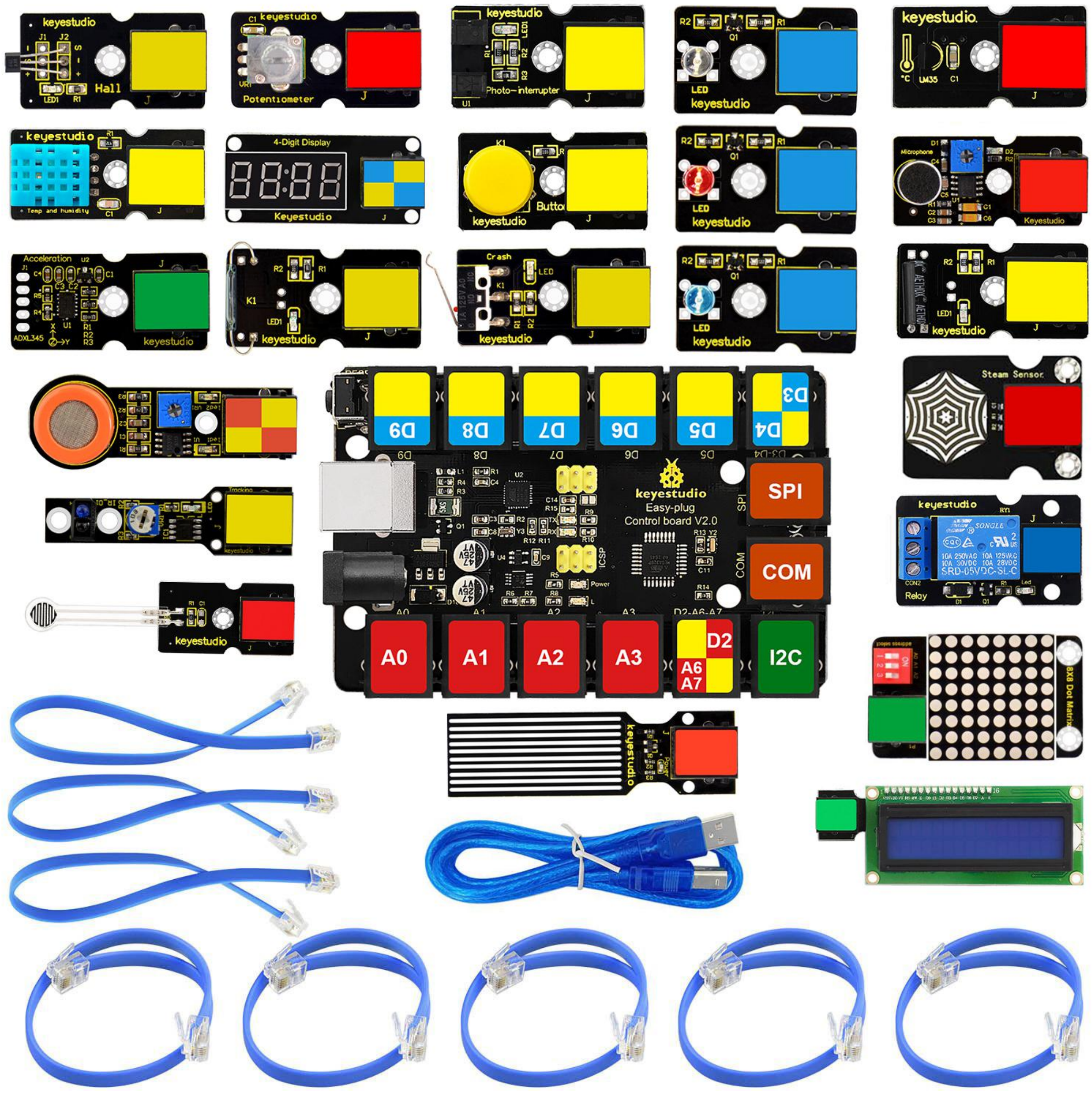
keyestudio

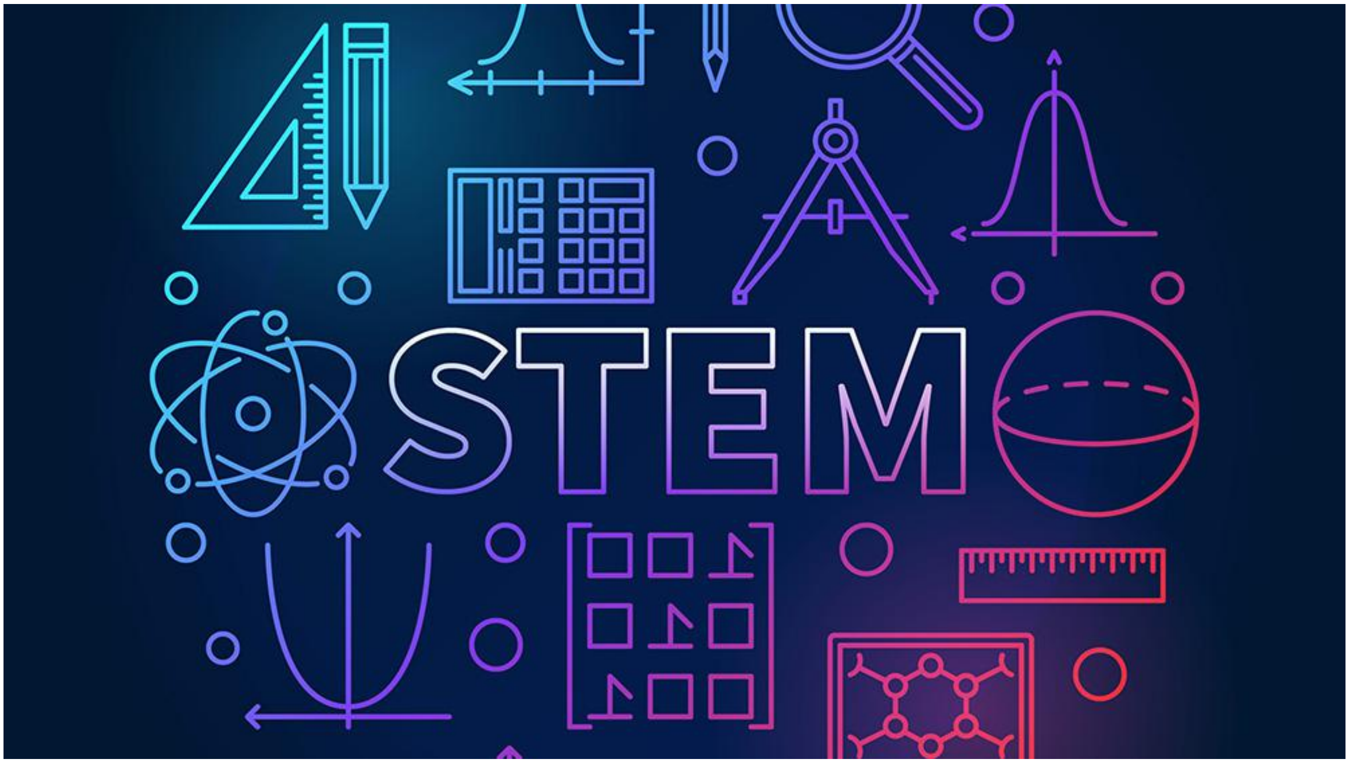
EASY PLUG Super Starter Kit

Arduino tutorial



www.keyestudio.com

1. Kit Description



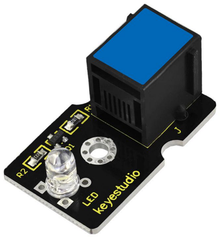
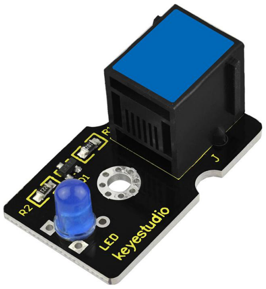
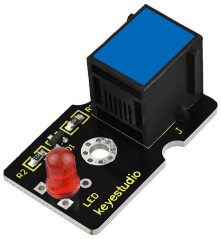
The keyestudio EASY PLUG Super Starter Kit is an entry-level Arduino learning kit. It has two programming methods, one is Arduino C programming, and the other is based on blockly MIXLY graphical programming, which is very easy to use and flexible.

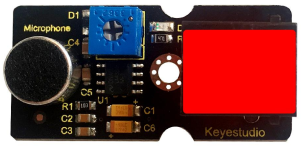
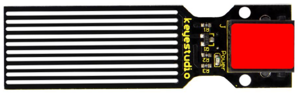
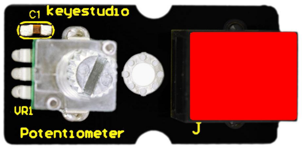
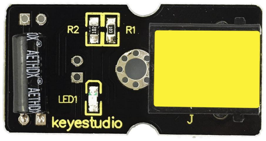
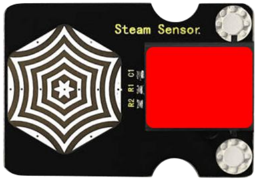
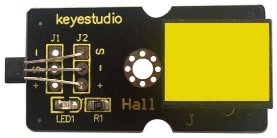
This kit contains everything you need to complete the project. These projects will teach you how to control and read external sensors and 1602 displays, control 8*8 dot matrix, etc.

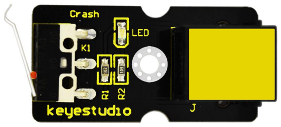
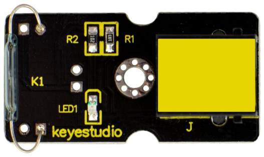
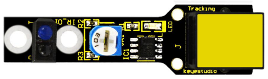
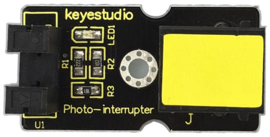
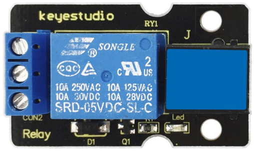
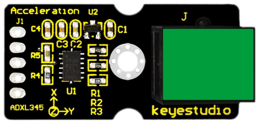
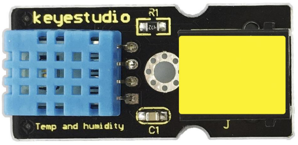
Although you have little knowledge about electronics, you can use this kit to realize your ideas if you want.

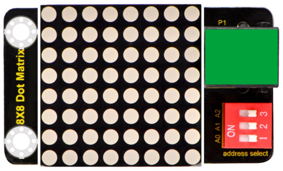
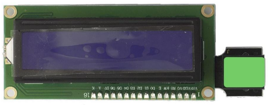
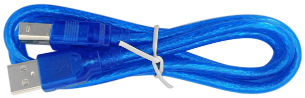
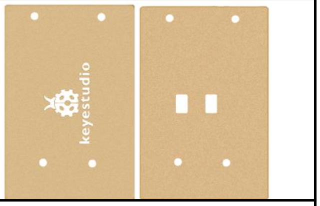
After using this kit, you will be able to start creating your own projects, and you can share your own creative works with close family, friends or classmates.

2. Kit List

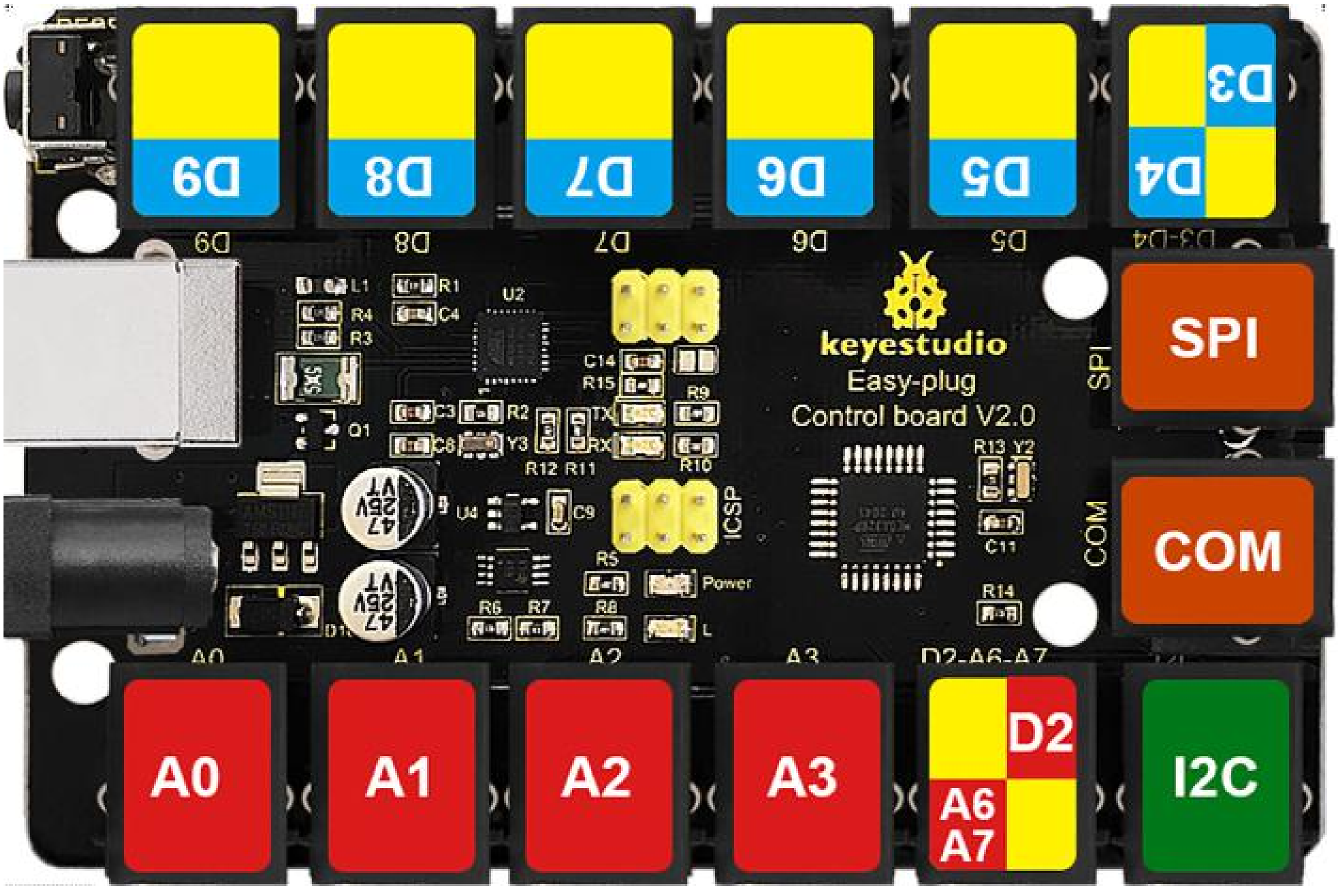
No.	Component	Quantity	Picture
1	EASY plug Control Board V2.0	1	
2	EASY plug White LED Module	1	
3	EASY plug Blue LED Module	1	
4	EASY plug Red LED Module	1	
5	EASY plug thin-film pressure sensor	1	

6	EASY plug Analog Sound Sensor	1	
7	EASY plug Water Level Sensor	1	
8	EASY plug Potentiometer Sensor	1	
9	EASY plug Analog Alcohol Sensor	1	
10	EASY plug LM35 Temperature Sensor	1	
11	EASY plug Digital Tilt Sensor Module	1	
12	EASY plug Steam Sensor	1	
13	EASY plug Hall Magnetic Sensor	1	

14	EASY plug Crash Sensor	1	
15	EASY plug Digital Push Button	1	
16	EASY plug Reed Switch Module	1	
17	EASY plug Line Tracking Sensor	1	
18	EASY plug Photo Interrupter Module	1	
19	EASY plug Single Relay Module	1	
20	EASY plug ADXL345 Acceleration Module	1	
21	EASY plug DHT11 Temperature and Humidity Sensor	1	

22	EASY plug 8x8 LED Matrix	1	 8X8 Dot Matrix P1 ON A0 A1 A2 1 2 3 address select
23	EASY plug 1602 LCD Module	1	
24	EASY plug 4-digit LED display	1	
25	200mm blue RJ11 cable	5	
26	300mm blue RJ11 cable	3	
27	USB cable	1	
28	Acrylic Boards	1	
29	Dual-pass M3*15MM Copper Pillar	4	
30	M3*10MM Round-head Screw	8	

3.Keyestudio EASY plug Control Board V2.0



The processor used in keyestudio EASY plug control board V2.0 is ATmega328.

It has 5 single Digital ports labeled D5 to D9 (of which 3 can be used as PWM outputs), 1 dual-digital interface (D3-D4), 4 analog inputs (A0-A3), a Joystick interface (D2-A6-A7), a SPI communication, a serial port communication and an IIC communication interface. Also with a USB connection, a power jack, two ICSP headers and a reset button. It breaks out the IO ports with RJ11 6P6C plug.

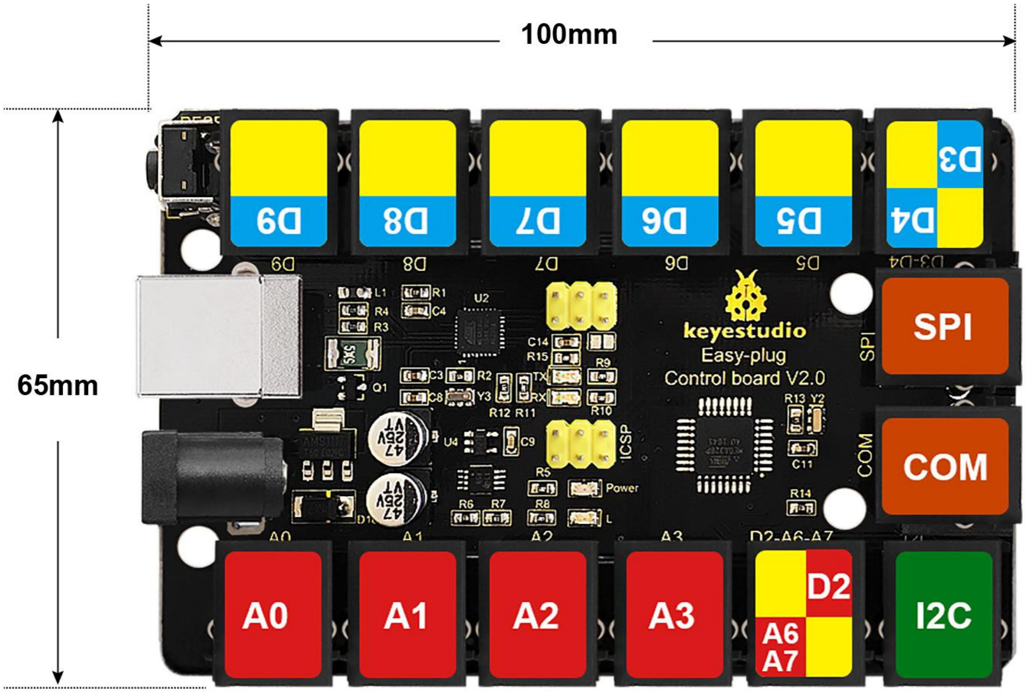
Simply connect it to a computer with a USB cable or power it via a DC jack to get started.

For convenience of wire connection, we simplify the pins GND and VCC into each plug, so you only need one RJ11 6P6C connector wire to connect an external sensor or module, no need to separately connect the VCC and GND.

So don't worry that the wrong wiring will damage the external products.

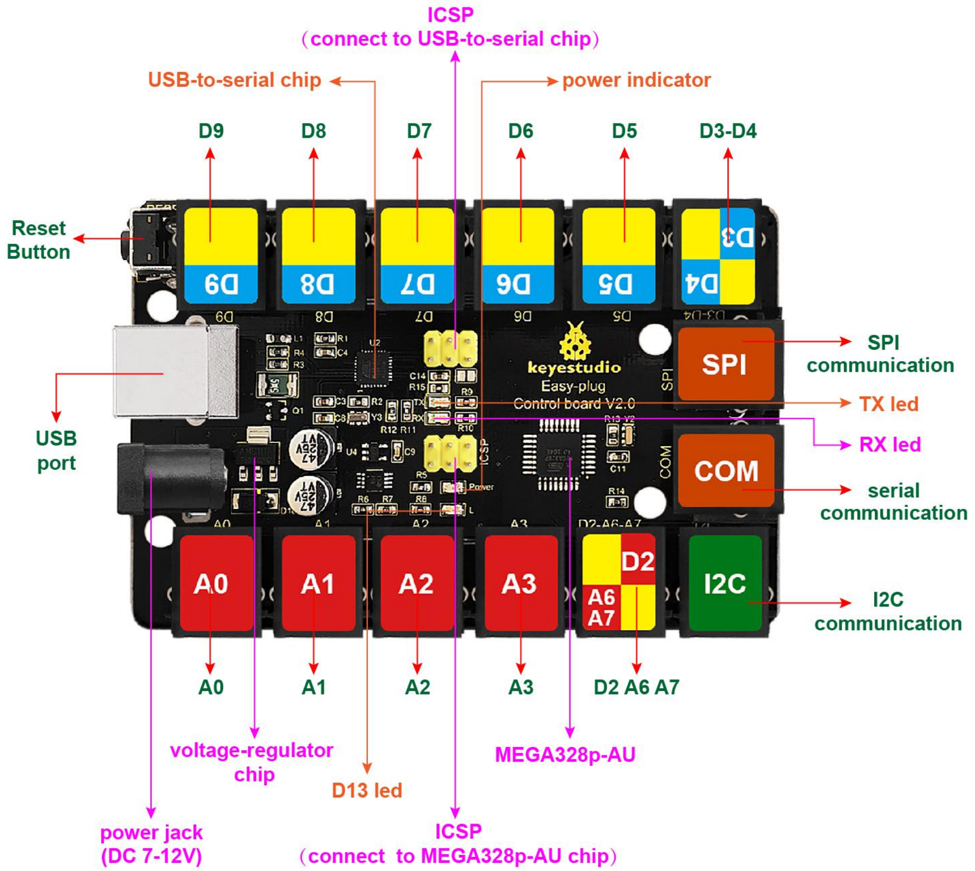
Specifications

Microcontroller	ATmega328P-AU
Operating Voltage	5V
Input Voltage (recommended)	DC7-12V
Single Digital Ports	5 (D5-D9) (of which 3 provide PWM output)
PWM Digital Ports	D5, D6, D9
Analog Input Pins	4 (A0-A3)
DC Current per I/O Pin	20 mA
Flash Memory	32 KB (ATmega328) of which 0.5 KB used by bootloader
SRAM	2 KB
EEPROM	1 KB
Clock Speed	16 MHz



Element and Interfaces:

Here is an explanation of what every element and interface of the board does:

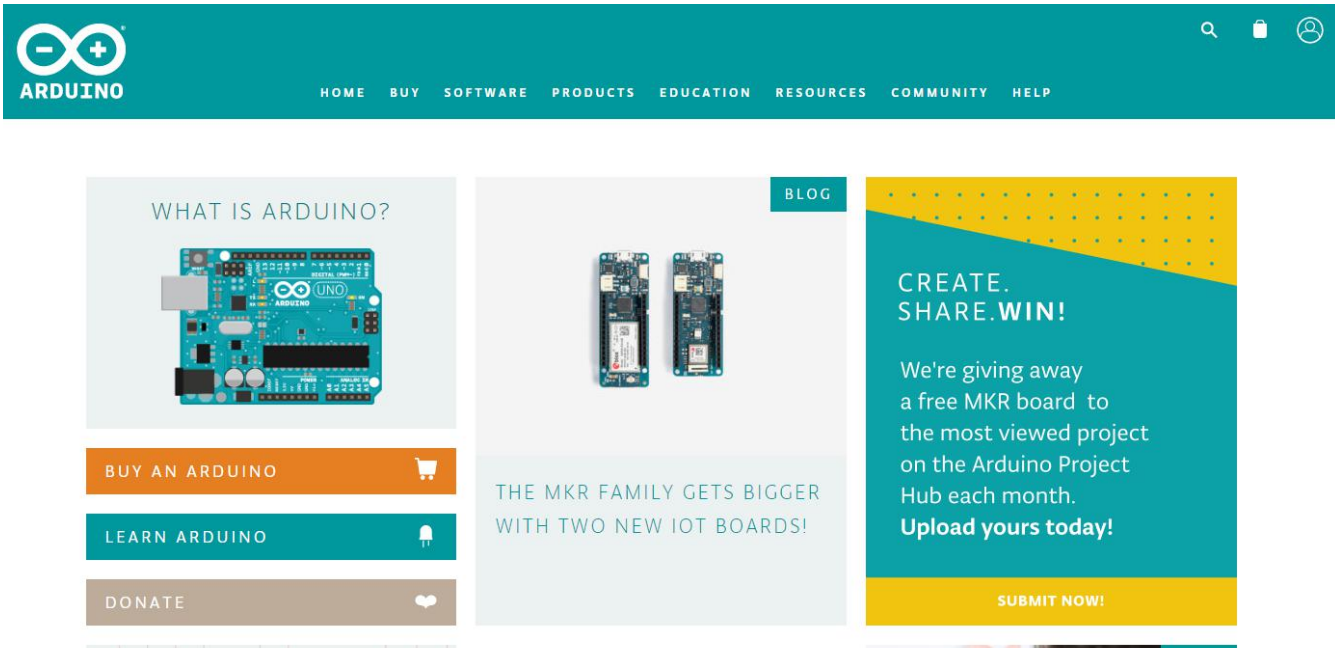

ICSP
（connect to USB-to-serial chip）
USB-to-serial chip
power indicator
D9
D8
D7
D6
D5
D3-D4
Reset
Button
D9
D8
D7
D6
D5
D4
D3
keyestudio
Easy-plug
Control board V2.0
SPI
SPI
communication
TX led
USB
port
RX led
COM
serial
communication
A0
A1
A2
A3
D2
A6
A7
I2C
I2C
communication
A0
A1
A2
A3
D2 A6 A7
voltage-regulator
chip
D13 led
MEGA328p-AU
power jack
(DC 7-12V)
ICSP
（connect to MEGA328p-AU chip）

4.Detailed Use with ARDUINO Software as follows:

Step1| Download the Arduino IDE

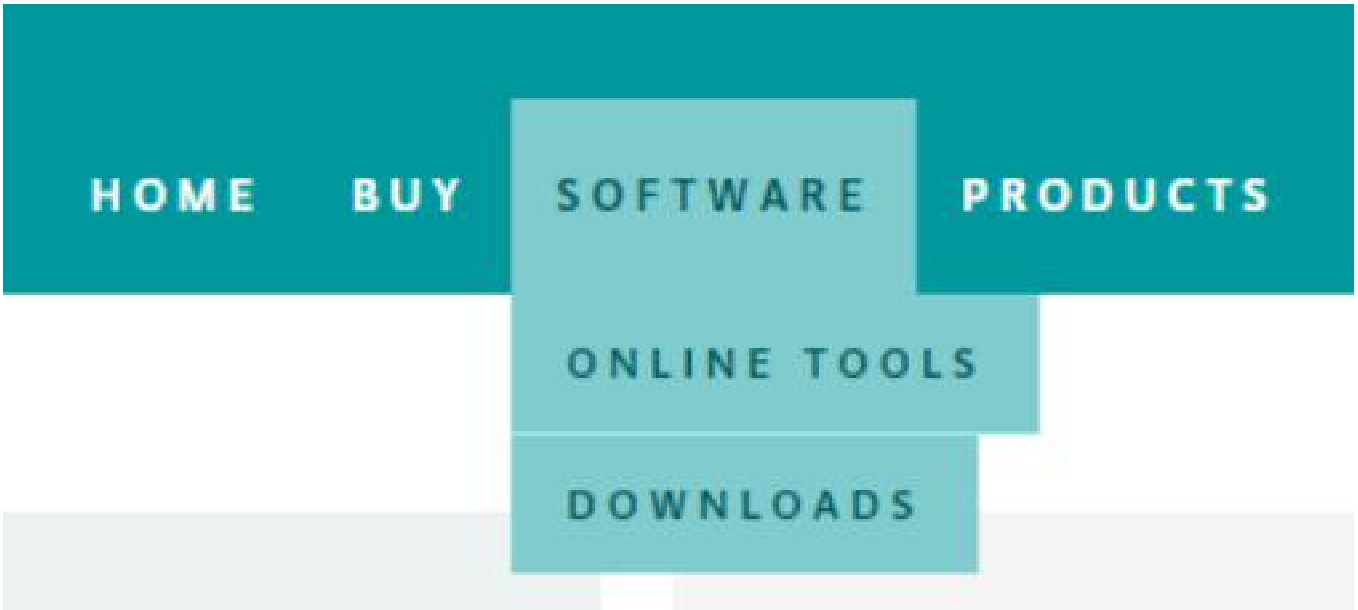
When you get the board, first you should install the Arduino software and driver.
We usually use the Windows software Arduino 1.5.6 version. You can download it from the link below:
https://www.arduino.cc/en/Main/OldSoftwareReleases#1.5.x

Or you can browse the ARDUINO website to download the latest version from this link, https://www.arduino.cc, pop up the following interface.

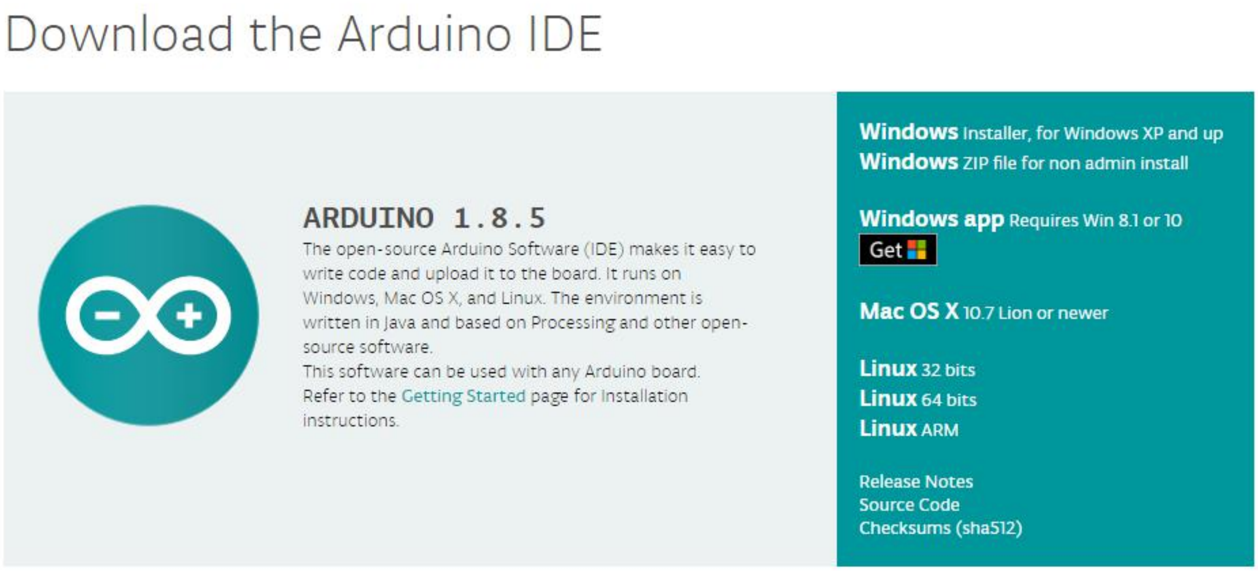


We're giving away a free MKR board to the most viewed project on the Arduino Project Hub each month. **Upload yours today!**

Then click the **SOFTWARE** on the browse bar, you will have two options ONLINE TOOLS and DOWNLOADS.



Click **DOWNLOADS**, it will appear the latest software version of ARDUINO 1.8.5 shown as below.



Download the Arduino IDE

ARDUINO 1.8.5

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software.

This software can be used with any Arduino board.

Refer to the Getting Started page for Installation instructions.

Windows Installer, for Windows XP and up

Windows ZIP file for non admin install

Windows app Requires Win 8.1 or 10

Get

Mac OS X 10.7 Lion or newer

Linux 32 bits

Linux 64 bits

Linux ARM

Release Notes

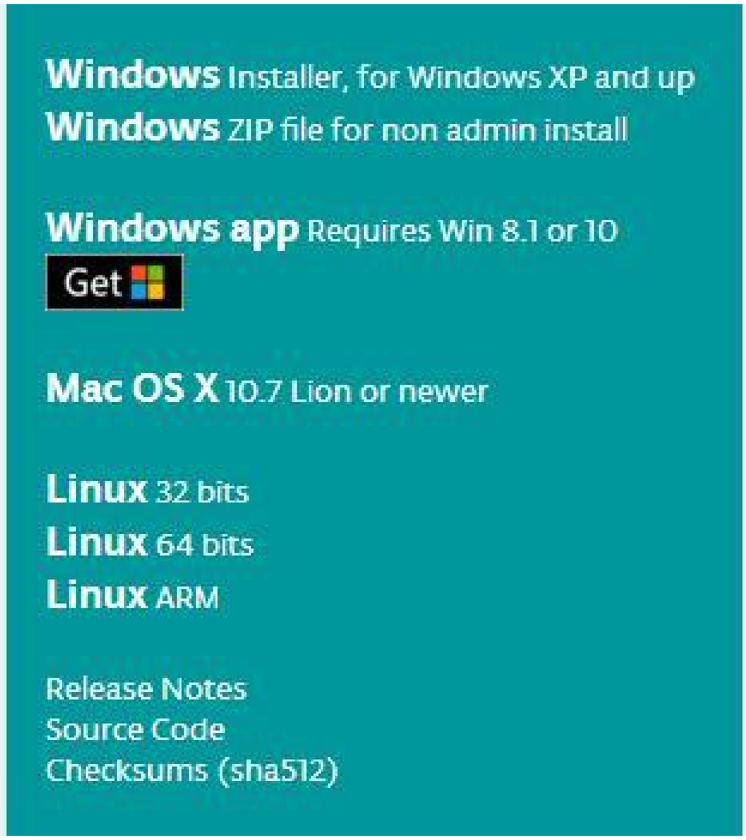
Source Code

Checksums (sha512)

In this software page, on the right side you can see the version of development software for different operating systems. ARDUINO has a powerful compatibility. You should download the software that is compatible with the operating system of your computer.

We will take **WINDOWS system** as an example here. There are also two options under Windows system, one is installed version, the other is non-installed version.

For simple installed version, first click **Windows Installer**, you will get the following page.



Windows Installer, for Windows XP and up
Windows ZIP file for non admin install

Windows app Requires Win 8.1 or 10

Mac OS X 10.7 Lion or newer

Linux 32 bits
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Release Notes
Source Code
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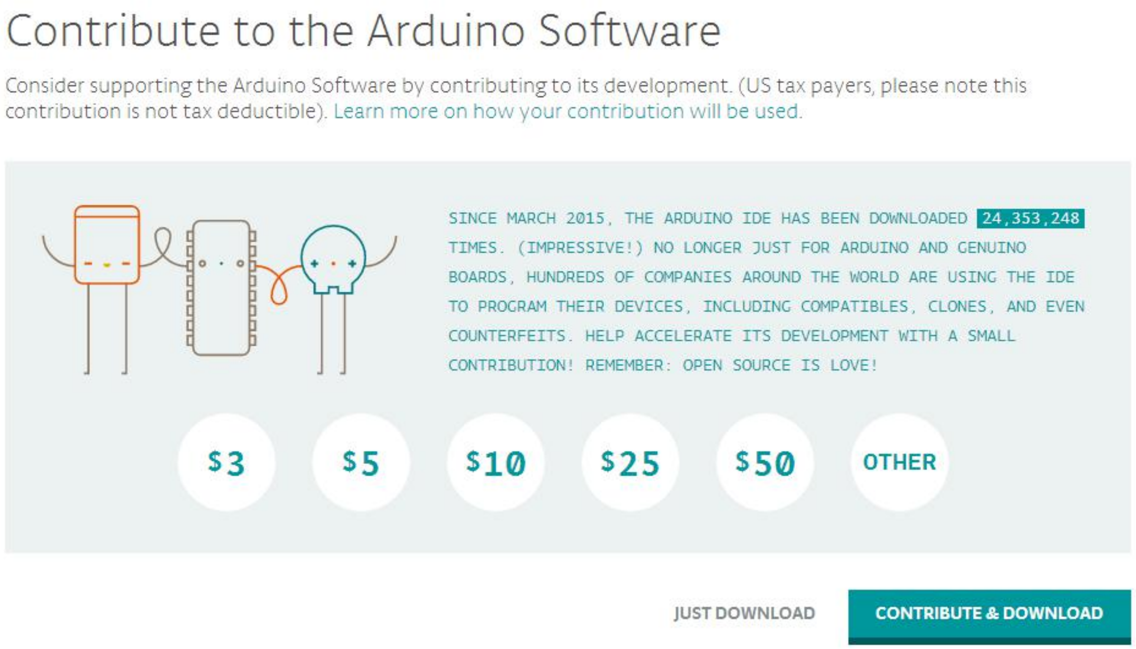


Contribute to the Arduino Software

Consider supporting the Arduino Software by contributing to its development. (US tax payers, please note this contribution is not tax deductible). Learn more on how your contribution will be used.

SINCE MARCH 2015, THE ARDUINO IDE HAS BEEN DOWNLOADED 24,353,248 TIMES. (IMPRESSIVE!) NO LONGER JUST FOR ARDUINO AND GENUINO BOARDS, HUNDREDS OF COMPANIES AROUND THE WORLD ARE USING THE IDE TO PROGRAM THEIR DEVICES, INCLUDING COMPATIBLES, CLONES, AND EVEN COUNTERFEITS. HELP ACCELERATE ITS DEVELOPMENT WITH A SMALL CONTRIBUTION! REMEMBER: OPEN SOURCE IS LOVE!

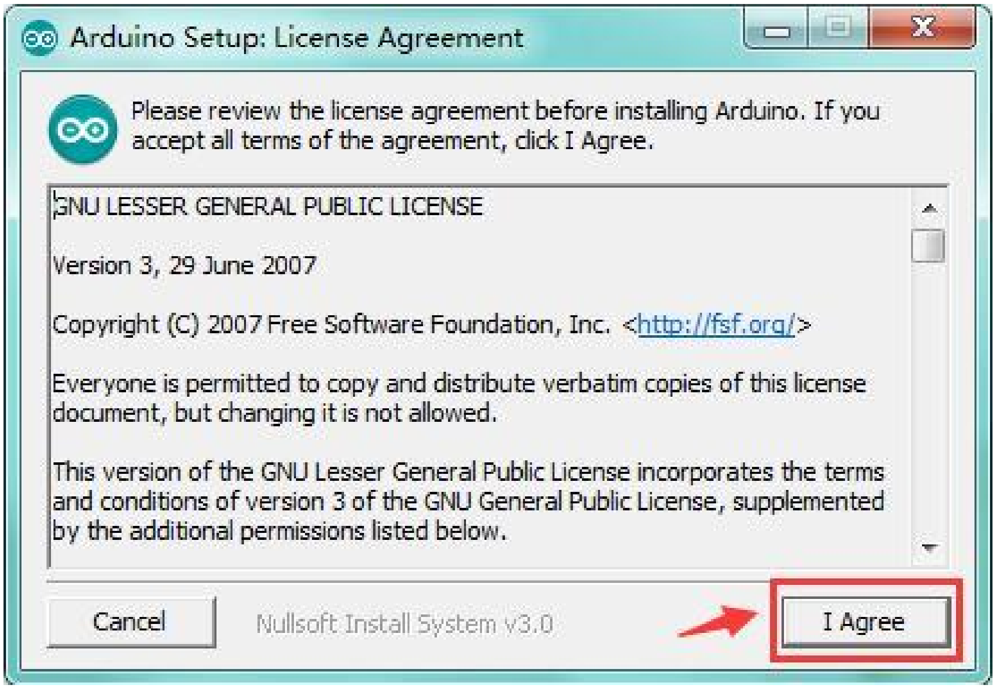
downloaded file to install it.

For non-installed version, first click Windows ZIP file, you will also get the pop-up interface as the above figure.

Click JUST DOWNLOAD, and when the ZIP file is downloaded well to your computer, you can directly unzip the file and click the icon of ARDUINO software to start it.

Installing Arduino (Windows):

Install Arduino with the exe. Installation package downloaded well.



Arduino Setup: License Agreement

Please review the license agreement before installing Arduino. If you accept all terms of the agreement, click I Agree.

GNU LESSER GENERAL PUBLIC LICENSE

Version 3, 29 June 2007

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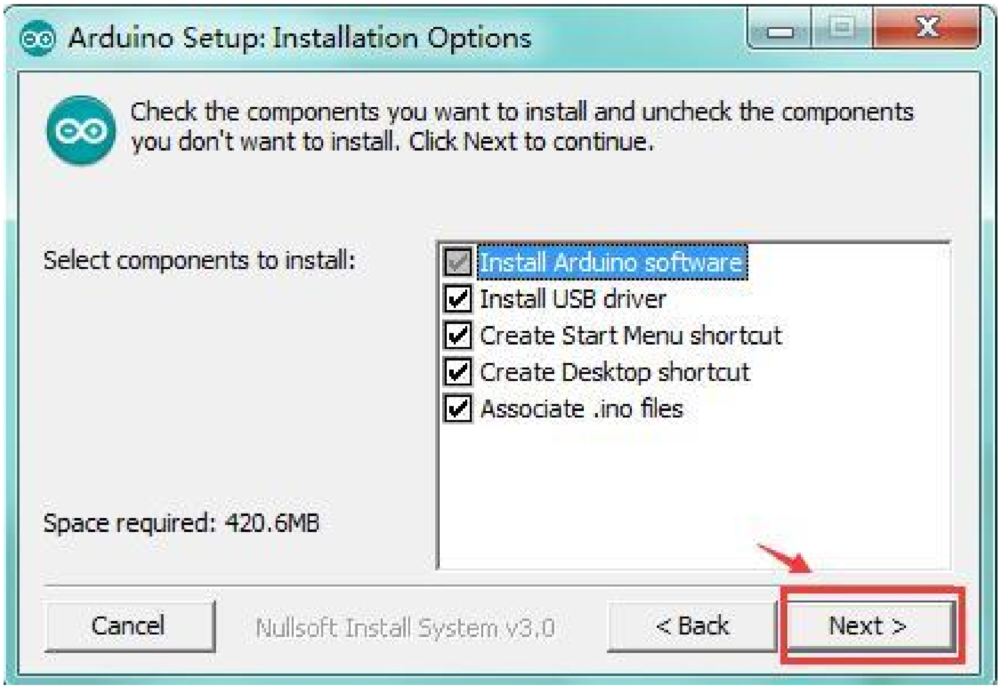
This version of the GNU Lesser General Public License incorporates the terms and conditions of version 3 of the GNU General Public License, supplemented by the additional permissions listed below.

Click *"I Agree"* to see the following interface.



Arduino Setup: Installation Options

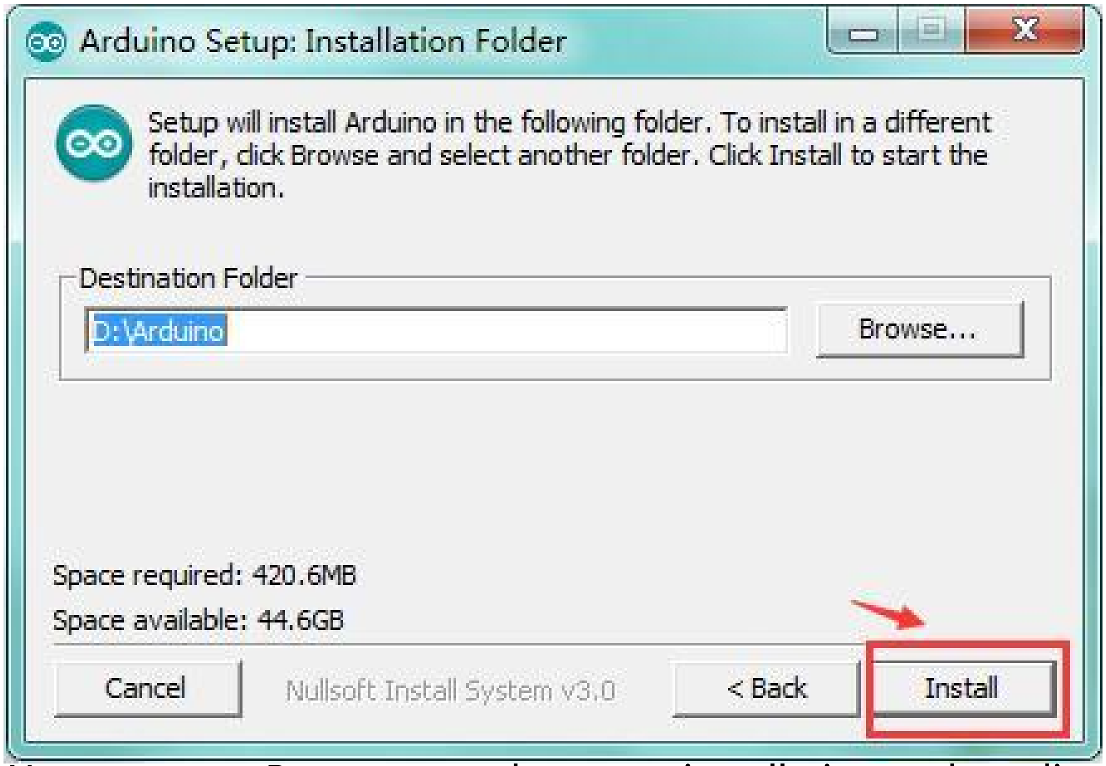
Check the components you want to install and uncheck the components you don't want to install. Click Next to continue.

