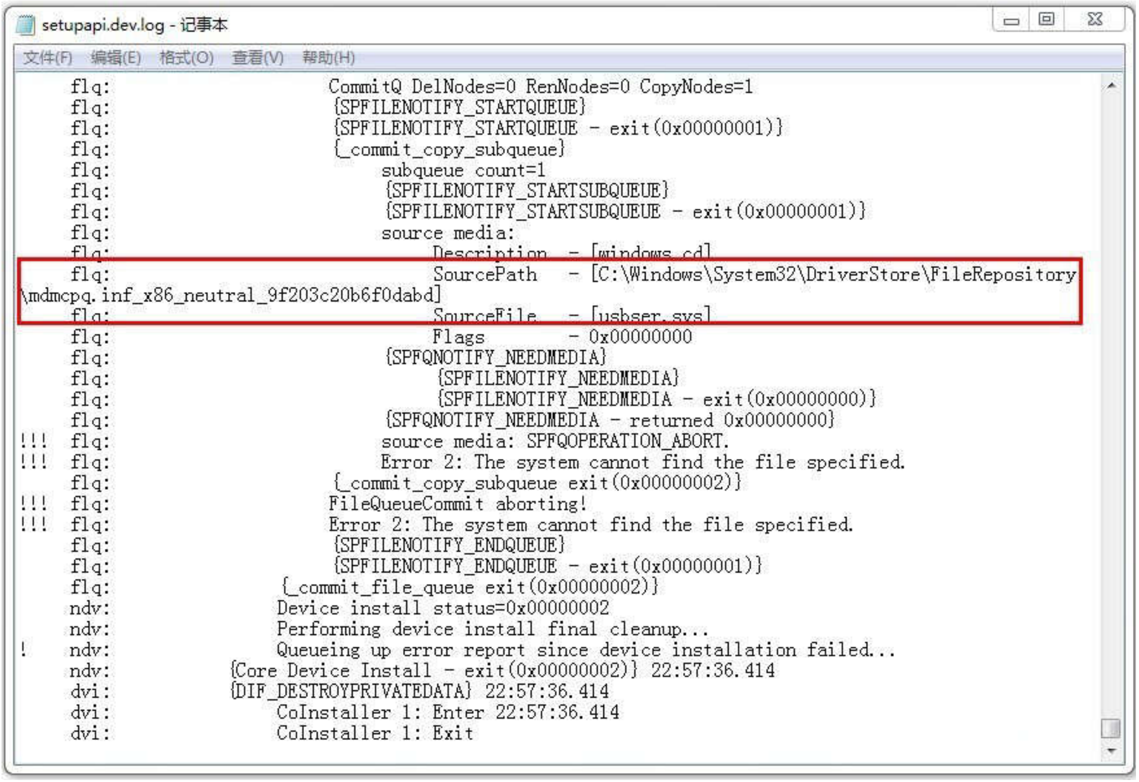
A: The code has not burned-in and the connection of LCD is poor.

3. Q: Fail to install driver.

A: you may encounter a problem “system cannot find the specific folder” in the process of Arduino driver installation when you use starter edition windows, because the starter edition of windows system has deleted some uncommon information for driver. The resolutions are as follows,

1),open C:\windows\inf\setupapi.dev.log

The file not only includes plug and play device, information for driver installation, but also record the reason for the failure of Arduino driver installation. Open this file and move to the end of the file you will observe the following information as 6-2.


setupapi.dev.log - 记事本
文件(F) 编辑(E) 格式(O) 查看(V) 帮助(H)

```
     flq:                        CommitQ DelNodes=0 RenNodes=0 CopyNodes=1
     flq:                        {SPFILENOTIFY_STARTQUEUE}
     flq:                        {SPFILENOTIFY_STARTQUEUE - exit(0x00000001)}
     flq:                        {_commit_copy_subqueue}
     flq:                             subqueue count=1
     flq:                             {SPFILENOTIFY_STARTSUBQUEUE}
     flq:                             {SPFILENOTIFY_STARTSUBQUEUE - exit(0x00000001)}
     flq:                             source media:
     flq:                                  Description   - [windows cd]
     flq:                                  SourcePath    - [C:\Windows\System32\DriverStore\FileRepository
\mdmcpq.inf_x86_neutral_9f203c20b6f0dabd]
     flq:                                  SourceFile    - [usbser.sys]
     flq:                                  Flags         - 0x00000000
     flq:                             {SPFQNOTIFY_NEEDMEDIA}
     flq:                                  {SPFILENOTIFY_NEEDMEDIA}
     flq:                                  {SPFILENOTIFY_NEEDMEDIA - exit(0x00000000)}
     flq:                             {SPFQNOTIFY_NEEDMEDIA - returned 0x00000000}
!!!  flq:                             source media: SPFQOPERATION_ABORT.
!!!  flq:                             Error 2: The system cannot find the file specified.
     flq:                        {_commit_copy_subqueue exit(0x00000002)}
!!!  flq:                        FileQueueCommit aborting!
!!!  flq:                        Error 2: The system cannot find the file specified.
     flq:                        {SPFILENOTIFY_ENDQUEUE}
     flq:                        {SPFILENOTIFY_ENDQUEUE - exit(0x00000001)}
     flq:                   {_commit_file_queue exit(0x00000002)}
     ndv:                   Device install status=0x00000002
     ndv:                   Performing device install final cleanup...
!    ndv:                   Queueing up error report since device installation failed...
     ndv:              {Core Device Install - exit(0x00000002)} 22:57:36.414
     dvi:              {DIF_DESTROYPRIVATEDATA} 22:57:36.414
     dvi:                   CoInstaller 1: Enter 22:57:36.414
     dvi:                   CoInstaller 1: Exit
```

6-1

It is just the file error that causes the failure of Arduino driver installation.

2),creating a folder" mdmcpq.inf_x86_neutral_****** "in the path of C:\Windows\System32\DriverStore\FileRepository\**

The identifications of all computers are different, so please refer to the prompt box from the "setupapi.dev.log" to know the "******* ".

For example, information provided by my computer is

"C:\Windows\System32\DriverStore\FileRepository\mdmcpq.inf_x86_neutral_9f203c20b6f0dabd "

According to this prompt, I created another folder with the same name in the path of C:\Windows\System32\DriverStore\FileRepository\, as follows,

mdmcpq.inf_x86_neutral_9f203c20b6f0dabd

6-3

3),Download and decompress the following file and add it to the created folder mdmcpq.inf_x86_neutral_******.**

32bits windows:

mdmcpq.inf_x86.rar

((http://www.arduino.cn/forum.php?mod=attachment&aid=MTIzMHw2ZjJkZDY1OXwxNDA0NzAyMDgxfDY0MDF8MjQ4NQ%3D%3D)

64bits windows

mdmcpq.inf_amd64.rar (http://www.arduino.cn/forum.php?mod=attachment&aid=MTIzMXxkN2QxMzdiMHwxNDA0NzAyMDgxfDY0MDF8MjQ4NQ%3D%3D)

Downloading from "http://x.openjumper.com/mdmcpq/" is acceptable.

4）. Reinstall driver step-by-step.

At this point, driver can be installed.

If the computer system is windows 8 and driver cannot be installed, there are some other alternative methods for you.

1，Click Windows and R

2， Input shutdown.exe /r /o /f /t 00

3，Click "confirm"

4， The system enters "option" page automatically

5，Click FAQ

6，Click advanced options

7，Click windows boot settings

8， Click reboot button

9，System will reboot and go to the advanced boot options

10，Click “disable driver and mandatory signature”

11，Rebooted, install the Arduino driver and the installation method is the same with that of windows 7.