Select components to install:

☑ Install Arduino software
☑ Install USB driver
☑ Create Start Menu shortcut
☑ Create Desktop shortcut
☑ Associate .ino files

Space required: 420.6MB

Click *“Next”*. Pop up the interface below.



Arduino Setup: Installation Folder

Setup will install Arduino in the following folder. To install in a different folder, click Browse and select another folder. Click Install to start the installation.

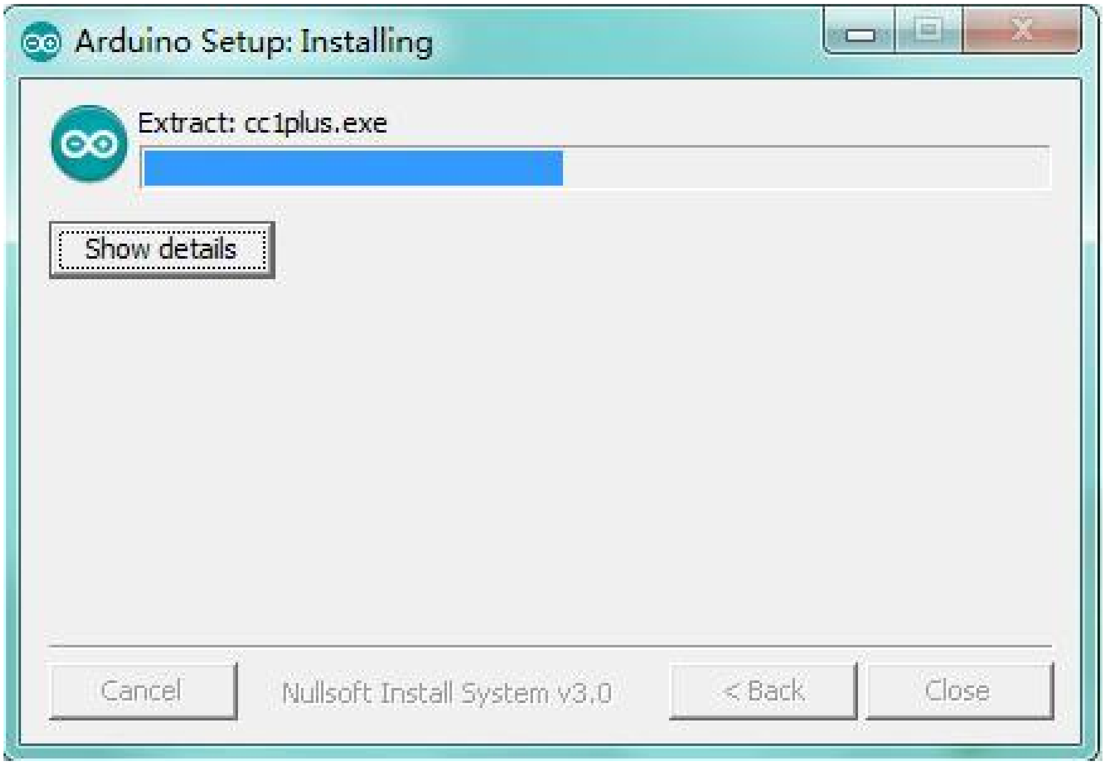
Destination Folder

D:\Arduino

Space required: 420.6MB

Space available: 44.6GB

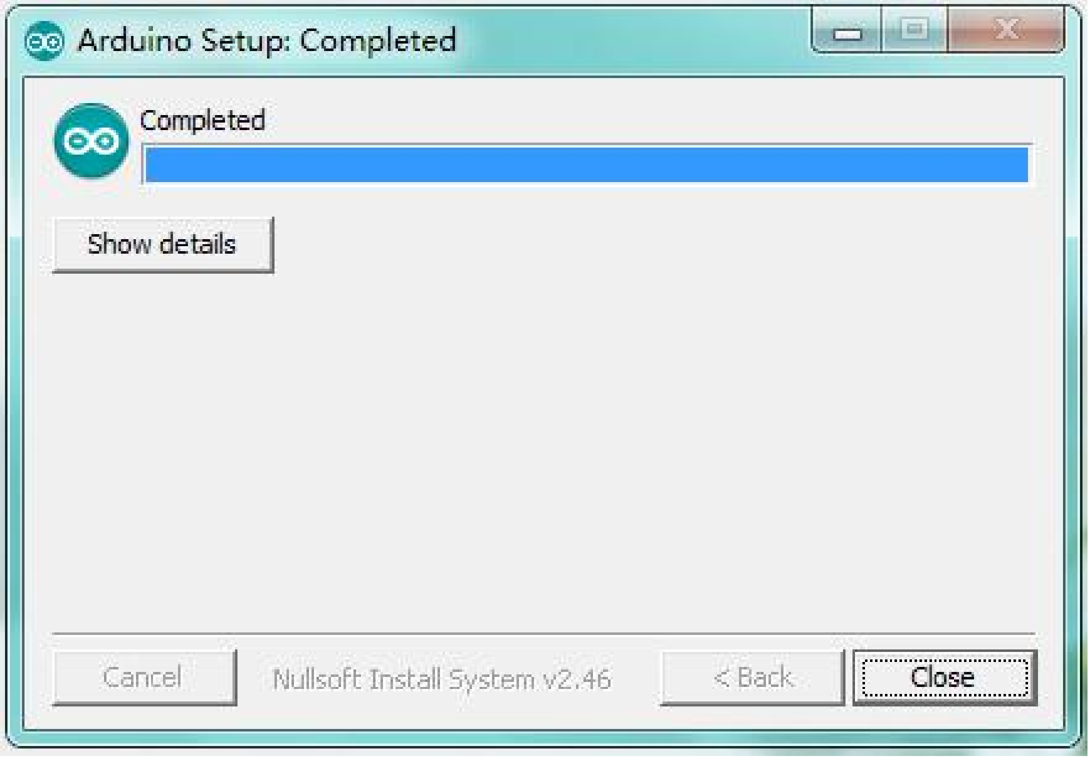
You can press Browse... to choose an installation path or directly type in the directory you want. Then click “Install” to initiate installation.



Arduino Setup: Installing

Extract: cc1plus.exe

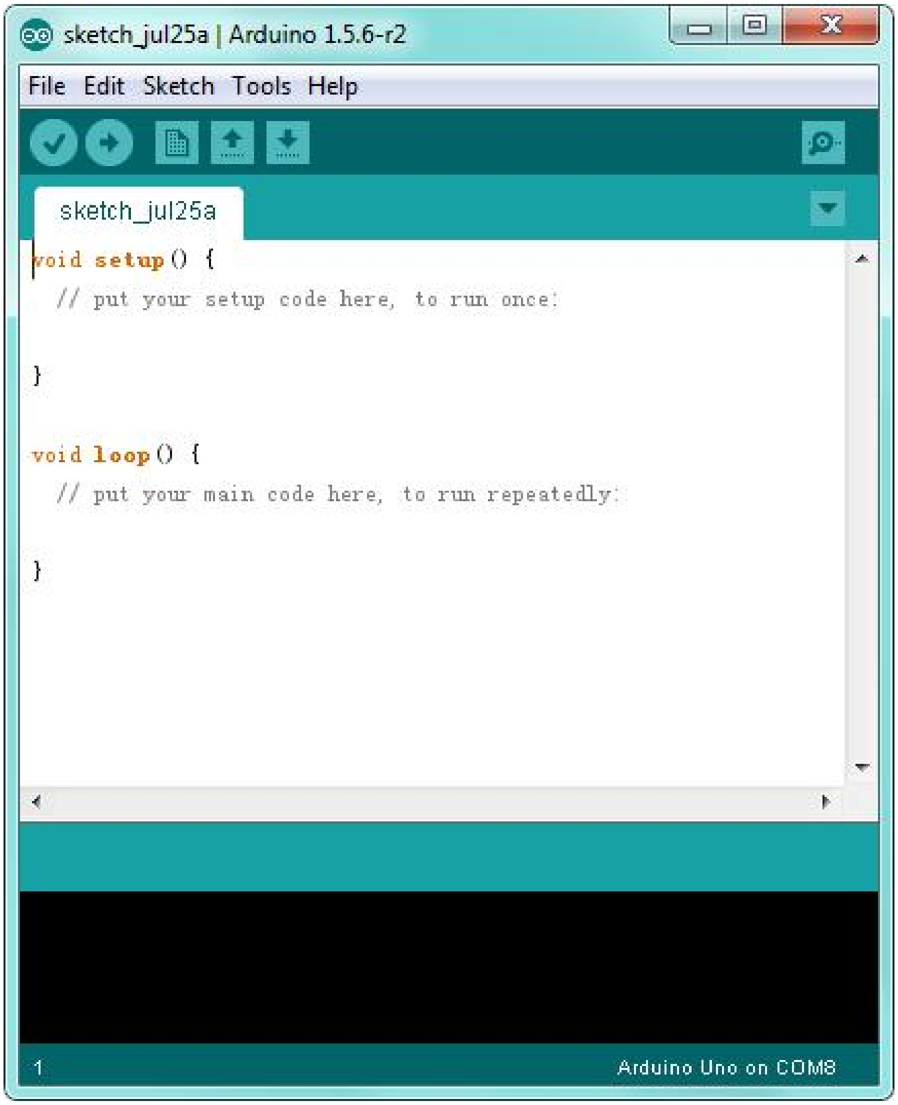
Wait for the installing process, if appear the interface of Window Security, just continue to click Install to finish the installation.



Introduction for Arduino IDE Toolbar:

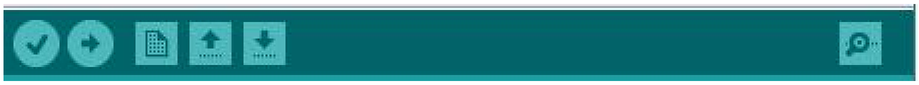
Double-click the icon of Arduino software downloaded, you will get the interface shown below.

(Note: if the Arduino software loads in the wrong language, you can change it in the preferences dialog. See the environment page for details.)



```
void setup() {
  // put your setup code here, to run once:

}

void loop() {
  // put your main code here, to run repeatedly:

}
```

The functions of each button on the Toolbar are listed below:



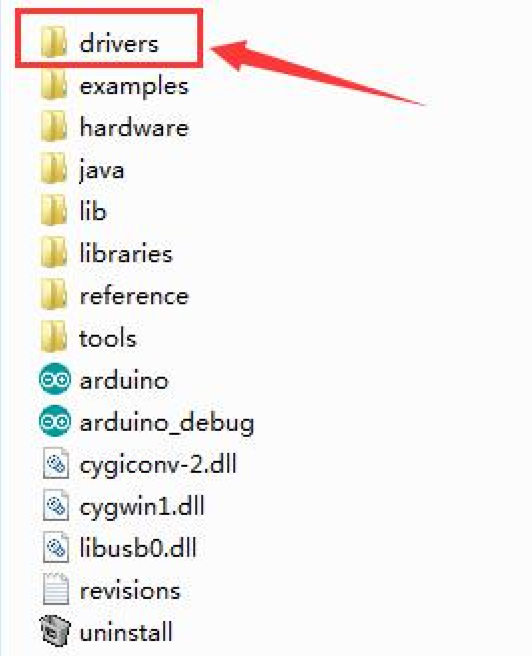
✓ **Verify/Compile**	Check the code for errors
➜ **Upload**	Upload the current Sketch to the Arduino

New	Create a new blank Sketch
Open	Show a list of Sketches
Save	Save the current Sketch
Serial Monitor	Display the serial data being sent from the Arduino

Installing the Driver:

Next, we will introduce the driver installation for the board. The driver installation may have slight differences in different computer systems. So in the following let’ s move on to the driver installation in the WIN 7 system.

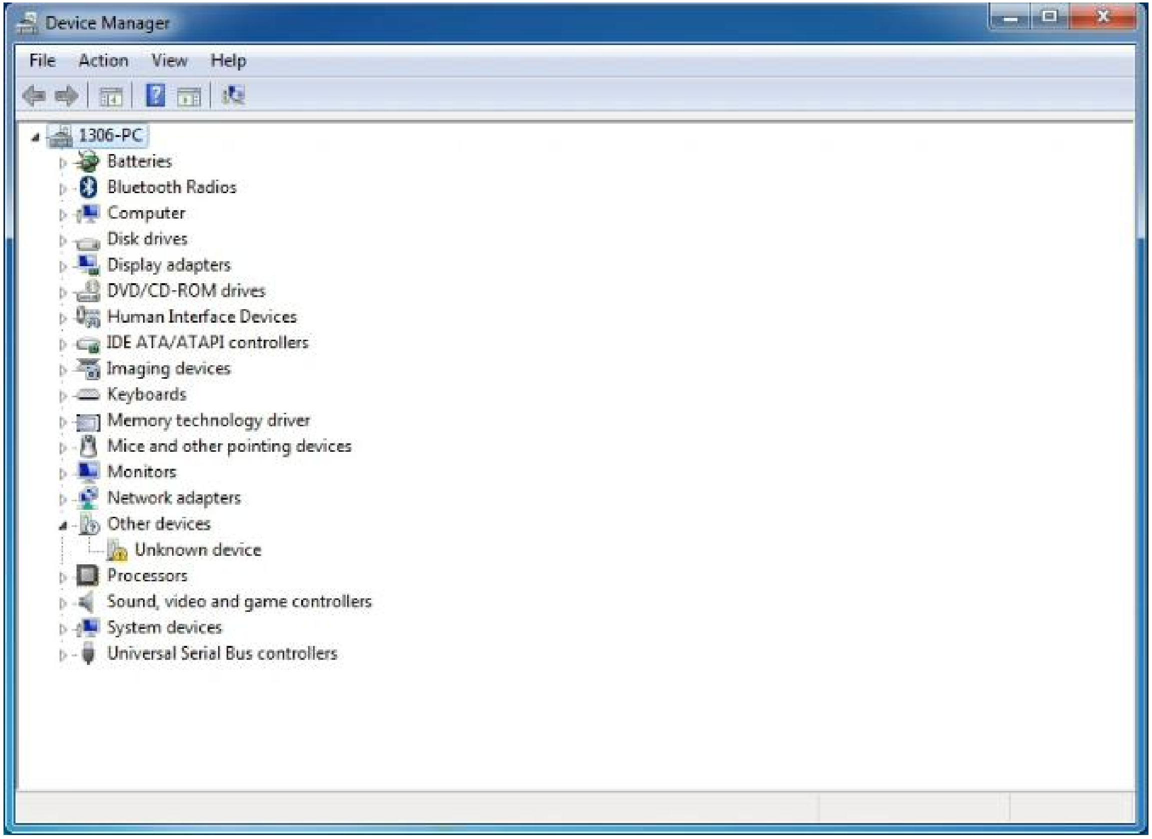
The Arduino folder contains both the Arduino program itself and the drivers that allow the Arduino to be connected to your computer by a USB cable. Before we launch the Arduino software, you are going to install the USB drivers.



drivers
examples
hardware
java
lib
libraries
reference
tools
arduino
arduino_debug
cygiconv-2.dll
cygwin1.dll
libusb0.dll
revisions
uninstall

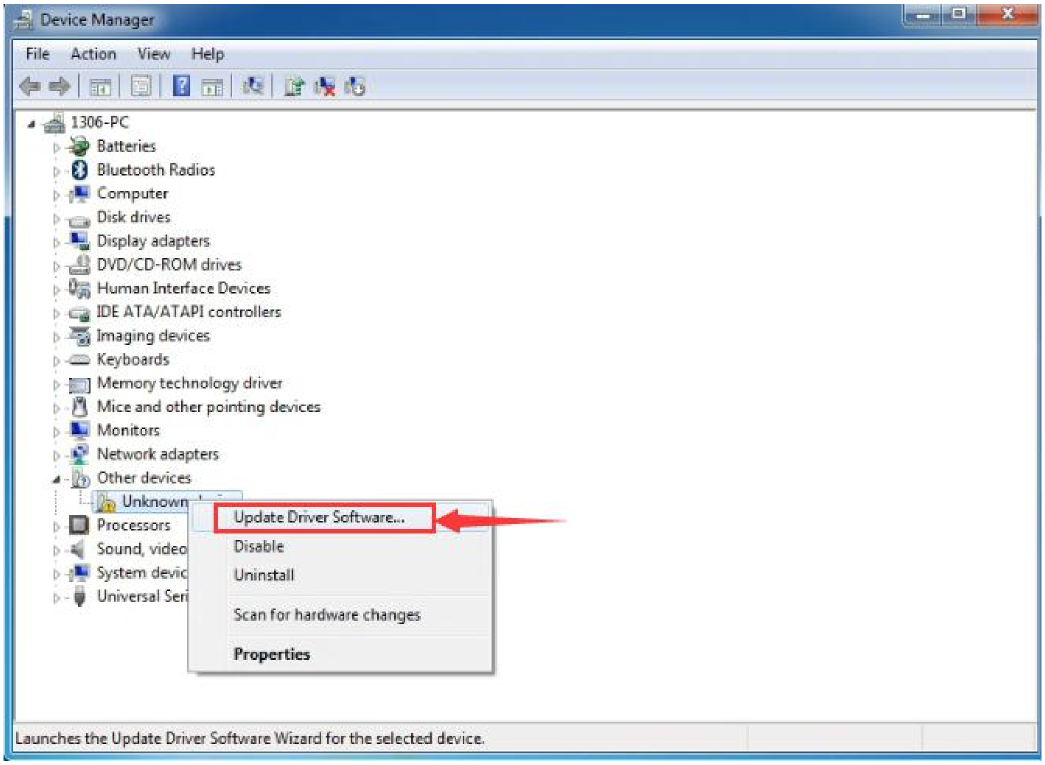
Plug one end of your USB cable into the Arduino and the other into a USB socket on your computer.

When you connect the board to your computer at the first time, right click the icon of your *“Computer” —>for “Properties” —> click the “Device manager”* , under “Other Devices” , you should see an icon for “Unknown device” with a little yellow warning triangle next to it.



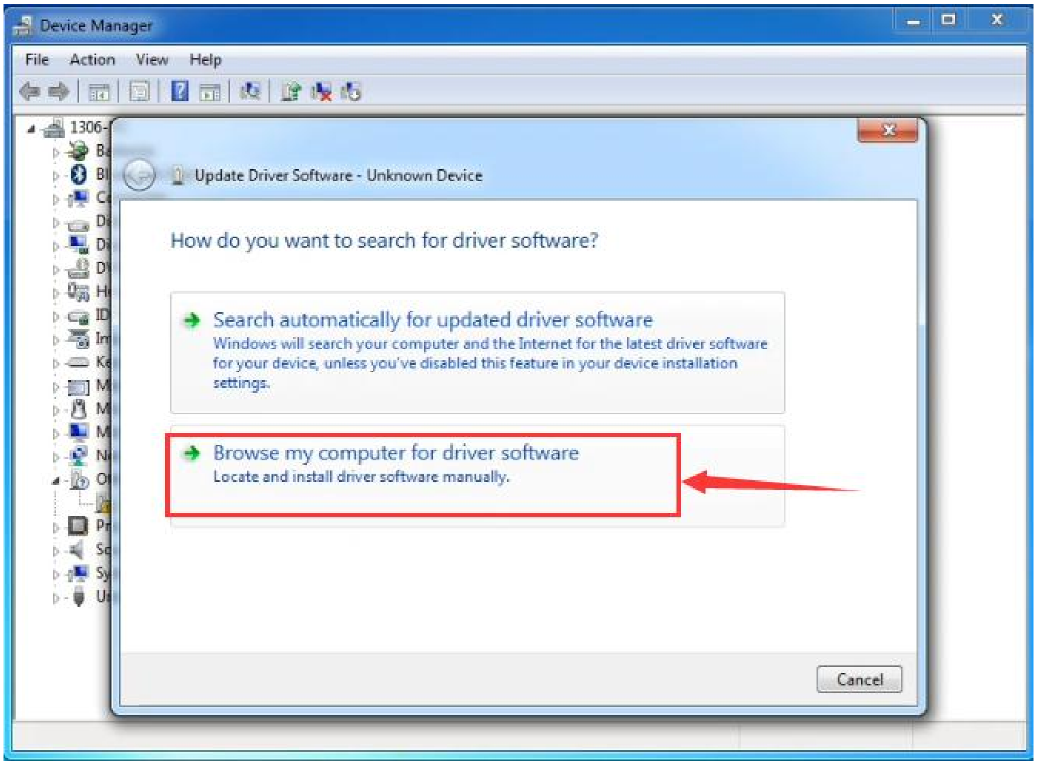
1306-PC
Batteries
Bluetooth Radios
Computer
Disk drives
Display adapters
DVD/CD-ROM drives
Human Interface Devices
IDE ATA/ATAPI controllers
Imaging devices
Keyboards
Memory technology driver
Mice and other pointing devices
Monitors
Network adapters
Other devices
Unknown device
Processors
Sound, video and game controllers
System devices
Universal Serial Bus controllers

Then right-click on the device and select the top menu option (Update Driver Software...) shown as the figure below.



Launches the Update Driver Software Wizard for the selected device.

It will then be prompted to either “Search Automatically for updated driver software” or “Browse my computer for driver software” . Shown as below. In this page, select “Browse my computer for driver software” .

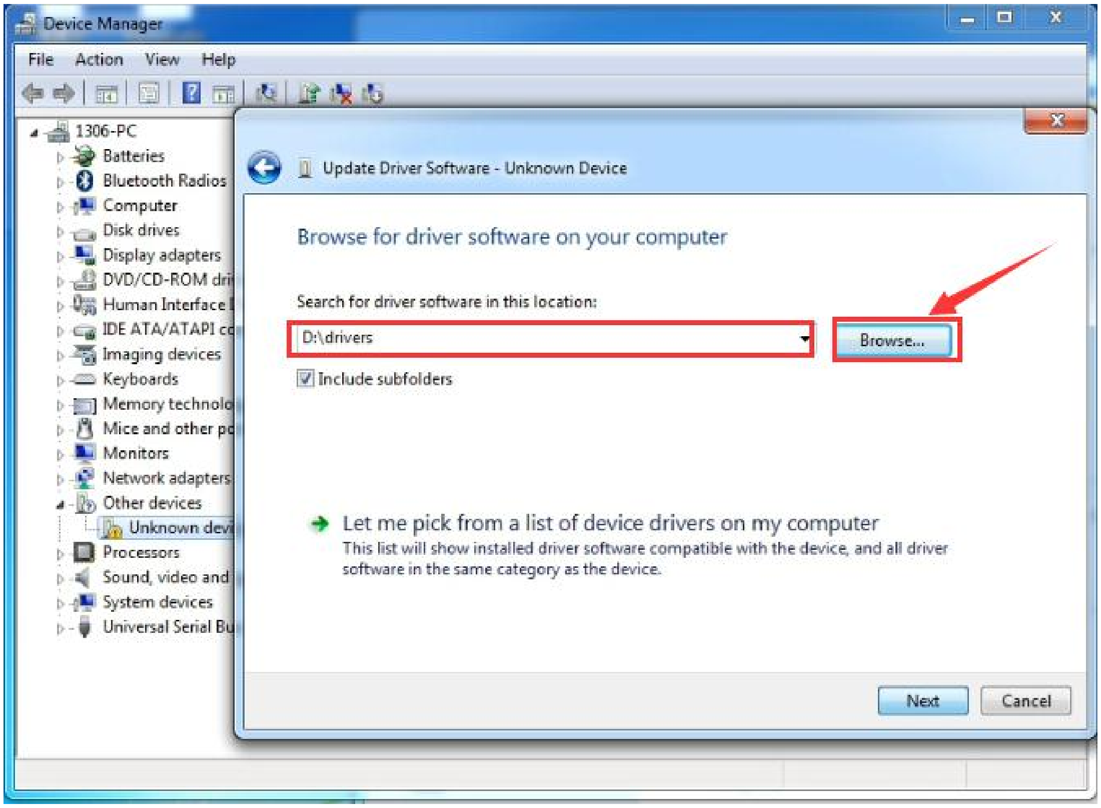


How do you want to search for driver software?

Search automatically for updated driver software
Windows will search your computer and the Internet for the latest driver software for your device, unless you've disabled this feature in your device installation settings.

Browse my computer for driver software
Locate and install driver software manually.

After that, select the option to browse and navigate to the “drivers” folder of Arduino installation.



Update Driver Software - Unknown Device

Browse for driver software on your computer

Search for driver software in this location:

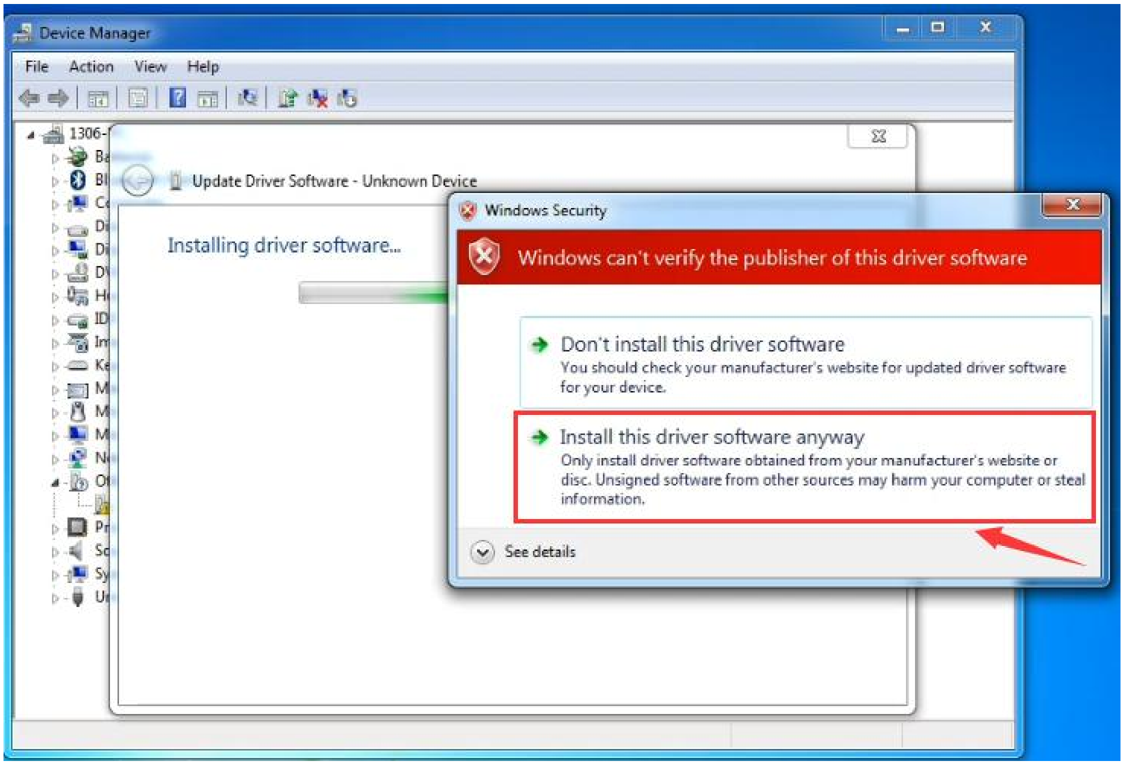
D:\drivers

☑ Include subfolders

Let me pick from a list of device drivers on my computer

This list will show installed driver software compatible with the device, and all driver software in the same category as the device.

Click “Next” and you may get a security warning; if so, allow the software to be installed. Shown as below.



Update Driver Software - Unknown Device

Installing driver software...

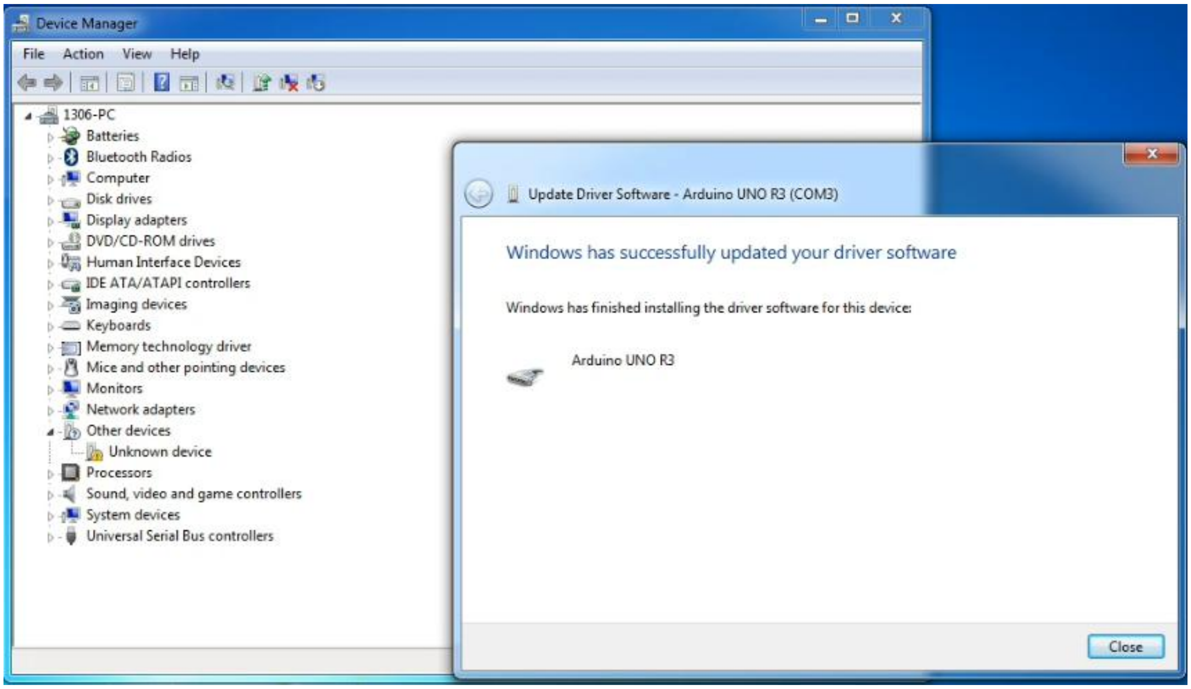
Windows Security

Windows can't verify the publisher of this driver software

Don't install this driver software
You should check your manufacturer's website for updated driver software for your device.

Install this driver software anyway
Only install driver software obtained from your manufacturer's website or disc. Unsigned software from other sources may harm your computer or steal information.

Installation completed, click "Close" .



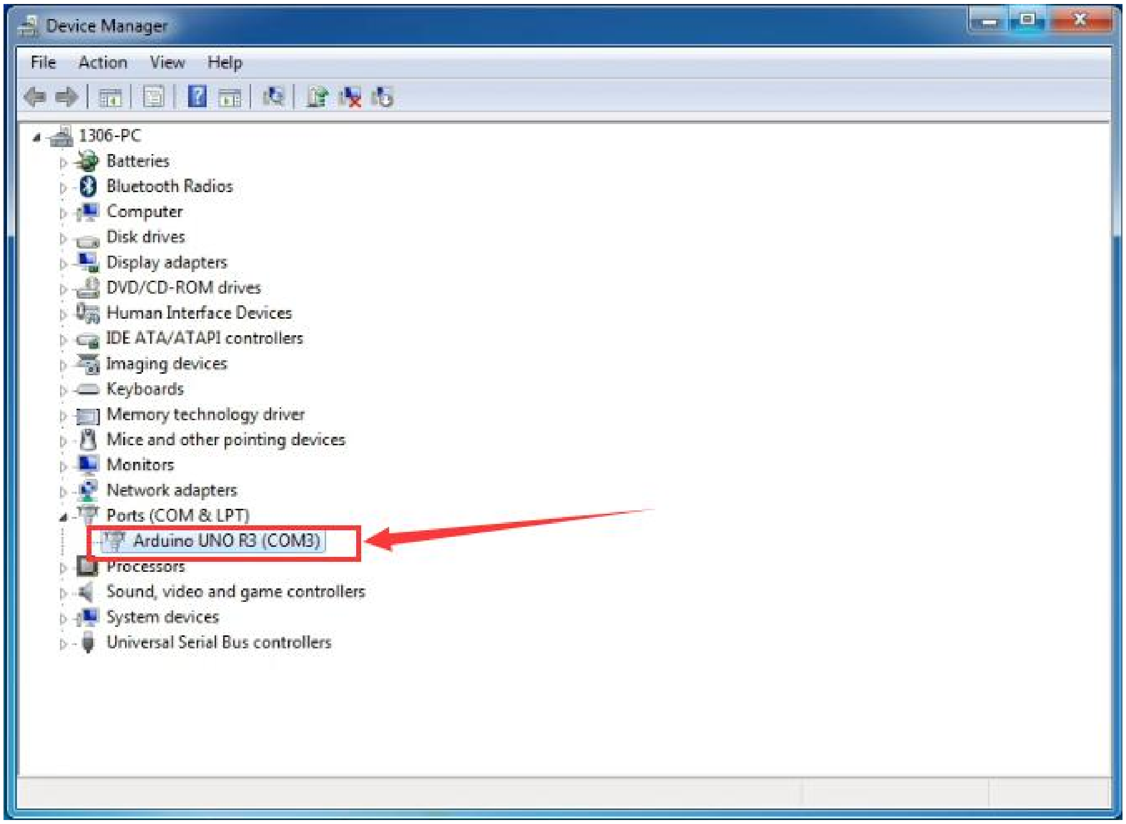
Update Driver Software - Arduino UNO R3 (COM3)

Windows has successfully updated your driver software

Windows has finished installing the driver software for this device:

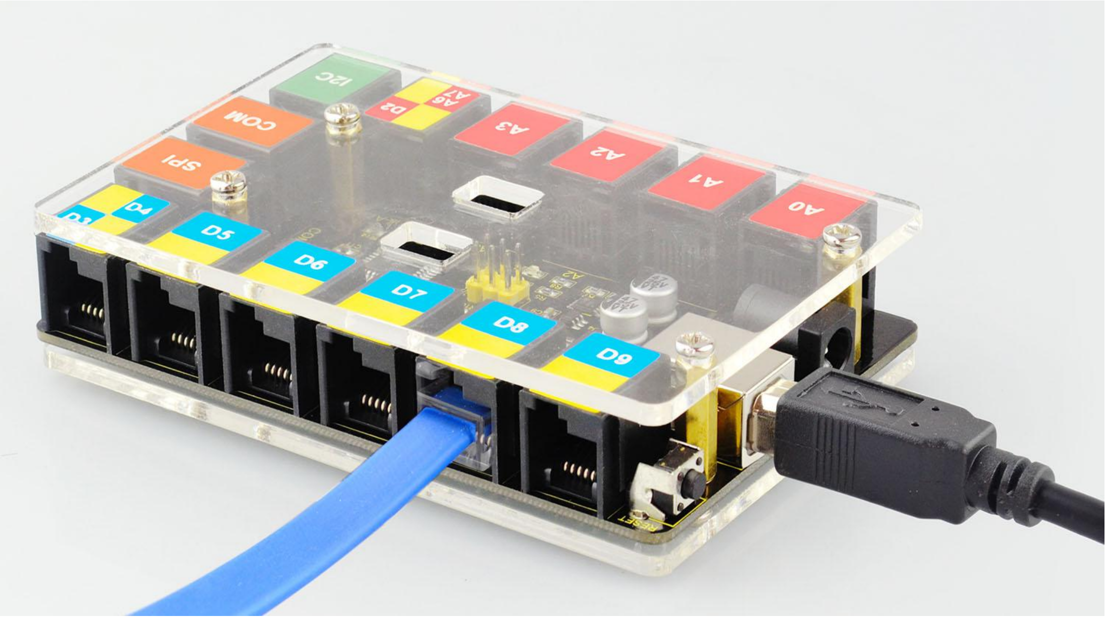
Arduino UNO R3

Up to now, the driver is installed well. Then you can right click *"Computer"* —> *"Properties"* —> *"Device manager"* , you should see the device shown below.


Device Manager
File Action View Help
1306-PC
Batteries
Bluetooth Radios
Computer
Disk drives
Display adapters
DVD/CD-ROM drives
Human Interface Devices
IDE ATA/ATAPI controllers
Imaging devices
Keyboards
Memory technology driver
Mice and other pointing devices
Monitors
Network adapters
Ports (COM & LPT)
Arduino UNO R3 (COM3)
Processors
Sound, video and game controllers
System devices
Universal Serial Bus controllers

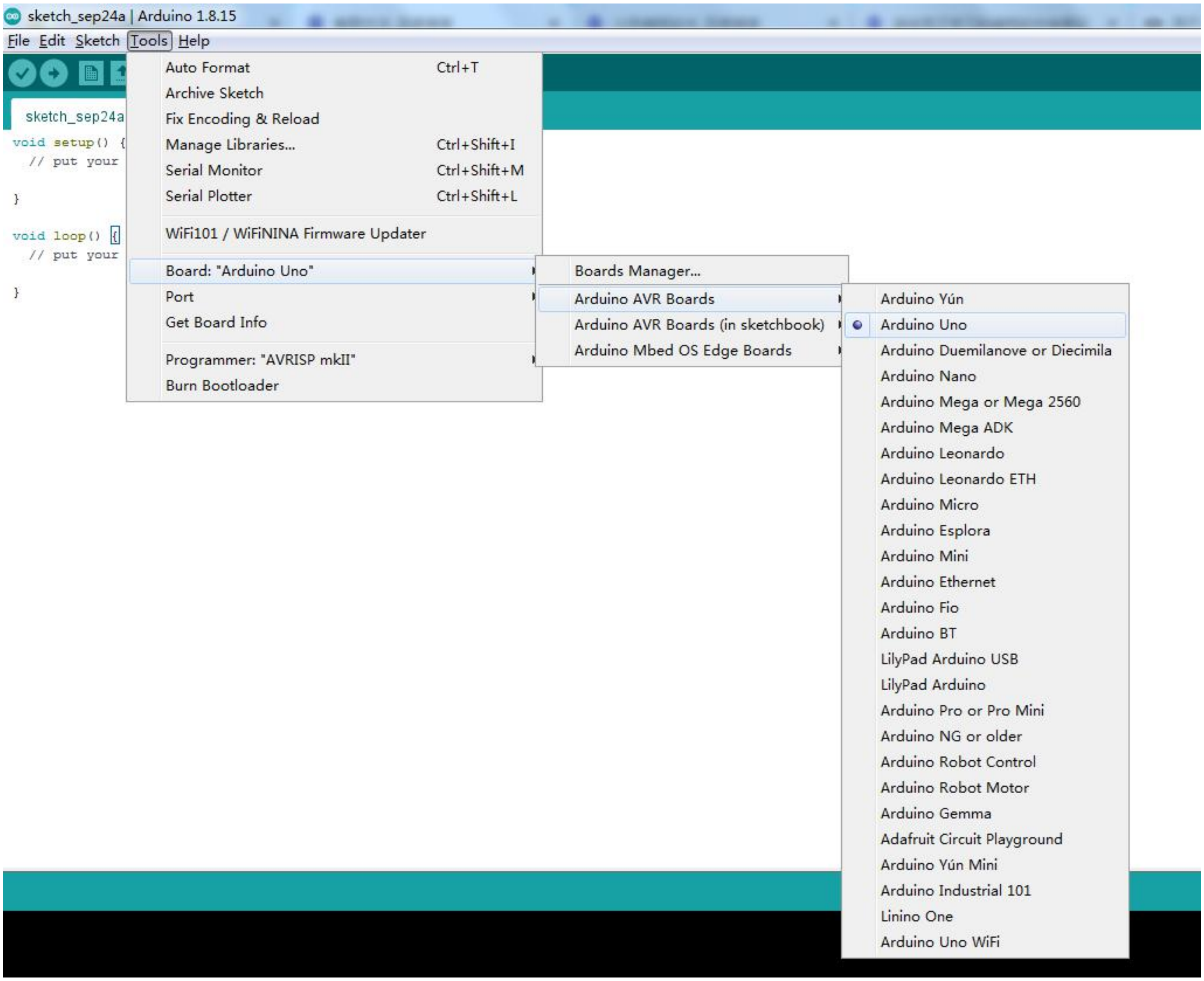
Step2| Connect the board

Connect the control board to your computer using the USB cable. The power LED should go on.



Step3| Select the Arduino Board

Open the Arduino IDE, you’ ll need to click the “Tools” , then select the Board that corresponds to your Arduino.

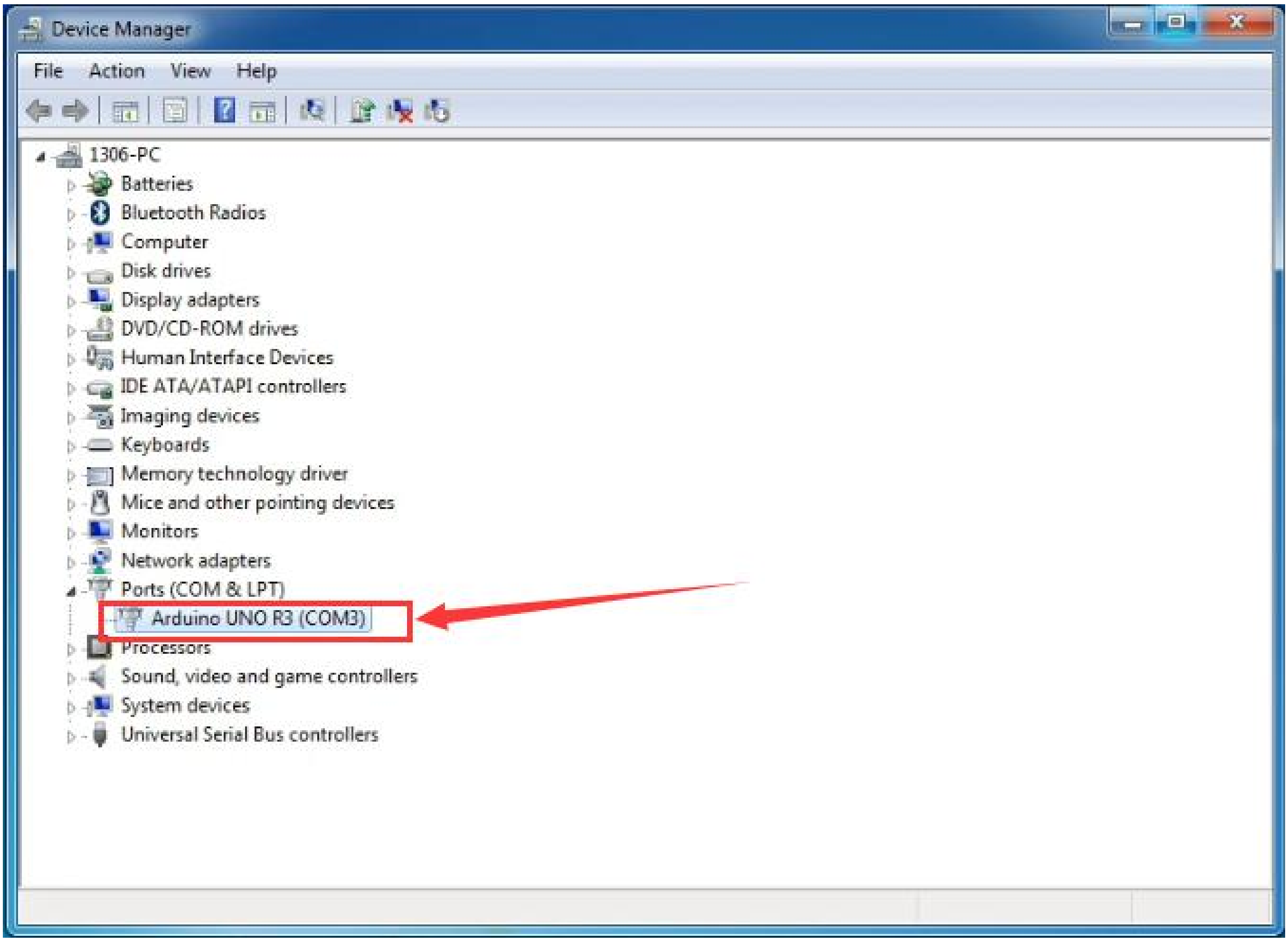


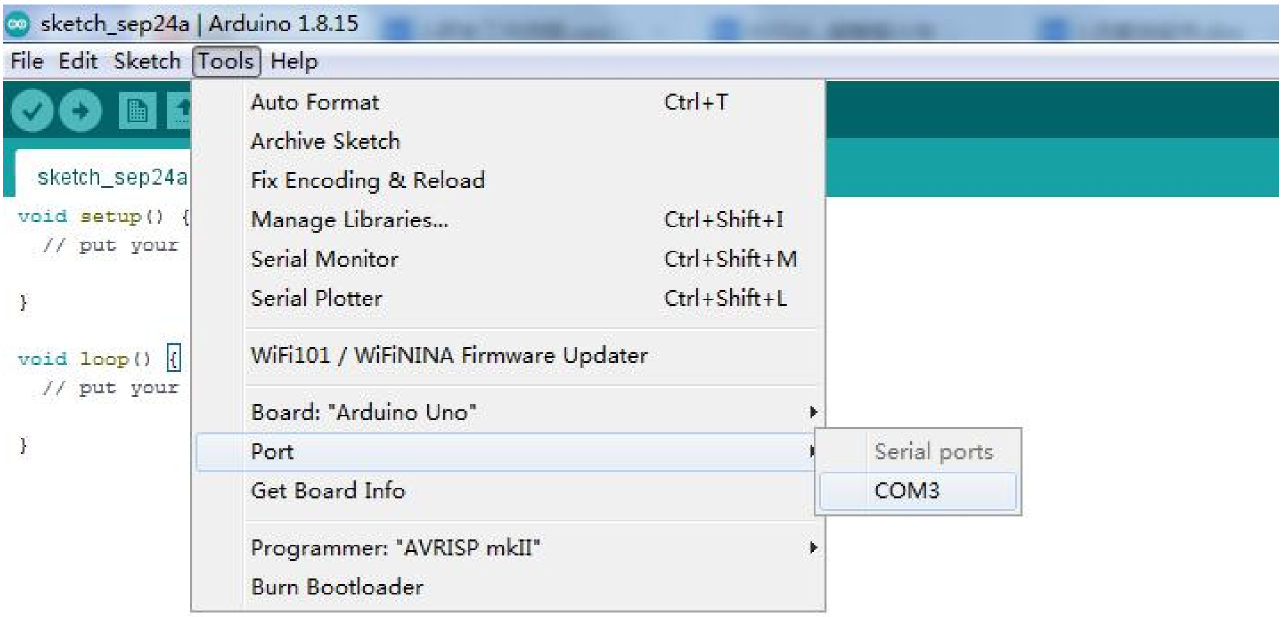
```
void setup() {
  // put your

}

void loop() {
  // put your

}
```

Step4| Select your serial port

Select the serial device of the Arduino board from the **Tools | Serial Port menu**.

Note: to avoid errors, the COM Port should keep the same as the Ports shown on Device Manager.




sketch_sep24a | Arduino 1.8.15
File Edit Sketch Tools Help
sketch_sep24a
Auto Format Ctrl+T
Archive Sketch
Fix Encoding & Reload
Manage Libraries... Ctrl+Shift+I
Serial Monitor Ctrl+Shift+M
Serial Plotter Ctrl+Shift+L
WiFi101 / WiFiNINA Firmware Updater
Get Board Info
Burn Bootloader
Serial ports

```
void setup() {
  // put your

}

void loop() {
  // put your

}
```

Board: "Arduino Uno"

Port

COM3

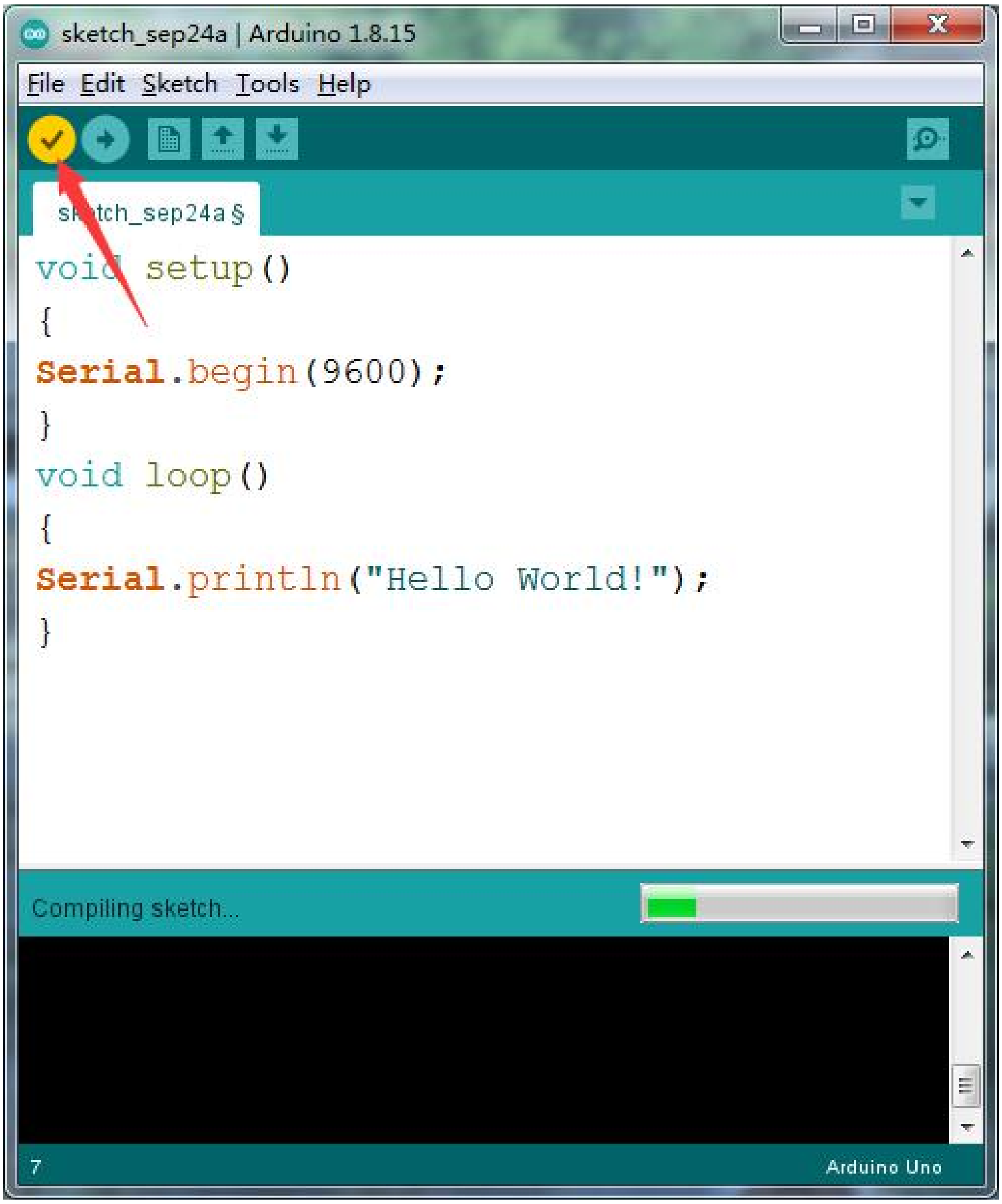
Programmer: "AVRISP mkII"

Step5| Upload the Code

Below is an example code for displaying the Hello World!
Copy and paste the code to the Arduino environment IDE.

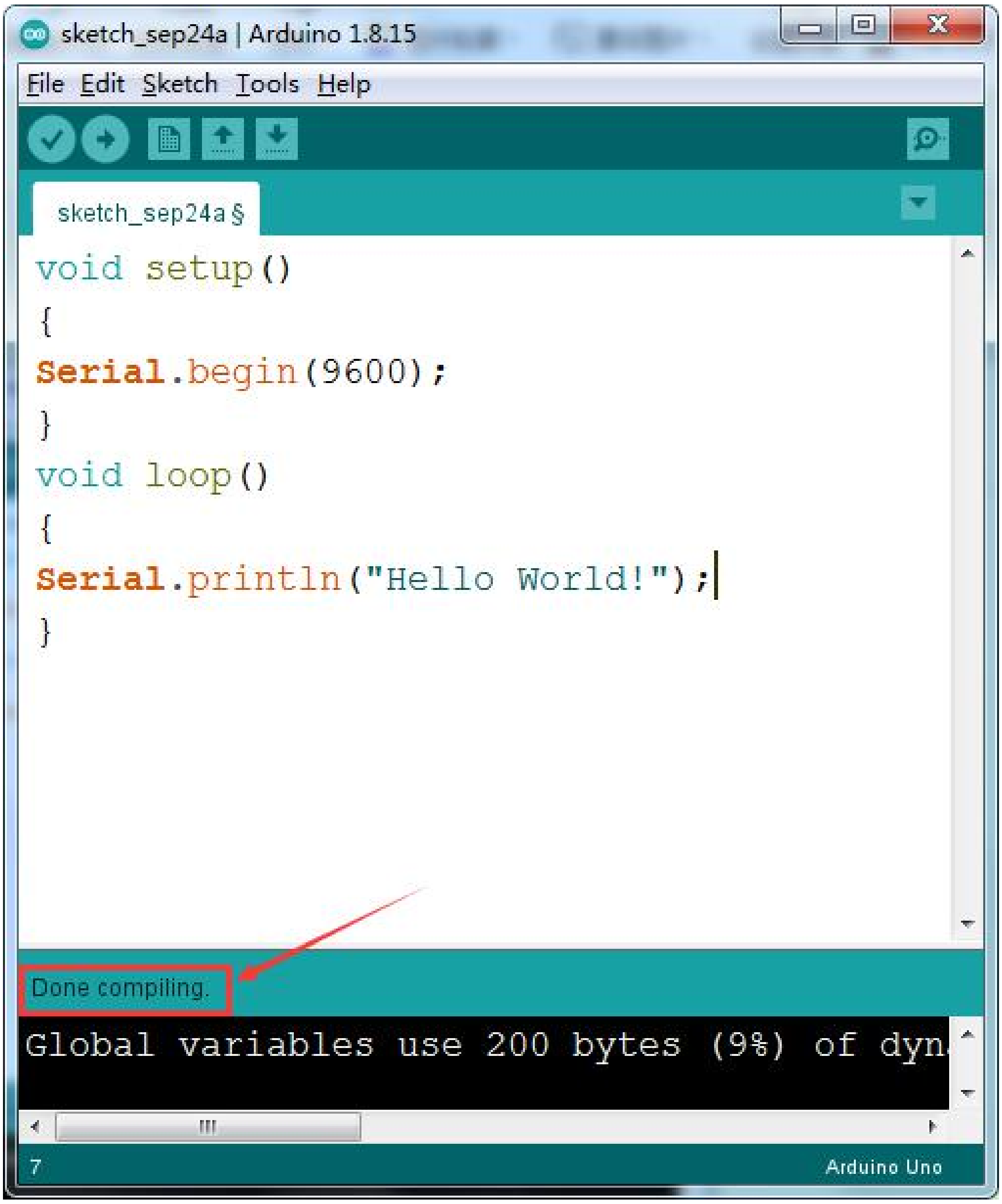
```
///////////////////////////////////////////////////////////////////////////////////
void setup()
{
Serial.begin(9600);
}
void loop()
{
Serial.println("Hello World!");
}
```

///
///////
Then click verify button to check the errors. If compiling successfully, the message "Done compiling" will appear in the status bar.



```
void setup()
{
Serial.begin(9600);
}
void loop()
{
Serial.println("Hello World!");
}
```

Compiling sketch...

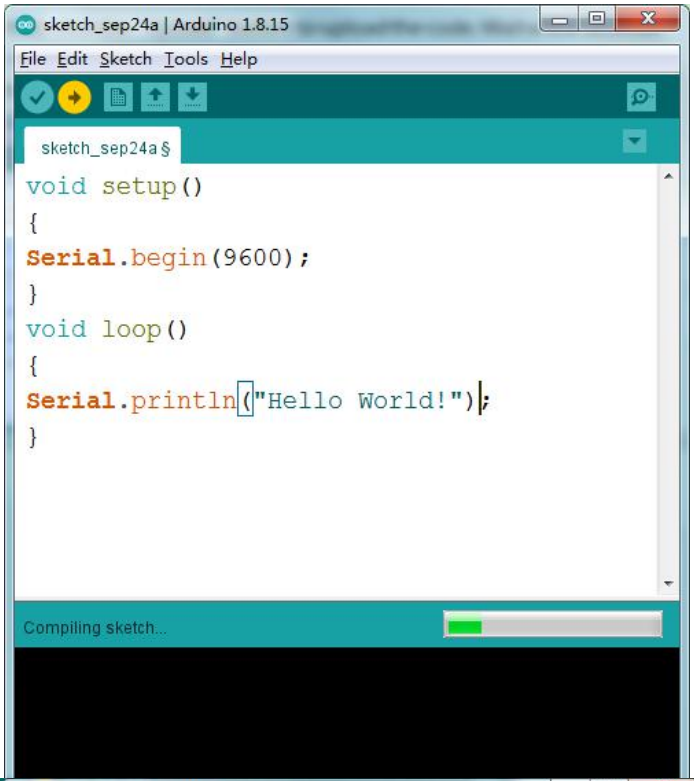


```
void setup()
{
Serial.begin(9600);
}
void loop()
{
Serial.println("Hello World!");
}
```

Done compiling.

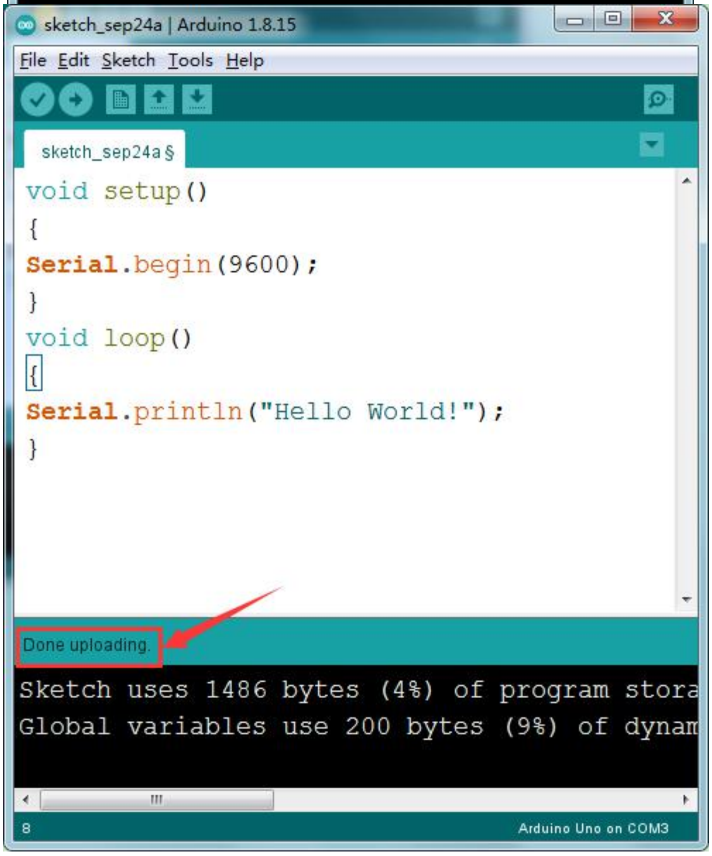
```
Global variables use 200 bytes (9%) of dyn
```

After that, click the “Upload” button to upload the code. Wait a few seconds - you should see the RX and TX leds on the board flashing. If the upload is successful, the message "Done uploading" will appear in the status bar.



```
void setup()
{
Serial.begin(9600);
}
void loop()
{
Serial.println("Hello World!");
}
```

Compiling sketch...



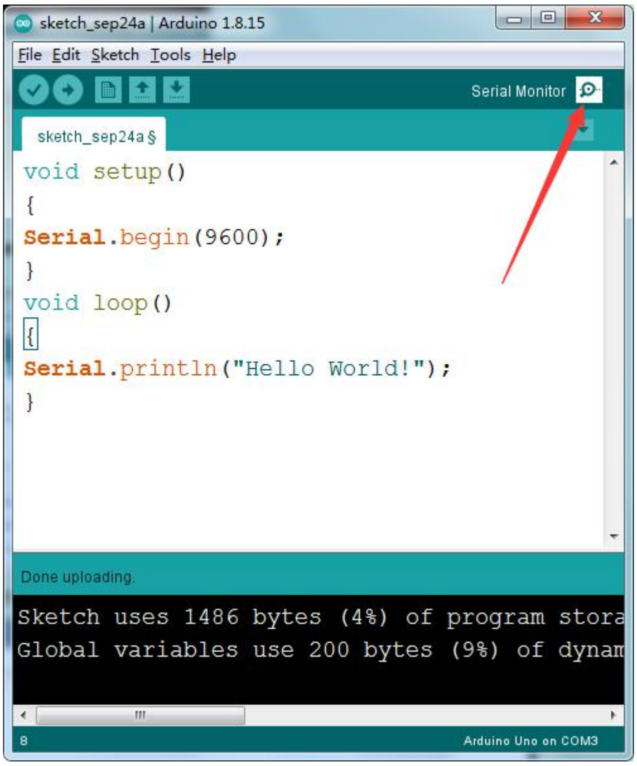
```
void setup()
{
Serial.begin(9600);
}
void loop()
{
Serial.println("Hello World!");
}
```

Done uploading.

```
Sketch uses 1486 bytes (4%) of program stora
Global variables use 200 bytes (9%) of dynam
```

Step6|Open the Serial Monitor

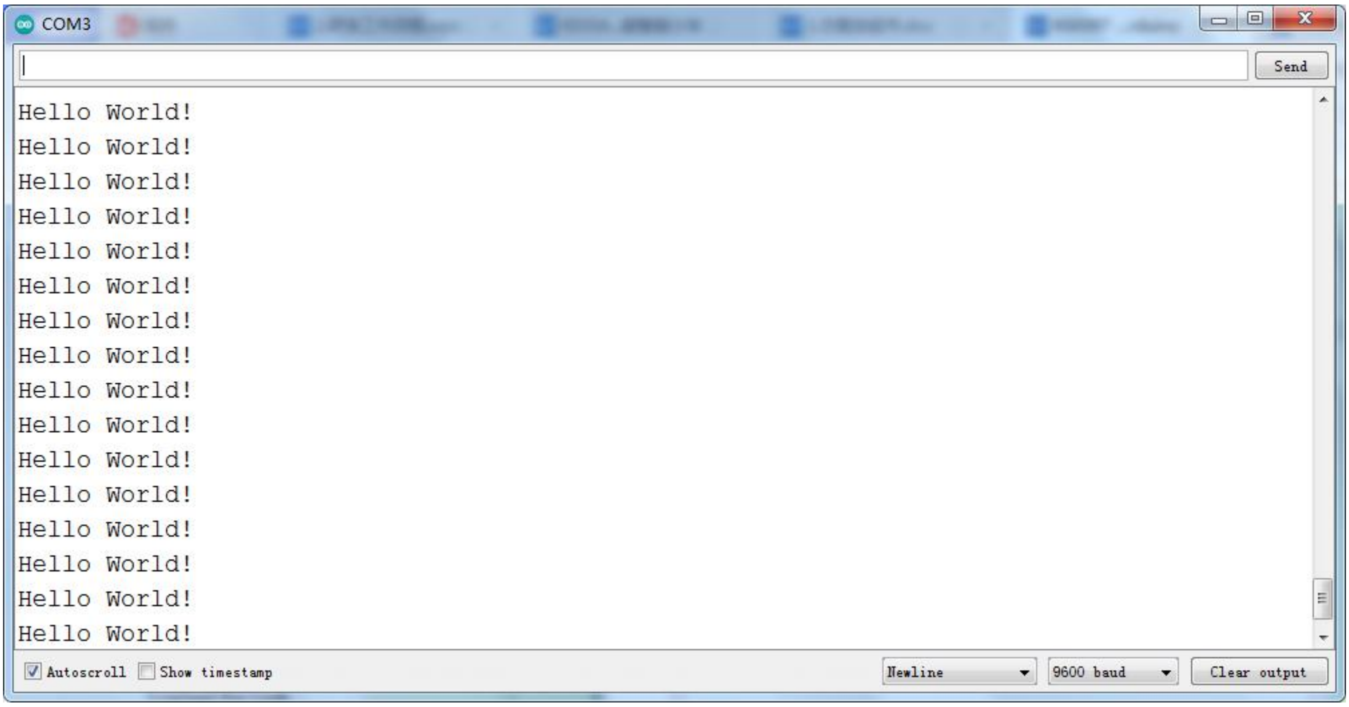
After that, click the monitor button to open the serial monitor.



```
void setup()
{
Serial.begin(9600);
}
void loop()
{
Serial.println("Hello World!");
}
```

```
Done uploading.
Sketch uses 1486 bytes (4%) of program stora
Global variables use 200 bytes (9%) of dynam
```

Then set the baud rate as 9600, "Hello World!" is showed on the monitor.



```
Hello World!
Hello World!
Hello World!
Hello World!
Hello World!
Hello World!
Hello World!
Hello World!
Hello World!
Hello World!
Hello World!
Hello World!
Hello World!
Hello World!
Hello World!
Hello World!
```

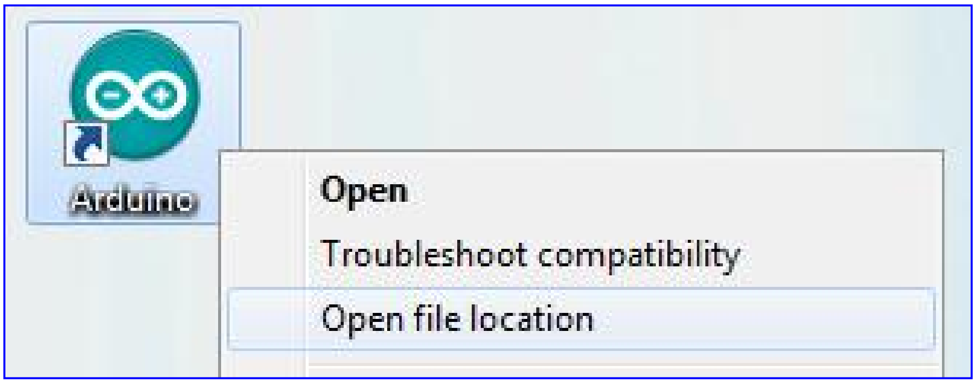
☑ Autoscroll □ Show timestamp Newline 9600 baud

Step 7|How to Install a Library ?

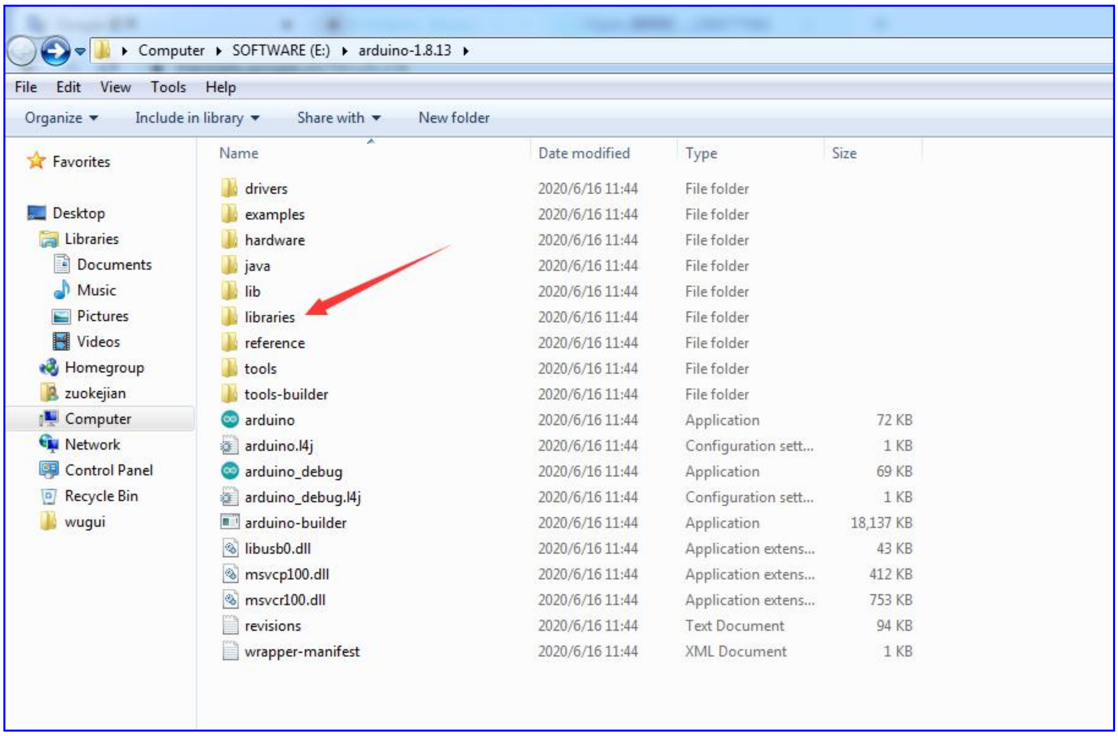
Here we will introduce the most simple way to add libraries .

Step 1： After downloading well the Arduino IDE, you can right-click the icon of Arduino IDE.

Find the option "Open file location"

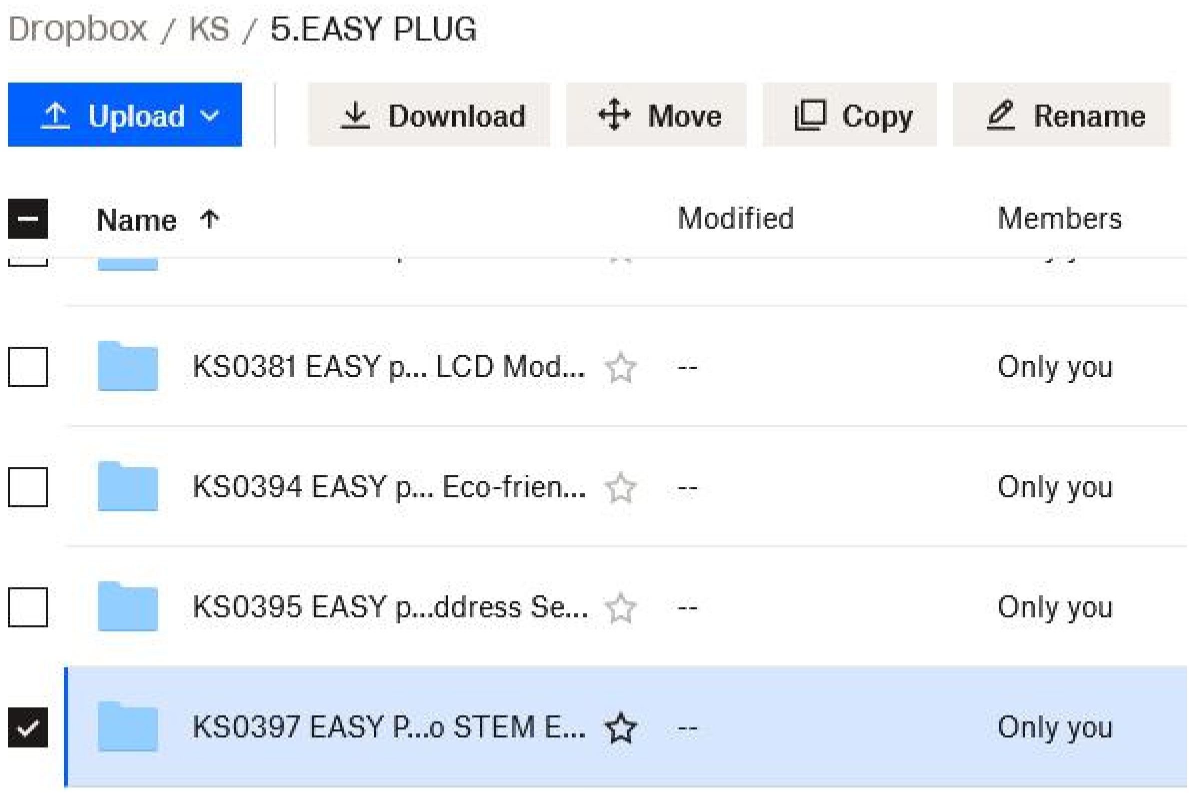


Step 2: Click Open file location >libraries


Computer ▸ SOFTWARE (E:) ▸ arduino-1.8.13 ▸
File Edit View Tools Help
Organize ▾ Include in library ▾ Share with ▾ New folder
Favorites
Desktop
Libraries
Documents
Music
Pictures
Videos
Homegroup
zuokejian
Computer
Network
Control Panel
Recycle Bin
wugui

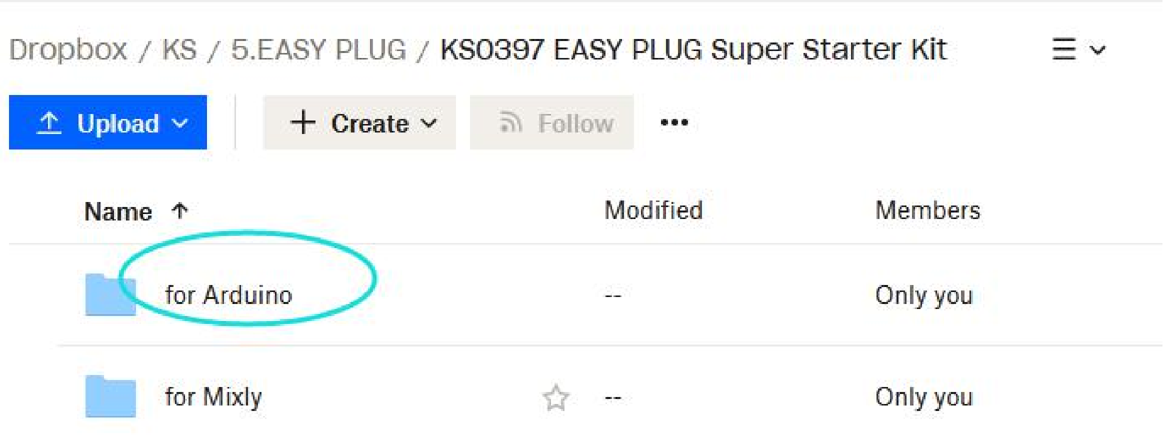
Name	Date modified	Type	Size
drivers	2020/6/16 11:44	File folder	
examples	2020/6/16 11:44	File folder	
hardware	2020/6/16 11:44	File folder	
java	2020/6/16 11:44	File folder	
lib	2020/6/16 11:44	File folder	
libraries	2020/6/16 11:44	File folder	
reference	2020/6/16 11:44	File folder	
tools	2020/6/16 11:44	File folder	
tools-builder	2020/6/16 11:44	File folder	
arduino	2020/6/16 11:44	Application	72 KB
arduino.l4j	2020/6/16 11:44	Configuration sett...	1 KB
arduino_debug	2020/6/16 11:44	Application	69 KB
arduino_debug.l4j	2020/6/16 11:44	Configuration sett...	1 KB
arduino-builder	2020/6/16 11:44	Application	18,137 KB
libusb0.dll	2020/6/16 11:44	Application extens...	43 KB
msvcp100.dll	2020/6/16 11:44	Application extens...	412 KB
msvcr100.dll	2020/6/16 11:44	Application extens...	753 KB
revisions	2020/6/16 11:44	Text Document	94 KB
wrapper-manifest	2020/6/16 11:44	XML Document	1 KB

Step 3：Next, find out the “libraries” folder of the starter kit(seen in the link: https://fs.keyestudio.com/KS0397)



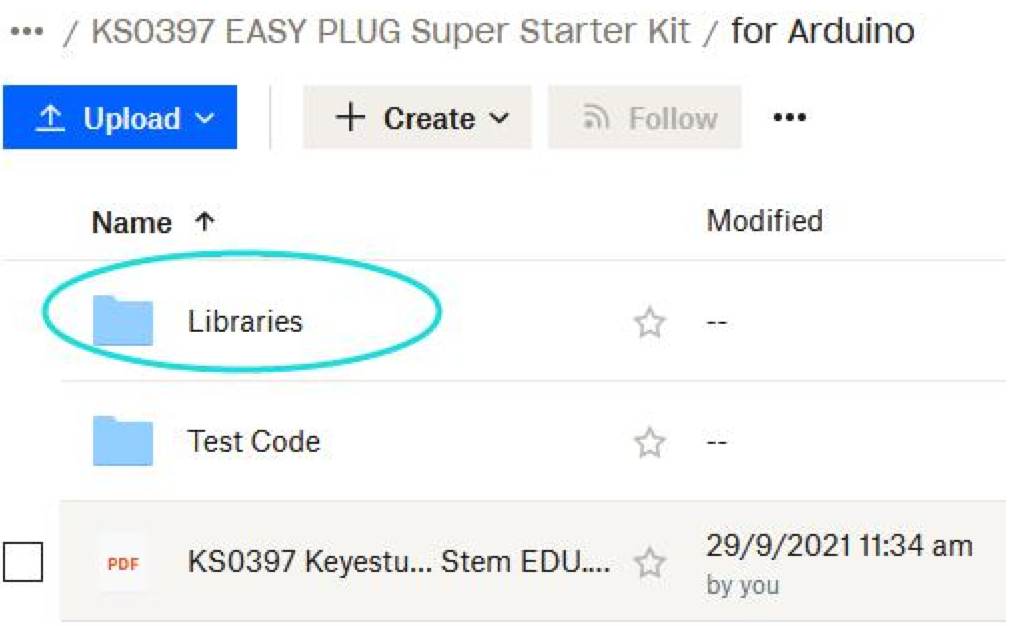
Dropbox / KS / 5.EASY PLUG

	Name	Modified	Members
□	KS0381 EASY p... LCD Mod... ☆	--	Only you
□	KS0394 EASY p... Eco-frien... ☆	--	Only you
□	KS0395 EASY p...ddress Se... ☆	--	Only you
☑	KS0397 EASY P...o STEM E... ☆	--	Only you



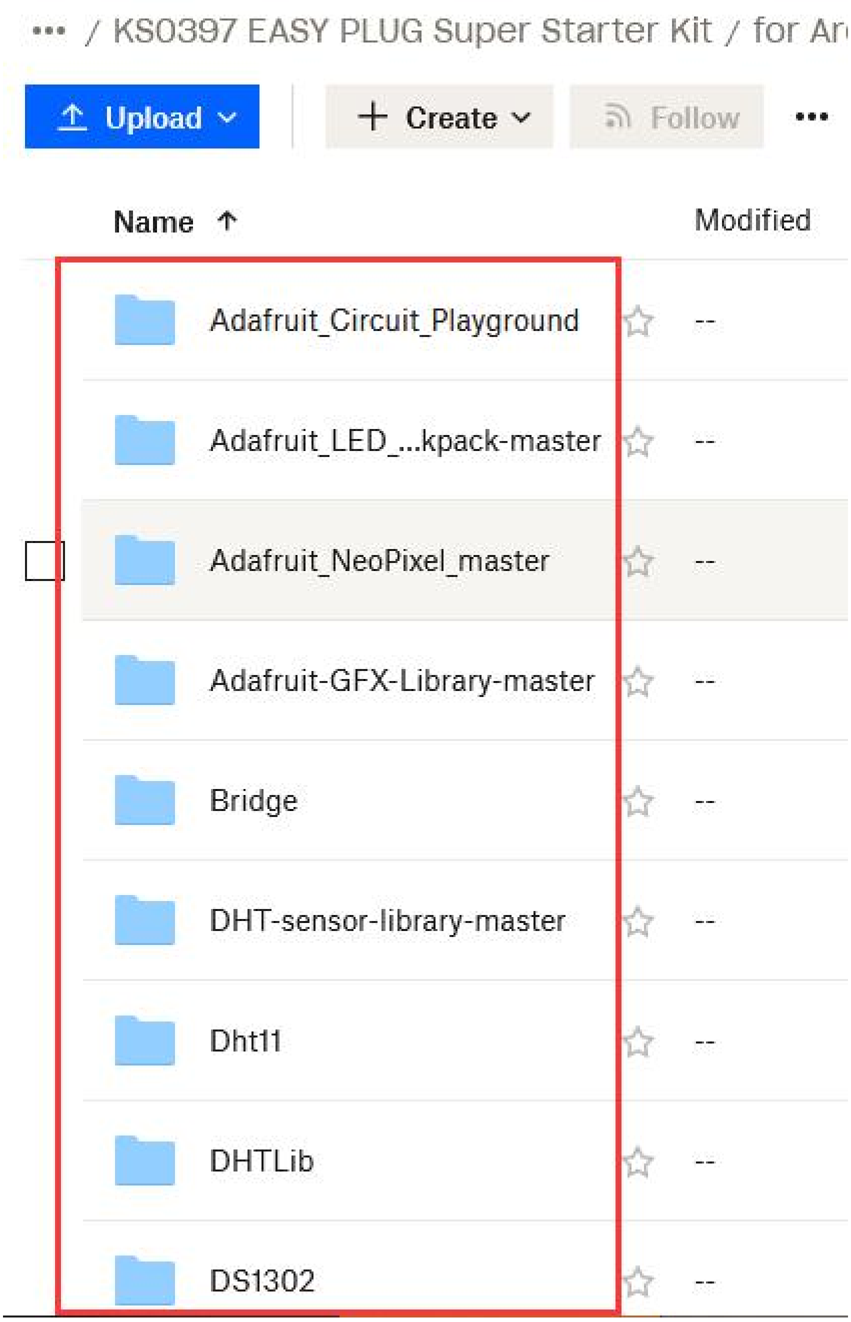
Dropbox / KS / 5.EASY PLUG / KS0397 EASY PLUG Super Starter Kit

Name	Modified	Members
for Arduino	--	Only you
for Mixly ☆	--	Only you



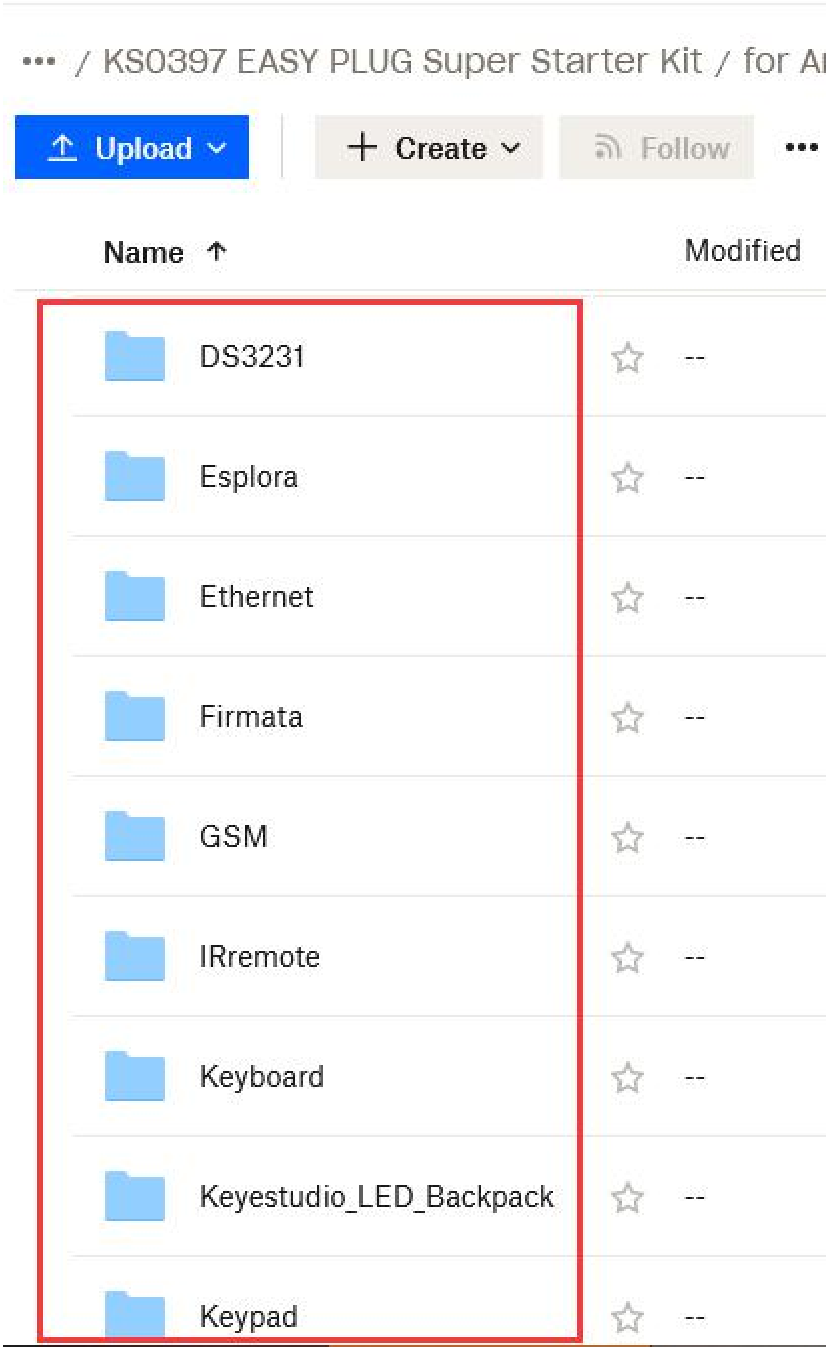
••• / KS0397 EASY PLUG Super Starter Kit / for Arduino

Name ↑	Modified
Libraries	--
Test Code	--
□ PDF KS0397 Keyestu... Stem EDU....	29/9/2021 11:34 am by you

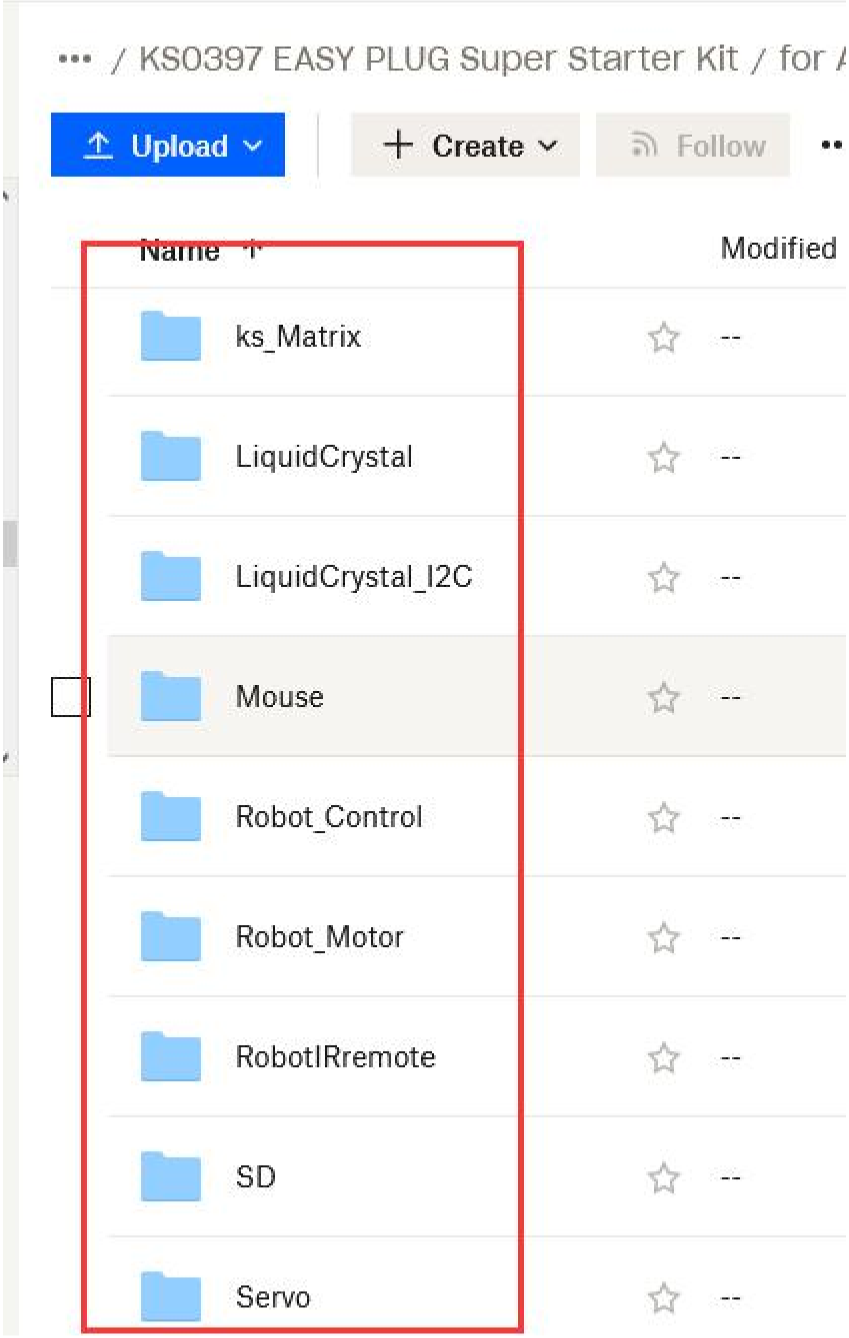


••• / KS0397 EASY PLUG Super Starter Kit / for Ar

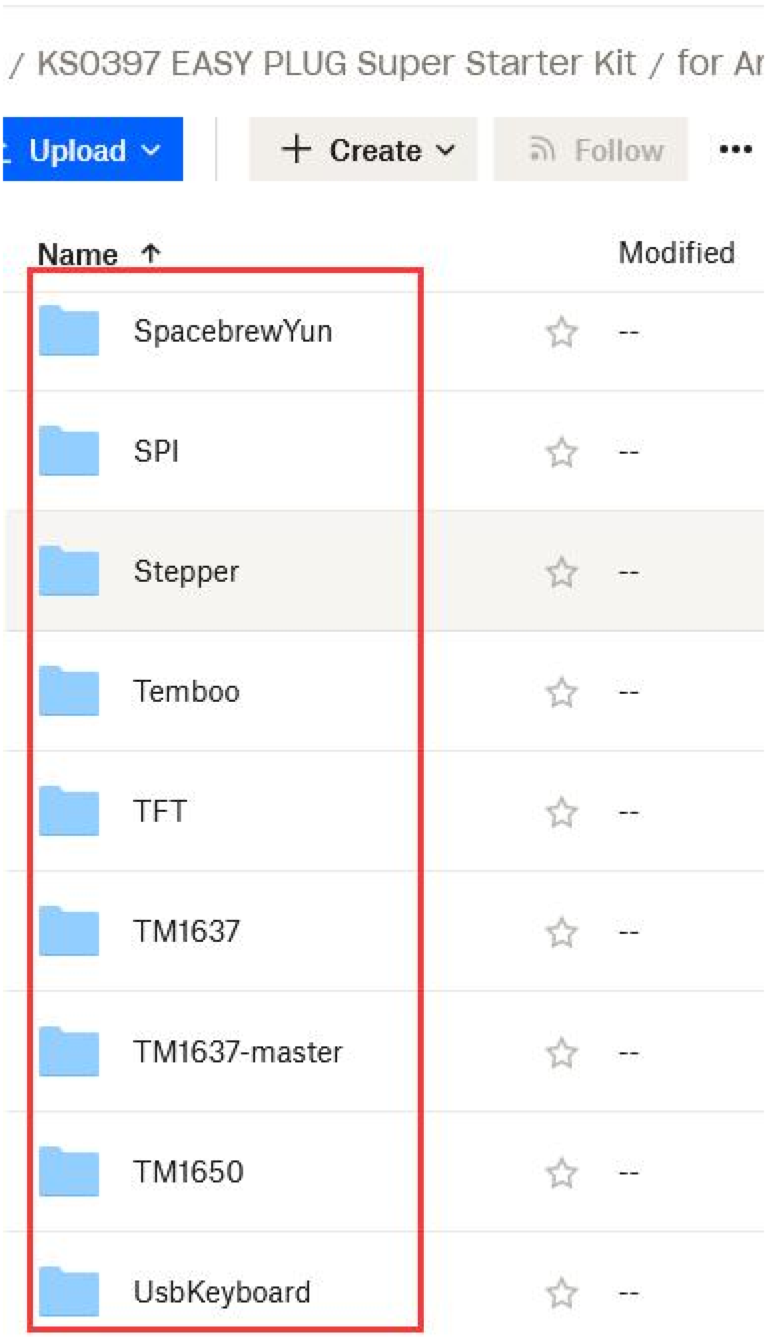
Name ↑	Modified
Adafruit_Circuit_Playground	--
Adafruit_LED_...kpack-master	--
Adafruit_NeoPixel_master	--
Adafruit-GFX-Library-master	--
Bridge	--
DHT-sensor-library-master	--
Dht11	--
DHTLib	--
DS1302	--



Name ↑		Modified
DS3231	☆	--
Esplora	☆	--
Ethernet	☆	--
Firmata	☆	--
GSM	☆	--
IRremote	☆	--
Keyboard	☆	--
Keyestudio_LED_Backpack	☆	--
Keypad	☆	--

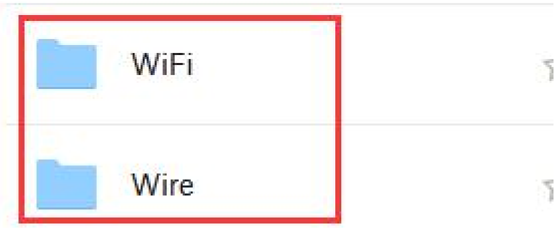


Name		Modified
ks_Matrix	☆	--
LiquidCrystal	☆	--
LiquidCrystal_I2C	☆	--
Mouse	☆	--
Robot_Control	☆	--
Robot_Motor	☆	--
RobotIRremote	☆	--
SD	☆	--
Servo	☆	--



/ KS0397 EASY PLUG Super Starter Kit / for Ar

Name ↑	Modified
SpacebrewYun	--
SPI	--
Stepper	--
Temboo	--
TFT	--
TM1637	--
TM1637-master	--
TM1650	--
UsbKeyboard	--

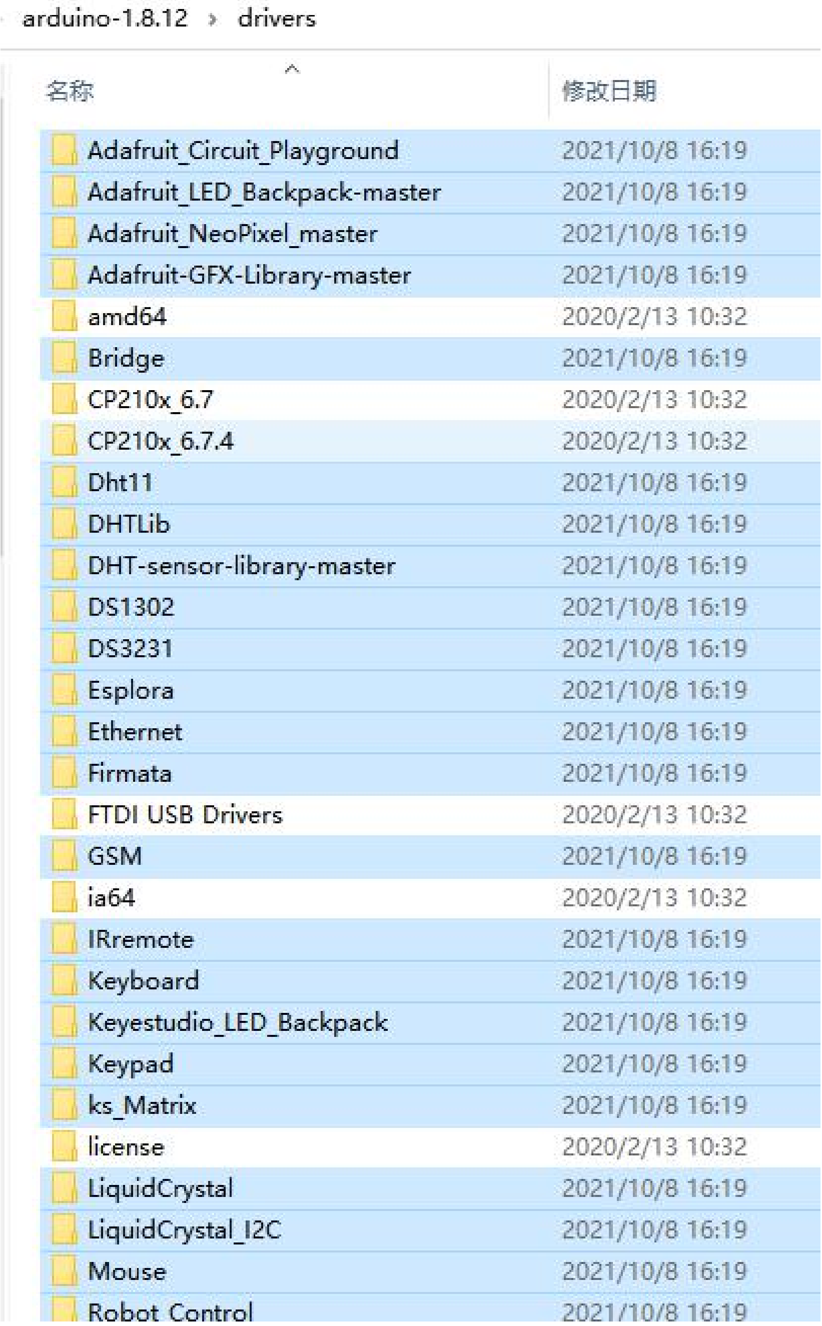


WiFi

Wire

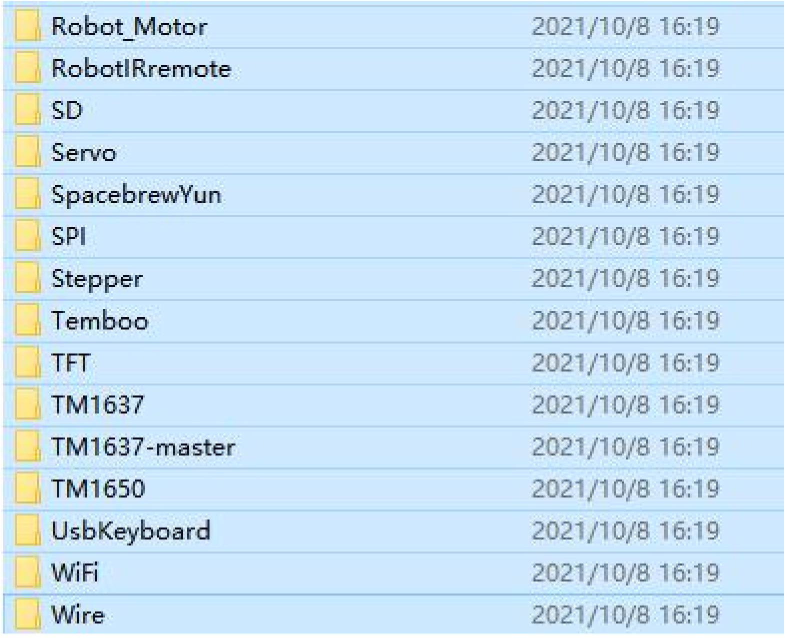
You just need to replicate and paste the following folders into the libraries folder of Arduino IDE.

Then the libraries of the starter kit are installed successfully, as shown below:



arduino-1.8.12 › drivers

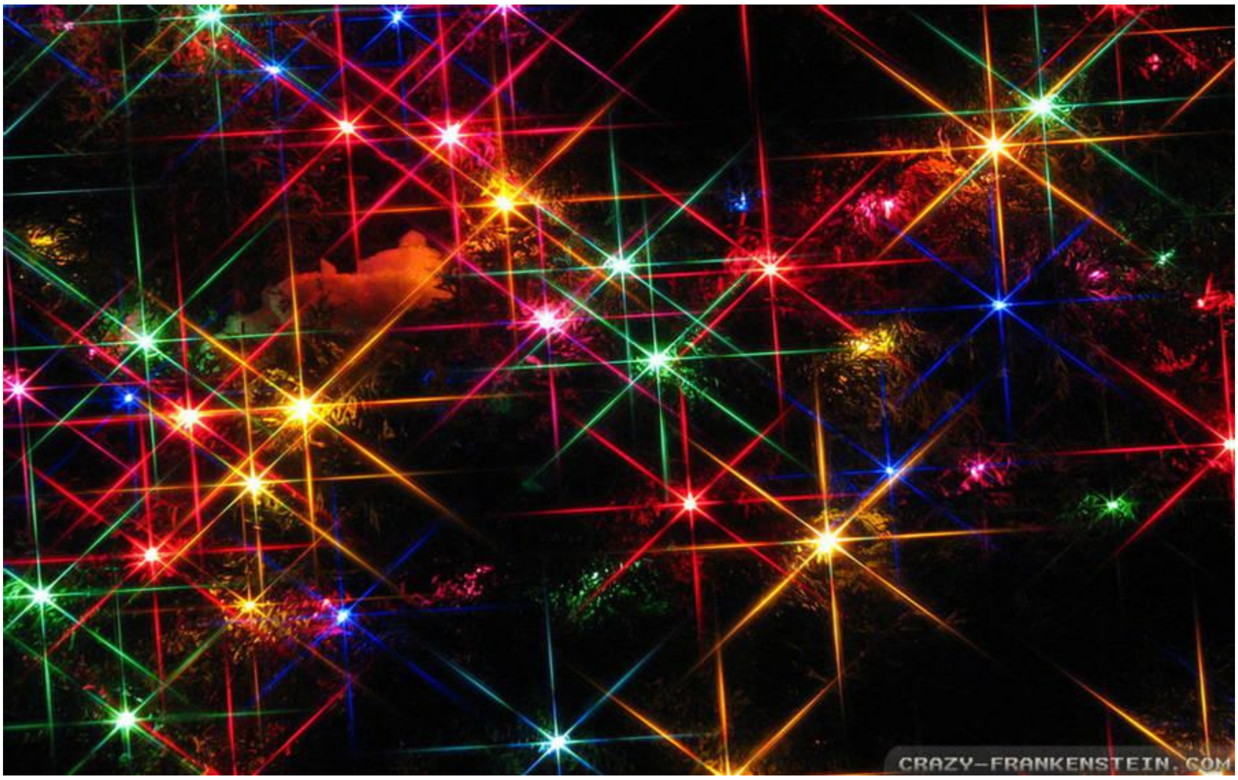
名称	修改日期
Adafruit_Circuit_Playground	2021/10/8 16:19
Adafruit_LED_Backpack-master	2021/10/8 16:19
Adafruit_NeoPixel_master	2021/10/8 16:19
Adafruit-GFX-Library-master	2021/10/8 16:19
amd64	2020/2/13 10:32
Bridge	2021/10/8 16:19
CP210x_6.7	2020/2/13 10:32
CP210x_6.7.4	2020/2/13 10:32
Dht11	2021/10/8 16:19
DHTLib	2021/10/8 16:19
DHT-sensor-library-master	2021/10/8 16:19
DS1302	2021/10/8 16:19
DS3231	2021/10/8 16:19
Esplora	2021/10/8 16:19
Ethernet	2021/10/8 16:19
Firmata	2021/10/8 16:19
FTDI USB Drivers	2020/2/13 10:32
GSM	2021/10/8 16:19
ia64	2020/2/13 10:32
IRremote	2021/10/8 16:19
Keyboard	2021/10/8 16:19
Keyestudio_LED_Backpack	2021/10/8 16:19
Keypad	2021/10/8 16:19
ks_Matrix	2021/10/8 16:19
license	2020/2/13 10:32
LiquidCrystal	2021/10/8 16:19
LiquidCrystal_I2C	2021/10/8 16:19
Mouse	2021/10/8 16:19
Robot Control	2021/10/8 16:19



Robot_Motor	2021/10/8 16:19
RobotIRremote	2021/10/8 16:19
SD	2021/10/8 16:19
Servo	2021/10/8 16:19
SpacebrewYun	2021/10/8 16:19
SPI	2021/10/8 16:19
Stepper	2021/10/8 16:19
Temboo	2021/10/8 16:19
TFT	2021/10/8 16:19
TM1637	2021/10/8 16:19
TM1637-master	2021/10/8 16:19
TM1650	2021/10/8 16:19
UsbKeyboard	2021/10/8 16:19
WiFi	2021/10/8 16:19
Wire	2021/10/8 16:19

5. Started With Your Projects

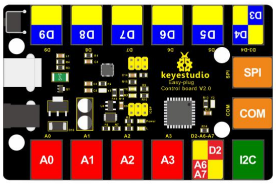
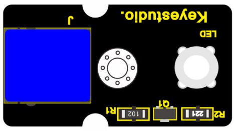
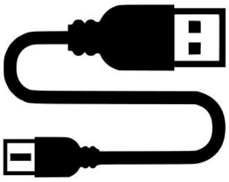
Project 1: LED Blink



1.Overview

The LED blinking project is the most basic Arduino project. In this project, we connect an LED to a digital pin and control it.

2. Component Required:

EASY plug control board*1	EASY plug LED Module *1	RJ11 cable*1	USB cable*1
			

3.Component Introduction:

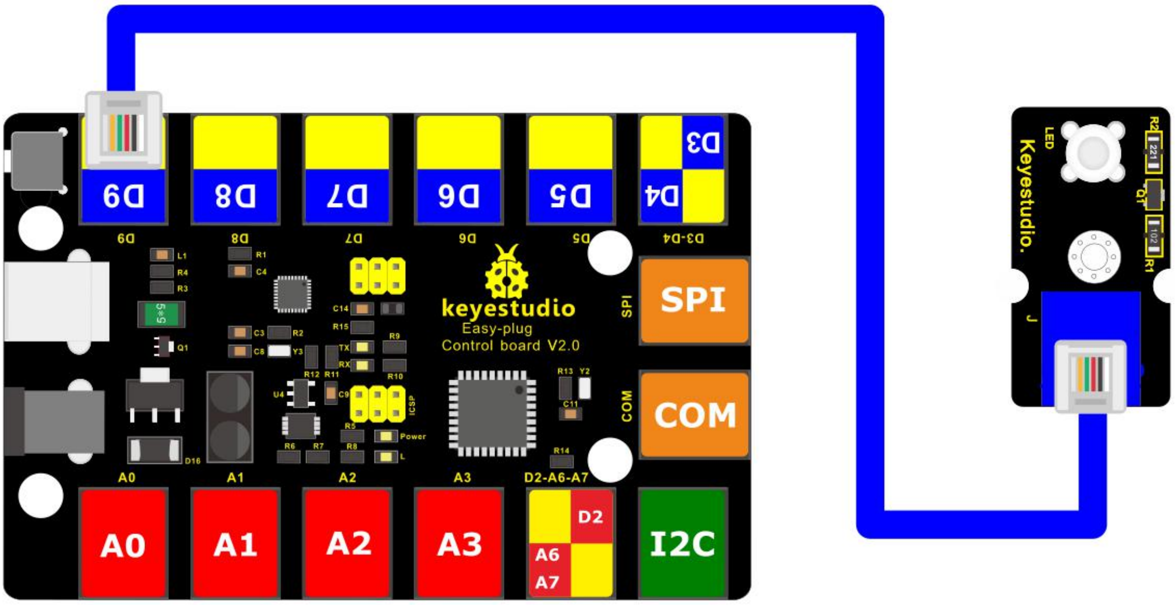
The LED light modules have shiny colors, ideal for Arduino starters. It can be easily connected to IO/Sensor shield.

Note: this module needs to be used together with EASY plug control board. You can also choose other LED to emit different color of light like blue, green, yellow and red.

- Sensor type: Digital
- Interface: Easy plug
- PH2.54 socket

4.Connect It Up

Connect the EASY Plug LED module to control board using an RJ11 cable.



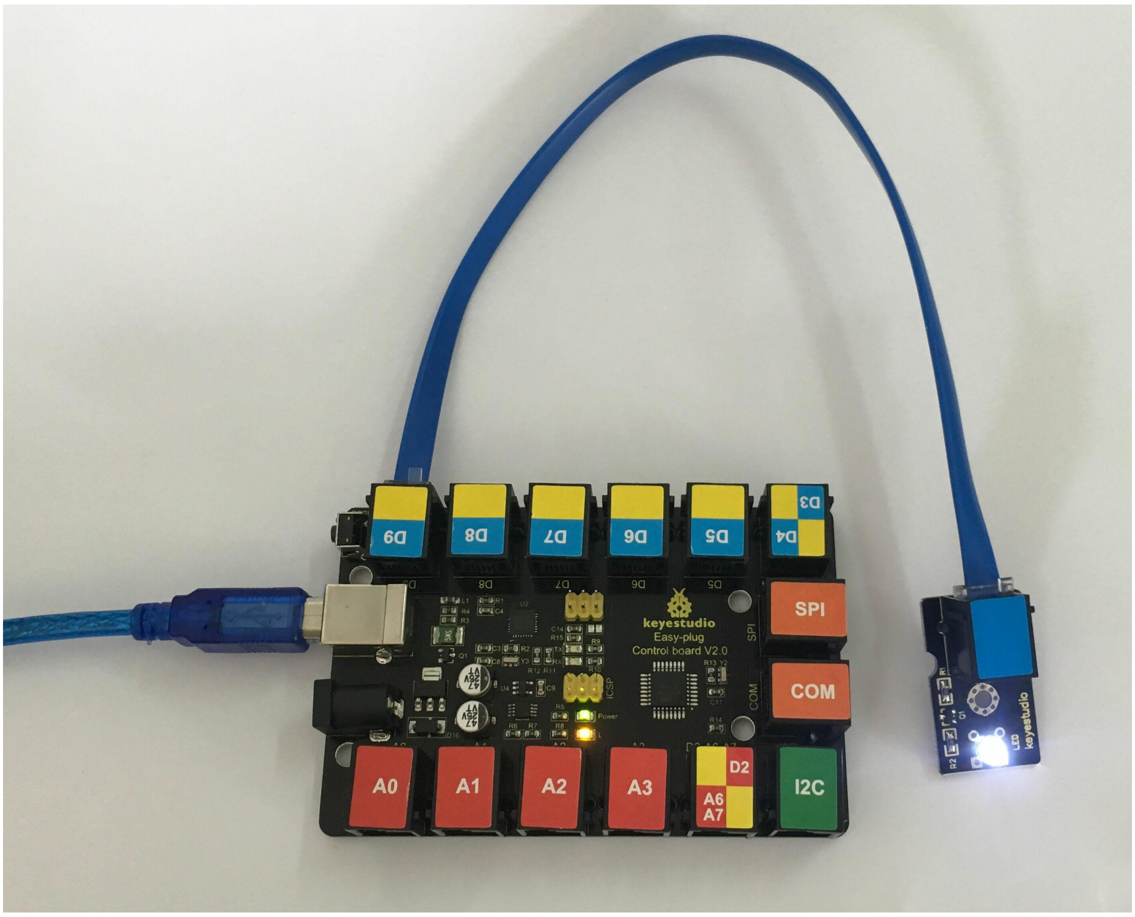
5.Upload the Code

```
   /*
keyestudio Easy plug super kit
Project 1
Blink
http://www.keyestudio.com
*/
// the setup function runs once when you press reset or power the board
void setup() {
   // initialize digital pin 9 as an output.
   pinMode(9, OUTPUT);
}
// the loop function runs over and over again forever
void loop() {
   digitalWrite(9, HIGH);    // turn the LED on (HIGH is the voltage level)
   delay(1000);                     // wait for a second
   digitalWrite(9, LOW);     // turn the LED off by making the voltage LOW
   delay(1000);                     // wait for a second
}
//*****************************************************
```

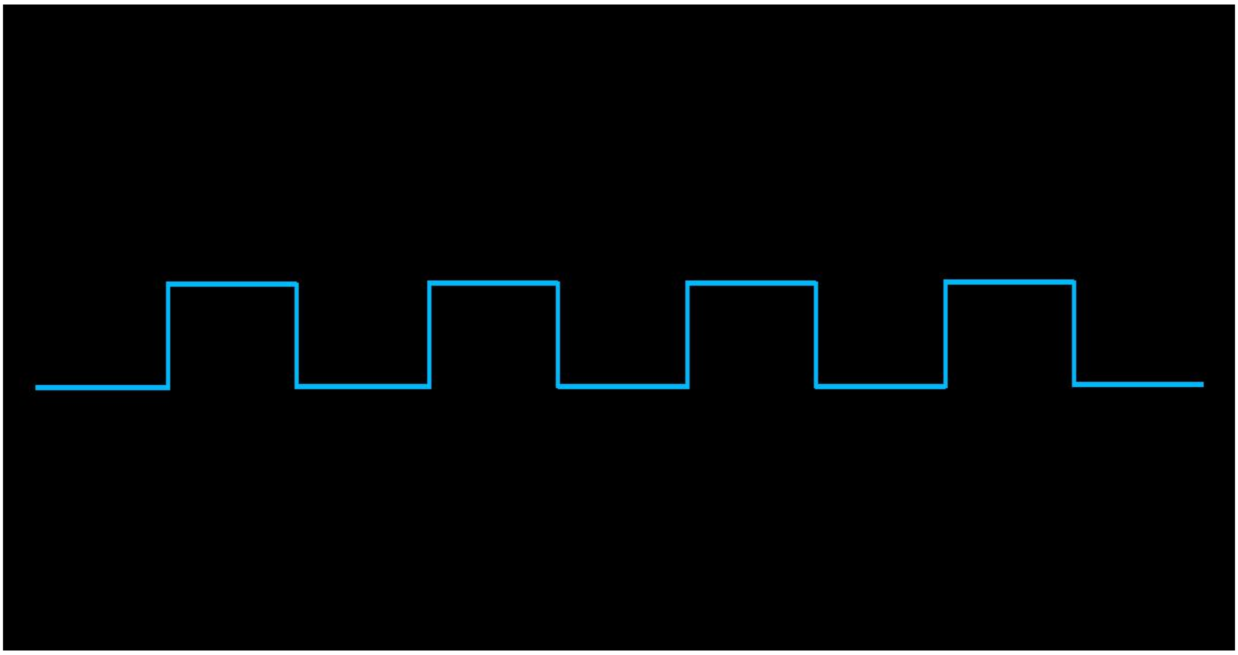
6.What You Should See

The LED will flash on for one second, then blink off for one second.

If it doesn’t, make sure you have assembled the circuit correctly and verified and uploaded the code to your board.



Project 2: PWM



1.Overview

LED blinking can be achieved through high and low levels, so how to control the brightness of the LED? PWM technology is used to control the brightness of LEDs.

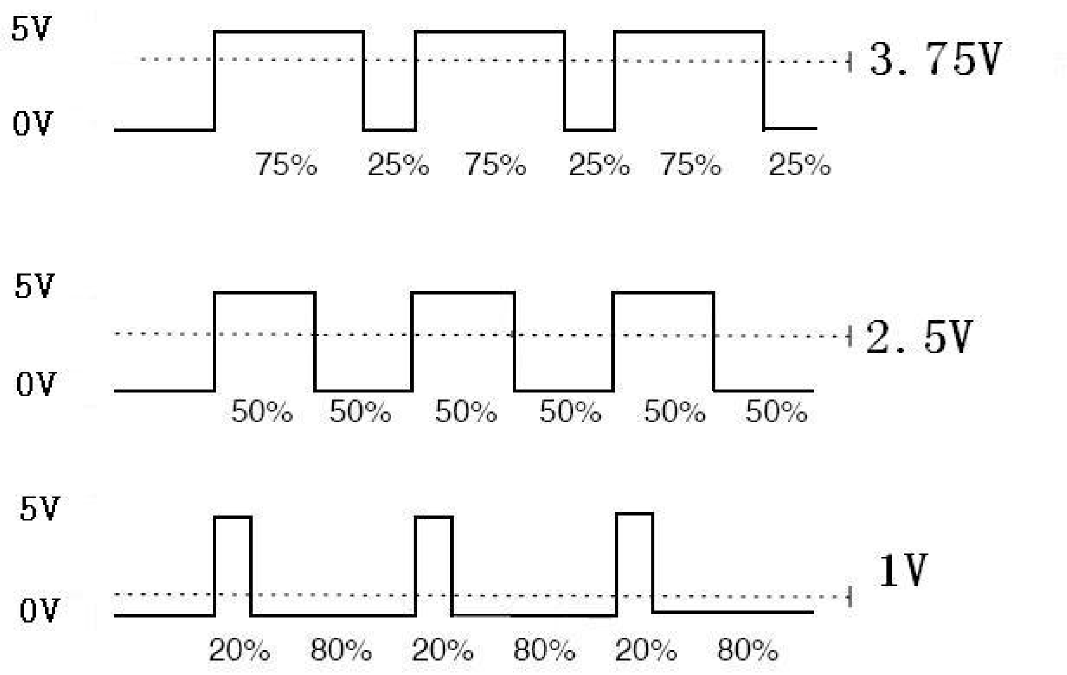
PWM, short for Pulse Width Modulation, is a technique used to encode analog signal level into digital ones.

A computer cannot output analog voltage but only digital voltage values such as 0V or 5V. So we use a high resolution counter to encode a specific analog signal level by modulating the duty cycle of PMW.

The PWM signal is also digitalized because in any given moment, fully on DC power supply is either 5V (ON), or 0V (OFF). The voltage or current is fed to the analog load (the device that uses the power) by repeated pulse sequence being ON or OFF. Being on, the current is fed to the load; being off, it's not.

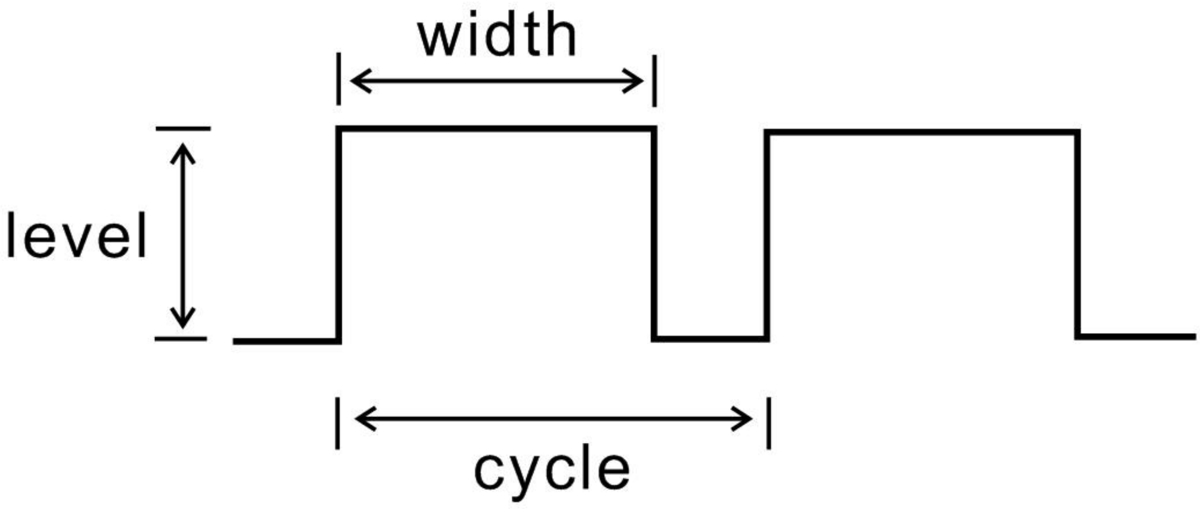
With adequate bandwidth, any analog value can be encoded using PWM. The output voltage value is calculated via the on and off time.

Output voltage = (turn on time/pulse time) * maximum voltage value



PWM has many applications: lamp brightness regulating, motor speed regulating, sound making, etc.

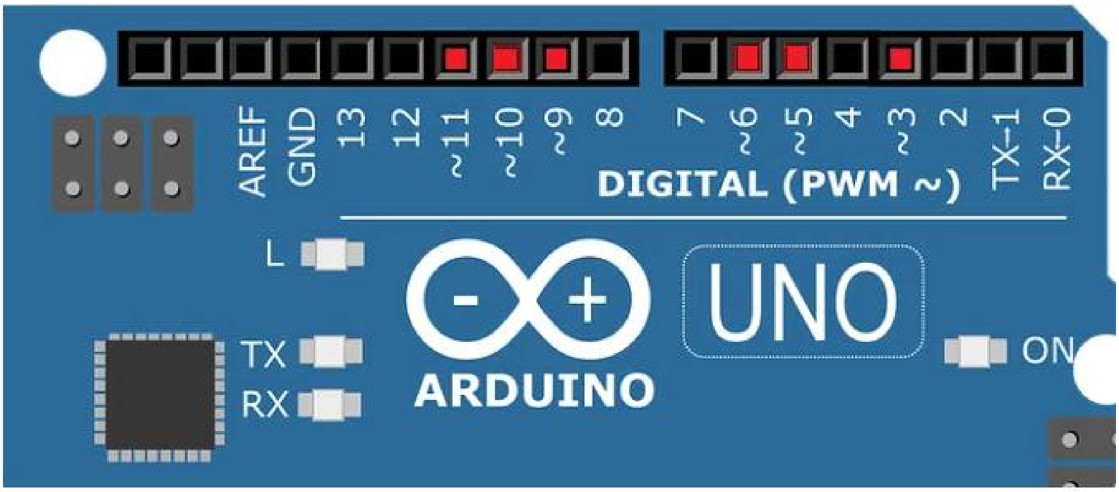
The following are the three basic parameters of PMW:



1. The amplitude of pulse width (minimum / maximum)

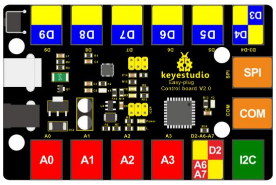
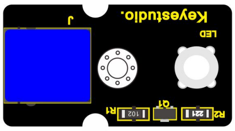
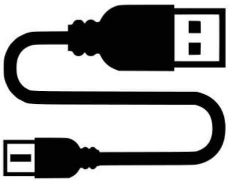
2. The pulse period (The reciprocal of pulse frequency in 1 second)

3. The voltage level (such as 0V-5V)



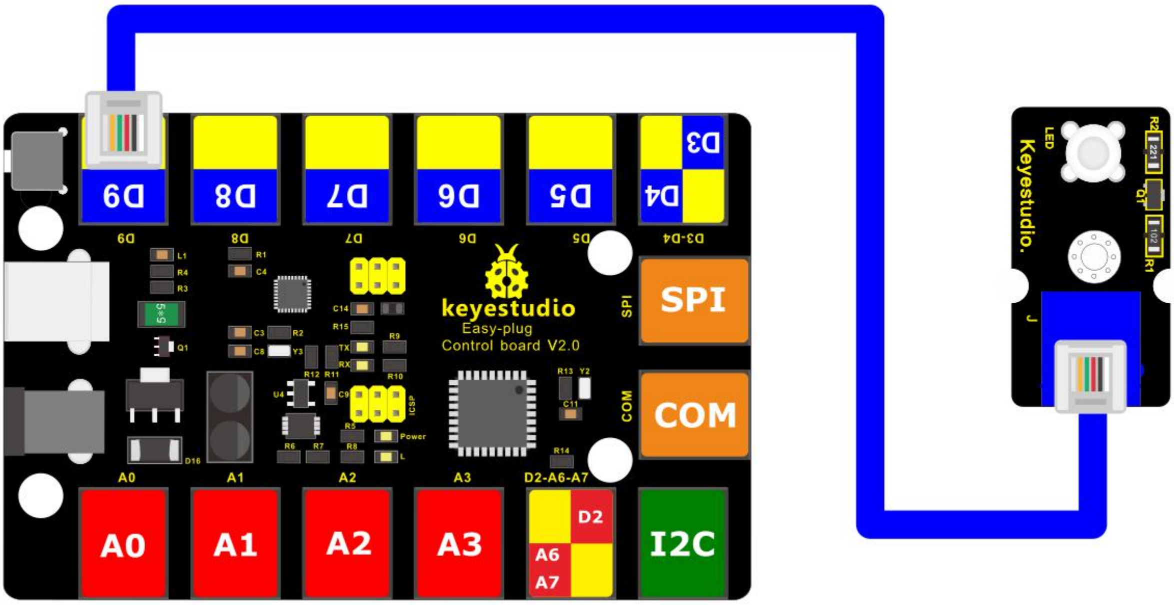
There are 6 PMW pins on Arduino board, namely digital pin 3, 5, 6, 9, 10, and 11.

2.Component Required:

EASY plug control board*1	EASY plug LED Module *1	RJ11 cable*1	USB cable*1
			

- EASY plug control board*1
- EASY plug LED Module *1
- RJ11 cable*1
- USB cable*1

3.Connect It Up



4.Test Code

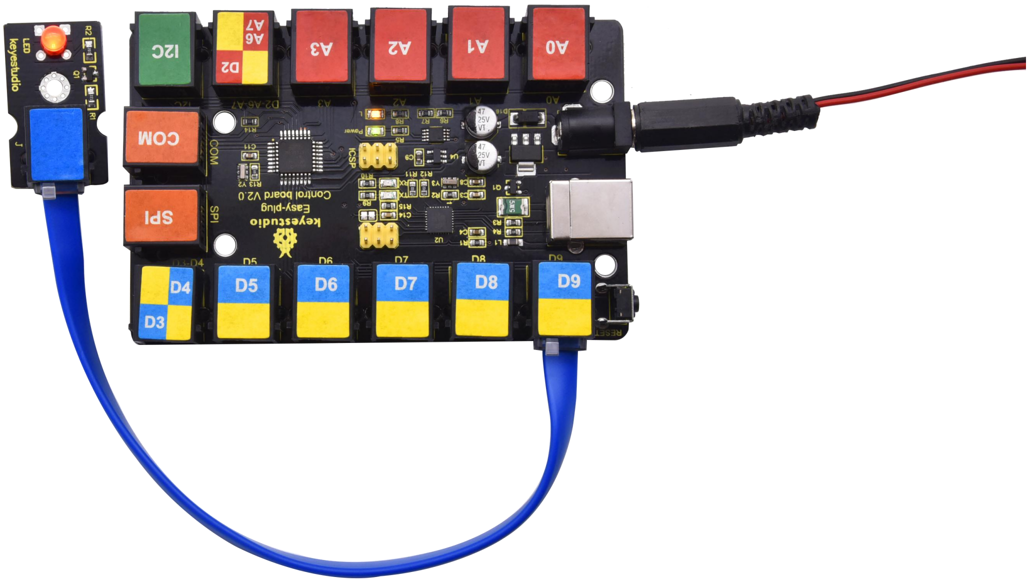
```
/*

keyestudio Easy plug super kit

Project 2

PWM

http://www.keyestudio.com

*/

int led = 9;               // the PWM pin the LED is attached to

int brightness = 0;        // how bright the LED is

int fadeAmount = 5;        // how many points to fade the LED by


// the setup routine runs once when you press reset:

void setup() {

  // declare pin 9 to be an output:

  pinMode(led, OUTPUT);

}


// the loop routine runs over and over again forever:
```

```
void loop() {
  // set the brightness of pin 9:
  analogWrite(led, brightness);


  // change the brightness for next time through the loop:
  brightness = brightness + fadeAmount;


  // reverse the direction of the fading at the ends of the fade:
  if (brightness <= 0 || brightness >= 255) {
    fadeAmount = -fadeAmount;
  }
  // wait for 30 milliseconds to see the dimming effect
  delay(30);
}
//*****************************************************************
```

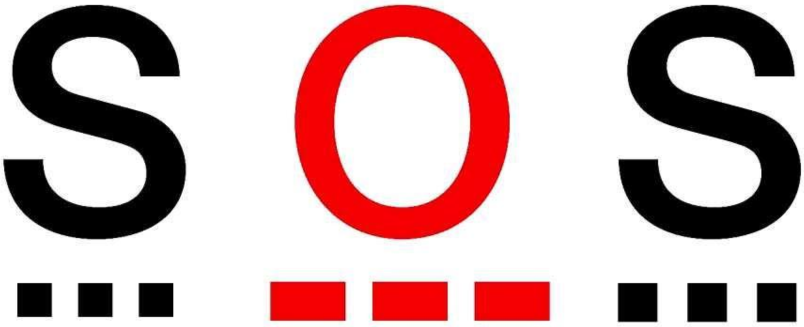
5.What You Should See

The LED gradually becomes brighter and gradually dimming.

If it doesn’ t, make sure you have assembled the circuit correctly and verified and uploaded the code to your board.



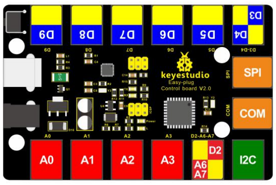
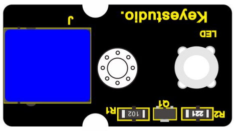
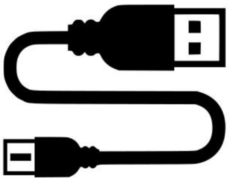
Project 3: SOS light



1.Overview

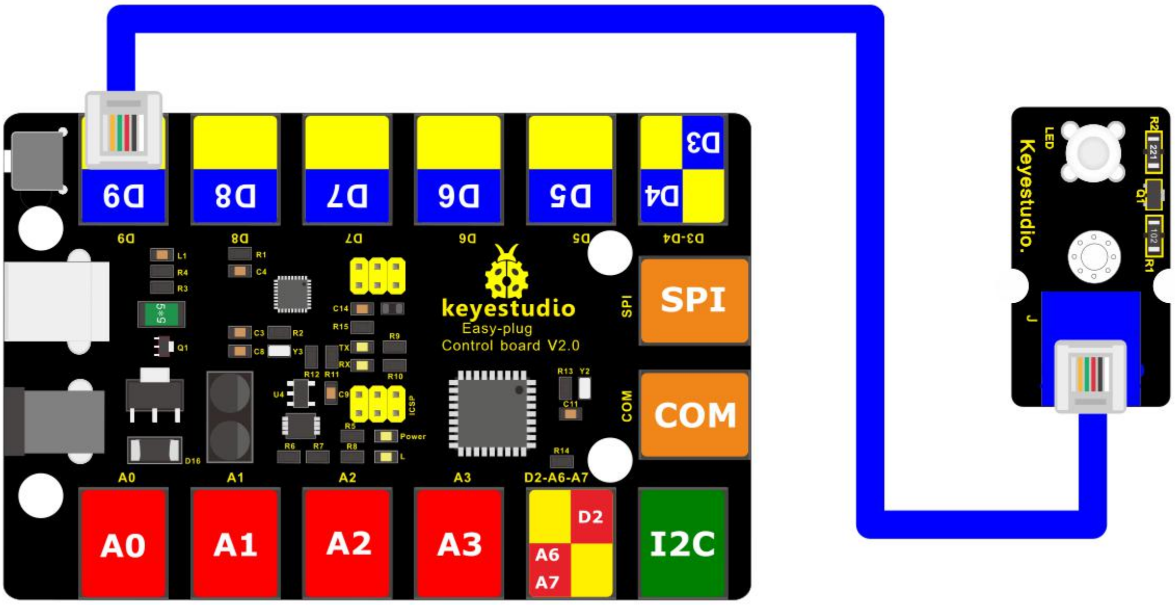
SOS is a Morse code distress signal, used internationally, that was originally established for maritime use. In formal notation SOS is written with an overscore line, to indicate that the Morse code equivalents for the individual letters of "SOS" are transmitted as an unbroken sequence of three dots / three dashes / three dots, with no spaces between the letters.[1] In International Morse Code three dots form the letter "S" and three dashes make the letter "O", so "S O S" became a common way to remember the order of the dots and dashes. (IWB, VZE, 3B, and V7 form equivalent sequences, but traditionally SOS is the easiest to remember.)

2.Component Required:

EASY plug control board*1	EASY plug LED Module *1	RJ11 cable*1	USB cable*1
			

- EASY plug control board*1
- EASY plug LED Module *1
- RJ11 cable*1
- USB cable*1

3.Connect It Up



4.Test Code

```
/*
keyestudio Easy plug super kit
Project 3
s o s
http://www.keyestudio.com
*/
int ledPin = 9;
void setup() {
  pinMode(ledPin, OUTPUT);
}
```

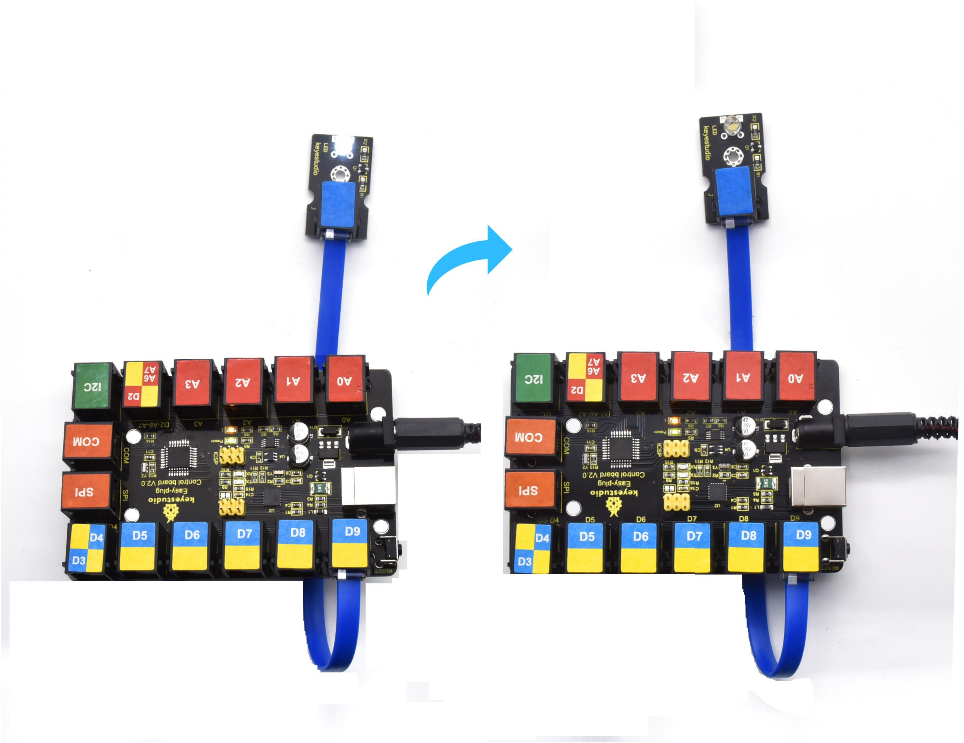
```
void loop() {
            //   stand for “S” with three quick flash
for(int x=0;x<3;x++){
digitalWrite(ledPin,HIGH);                 //set LED on
delay(150);                                 //delay in 150ms
digitalWrite(ledPin,LOW);                  //set LED off
delay(100);                                 //delay in 100ms
          }//
delay(100);
               // stand for “O” with three short flash
for(int x=0;x<3;x++){
digitalWrite(ledPin,HIGH);                 //set LED on
delay(400);                                 //delay in 400ms
digitalWrite(ledPin,LOW);                  //set LED off
delay(100);                                 //delay in 100ms
               }//
delay(100);//   stand for “S” with three quick flash
for(int x=0;x<3;x++){
digitalWrite(ledPin,HIGH);                 //set LED on
delay(150);                                 //delay in 150ms
digitalWrite(ledPin,LOW);                  //set LED off
delay(100);                                 //delay in 100ms
}// wait for 5s before repeating S.0.S
delay(5000);
}
//*******************************************************
```

5.What You Should See

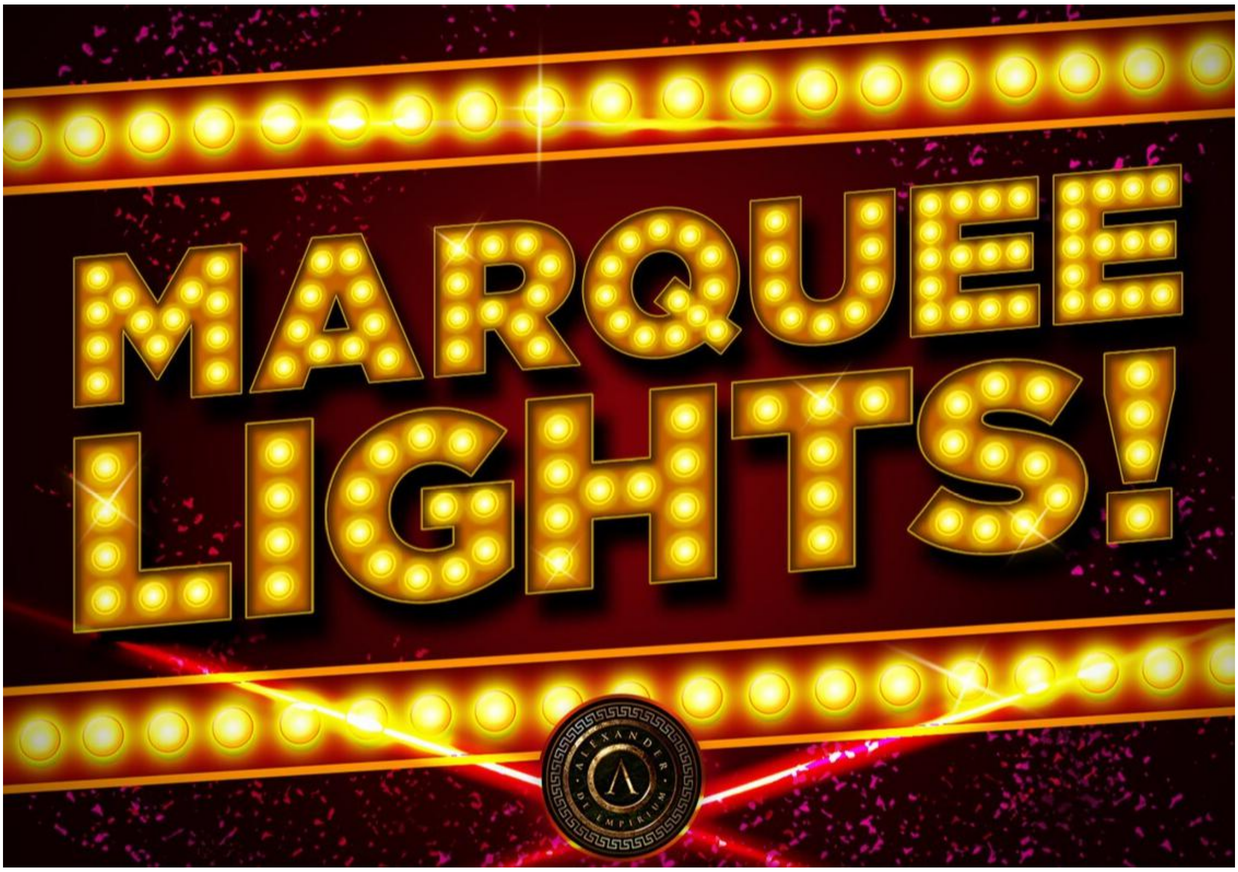
Upload code to Arduino, LED will show S.O.S signal, wait for 5s and show it again.

Plug external power in Arduino, and place them in a waterproof box, then S.O.S signal can be sent.

S.O.S signal is usually applied in maritime use and mountain-climbing.



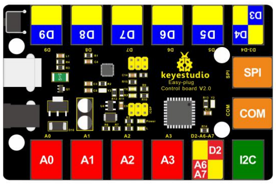
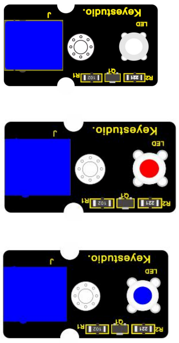
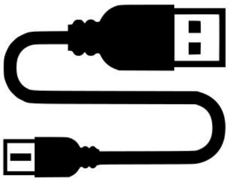
Project 4: LED Chasing Effect



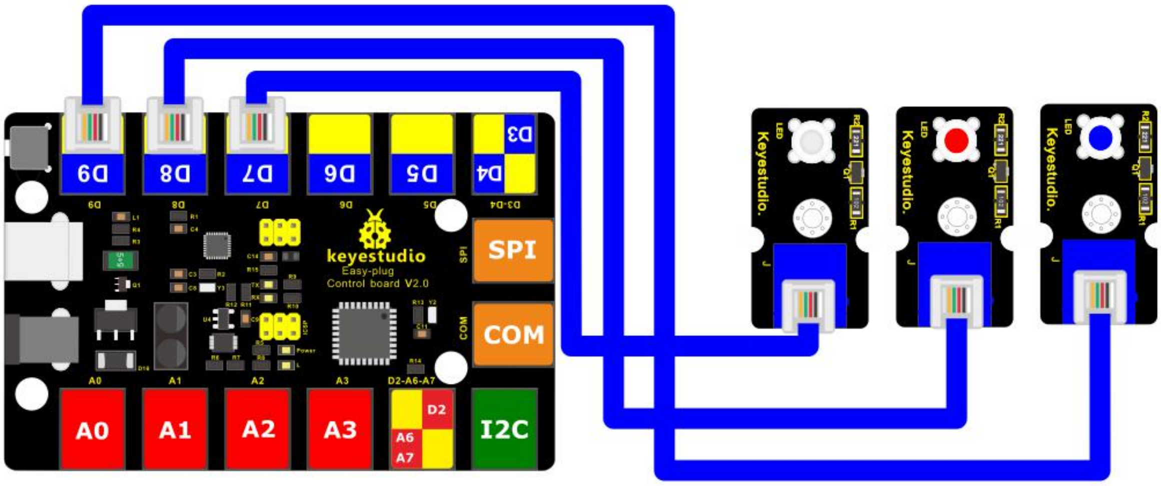
1.Overview

Flow light is commonly viewed in our daily life, such as on building, advertisement board and so on. We will show you how to make a flow light in this part.

2.Component Required:

EASY plug control board*1	EASY plug LED Module *3	RJ11 cable*3	USB cable*1
			

3.Connect It Up

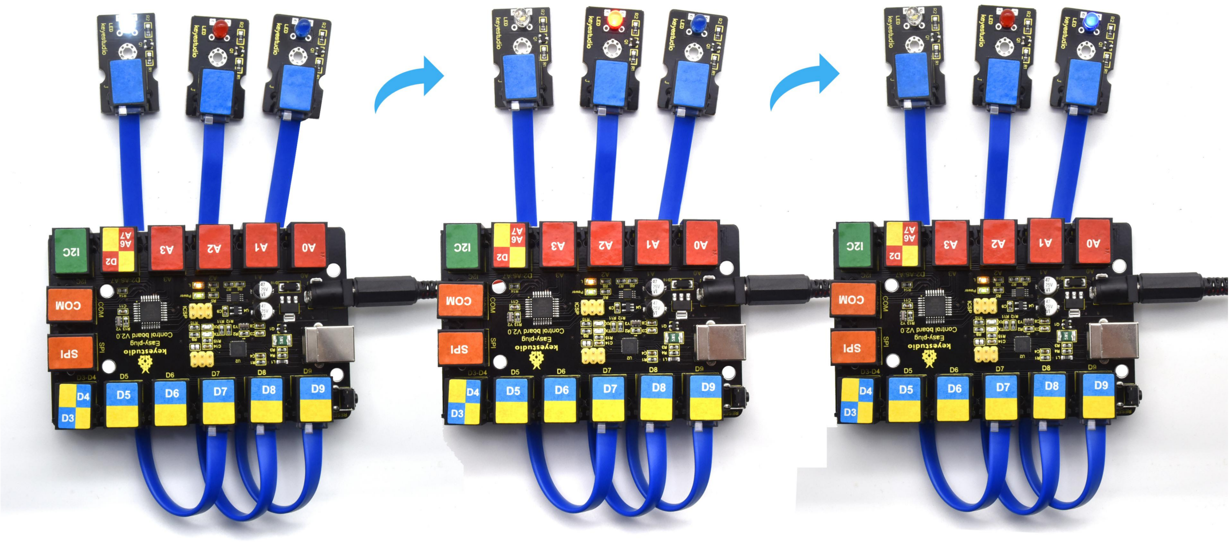


4. Test Code

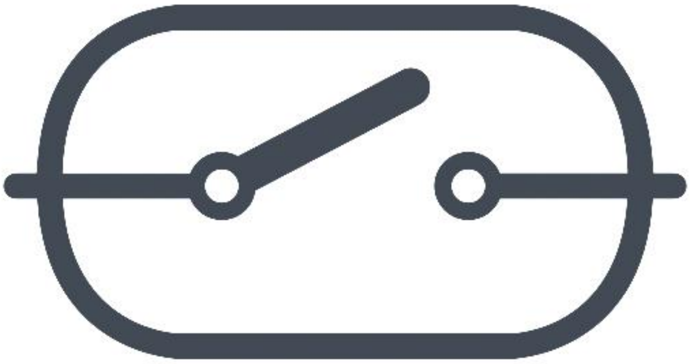
```
/*
keyestudio Easy plug super kit
Project 4
LED Chasing Effect
http://www.keyestudio.com
*/
int whiteled=7;
int redled=8;
int blueled=9;
void setup()
{
pinMode(whiteled,OUTPUT);
pinMode(redled,OUTPUT);
pinMode(blueled,OUTPUT);
}
void loop()
{
digitalWrite(whiteled,HIGH);//turn on the white led
delay(100);//delay in 0.1s
digitalWrite(whiteled,LOW);//turn off the white led
delay(100);//delay in 1s
digitalWrite(redled,HIGH);//turn on the red led
delay(100);//delay in 0.1s
digitalWrite(redled,LOW);//turn off the red led

delay(100);//delay in 0.1s

digitalWrite(blueled,HIGH);//turn on the blue led

delay(100);//delay in 0.1s

digitalWrite(blueled,LOW);//turn off the blue led

delay(100);//delay in 0.1s

}

//*********************************************
```

5. What You Should See

After downloading code, we will view white, red and blue LEDs flash ceaselessly.



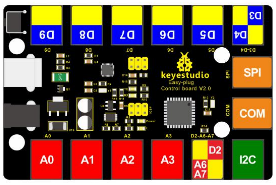
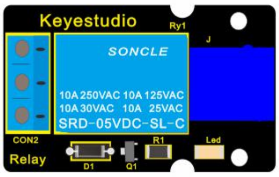
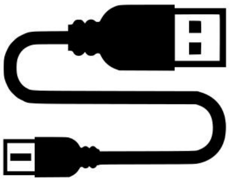
Project 5: Relay



1.Overview

In this project, we will show you how to control a relay module. This relay module uses a high-quality relay. A relay is basically an electrically controlled mechanical switch. It can be used to interactive projects.

2. Component Required:

EASY plug control board*1	EASY plug　Relay Module *1	RJ11 cable*1	USB cable*1
			

3.Component Introduction:

EASY plug Single Relay Module

This EASY Plug relay module uses a high-quality relay. A relay is basically an electrically controlled mechanical switch.

It is one of the most important controlled elements, which is widely used to control the lighting, communications, remote sensing, electrical and other equipments.

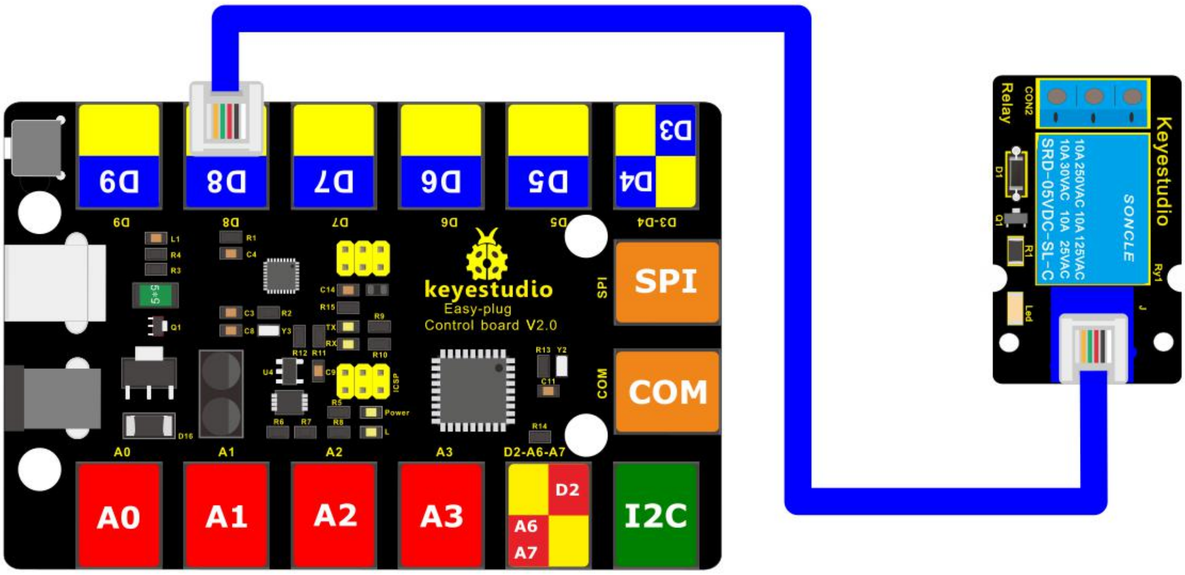
The Relay output state by a light-emitting diode, observing the relay ON and OFF status.

It can be controlled through the digital IO port, such as lamps, motors and other high current or high voltage devices.

- Type: Digital
- Rated current: 10A (NO) 5A (NC)
- Maximum switching voltage: 150VAC 24VDC
- Digital interface
- Control signal: TTL level
- Rated load: 8A 150VAC (NO) 10A 24VDC (NO); 5A 250VAC (NO/NC) 5A 24VDC (NO/NC)
- Maximum switching power: AC1200VA DC240W (NO); AC625VA DC120W (NC)
- Contact action time: 10ms

4.Connect It Up

Connect the EASY Plug Single Relay module to control board using an RJ11 cable.



5.Upload the Code

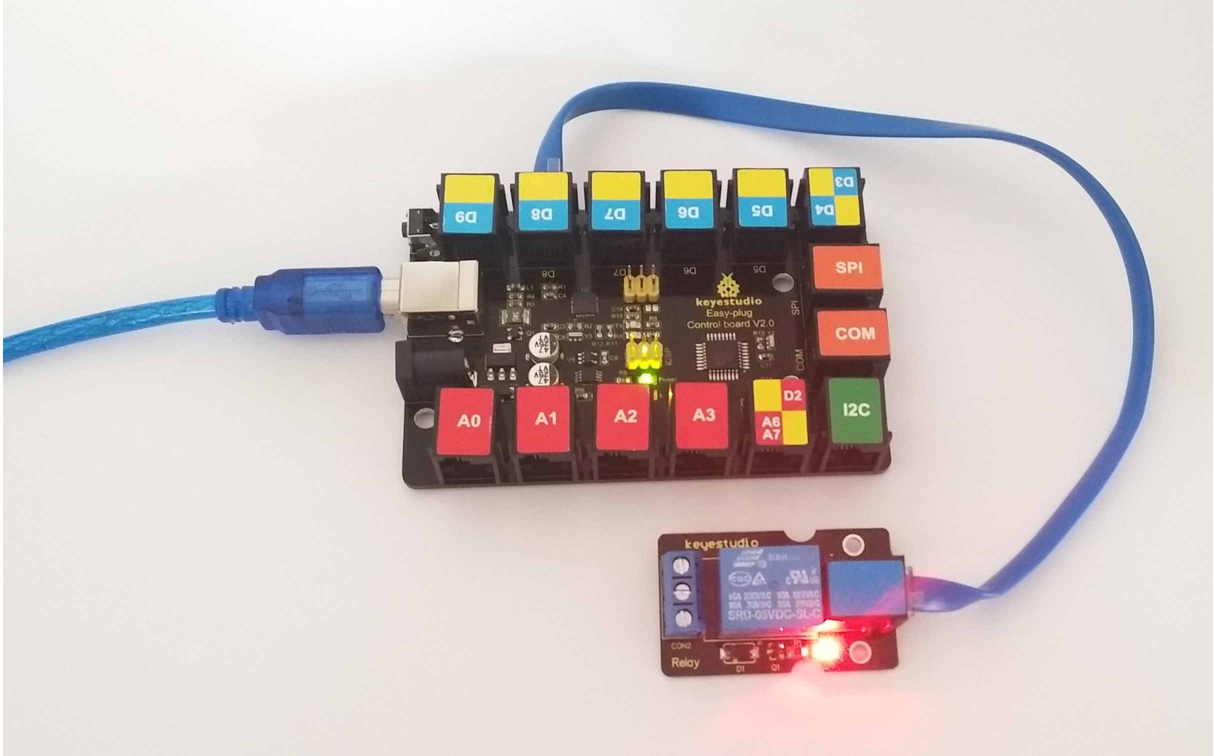
```
//Below is an example code.
 /*

keyestudio Easy plug super kit

Project 5

Relay

http://www.keyestudio.com

*/

// the setup function runs once when you press reset or power the board

void setup() {

   // initialize digital pin 8 as an output.
```

```
  pinMode(8, OUTPUT);
}
// the loop function runs over and over again forever
void loop() {
  digitalWrite(8, HIGH);     // turn the relay on (HIGH is the voltage level)
  delay(1000);                     // wait for a second
  digitalWrite(8, LOW);      // turn the relay off by making the voltage LOW
  delay(1000);                     // wait for a second
}
//********************************************************
```

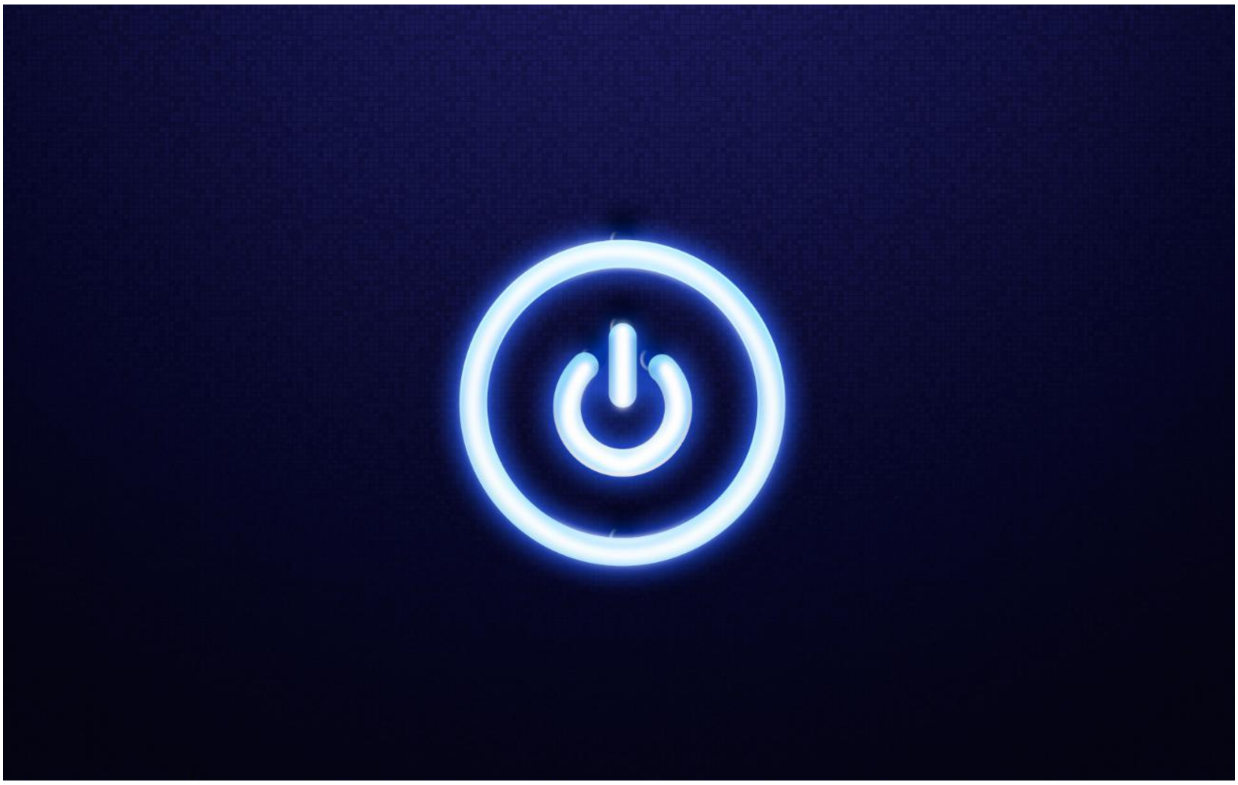
6.What You Should See

Done uploading the code, you should be able to hear the relay contacts click. When the relay is off, the COM (common) terminal block will be connected to the NC (Normally Closed) terminal block.

When the relay is on, the COM (common) terminal block will be connected to the NO (Normally Open) terminal block.


D9
D8
D7
D6
D5
D4
D3
SPI
COM
I2C
A0
A1
A2
A3
D2
A6
A7
keyestudio
Easy-plug
Control board V2.0
keyestudio
SRD-05VDC-SL-C
Relay

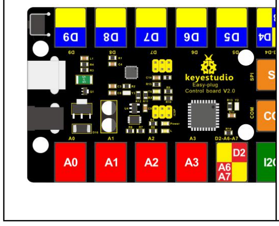
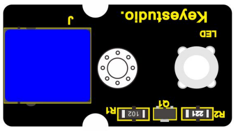
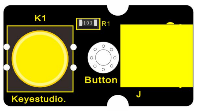
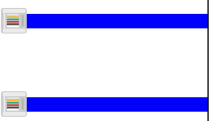
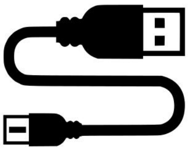
Project 6: Button



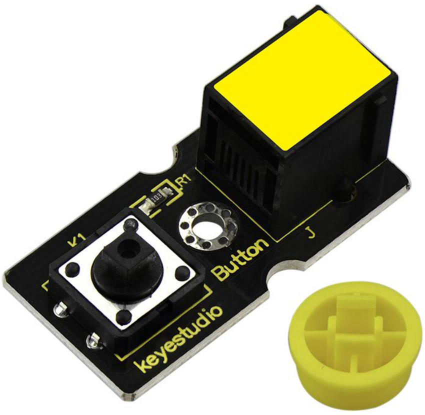
1.Overview

In this project, we' ll be looking at the one of the most common and simple inputs- a push button. It is an elegant way to control power to your project. Press once to turn on, then press again to turn off. Press to release pleasure!

2. Component Required:

EASY plug control board*1	EASY plug LED Module *1	EASY plug Digital Push Button *1	RJ11 cable*2	USB cable*1
				

3.Component Introduction:



EASY plug Push Button Module

The EASY Plug Push-button module is a tidy little design that lets you control a DC power source using an everyday tactile button.

This basic application module is widely applied to Arduino, Raspberry Pi platforms.

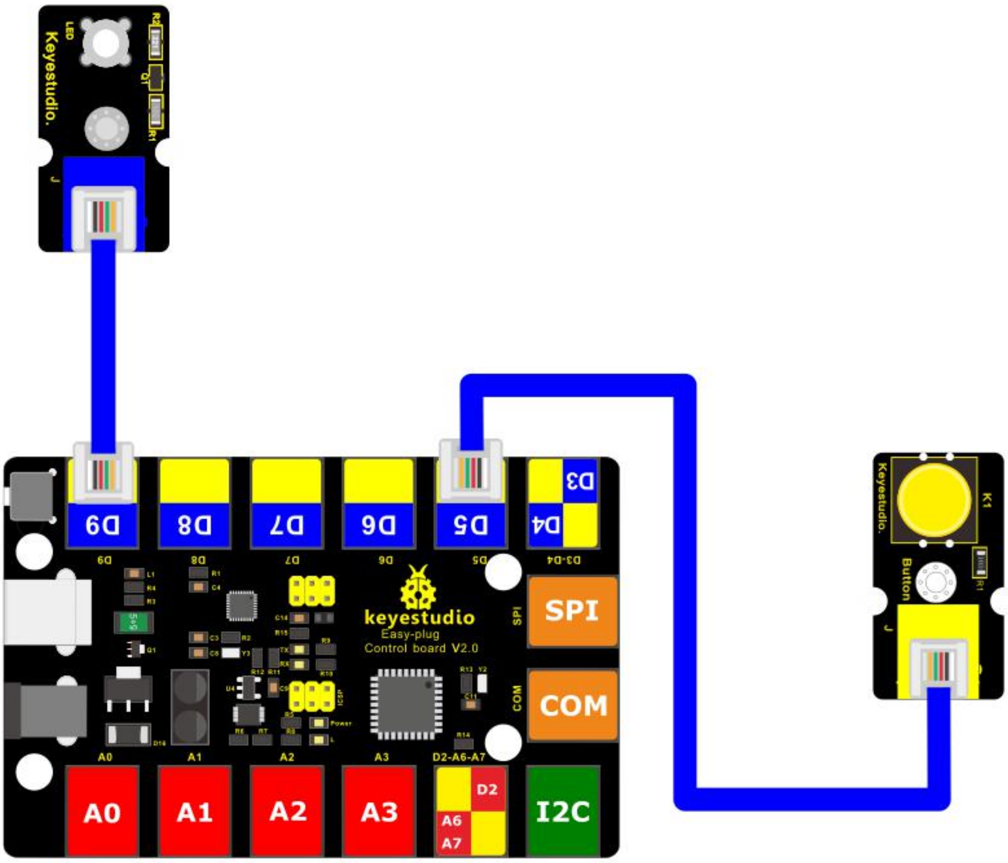
When the button is pressed, it outputs HIGH level signal; if release the button, it outputs LOW level signal.

You can simply connect to an IO port to have your first taste of Arduino.

- Supply Voltage: 3.3V to 5V
- Large button and high-quality top cap
- Sensor type: Digital

4.Connect It Up

Connect the EASY Plug push button sensor and LED module to control board using RJ11 cables.



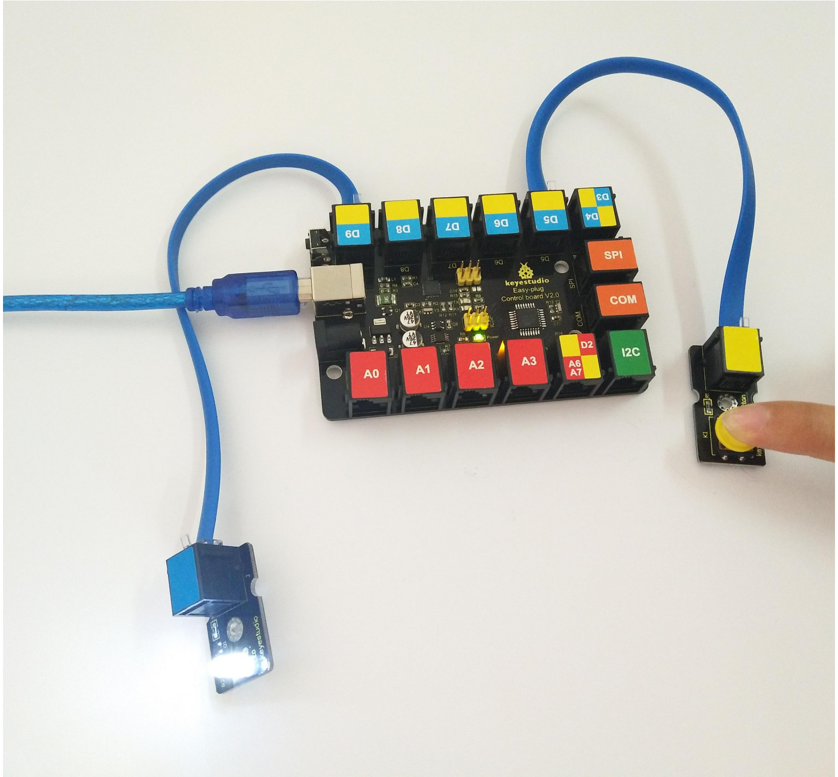
5.Upload the Code

```
 /*
keyestudio Easy plug super kit
Project 6
Button
http://www.keyestudio.com
*/
int ledPin = 9;                    // choose the pin for the LED
int inputPin = 5;                   // Connect Button to input pin D5
void setup() {
  pinMode(ledPin, OUTPUT);        // declare LED as output
```

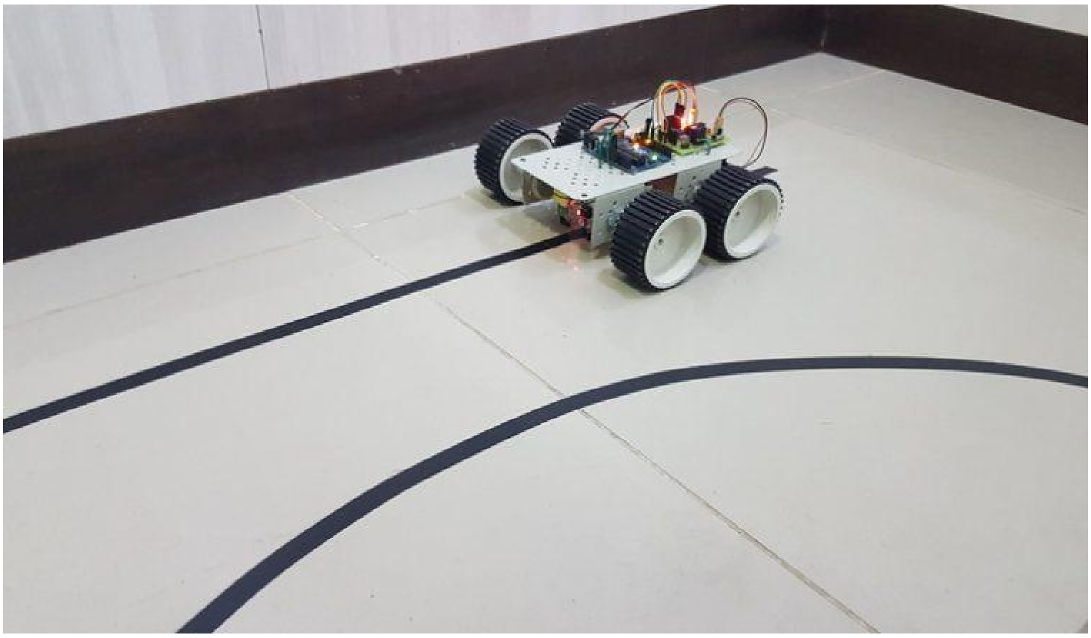
```
   pinMode(inputPin, INPUT);        // declare button as input
}
void loop(){
   int val = digitalRead(inputPin);   // read Button input value
   if (val == HIGH) {                  // check if the input is HIGH
      digitalWrite(ledPin, LOW);   // turn LED OFF
   } else {
      digitalWrite(ledPin, HIGH); // turn LED ON
   }
}
//*********************************************************
```

6.What You Should See

Powered up and upload well the code, press down the button, LED module is turned on. While release the button, LED is off.



Project 7: Line Tracking

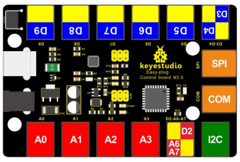
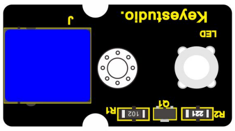
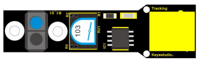
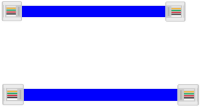
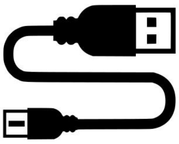


1.Overview

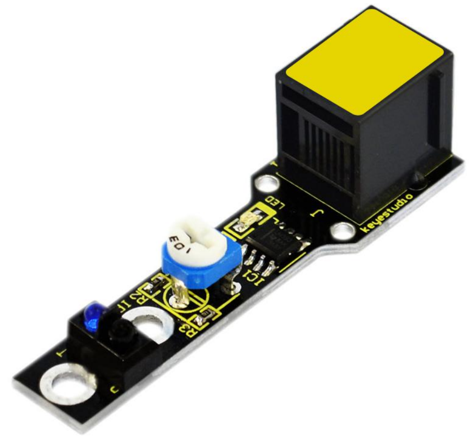
If you want to build a line tracking robot, the easiest way is to use a line tracking sensor. Line following is the most basic function of smart mobile robot.

We designed this new generation of line tracking sensor to be your robot's powerful copilot all the way. It will guide your robot by telling white from black quickly and accurately, via TTL signal.

2. Component Required:

EASY plug control board*1	EASY plug LED Module *1	EASY plug Line Tracking Sensor *1	RJ11 cable*2	USB cable*1
				

3.Component Introduction:



EASY plug Line Tracking Sensor

The Line Tracking Sensor can tell white from in black or black from white accurately.

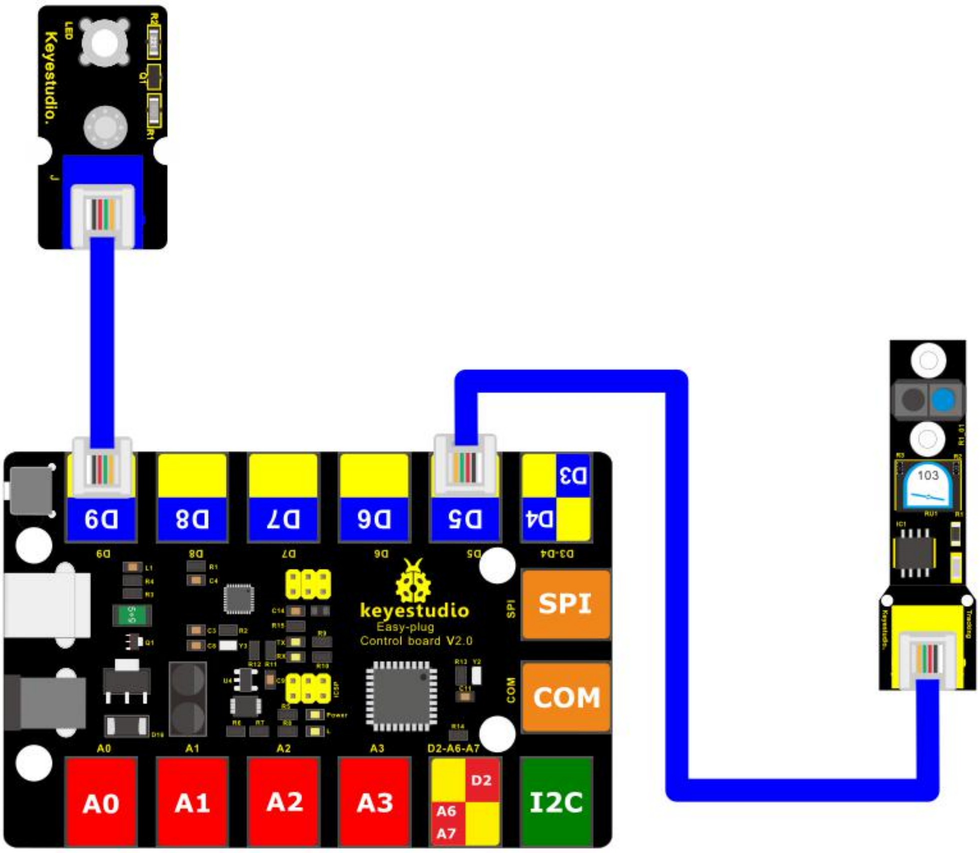
The single line-tracking signal provides a stable output signal TTL for a more accurate and more stable line.

The working principle is simple, using infrared light's different reflectivity for different color, and converting the strength of the reflected signal into current signal.

- Power supply: 5V
- Operating current: <10mA
- Operating temperature: 0℃~ 50℃
- Output Level: TTL (Black for LOW output, White for HIGH output)
- High quality connector

4.Connect It Up

Connect the EASY Plug line tracking sensor and LED module to control board using RJ11 cables.

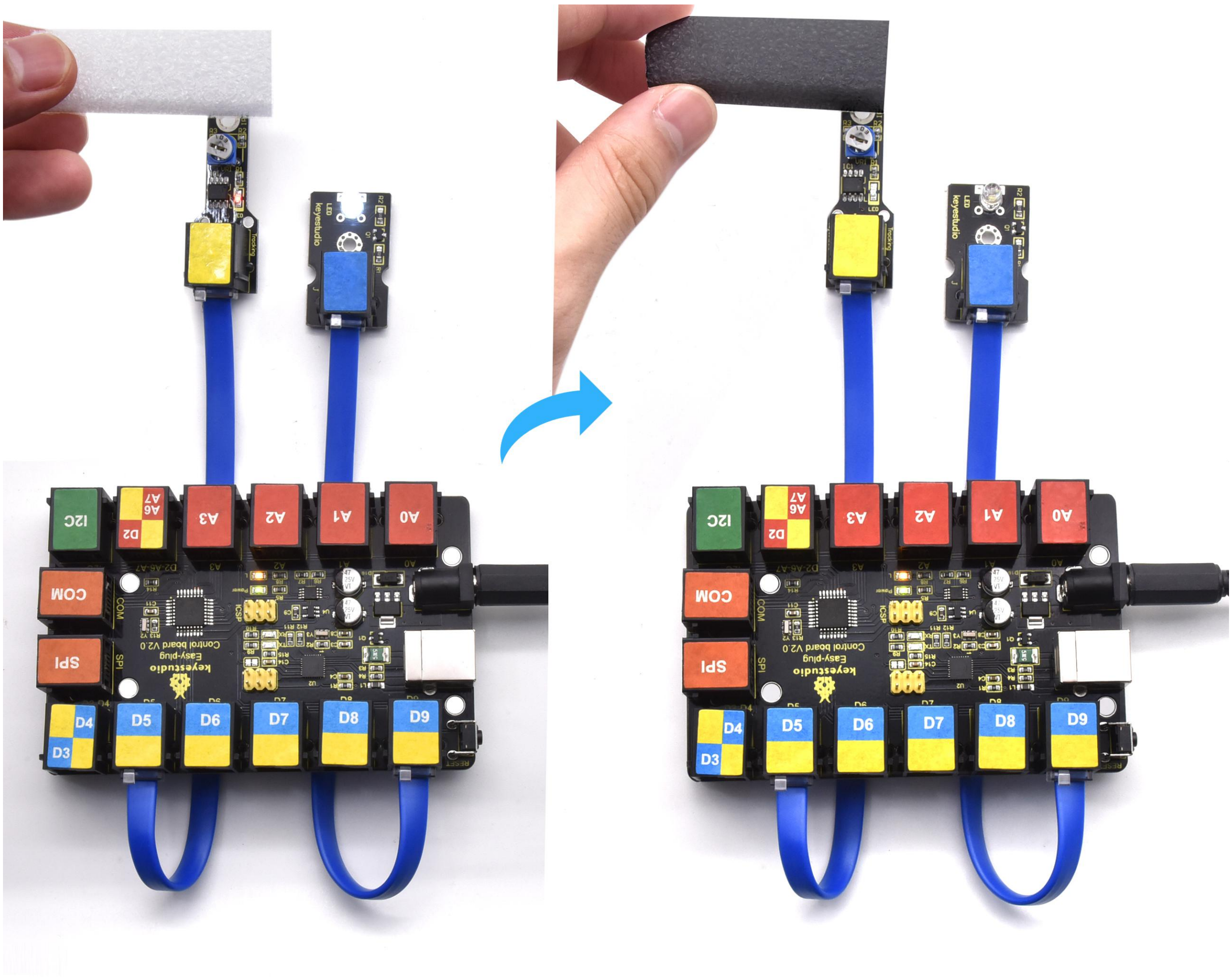


5.Upload the Code

```
 /*
keyestudio Easy plug super kit
Project 7
line tracking
http://www.keyestudio.com
*/
int ledPin = 9;                    // choose the pin for the LED
int inputPin = 5;                   // Connect line tracking sensor to input pin D5
void setup() {
  pinMode(ledPin, OUTPUT);          // declare LED as output
  pinMode(inputPin, INPUT);        // declare line tracking sensor as input
}
void loop(){
  int val = digitalRead(inputPin);   // read line tracking sensor input value
  if (val == HIGH) {                 // check if the input is HIGH
    digitalWrite(ledPin, LOW);   // turn LED OFF
  } else {
    digitalWrite(ledPin, HIGH); // turn LED ON
  }
}
//*************************************************************
```

6.What You Should See

Upload the test code, when the line tracking sensor detects the white object, its indicator will be on; if no object is detected, its indicator will be off.

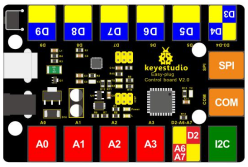
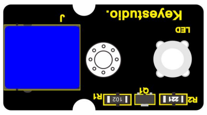
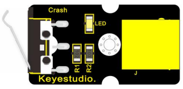
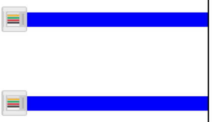
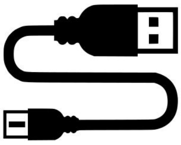


Project 8: Crash

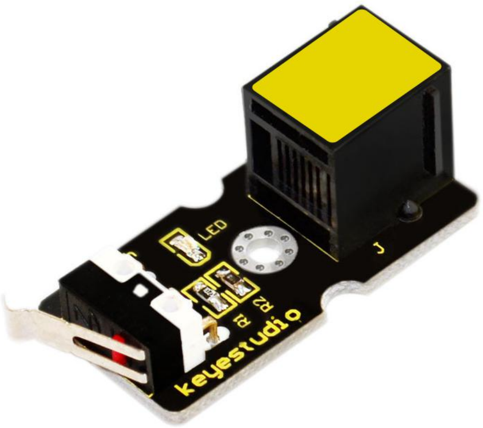
1.Overview

We use a crash sensor to detect whether happen collision or not. When an object crashes the metal switch of the sensor, it will output LOW level signal. When the switch is disconnected, it will keep HIGH level.

2. Component Required:

EASY plug control board*1	EASY plug LED Module *1	EASY plug Crash sensor *1	RJ11 cable*2	USB cable*1
				

3.Component Introduction:



EASY Plug Crash Sensor

Crash sensor, also known as snap-action switch, is an electric switch that is actuated by very little physical force.

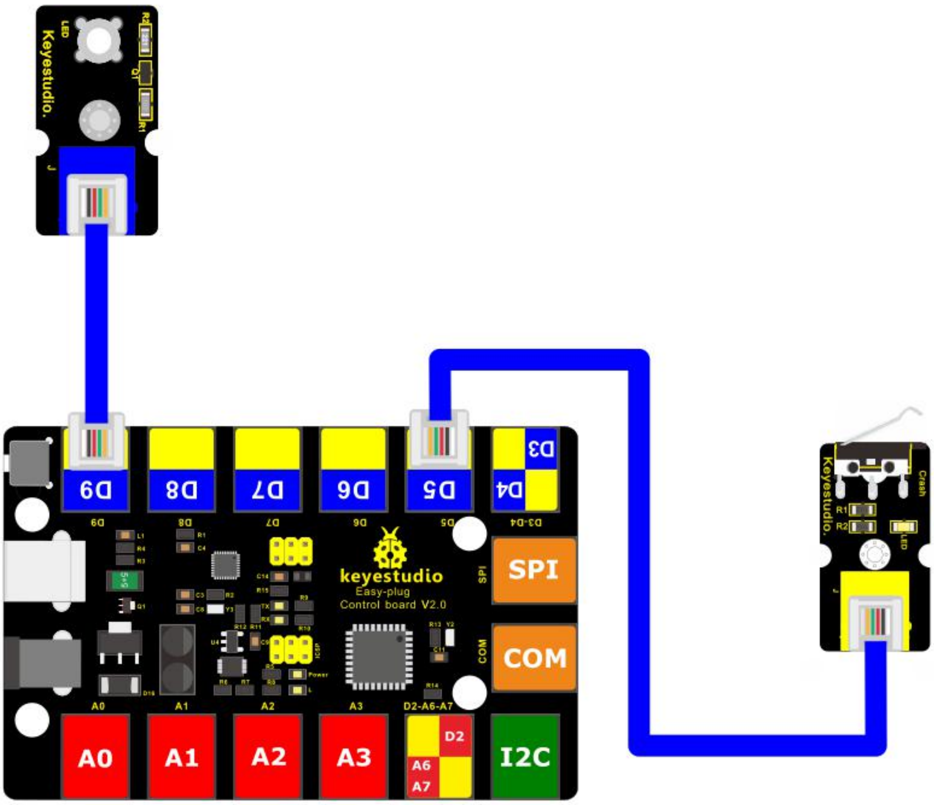
It is a digital on-off input module necessary for elementary electronic.

By programming, it can be used for the light, sound device, key function of LCD display, 3D Printer position feedback, or other devices.

- Onboard status indicator LED
- M3 mounting hole, convenient for fixation on other devices.
- If collision happened, outputs LOW level signal; no collision, outputs HIGH level signal.

4.Connect It Up

Connect the EASY Plug Crash sensor to control board using an RJ11 cable.



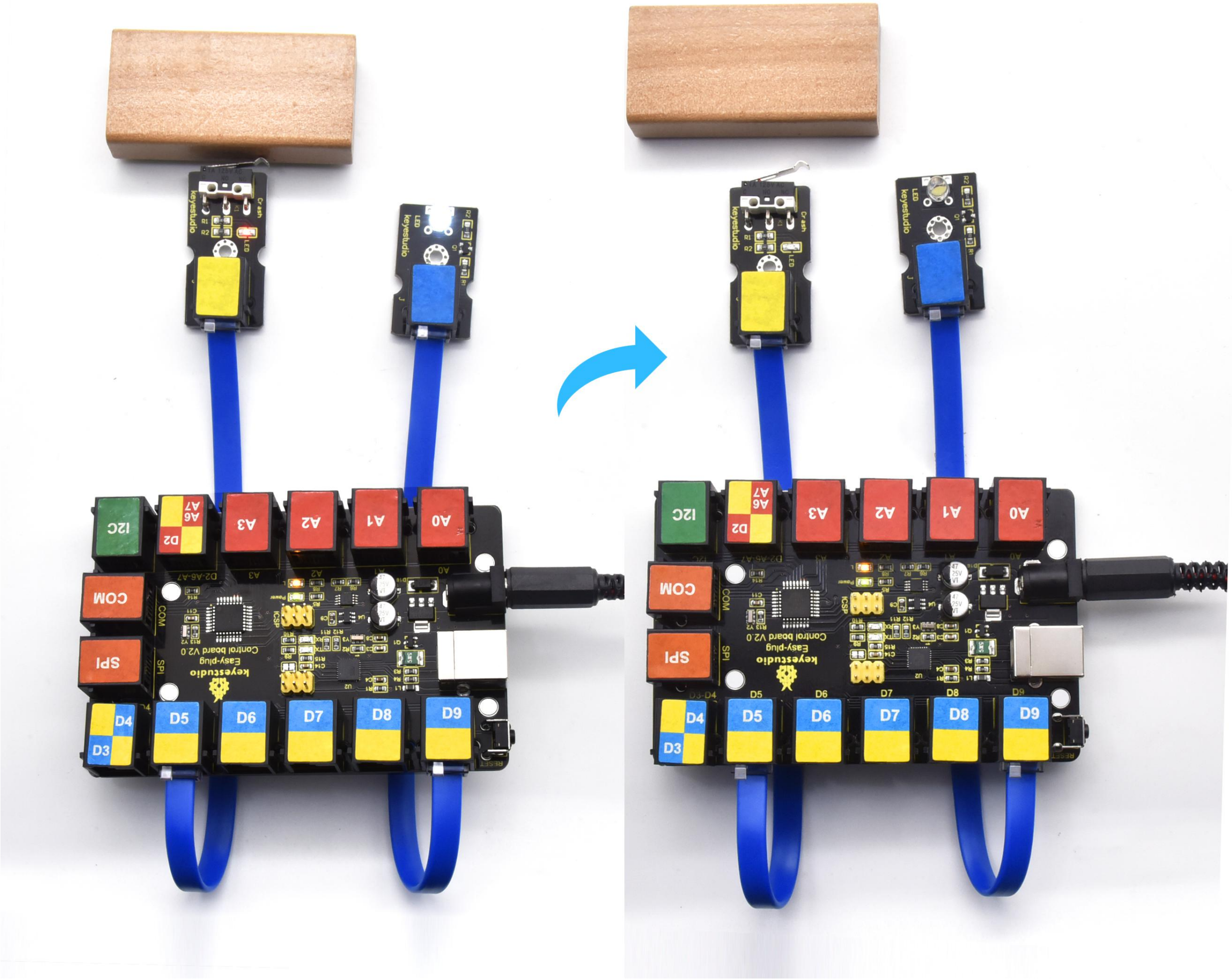
5.Upload the Code

```
/*
```

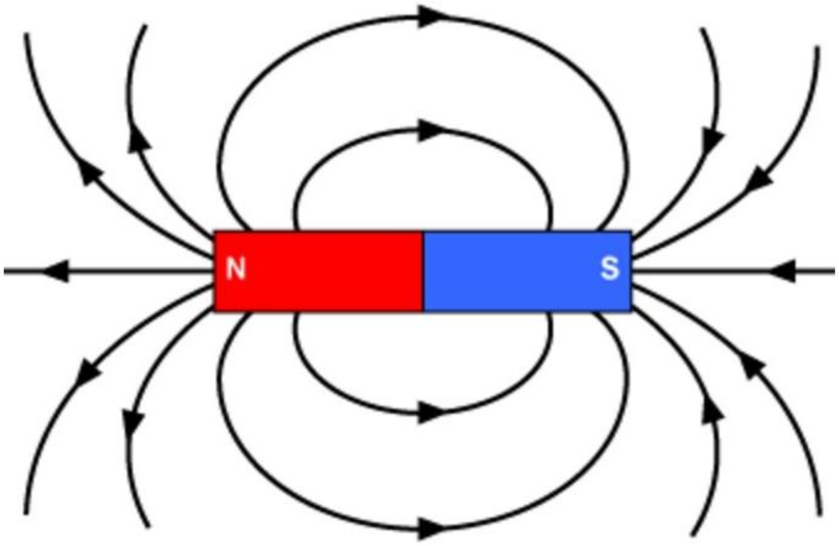
```
keyestudio Easy plug super kit
Project 8
Crash Sensor
http://www.keyestudio.com
*/
int ledPin = 9;                    // choose the pin for the LED
int inputPin = 5;                   // Connect Crash Sensor to input pin D5
void setup() {
  pinMode(ledPin, OUTPUT);         // declare LED as output
  pinMode(inputPin, INPUT);       // declare Crash Sensor as input
}
void loop(){
  int val = digitalRead(inputPin);   // read Crash Sensor input value
  if (val == HIGH) {               // check if the input is HIGH
    digitalWrite(ledPin, LOW);   // turn LED OFF
  } else {
    digitalWrite(ledPin, HIGH); // turn LED ON
  }
}
//*********************************************************
```

6.What You Should See

When an object knocks the metal switch of the sensor, the LED will be turned off. If no crash happened, LED will be turned on.



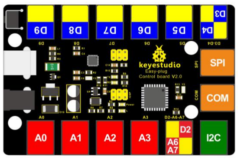
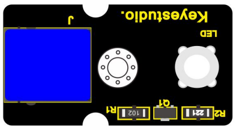
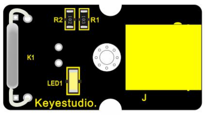
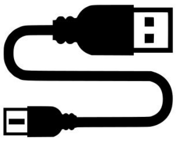
Project 9: Magnetic Field



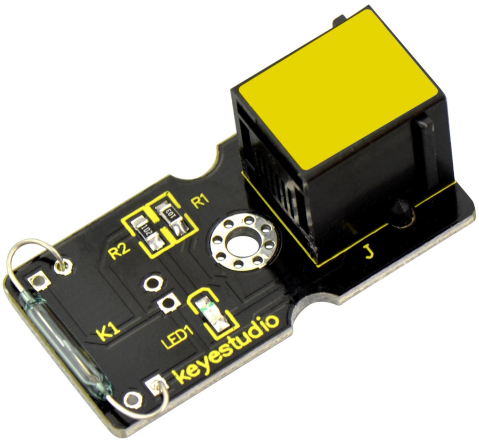
1.Overview

This project will tell you how to detect whether there is a magnetic field nearby or not ? Use a reed switch module.

2. Component Required:

EASY plug control board*1	EASY plug LED Module *1	EASY plug Reed Switch Module *1	RJ11 cable*2	USB cable*1
				

3.Component Introduction:



EASY plug Reed Switch Module

This is a small device called a reed switch on the module.

When the device is exposed to a magnetic field, the two ferrous materials inside the switch pull together and the switch closes.

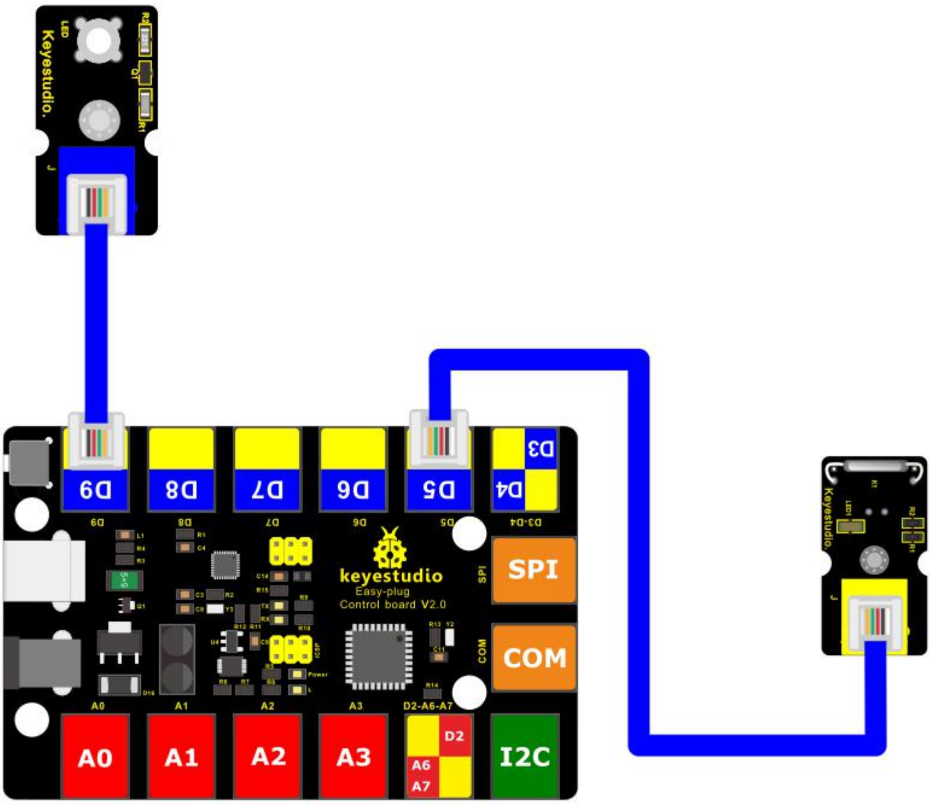
When the magnetic field is removed, the reeds separate and the switch opens. This makes for a great non-contact switch.

You can mount reed switch on the door for alarming purpose or as switches.

- Interface: Easy plug
- Working voltage: DC 3.3V-5V
- Working current: ≥20mA
- Working temperature: - 10℃ to + 50℃
- Detection distance: ≤10mm

4.Connect It Up

Connect the EASY Plug Reed switch module and LED module to control board using RJ11 cables.

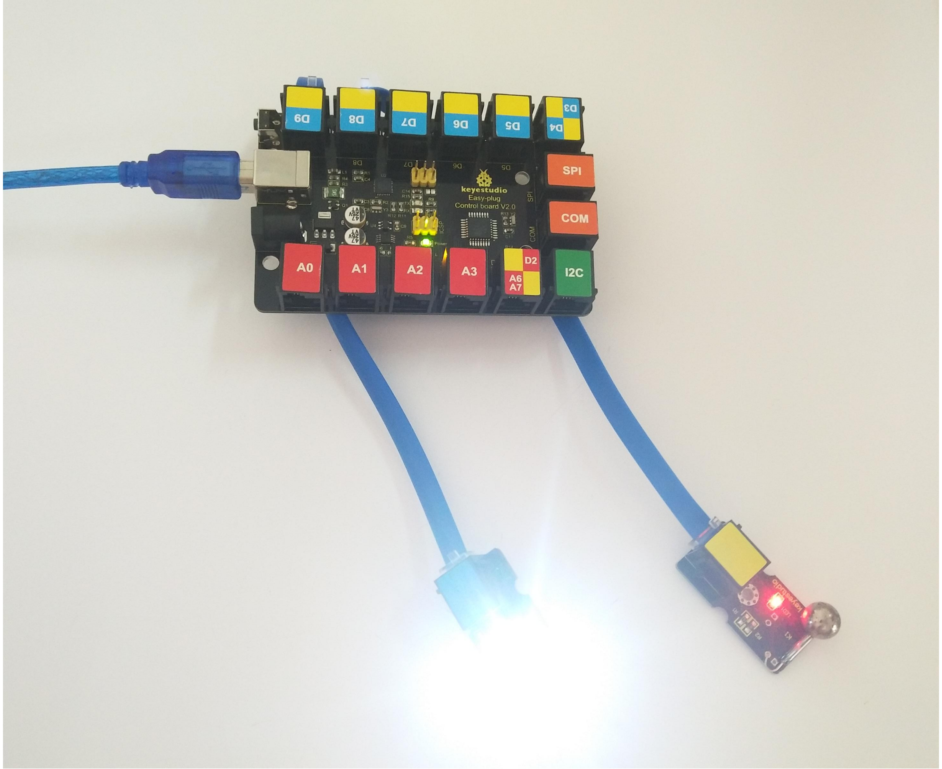


5. Upload the Code

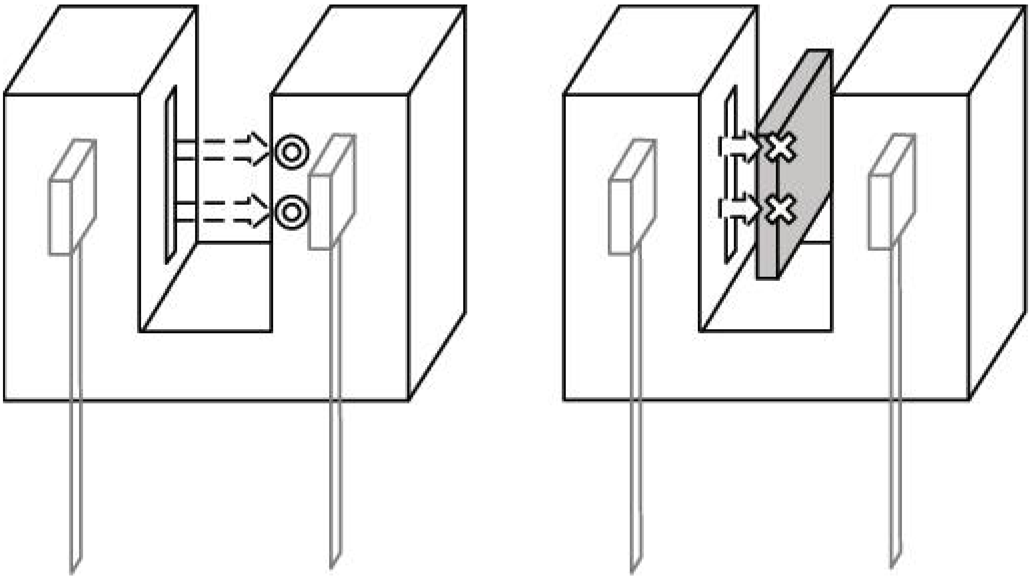
```
 /*
keyestudio Easy plug super kit
Project 9
Reed Switch Module
http://www.keyestudio.com
*/
int ledPin = 9;                    // choose the pin for the LED
int inputPin = 5;                   // Connect Reed Switch Module to input pin D5
void setup() {
  pinMode(ledPin, OUTPUT);          // declare LED as output
  pinMode(inputPin, INPUT);        // declare Reed Switch Module as input
}

void loop(){

   int val = digitalRead(inputPin);   // read Reed Switch Module input value

   if (val == HIGH) {                  // check if the input is HIGH

      digitalWrite(ledPin, LOW);   // turn LED OFF

   } else {

      digitalWrite(ledPin, HIGH); // turn LED ON

   }

}

//*************************************************************
```

6.What You Should See

If you put a magnetic bead close to the reed module, once the reed module detects the magnetic field, LED will turn on.



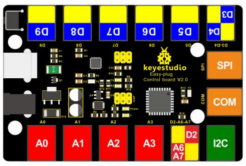
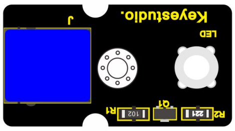
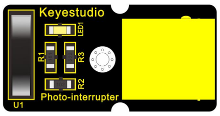
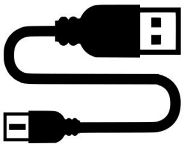
Project 10: Photo Interrupter

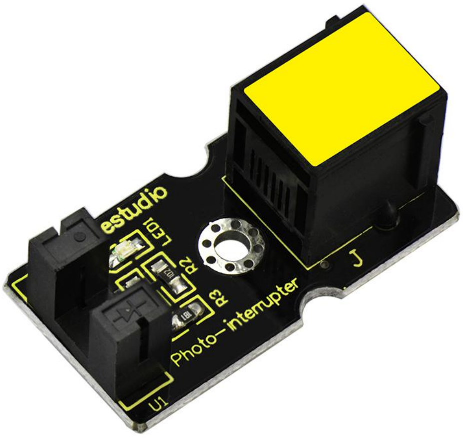


1.Overview

In this project, you will learn about how to use a photo interrupter module to turn on the LED and print the analog value on the monitor.

2. Component Required:

EASY plug control board*1	EASY plug LED Module *1	EASY plug Photo Interrupter Module *1	RJ11 cable*2	USB cable*1
				



3.Component Introduction:

EASY plug Photo Interrupter Module

This is a high performance EASY Plug photo interrupter module.

It integrates a photo-interrupter, which belongs to an optical switch of a photo-interrupting photoelectric switch.

The upright part on the module combines an infrared light emitting diode and shielded infrared detector.

By emitting a beam of infrared light from one end to another end, the sensor can detect an object when it passes through the beam.

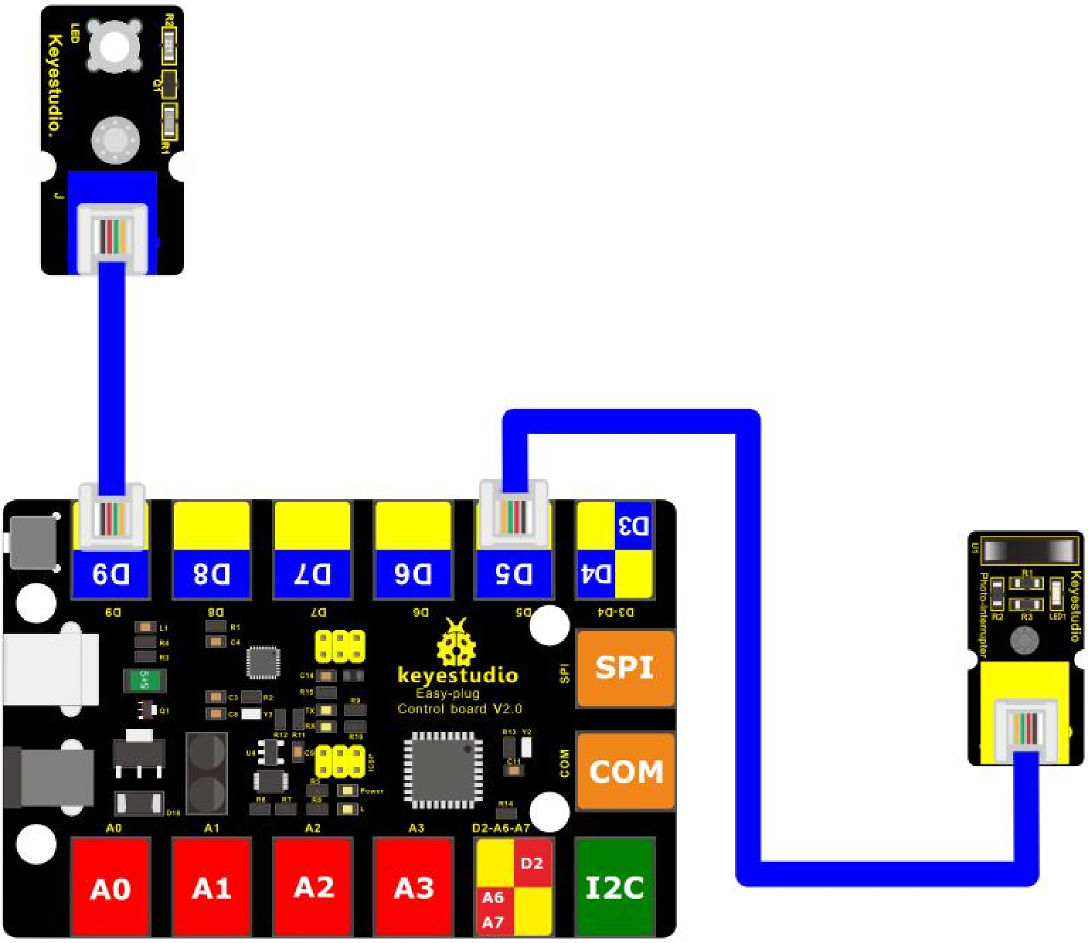
Useful for many applications such as optical limit switches, pellet dispensing, general object detection, etc.

Note: this module needs to be used together with EASY plug control board.

- Supply Voltage: 3.3V to 5V
- Interface: Digital

4.Connect It Up

Connect the EASY Plug Photo Interrupter module and LED module to control board using RJ11 cables.



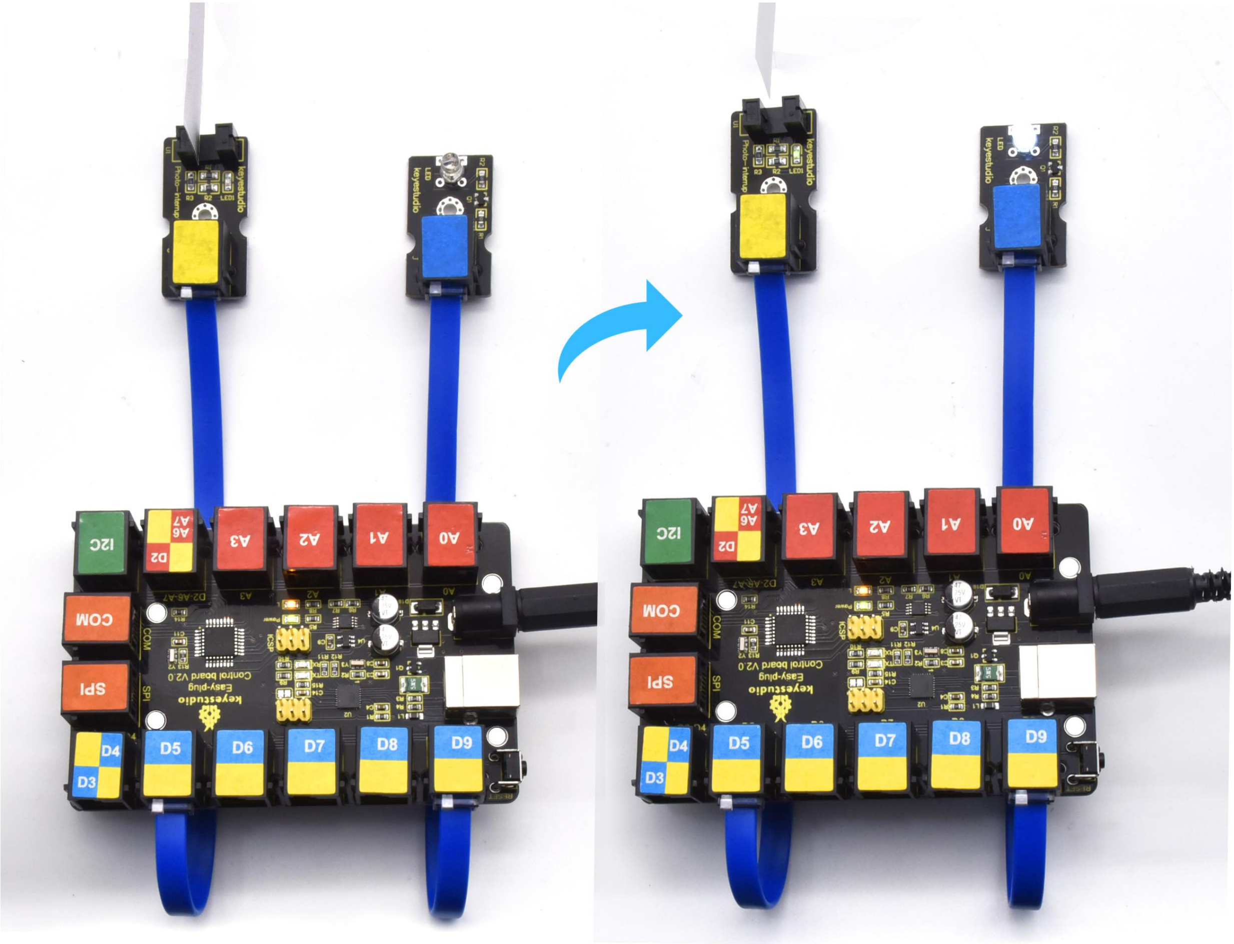
5. Upload the Code

```
 /*

keyestudio Easy plug super kit

Project 10

Photo Interrupter Module

http://www.keyestudio.com

*/

int ledPin = 9;                      // choose the pin for the LED

int inputPin = 5;                     // Connect Photo Interrupter Module to input pin
```

```
D5
void setup() {
  pinMode(ledPin, OUTPUT);          // declare LED as output
  pinMode(inputPin, INPUT);        // declare Photo Interrupter Module as input
}
void loop(){
  int val = digitalRead(inputPin);   // read Photo Interrupter Module input value
  if (val == HIGH) {                  // check if the input is HIGH
    digitalWrite(ledPin, LOW);   // turn LED OFF
  } else {
    digitalWrite(ledPin, HIGH); // turn LED ON
  }
}
//*********************************************************
```

6.What You Should See

Upload the code and power on. If you place a piece of paper in the groove of the module, LED will be turned off. If the paper is removed, the LED will be on


I2C
A7
A6
D2
A3
A2
A1
A0
COM
SPI
D4
D3
D5
D6
D7
D8
D9
keyestudio
Easy-plug
Control board V2.0

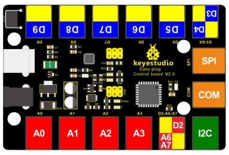
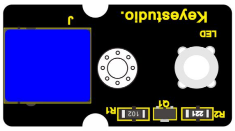
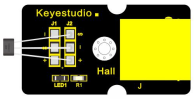
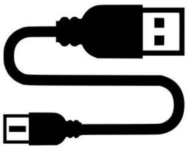
Project 11: Hall Magnetic Detection

1.Overview

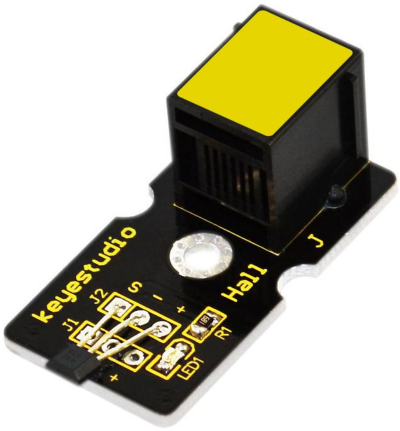
What's the best way to detect the magnet? Use another magnet. But it's not sensitive enough. You have to feel it by yourself.

Here you can try to use a hall sensor. It has the characteristics of high sensitivity, fast response, good temperature performance and high reliability.

2. Component Required:

EASY plug control board*1	EASY plug LED Module *1	EASY plug Hall Magnetic Sensor*1	RJ11 cable*2	USB cable*1
				

3.Component Introduction:



EASY plug Hall Magnetic Sensor

The Hall sensor is based on Hall Effect.

It can detect whether there is a magnetic object nearby or not. And it correctly tells you through digital output.

This sensor uses the SFE Reed Switch - Magnetic Field Sensor. It can sense the magnetic materials within a detection range up to 75px.

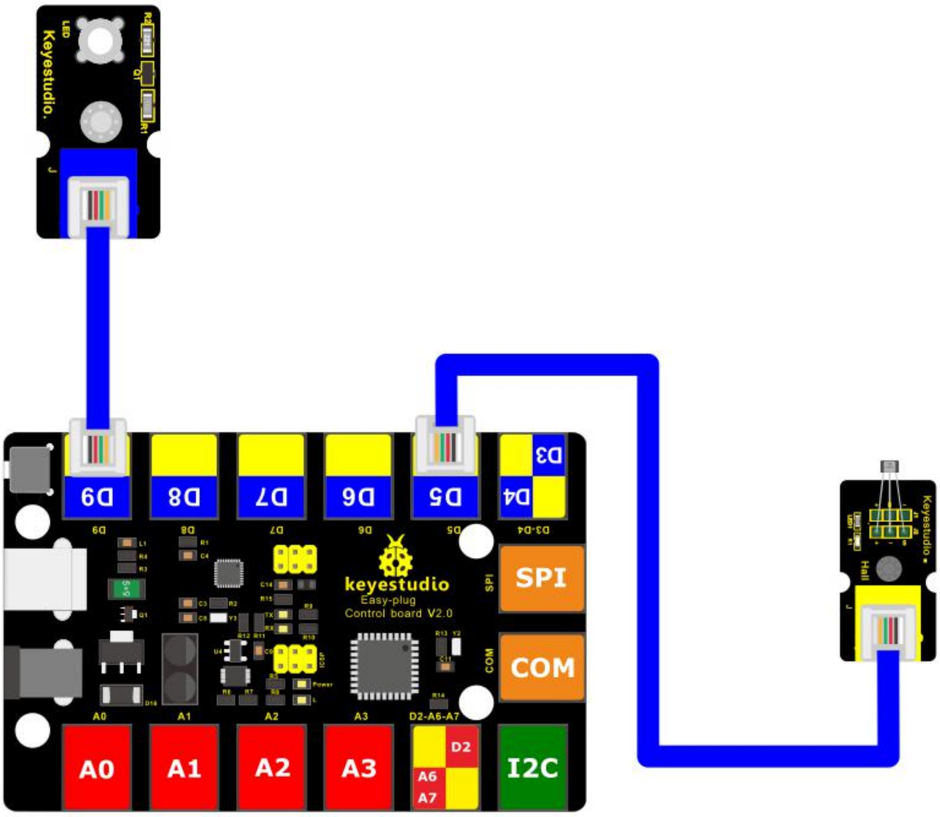
The detection range and the strength of magnetic field are proportional.

It is useful for non-contact/waterproof type switches, position sensors, rotary/shaft encoders.

- Sensing magnetic materials
- Detection range: up to 75px
- Output: Digital ON/OFF
- Detection range and magnetic field strength are proportional

4.Connect It Up

Connect the EASY Plug Hall Magnetic Sensor and LED module to control board using RJ11 cables.



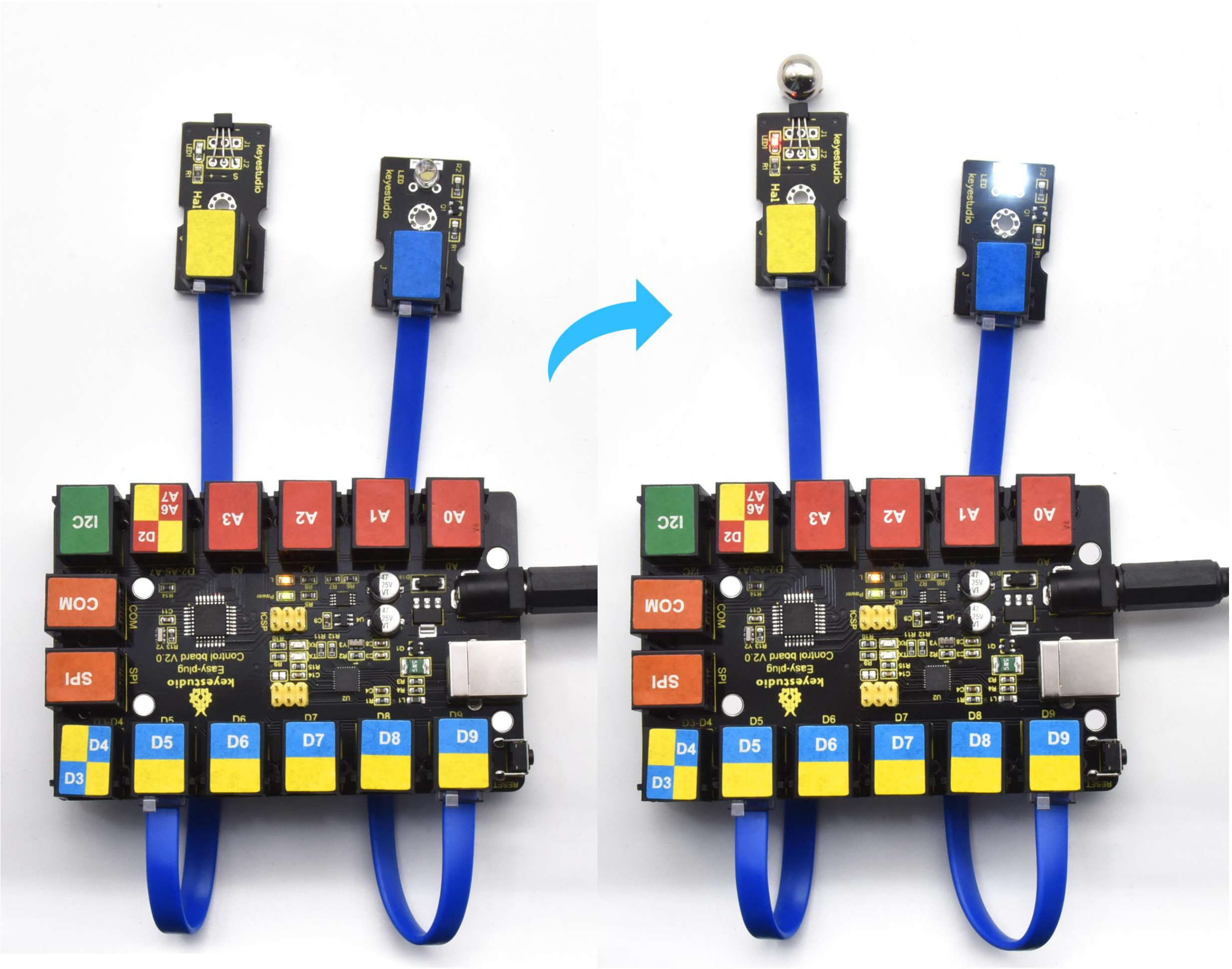
5. Upload the Code

```
 /*
keyestudio Easy plug super kit
Project 11
Hall Magnetic Sensor
http://www.keyestudio.com
*/
int ledPin = 9;                         // choose the pin for the LED
int inputPin = 5;                         // Connect Hall Magnetic Sensor to input pin D5
```

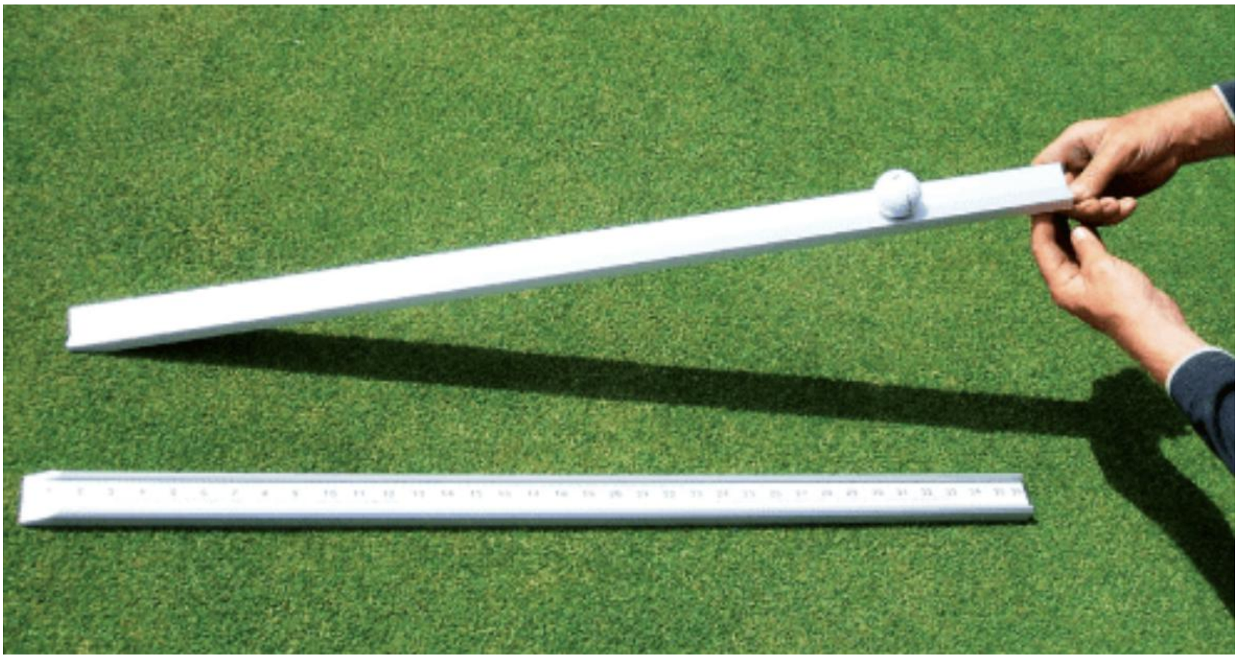
```
void setup() {
  pinMode(ledPin, OUTPUT);          // declare LED as output
  pinMode(inputPin, INPUT);        // declare Hall Magnetic Sensor as input
}
void loop(){
  int val = digitalRead(inputPin);   // read Hall Magnetic Sensor input value
  if (val == HIGH) {                  // check if the input is HIGH
    digitalWrite(ledPin, LOW);   // turn LED OFF
  } else {
    digitalWrite(ledPin, HIGH); // turn LED ON
  }
}
//*************************************************************
```

6.What You Should See

When magnetic beads are approaching to the sensor, the LED will be turned on. Otherwise, the LED is off.


keyestudio
Hal
LED
Keyestudio
I2C
D2
A6
A7
A3
A2
A1
A0
COM
SPI
keyestudio
Easy-plug
Control board V2.0
D4
D3
D5
D6
D7
D8
D9

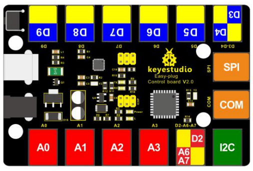
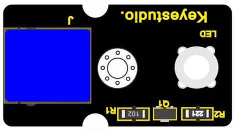
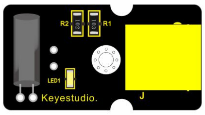
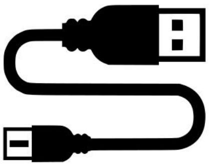
Project 12: Tilt Switch



1.Overview

This lesson we are going to test the tilt sensor. Simply connect to EASY Plug control board to make amazing interactive projects.

2. Component Required:

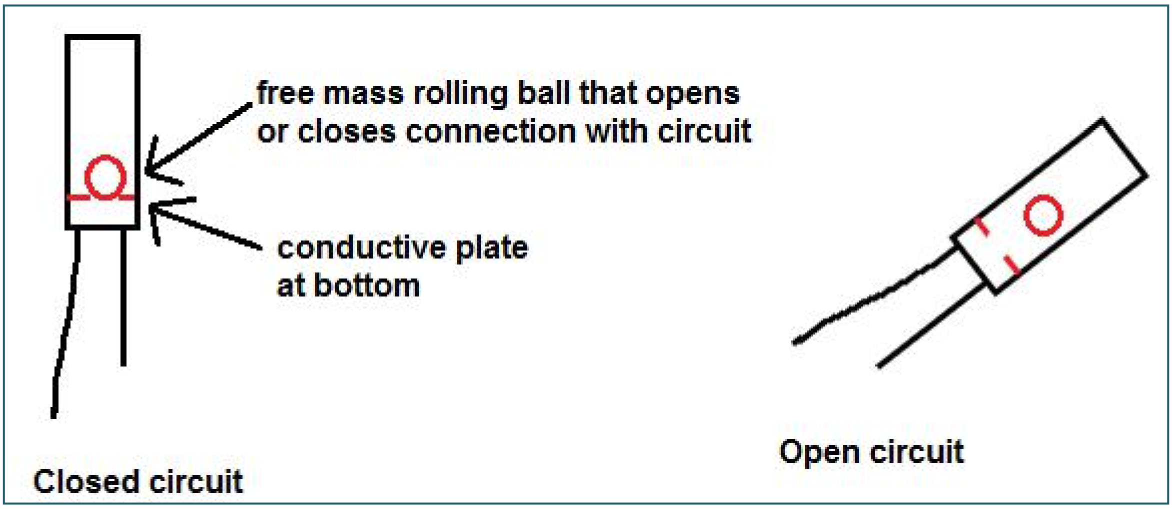
EASY plug control board*1	EASY plug LED Module *1	EASY plug Tilt Sensor *1	RJ11 cable*2	USB cable*1
				

3.Component Introduction:

EASY plug Tilt Sensor Module

The tilt-switch twig is the equivalent of a button, and is used as a digital input. Inside the tilt switch is a ball that make contact with the pins when the case is upright. Tilt the case over and the balls don't touch, thus not making a connection. When the switch is level it is open, and when tilted, the switch closes. It can be used for orientation detection, alarm device or others.

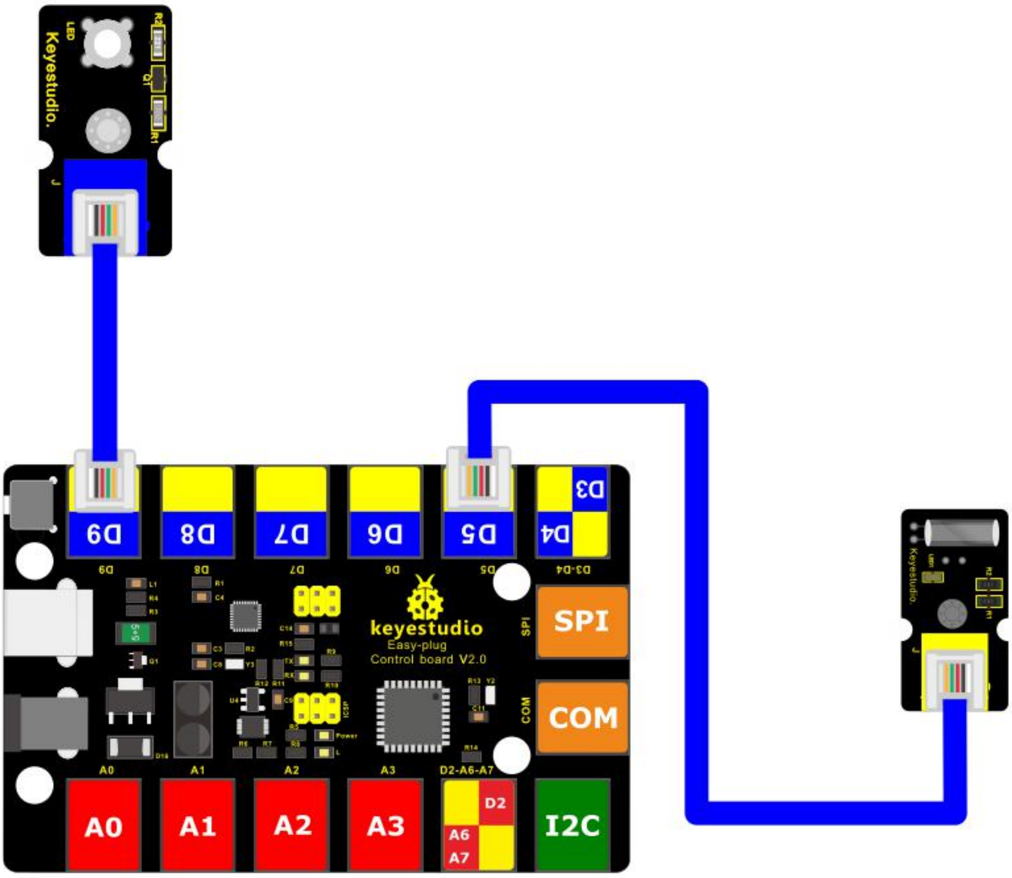
Here is the principle of tilt sensor to illustrate how it works:


free mass rolling ball that opens or closes connection with circuit
conductive plate at bottom
Closed circuit
Open circuit

- Interface: Easy plug
- Supply Voltage: 3.3V to 5V
- Sensor type: Digital

4.Connect It Up

Connect the EASY Plug Tilt sensor and LED module to control board using RJ11 cables.

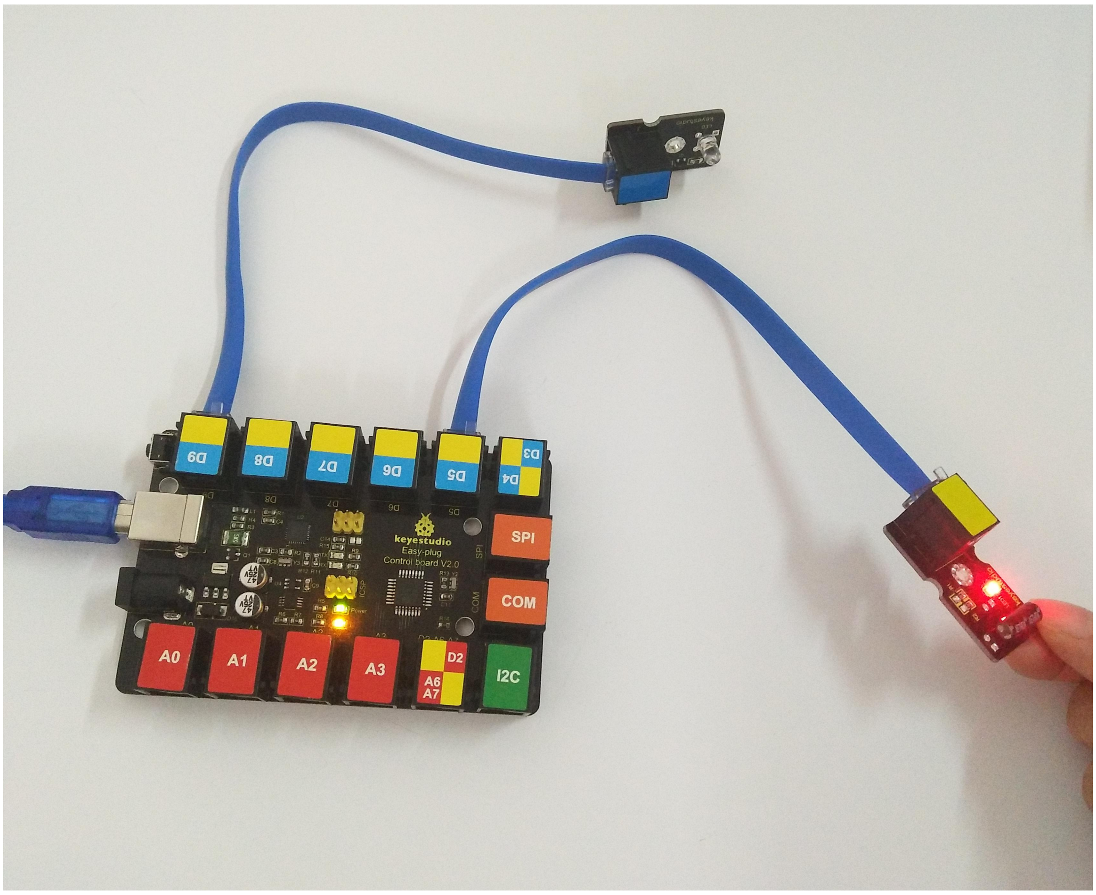


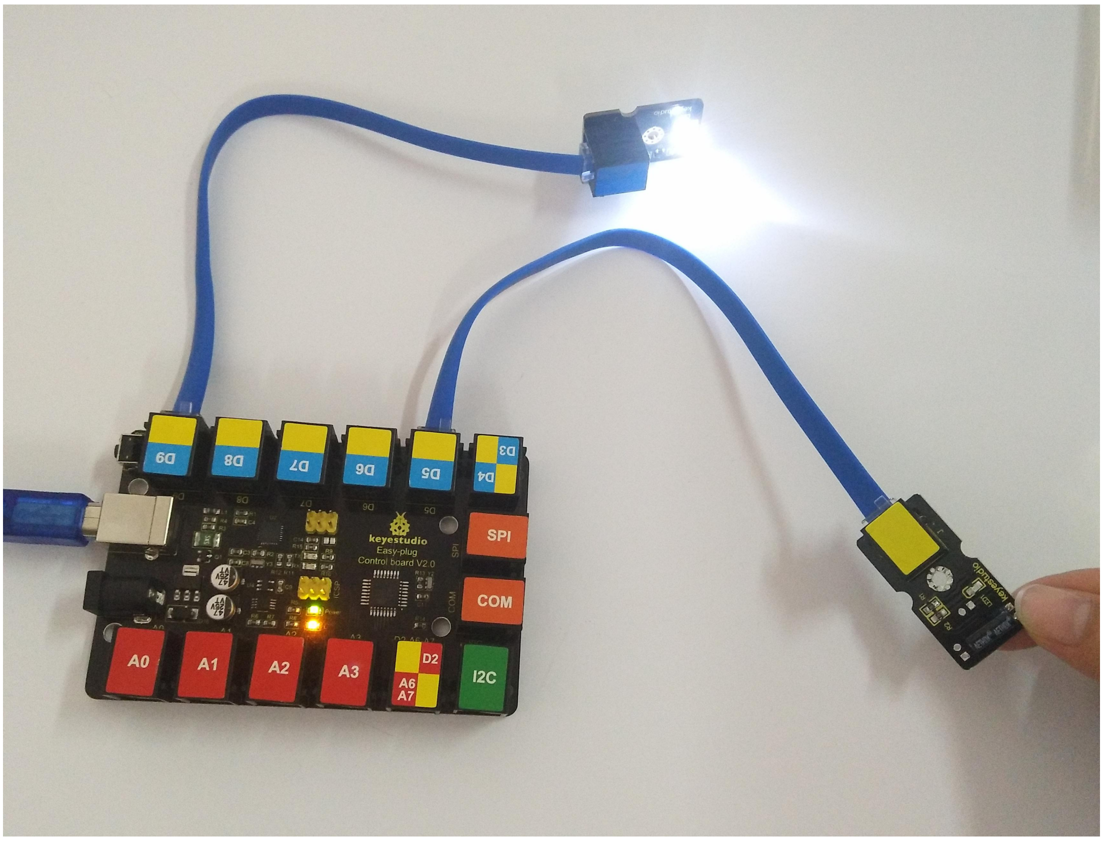
5. Upload the Code

```
/*
  keyestudio Easy plug super kit
  Project 12
  Tilt Sensor
  http://www.keyestudio.com
*/
int ledPin = 9;     // choose the pin for the LED
int inputPin = 5; // Connect Tilt Sensor to input pin D5
void setup()
{
  pinMode(ledPin,OUTPUT);     // declare LED as output
  pinMode(inputPin,INPUT);   // declare Tilt Sensor as input
}
void loop() {
  int val = digitalRead(inputPin);       // read Tilt Sensor input value
  if (val == HIGH)
  { // check if the input is HIGH
    digitalWrite(ledPin, LOW);          // turn LED OFF
  }
  else {
    digitalWrite(ledPin, HIGH);               // turn LED ON
  }
}
//******************************************************
```

6.What You Should See

Done uploading the code, if tilt the sensor, you should see the led state ON or OFF.


D9
D8
D7
D6
D5
D3
D4
keyestudio
Easy-plug
Control board V2.0
SPI
COM
A0
A1
A2
A3
D2
A6
A7
I2C

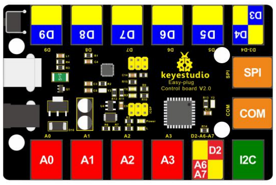
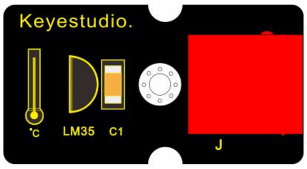
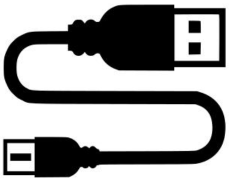

D9
D8
D7
D6
D5
D3
D4
keyestudio
Easy-plug
Control board V2.0
SPI
COM
A0
A1
A2
A3
D2
A6
A7
I2C

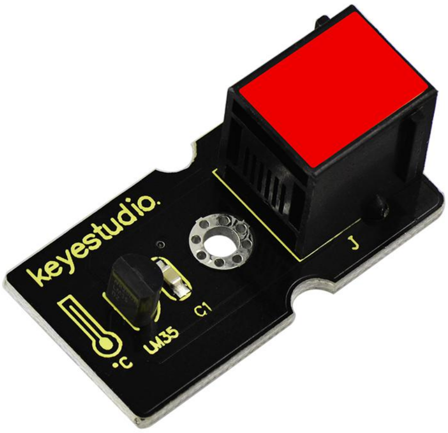
Project 13: Analog Temperature

1.Overview

In this circuit, you will learn how to integrate the temperature sensor with your EASY Plug control board, and display the analog temperature on the serial monitor.

2. Component Required:

EASY plug control board*1	EASY plug LM35 Temperature Sensor *1	RJ11 cable*1	USB cable*1
			



3.Component Introduction:

EASY plug LM35 Temperature Sensor

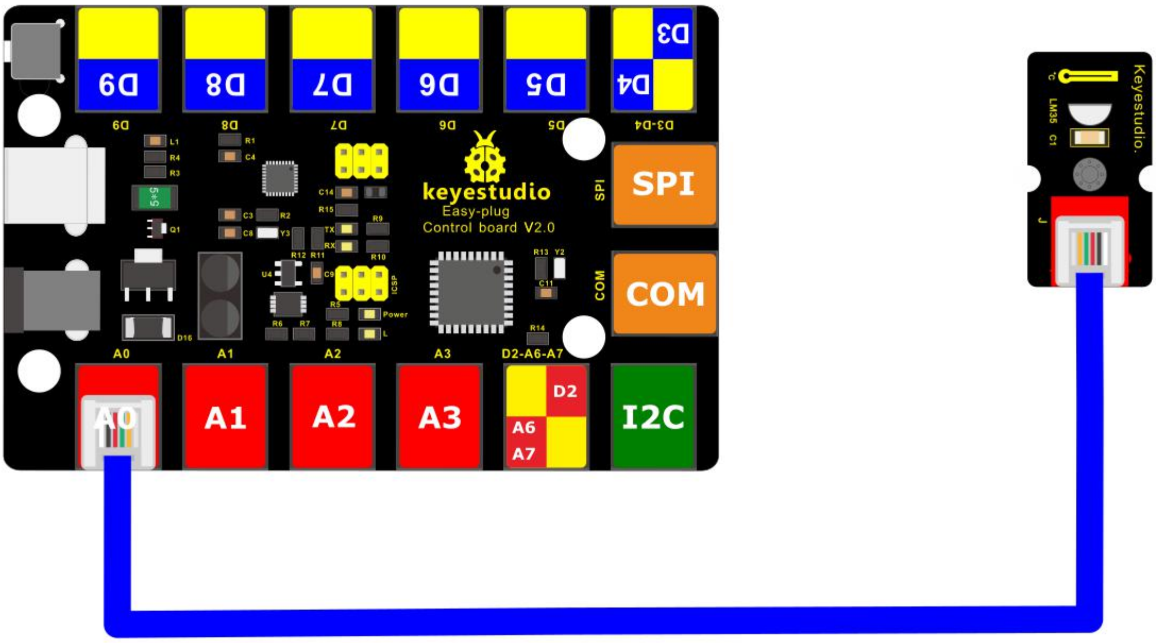
It is based on semiconductor LM35 temperature sensor. A temperature sensor is exactly what it sounds like - a sensor used to measure ambient temperature.

It is effective in the range between 0 degree Celsius and 100 degree Celsius. Sensitivity is 10mV per degree Celsius. The output voltage is proportional to the temperature.

- Power supply: 5V
- Sensitivity: 10mV per degree Celsius
- Function range: 0℃ to 100℃

4.Connect It Up

Connect the EASY Plug LM35 temperature to control board using an RJ11 cable.



5.Upload the Code

/*

keyestudio Easy plug super kit

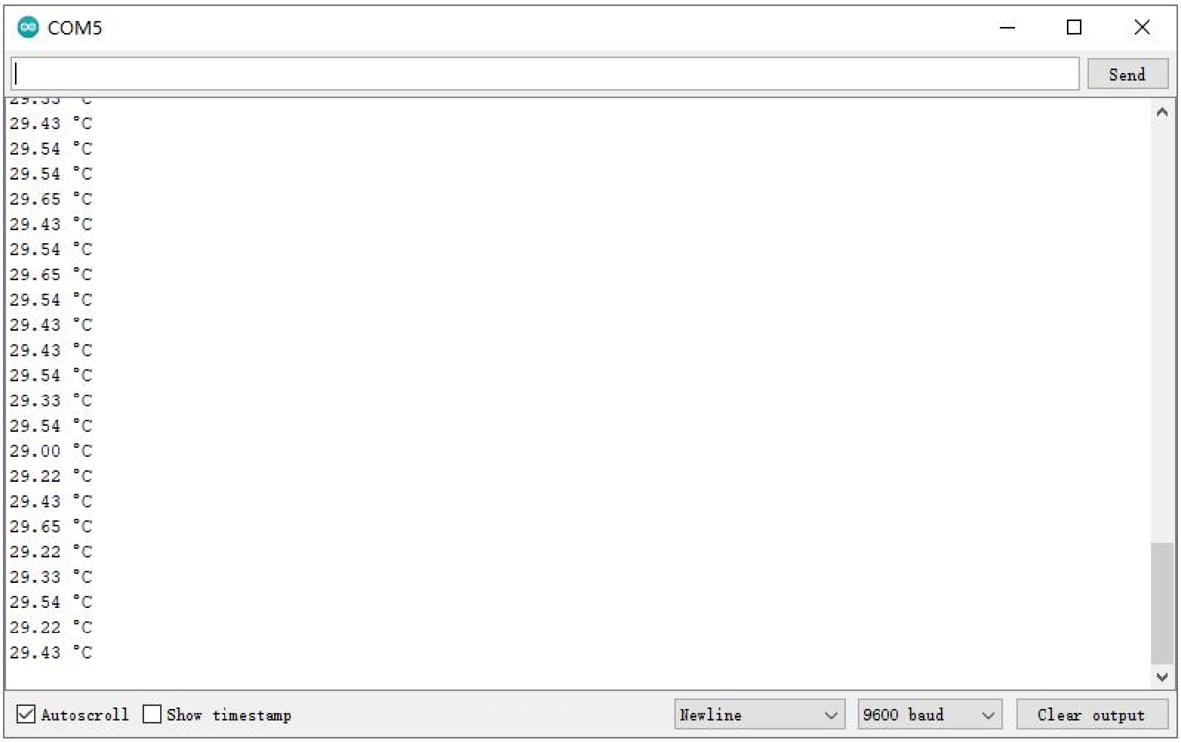
Project 13

```
Temperature
http://www.keyestudio.com
*/
#define sensorPin A0
void setup() {
  // Begin serial communication at a baud rate of 9600:
  Serial.begin(9600);
  // Set the reference voltage for analog input to the built-in 1.1 V reference:
  analogReference(INTERNAL);
}

void loop() {
  // Get a reading from the temperature sensor:
  int reading = analogRead(sensorPin);
  // Convert the reading into voltage:
  float voltage = reading * (1100 / 1024.0);

  // Convert the voltage into the temperature in degree Celsius:
  float temperature = voltage / 10;

  // Print the temperature in the Serial Monitor:
  Serial.print(temperature);
  Serial.print(" \xC2\xB0"); // shows degree symbol
```

```
    Serial.println("C");

    delay(1000); // wait a second between readings

}
```

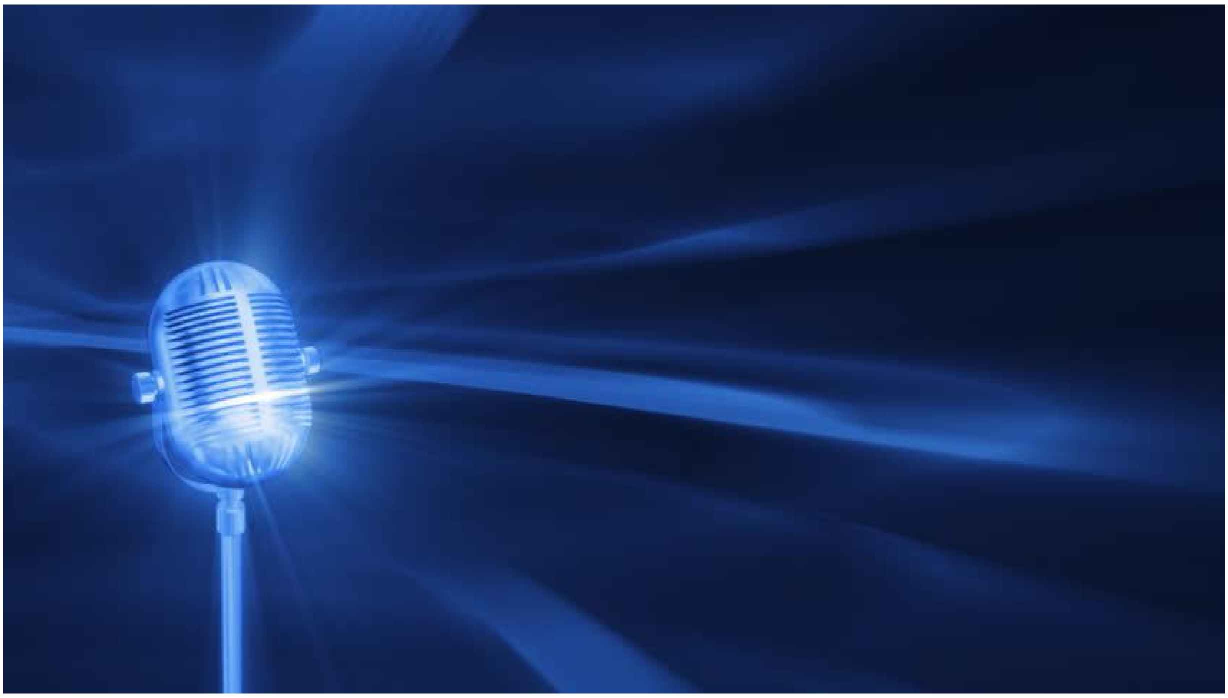
6.What You Should See

Done uploading the code, open the serial monitor and set the baud rate to 9600, you should see the analog temperature value.



```
29.43 °C
29.54 °C
29.54 °C
29.65 °C
29.43 °C
29.54 °C
29.65 °C
29.54 °C
29.43 °C
29.43 °C
29.54 °C
29.33 °C
29.54 °C
29.00 °C
29.22 °C
29.43 °C
29.65 °C
29.22 °C
29.33 °C
29.54 °C
29.22 °C
29.43 °C
```

Project 14: Sound

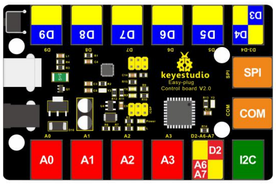
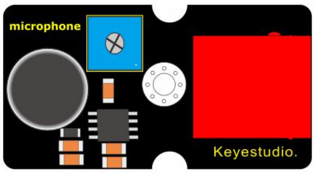
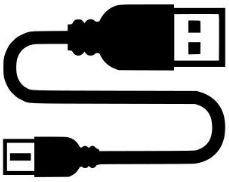


1.Overview

When we walk through the corridor to make a sound, the corridor light will automatically light up, after that, quiet down, the lights are off. Why? Actually inside the lighting circuit, it has installed a sound sensor. When detects the sound, light is turned on, or else LED off.

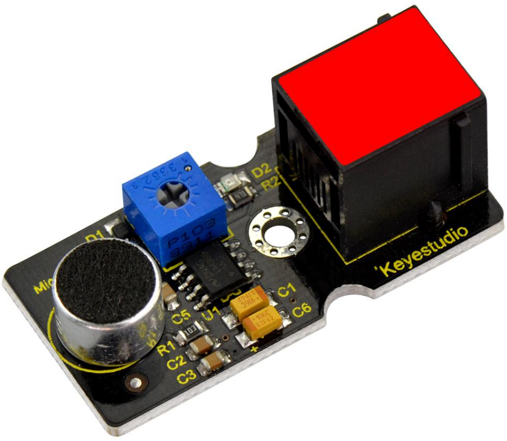
In this lesson, we will connect a sound sensor to EASY Plug control board, detecting the outside sound and printing out the analog value.

2. Component Required:

EASY plug control board*1	EASY plug Analog Sound Sensor *1	RJ11 cable*1	USB cable*1
 D9 D8 D7 D6 D5 D4 D3 keyestudio SPI COM A0 A1 A2 A3 D2 A6 A7 I2C			

3.Component Introduction:

EASY plug Analog Sound Sensor



It is typically used in detecting the loudness in ambient environment. You can use it to make interactive circuits such as a voice-operated switch.

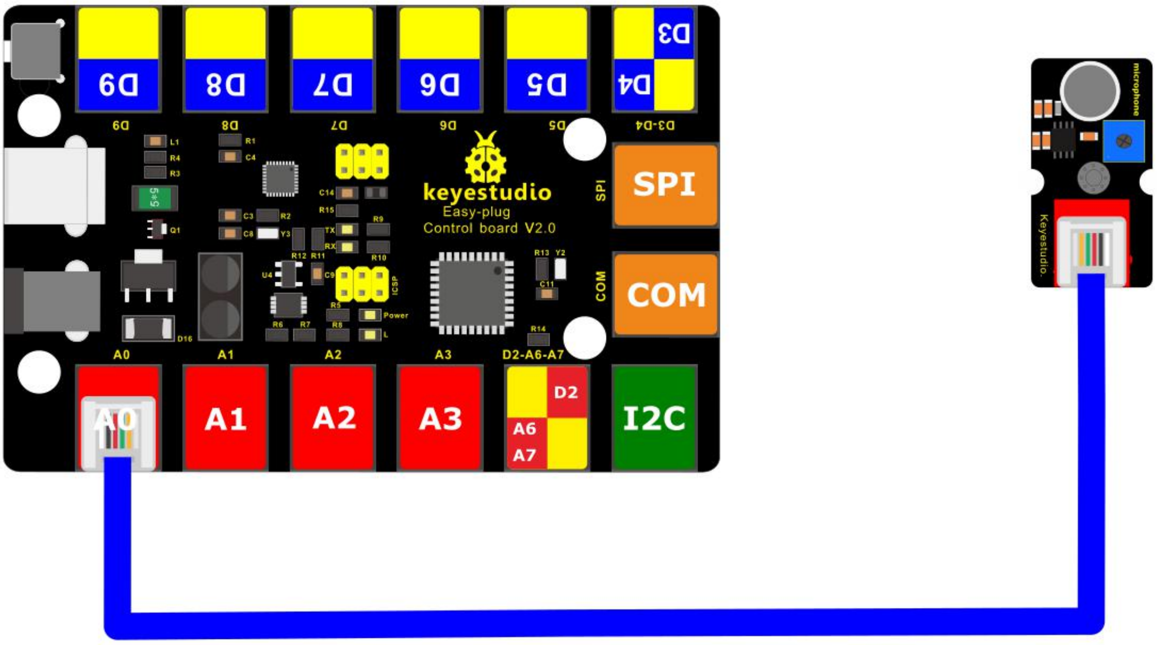
The sound sensitivity can be adjusted by the potentiometer.

The sensor comes with a fixed hole, easy for fixation on other devices.

- Sensor type: Analog
- Supply Voltage: 3.3V to 5V
- Operating current：<10mA
- Output signal：analog signal

4.Connect It Up

Connect the EASY Plug sound sensor and LCD module to control board using RJ11 cables.



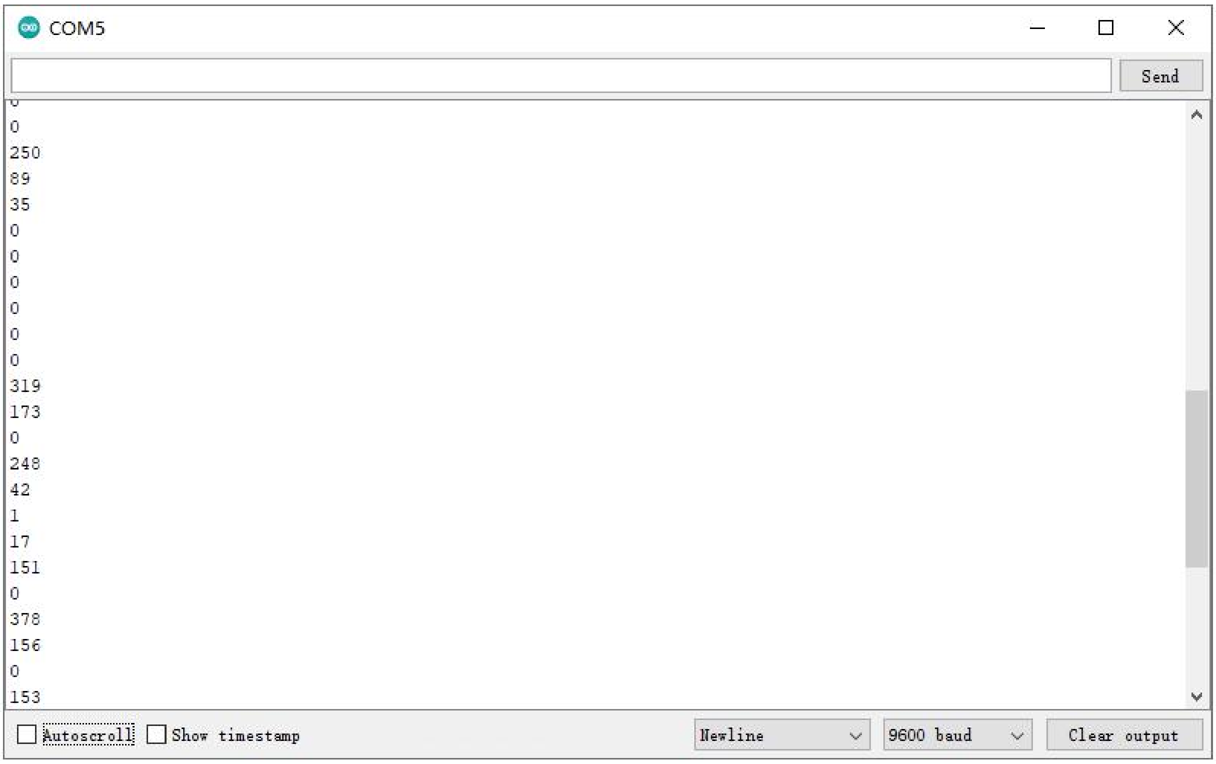
5.Upload the Code

```
/*
keyestudio Easy plug super kit
Project 14
Sound Sensor
http://www.keyestudio.com
*/
int sensorPin =A0 ;   // define analog port A0
int value = 0;        //set value to 0
void setup()
{
 Serial.begin(9600); //set the baud rate to 9600
}
```

```
void loop()

{

value = analogRead(sensorPin);   //set the value as the value read from A0

Serial.println(value, DEC);   //print the value and line wrap

delay(200);   //delay 0.2S

}

//*********************************************
```

6. What You Should See

Upload the code, open the serial monitor and set baud rate to 9600. Then you will see the displayed analog value on the monitor.



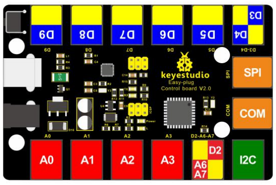
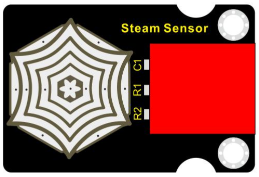
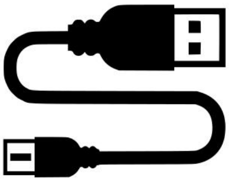
```
0
250
89
35
0
0
0
0
0
0
319
173
0
248
42
1
17
151
0
378
156
0
153
```

Project 15: It Rains

1.Overview

This experiment we are going to detect the water drop using keyestudio EASY Plug steam sensor. It is an analog sensor that can be used to make simple rain detectors and level switches.

2. Component Required:

EASY plug control board*1	EASY plug Steam Sensor *1	RJ11 cable*1	USB cable*1
 D9 D8 D7 D6 D5 D4 D3 keyestudio SPI COM A0 A1 A2 A3 A6 A7 D2 I2C			

3.Component Introduction:

EASY plug Steam Sensor

Vapor Sensor is an analog sensor and can make a simple rainwater detector and liquid level switch. When humidity on the surface of the sensor goes up, the output voltage will increase.

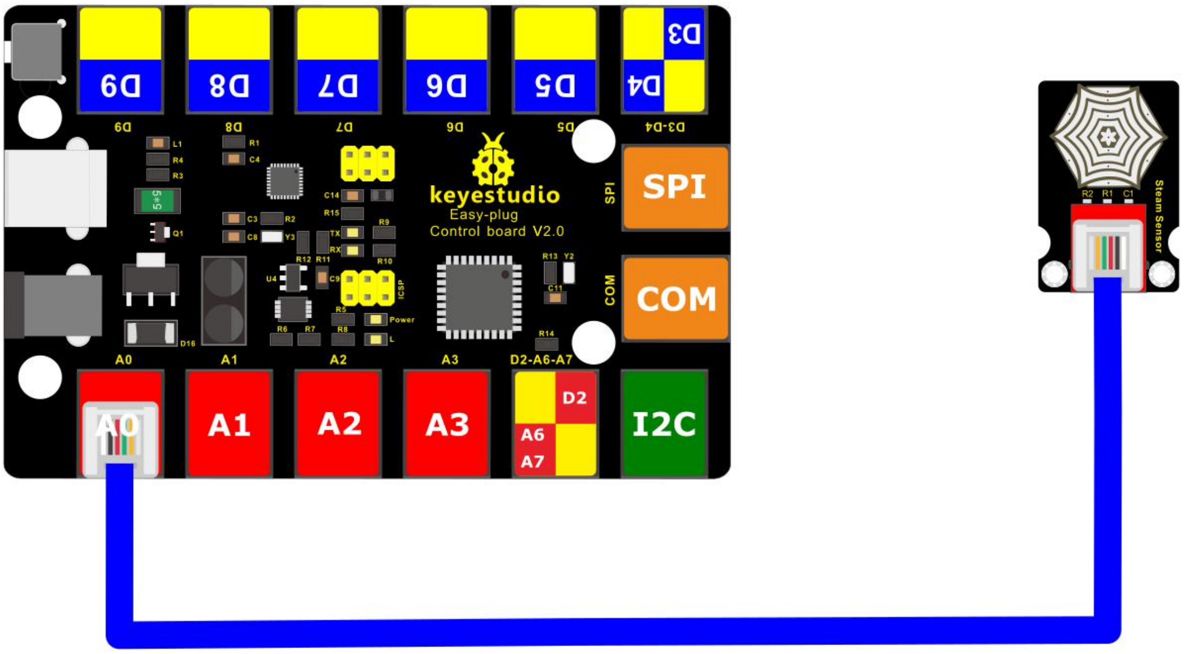
Warning: The connector is not waterproof, please be careful not to put the connector directly in water.

The module can be connected to the analog input interface with only one line, which is very easy and convenient.

- Working Voltage: 5V
- Working Current: <20mA
- Working Temperature: - 10℃ ~ + 70℃
- Interface Type: Analog Signal Output

4.Connect It Up

Connect the EASY Plug Steam Sensor to control board using an RJ11 cable.



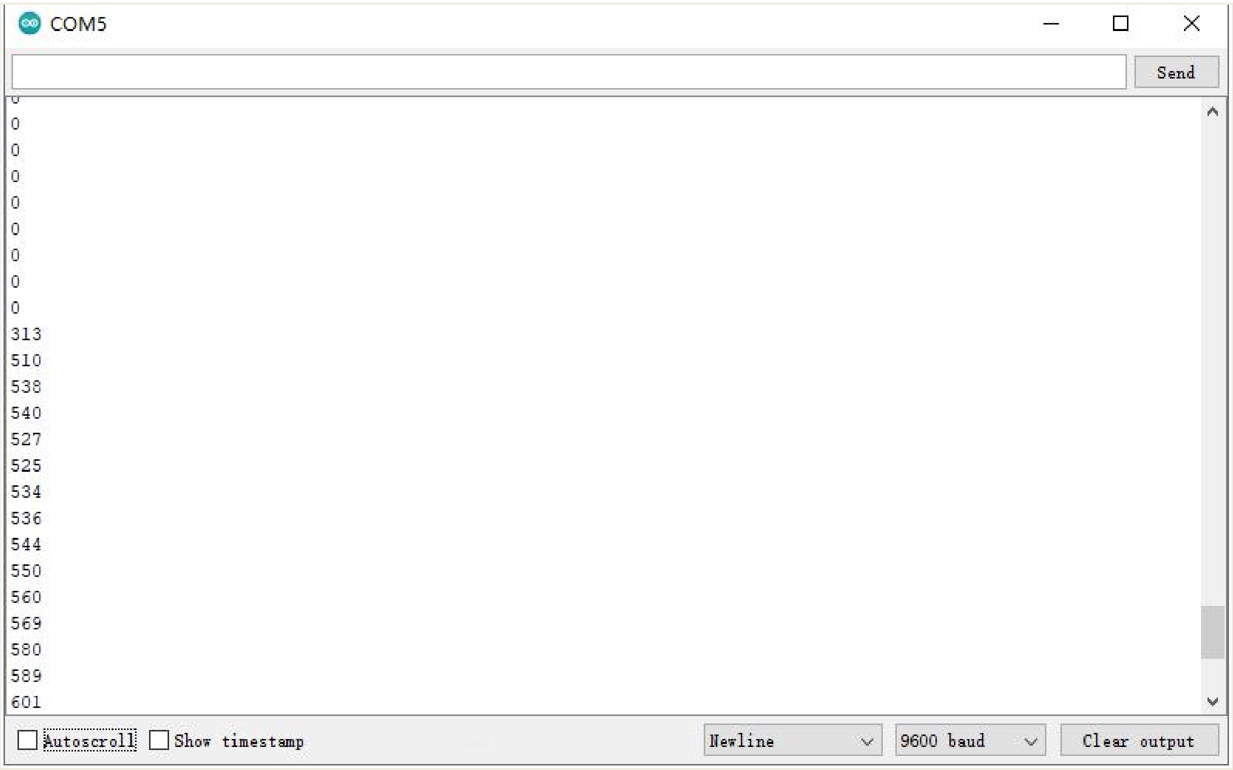
5. Test Code

```
/*
keyestudio Easy plug super kit
Project 15
Steam Sensor
http://www.keyestudio.com
*/
int sensorPin =A0 ;   // define analog port A0
int value = 0;        //set value to 0
void setup()
{
  Serial.begin(9600); //set the baud rate to 9600
}
```

```
void loop()

{

value = analogRead(sensorPin);   //set the value as the value read from A0

Serial.println(value, DEC);   //print the value and line wrap

delay(200);   //delay 0.2S

}

//*********************************************
```

6.What You Should See

When detect the different degree of humidity, the sensor outputs different value. If the sensor's sensing area detects a water drop, the analog value will be displayed on monitor window.



COM5

```
0
0
0
0
0
0
0
0
313
510
538
540
527
525
534
536
544
550
560
569
580
589
601
```

□ Autoscroll □ Show timestamp

Newline

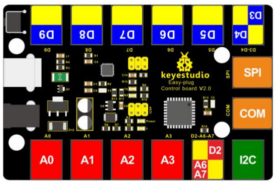
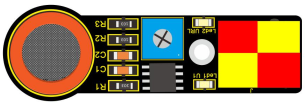
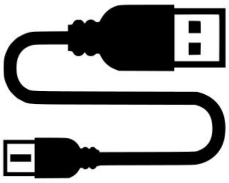
9600 baud

Project 16: Alcohol in the Air

1.Overview

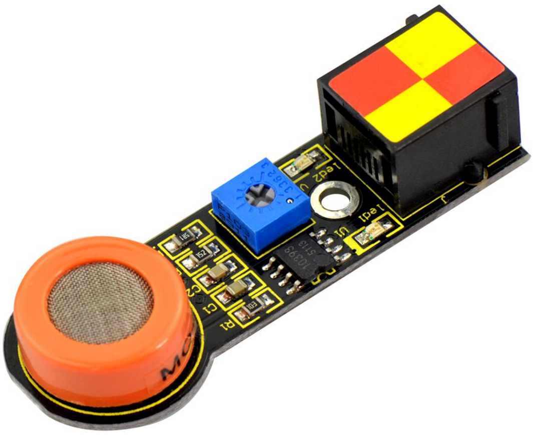
In this project, you will learn how to use the alcohol sensor and control board to detect the alcohol content in the air.

2. Component Required:

EASY plug control board*1	EASY plug Alcohol Sensor *1	RJ11 cable*1	USB cable*1
			

3.Component Introduction:

EASY plug Analog Alcohol Sensor



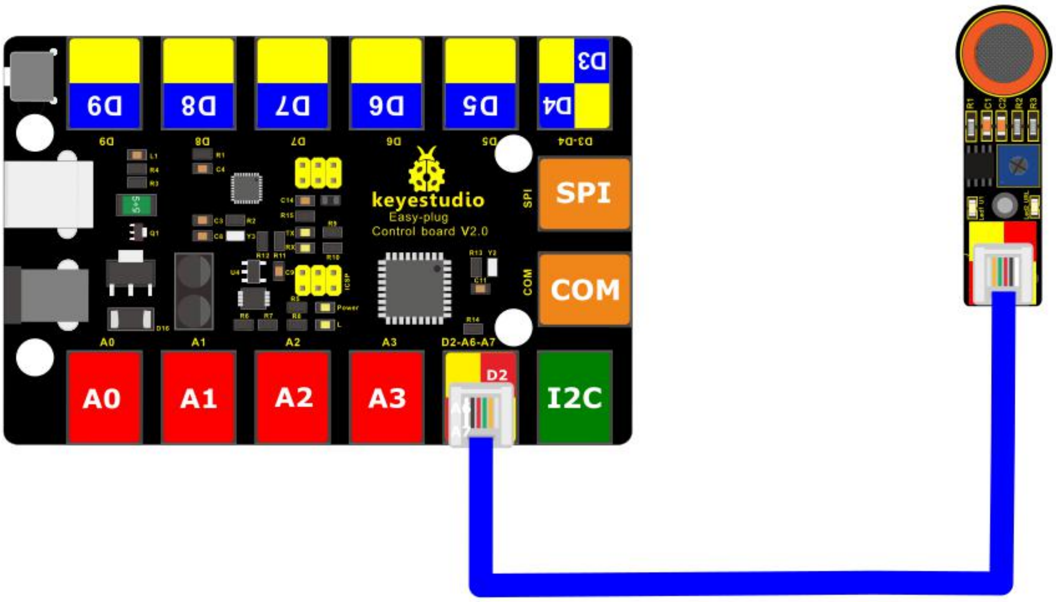
This analog gas sensor - MQ3 is suitable for detecting alcohol. It can be used in a Breath analyzer. Also it has high sensitivity to alcohol and low sensitivity to Benzine.

The sensitivity can be adjusted by a blue potentiometer on the sensor.

- Power supply: 5V
- Sensor type: Digital and Analog
- Quick response and High sensitivity
- Simple drive circuit
- Stable and long service life

4.Connect It Up

Connect the EASY Plug alcohol sensor and LCD module to control board using RJ11 cables.

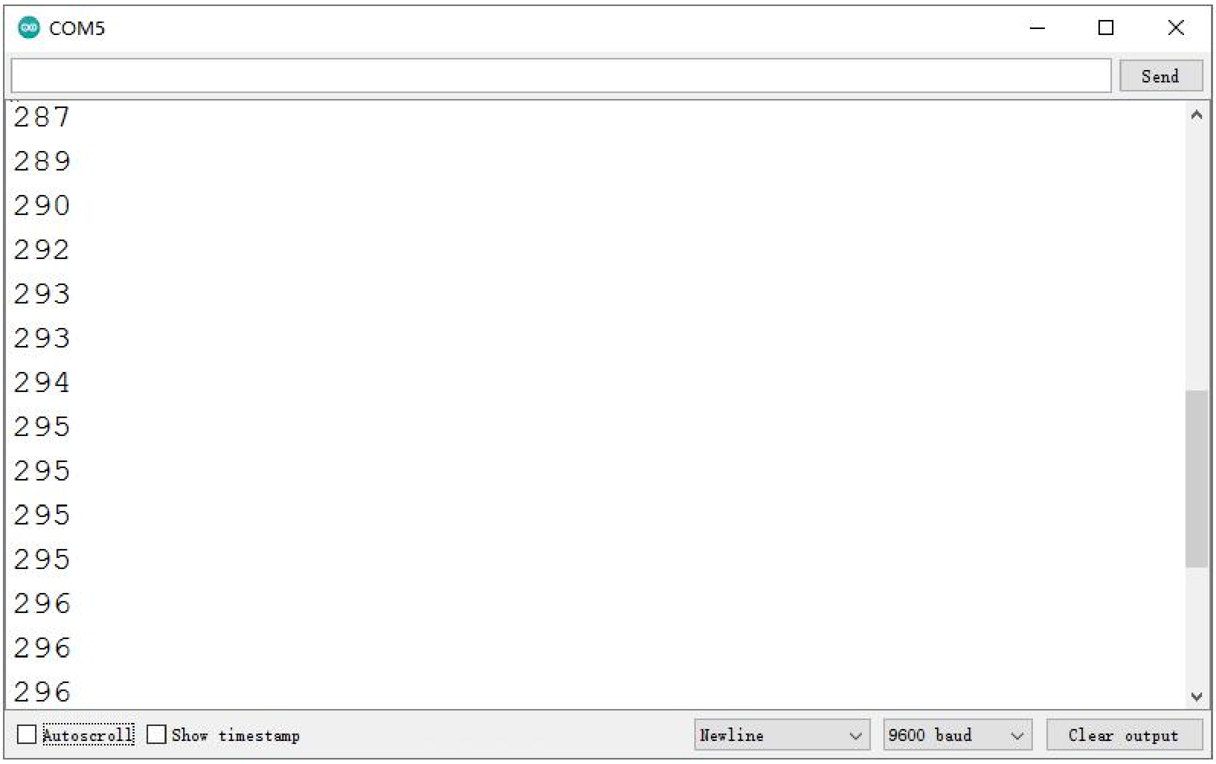


5. Test Code

```
/*

keyestudio Easy plug super kit

Project 16

Alcohol Sensor

http://www.keyestudio.com

*/

int sensorPin =A6 ;   // define analog port A6

int value = 0;       //set value to 0

void setup()

{

  Serial.begin(9600); //set the baud rate to 9600
}
void loop()
{
value = analogRead(sensorPin);   //set the value as the value read from A0
Serial.println(value, DEC);   //print the value and line wrap
delay(200);   //delay 0.2S
}
//*********************************************
```

6.What You Should See

Done uploading the code, open the serial monitor and set the baud rate to 9600. If the sensor detects the alcohol in the air, you should see the value change.



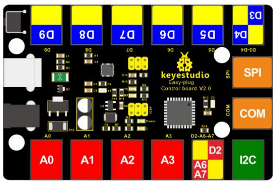
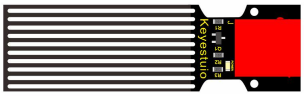
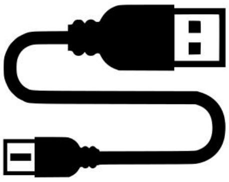
```
287
289
290
292
293
293
294
295
295
295
295
296
296
296
```

Project 17: Water Level

1.Overview

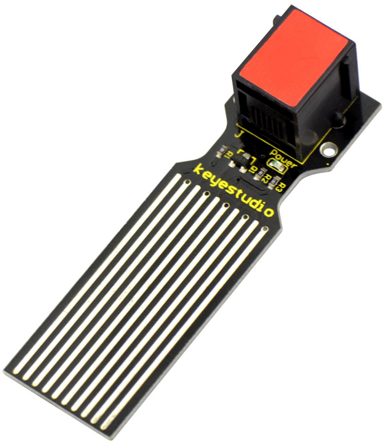
This lesson we are going to detect the water level using keyestudio water level sensor, showing you the value on the monitor or LCD screen.

2. Component Required:

EASY plug control board*1	EASY plug Water Level Sensor *1	RJ11 cable*1	USB cable*1
			

3.Component Introduction:

EASY plug Water Level Sensor



This sensor is easy-to-use, portable and particularly designed to identify and detect water level and water drop.

It can measure the volume of water drop and water quantity through an array of traces of exposed parallel line.

This sensor is small and equipped with the following features:

i) smooth conversion between water quantity and analog quantity;

ii) strong flexibility, outputting analog value;

iii) low power consumption and high sensitivity;

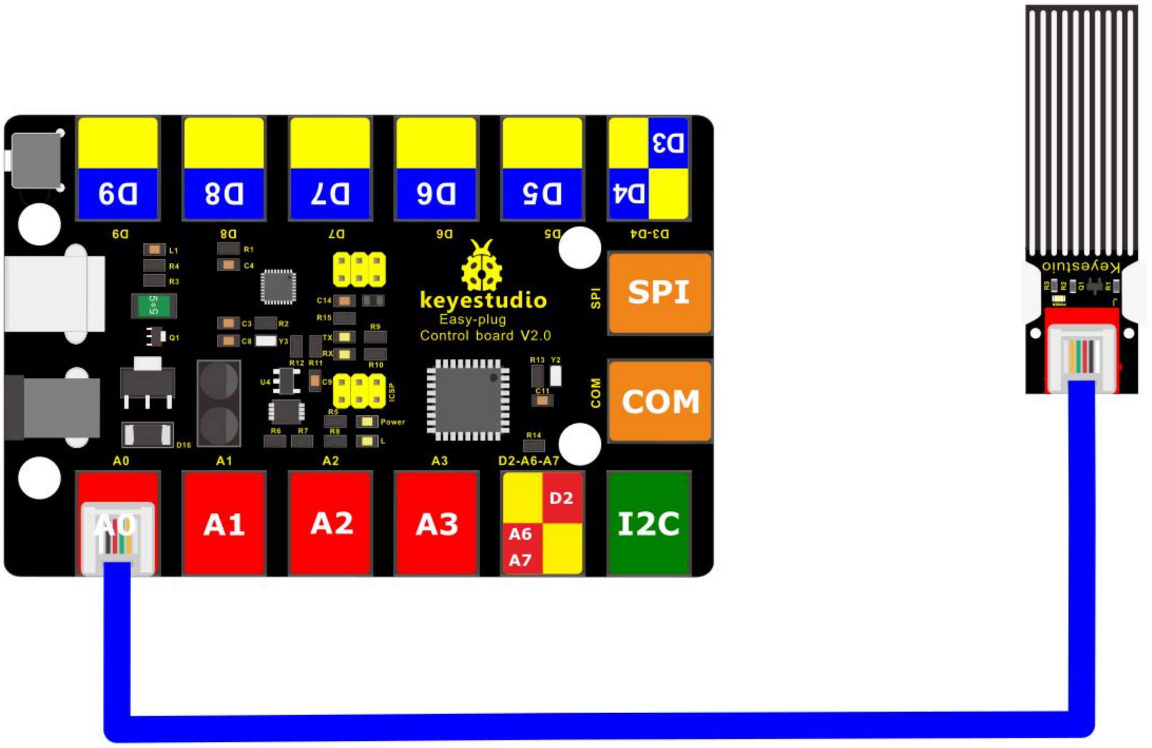
iv) directly connected to microprocessor or other logic circuits, suitable for a variety of development boards and controllers such as Arduino controller, STC single-chip microcomputer, AVR single-chip microcomputer, etc.

Specifications:

- Operating voltage: DC5V
- Operating current: <20mA
- Sensor type: Analog
- Detection area: 40mm x16mm
- Production process: FR4 double-side tinned
- Operating temperature: 10%~90% without condensation

4. Connect It Up

Connect the EASY Plug water level sensor and LED module to control board using an RJ11 cable.



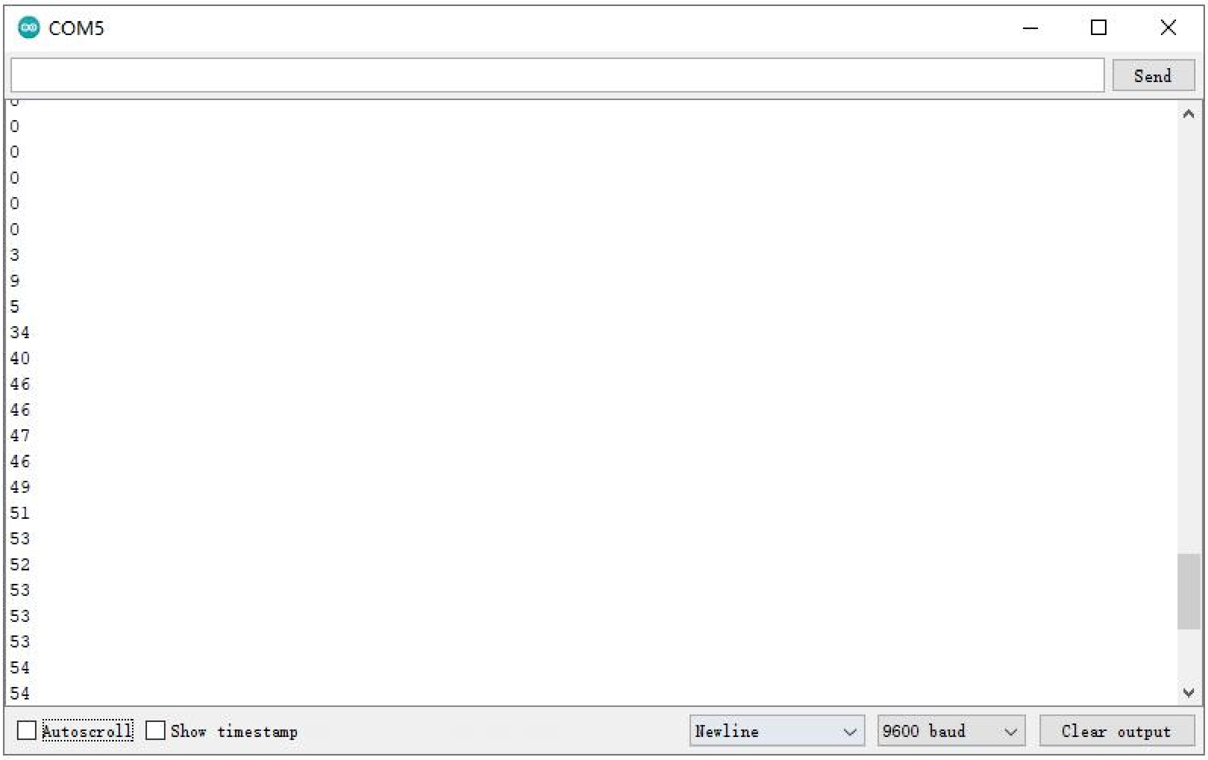
5. Test Code

```
/*

keyestudio Easy plug super kit

Project 17

Water Level Sensor

http://www.keyestudio.com
```

```
*/
int sensorPin =A0 ;   // define analog port A0
int value = 0;       //set value to 0
void setup()
{
  Serial.begin(9600); //set the baud rate to 9600
}
void loop()
{
value = analogRead(sensorPin);   //set the value as the value read from A0
Serial.println(value, DEC);   //print the value and line wrap
delay(200);   //delay 0.2S
}
//*************************************************************
```

6. What You Should See

Hook it up and upload well the code, you will see the led light on the water sensor light up, then open the serial monitor, you will see the analog value. When place the sensing area of sensor into the water, you can see the data change. The deeper the sensor’s sensing area into water, the greater the value.



```
0
0
0
0
0
3
9
5
34
40
46
46
47
46
49
51
53
52
53
53
53
54
54
```

□ Autoscroll □ Show timestamp

Newline

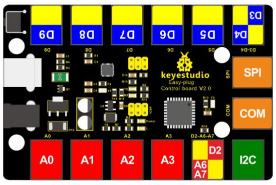
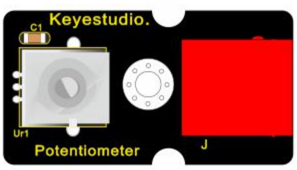
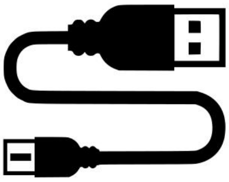
9600 baud

Project 18: Potentiometer

1.Overview

In this circuit you' ll work with a potentiometer sensor. You will learn how to simply test this potentiometer sensor to get the analog value.

2. Component Required:

EASY plug control board*1	EASY plug Potentiometer *1	RJ11 cable*1	USB cable*1
			

3.Component Introduction:

EASY plug Potentiometer Sensor

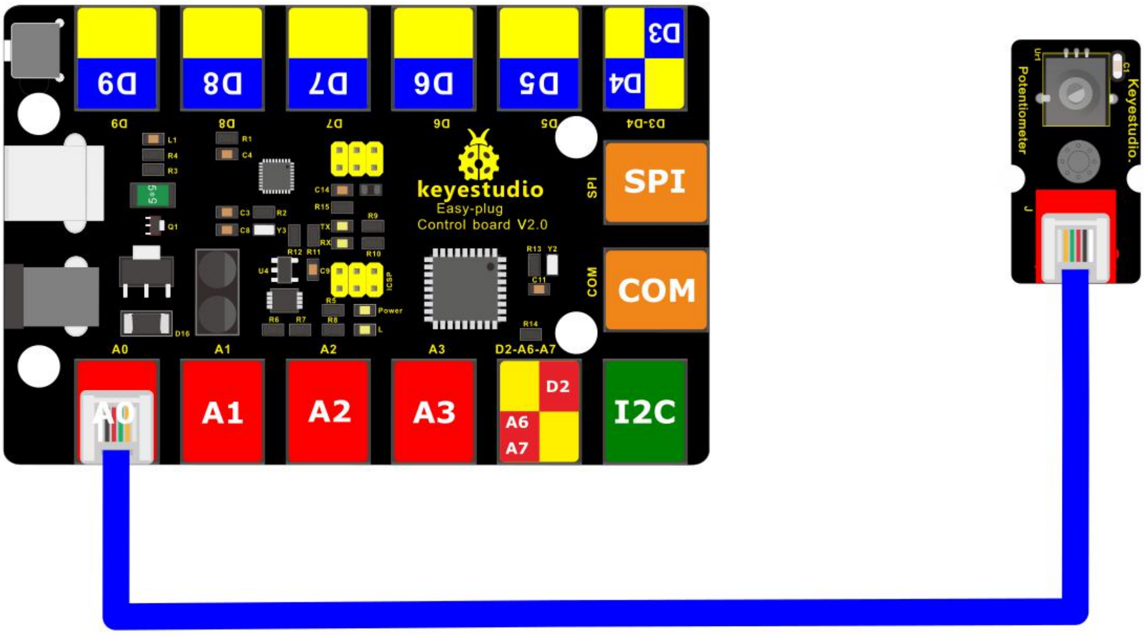
The sensor is based on a potentiometer. A potentiometer is also known as a variable resistor. It is a perfect demonstration of a variable voltage divider circuit. Its voltage can be subdivided into 1023, easy to be connected to Arduino with our sensor shield.

Combined with other sensors, you are able to make interesting projects by reading the analog value from the IO port.

- Interface: Easy plug
- Supply Voltage: 3.3V to 5V
- Sensor type: Analog

4.Connect It Up

Connect the EASY Plug potentiometer sensor, a red LED module and 1602 LCD module to control board using RJ11 cables.

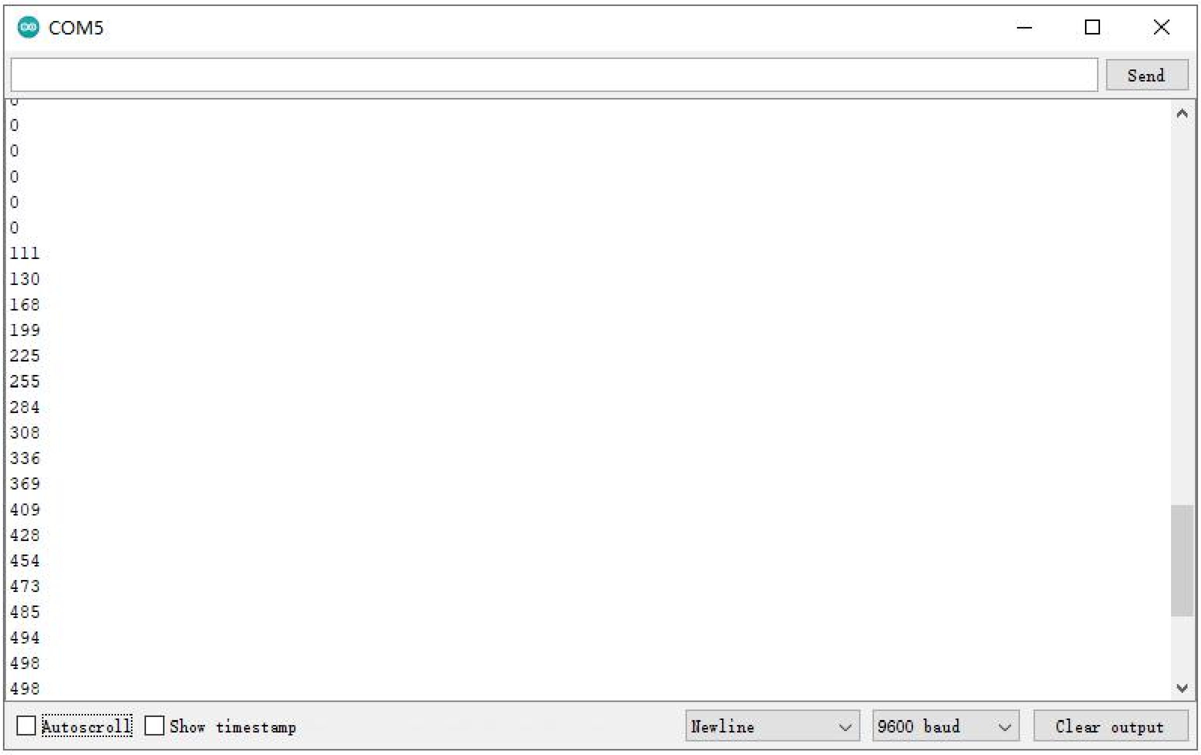


5. Test Code

```
/*

keyestudio Easy plug super kit

Project 18

potentiometer

http://www.keyestudio.com

*/

int sensorPin =A0 ;   // define analog port A0

int value = 0;        //set value to 0

void setup()

{

  Serial.begin(9600); //set the baud rate to 9600
}
void loop()
{
value = analogRead(sensorPin);   //set the value as the value read from A0
Serial.println(value, DEC);   //print the value and line wrap
delay(200);   //delay 0.2S
}
//*********************************************
```

6.What You Should See

After uploading the code, open the serial monitor and set the baud rate to 9600, you should see the analog value is showed on the monitor.



```
0
0
0
0
0
111
130
168
199
225
255
284
308
336
369
409
428
454
473
485
494
498
498
```

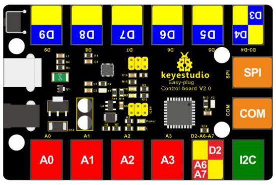
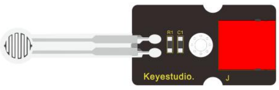
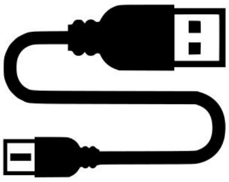
□ Autoscroll □ Show timestamp   Newline   9600 baud

Project 19: Pressure Sensor

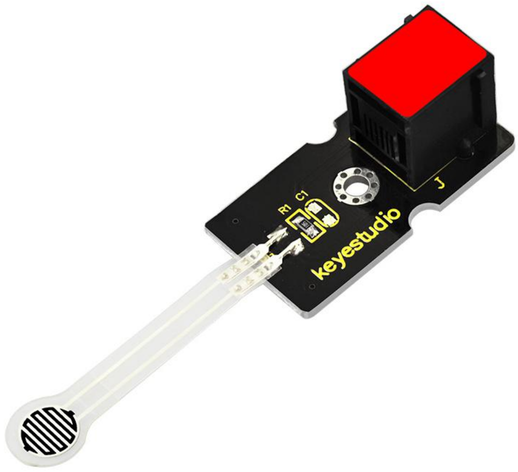
1.Overview

How to measure the outside force? Use a pressure sensor.

2. Component Required:

EASY plug control board*1	EASY plug thin-film pressure sensor *1	RJ11 cable*1	USB cable*1
			

3.Component Introduction:



EASY Plug Pressure Sensor

This EASY plug pressure sensor adopts the flexible Nano pressure-sensitive material with an ultra-thin film pad.

It has the functions of water-proof and pressure detection.

The force sensors are ultra-thin and flexible printed circuits, which can be easily integrated into force measurement applications.

The harder you press, the lower the sensor's resistance.

When the sensor detects the outside pressure, the resistance of sensor will make a change. So we can use the circuit to convert the pressure signal that senses pressure change into the corresponding electric signal output.

In this way, we can know the conditions of pressure changes by detecting the signal changes.

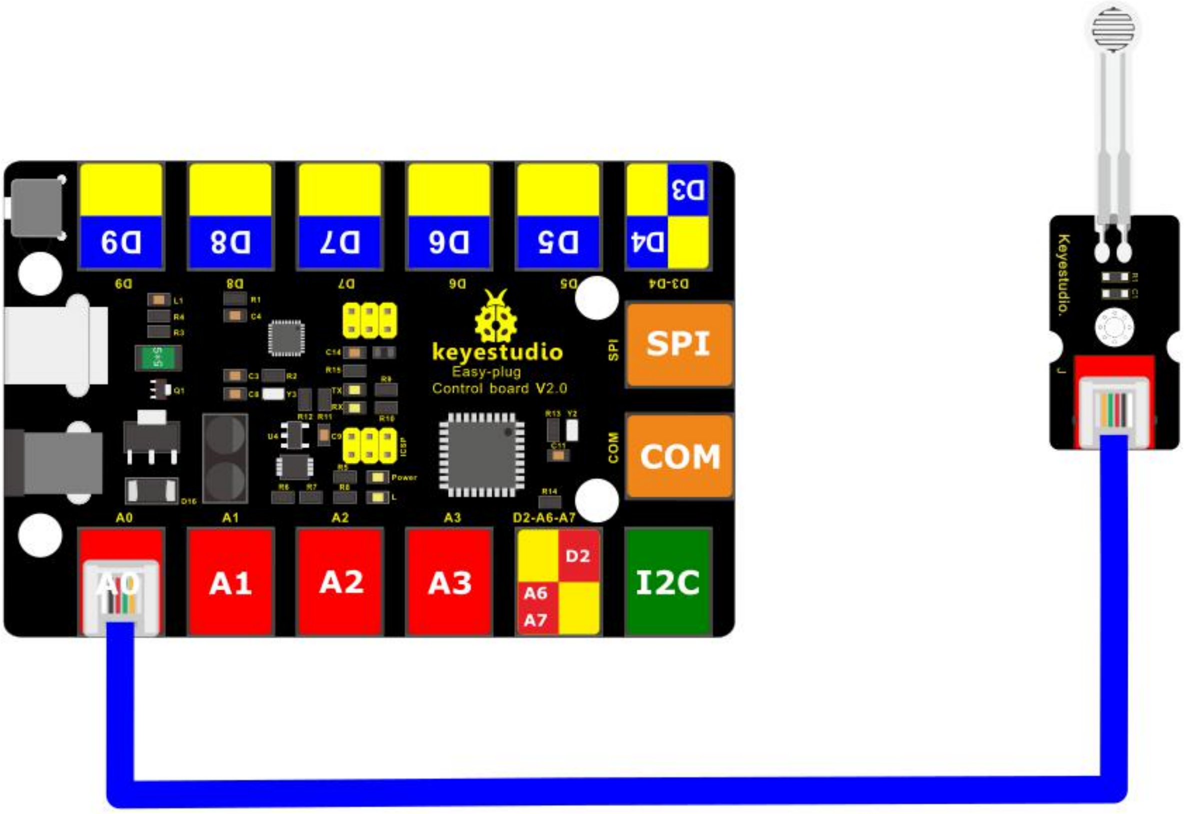
You can connect the sensor to EASY plug Control board for communication using only a RJ11 cable.

- Working Voltage: DC 3.3V—5V
- Range: 0-0.5KG
- Thickness: ＜0.25mm
- Response Point: ＜20g
- Repeatability: ＜±5.8% （50% load）
- Accuracy: ±2.5% （85% range interval）
- Durability: ＞100 thousand times

- Initial Resistance: ＞100MΩ (no load)
- Response Time: ＜1ms
- Recovery Time: ＜15ms
- Working Temperature: -20℃ to 60℃

4.Connect It Up

Connect the EASY Plug pressure sensor and LED module to control board using RJ11 cables.



5. Upload the Code

/*

keyestudio Easy plug super kit

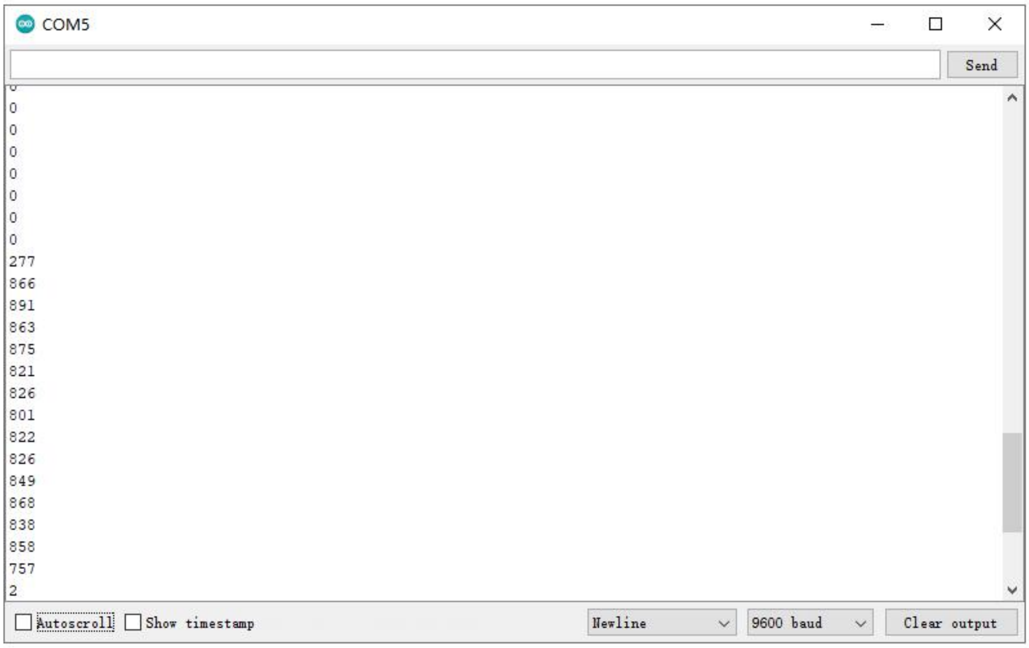
Project 19

thin-film pressure sensor

```
http://www.keyestudio.com
*/
int sensorPin=A0;// define analog port A0
int value=0;//set value to 0
void setup()
{
  Serial.begin(9600);//set the baud rate to 9600
}
void loop()
{
value=analogRead(sensorPin);//set the value as the value read from A0
Serial.println(value,DEC);//print the value and line wrap
delay(200);//delay 0.2S
}
//*************************************************************************
```

6.What You Should See

After uploading the code, open the serial monitor, and set the baud rate to 9600. When tightly press the sensor, you should see the value become larger. So the sensor works normally.



```
0
0
0
0
0
0
0
277
866
891
863
875
821
826
801
822
826
849
868
838
858
757
2
```

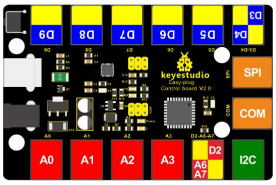
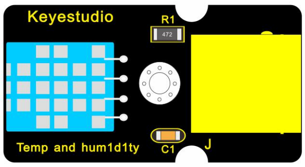
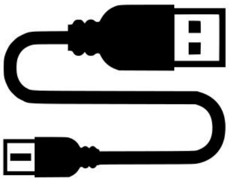
Newline 9600 baud

Project 20: Temperature and Humidity

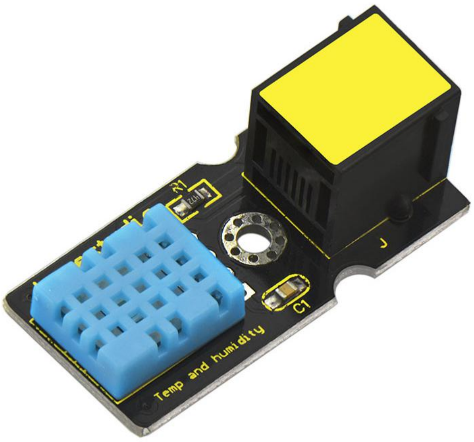
1.Overview

How to test the temperature and humidity in the current environment? Use a DHT11 sensor. Simply connect to the EASY Plug control board.

2. Component Required:

EASY plug control board*1	EASY plug DHT11 Sensor *1	RJ11 cable*1	USB cable*1
			

3.Component Introduction:



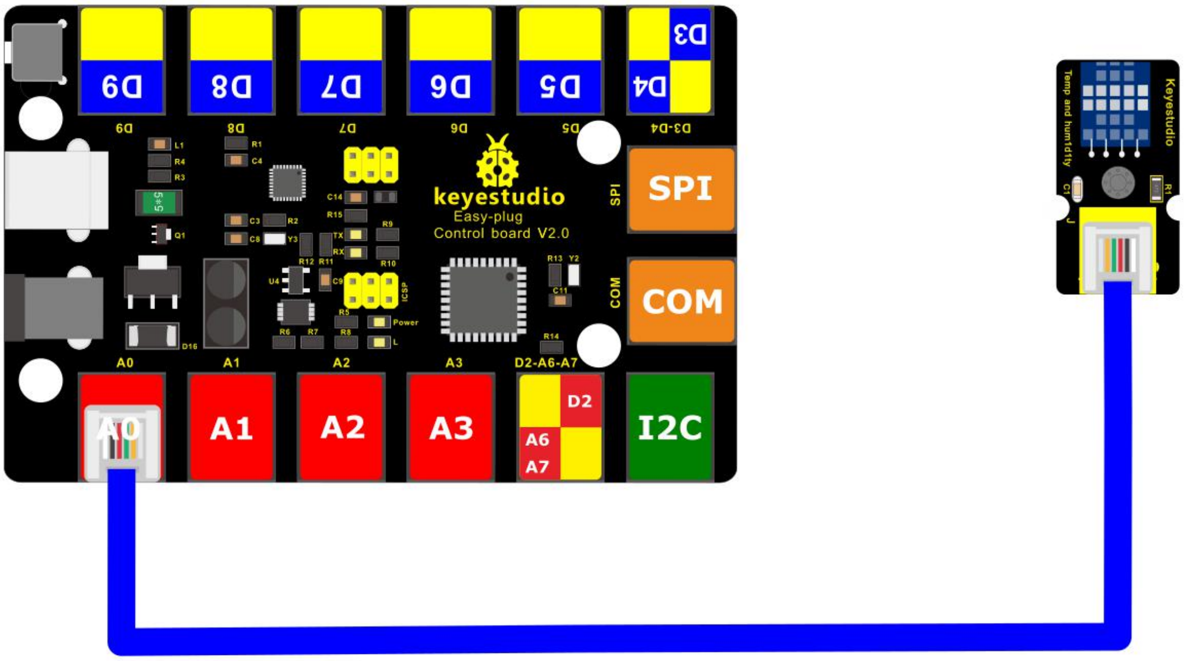
EASY plug DHT11 Temperature and Humidity Sensor

The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor.
It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and provides a pre-calibrated digital signal output.
This DHT11 sensor has fast response, anti-interference ability, excellent reliability and long-term stability.

- Supply Voltage: 5V
- Relative Humidity and temperature measurement
- Good for 20-90% humidity readings with 5% accuracy
- Good for 0-50°C temperature readings ±2°C accuracy
- Interface: Digital
- Low Cost

4.Connect It Up

Connect the EASY Plug DHT11 sensor and 1602 LCD module to control board using RJ11 cables.



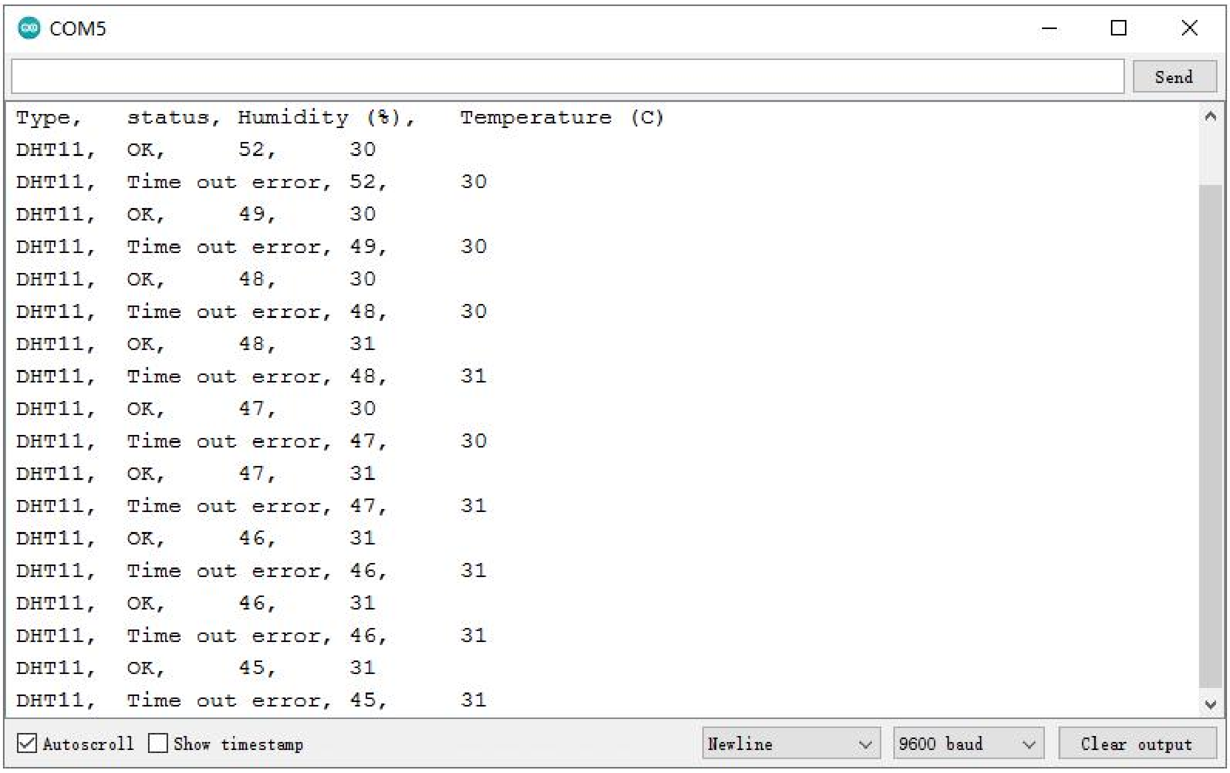
5. Upload the Code

```
/*

keyestudio Easy plug super kit

Project 20

temperature and humidity sensor

http://www.keyestudio.com

*/

 #include <dht11.h>

 dht11 DHT;

 #define DHT11_PIN A0
```

```
void setup()
  {
  Serial.begin(9600);
  Serial.println();
  Serial.println("Type,\tstatus,\tHumidity (%),\tTemperature (C)");
  }

void loop()
  {
int chk;
Serial.print("DHT11, \t");
chk = DHT.read(DHT11_PIN);// READ DATA
switch (chk)
  {
  case DHTLIB_OK:
      Serial.print("OK,\t");
      break;
  case DHTLIB_ERROR_CHECKSUM:
      Serial.print("Checksum error,\t");
      break;
  case DHTLIB_ERROR_TIMEOUT:
      Serial.print("Time out error,\t");
      break;
  default:
     Serial.print("Unknown error,\t");
     break;
    }// DISPLAT DATA
     Serial.print(DHT.humidity,1);
     Serial.print(",\t");
     Serial.println(DHT.temperature,1);
     delay(1000);
     }
//**********************************************************************
```

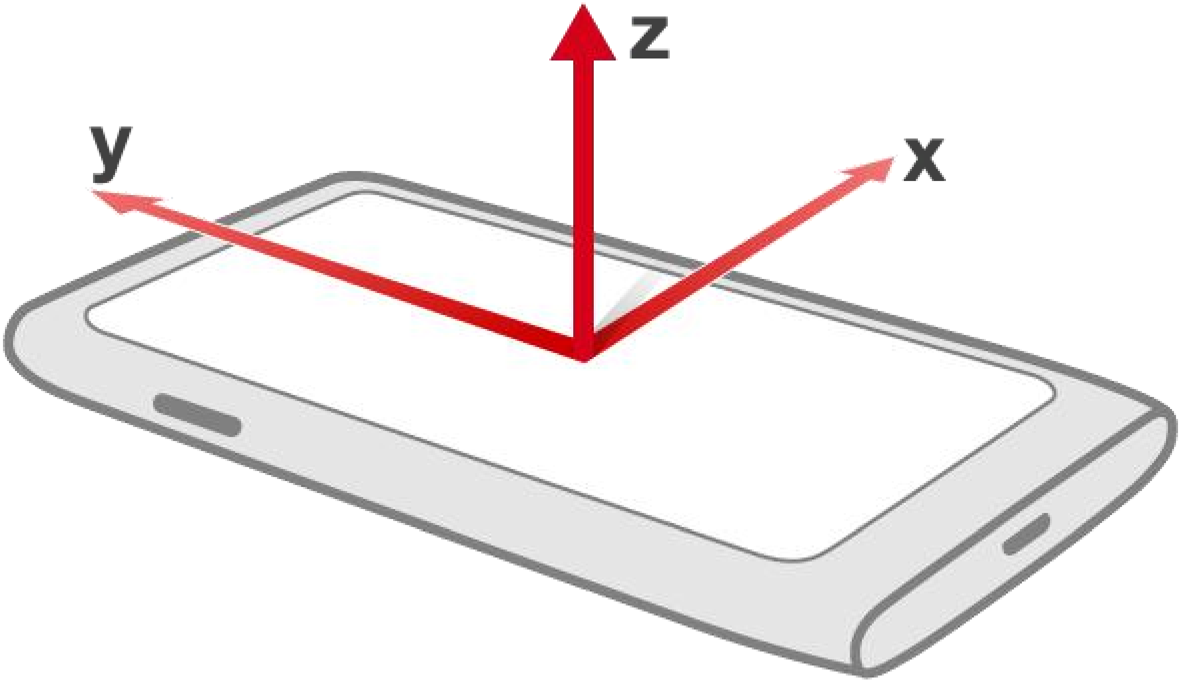
6. What You Should See

Open the Serial monitor, you should be able to see the temperature and humidity data.



```
Type,   status, Humidity (%),   Temperature (C)
DHT11,  OK,     52,     30
DHT11,  Time out error, 52,     30
DHT11,  OK,     49,     30
DHT11,  Time out error, 49,     30
DHT11,  OK,     48,     30
DHT11,  Time out error, 48,     30
DHT11,  OK,     48,     31
DHT11,  Time out error, 48,     31
DHT11,  OK,     47,     30
DHT11,  Time out error, 47,     30
DHT11,  OK,     47,     31
DHT11,  Time out error, 47,     31
DHT11,  OK,     46,     31
DHT11,  Time out error, 46,     31
DHT11,  OK,     46,     31
DHT11,  Time out error, 46,     31
DHT11,  OK,     45,     31
DHT11,  Time out error, 45,     31
```

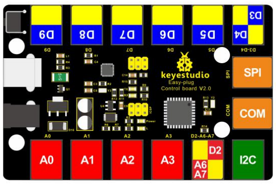
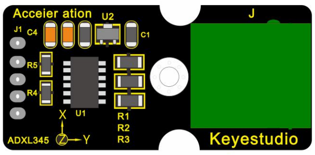
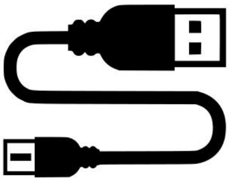
Project 21: ADXL345 Acceleration module

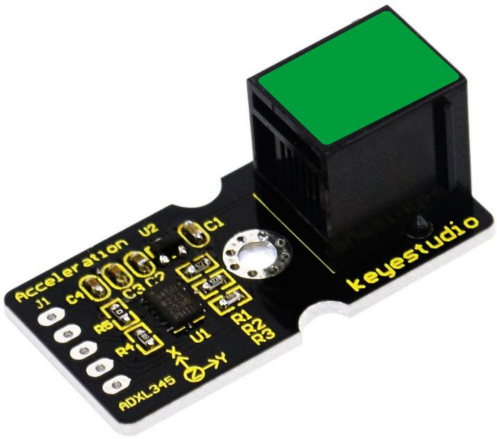


1.Overview

This lesson you will learn about how to use a Triple Axis Acceleration module ADXL345 for tilt sensing.

2. Component Required:

EASY plug control board*1	EASY plug ADXL345 Acceleration Module *1	RJ11 cable*1	USB cable*1
			



3.Component Introduction:

EASY plug Acceleration Module

The ADXL345 module is a low power, 3-axis

MEMS accelerometer with high resolution (13-bit) and measurement at up to ± 16g (gravitational force).

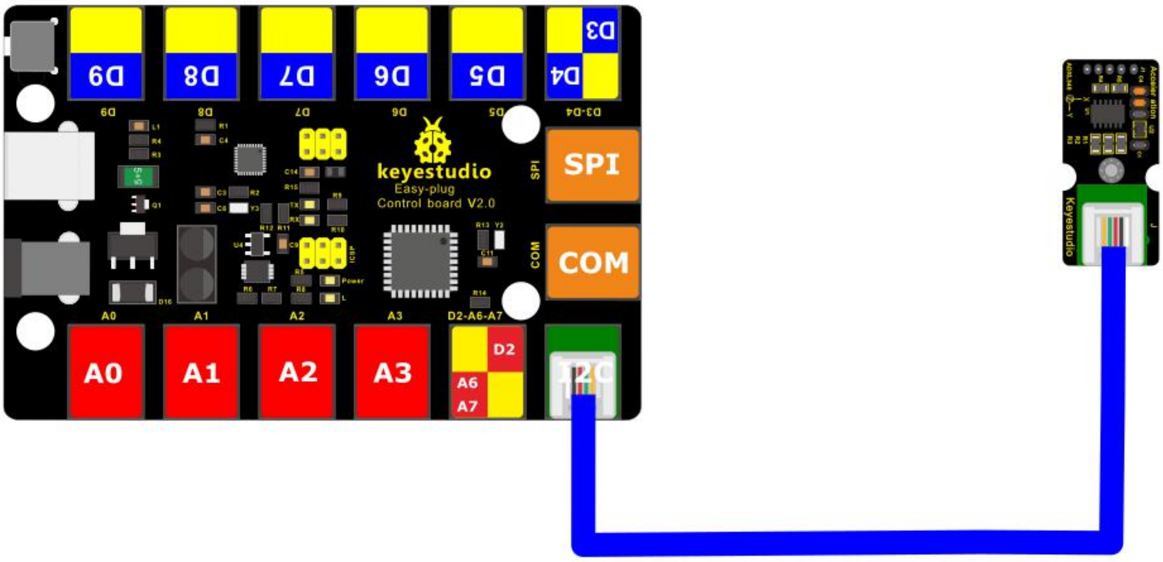
Digital output data is formatted as 16-bit twos complement, and is accessible through either a SPI or I2C digital interface.

The ADXL345 is well suited to measures the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion or shock.

- Working Voltage: 2.0-3.6V
- Ultra Low Power @2.5v: 40uA /working mode; 0.1uA / standby mode
- Communication interface: I2C / SPI
- Tap/Double Tap Detection ; Free-Fall Detection

4.Connect It Up

Connect the EASY Plug ADXL345 Acceleration module to control board using an RJ11 cable.



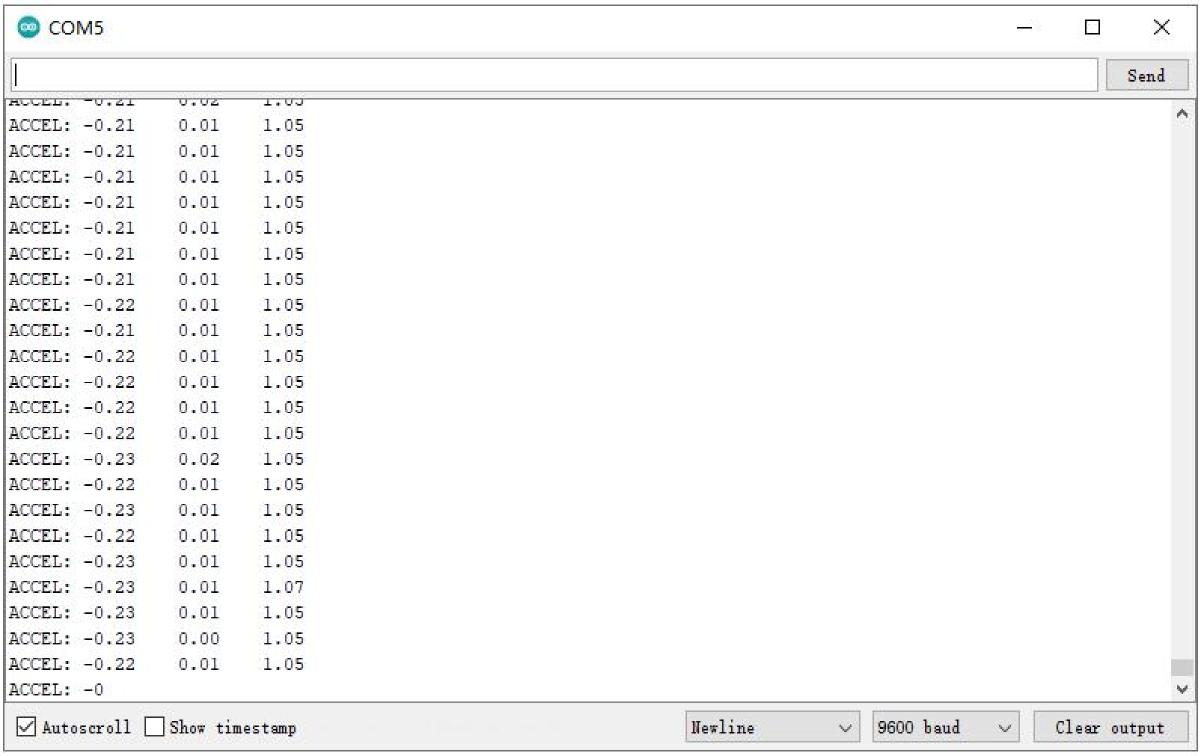
5. Upload the Code

/*

```
keyestudio Easy plug super kit
Project 21
ADXL345 Acceleration module
http://www.keyestudio.com
*/
#include <Wire.h>
// Registers for ADXL345
#define ADXL345_ADDRESS (0xA6 >> 1)   // address for device is 8 bit but shift
to the
// right by 1 bit to make it 7 bit because the
// wire library only takes in 7 bit addresses
#define ADXL345_REGISTER_XLSB (0x32)

int accelerometer_data[3];
// void because this only tells the cip to send data to its output register
// writes data to the slave's buffer
void i2c_write(int address, byte reg, byte data) {
  // Send output register address
  Wire.beginTransmission(address);
  // Connect to device
  Wire.write(reg);
  // Send data
  Wire.write(data); //low byte
  Wire.endTransmission();
}


// void because using pointers
// microcontroller reads data from the sensor's input register
void i2c_read(int address, byte reg, int count, byte* data) {
  // Used to read the number of data received
  int i = 0;
  // Send input register address
  Wire.beginTransmission(address);
  // Connect to device
  Wire.write(reg);
  Wire.endTransmission();


  // Connect to device
  Wire.beginTransmission(address);
  // Request data from slave
  // Count stands for number of bytes to request
  Wire.requestFrom(address, count);
  while(Wire.available()) // slave may send less than requested
  {
    char c = Wire.read(); // receive a byte as character
    data[i] = c;
    i++;
  }
  Wire.endTransmission();
}
void init_adxl345() {
  byte data = 0;
  i2c_write(ADXL345_ADDRESS, 0x31, 0x0B);     // 13-bit mode   +_ 16g
  i2c_write(ADXL345_ADDRESS, 0x2D, 0x08);     // Power register
  i2c_write(ADXL345_ADDRESS, 0x1E, 0x00);     // x
  i2c_write(ADXL345_ADDRESS, 0x1F, 0x00);     // Y
  i2c_write(ADXL345_ADDRESS, 0x20, 0x05);     // Z

  // Check to see if it worked!
  i2c_read(ADXL345_ADDRESS, 0X00, 1, &data);
  if(data==0xE5)
    Serial.println("it work Success");
  else
    Serial.println("it work Fail");
}
void read_adxl345() {
  byte bytes[6];
  memset(bytes,0,6);
  // Read 6 bytes from the ADXL345
  i2c_read(ADXL345_ADDRESS, ADXL345_REGISTER_XLSB, 6, bytes);
  // Unpack data
  for (int i=0;i<3;++i) {
    accelerometer_data[i] = (int)bytes[2*i] + (((int)bytes[2*i + 1]) << 8);
  }
}
// initialise and start everything
void setup() {
  Wire.begin();
  Serial.begin(9600);
  for(int i=0; i<3; ++i) {
    accelerometer_data[i]   = 0;
  }
  init_adxl345();
}
void loop() {
  read_adxl345();
  Serial.print("ACCEL: ");
  Serial.print(float(accelerometer_data[0])*3.9/1000);//3.9mg/LSB scale factor in
13-bit mode
  Serial.print("\t");
  Serial.print(float(accelerometer_data[1])*3.9/1000);
  Serial.print("\t");
  Serial.print(float(accelerometer_data[2])*3.9/1000);
  Serial.print("\n");
  delay(100);
}
```

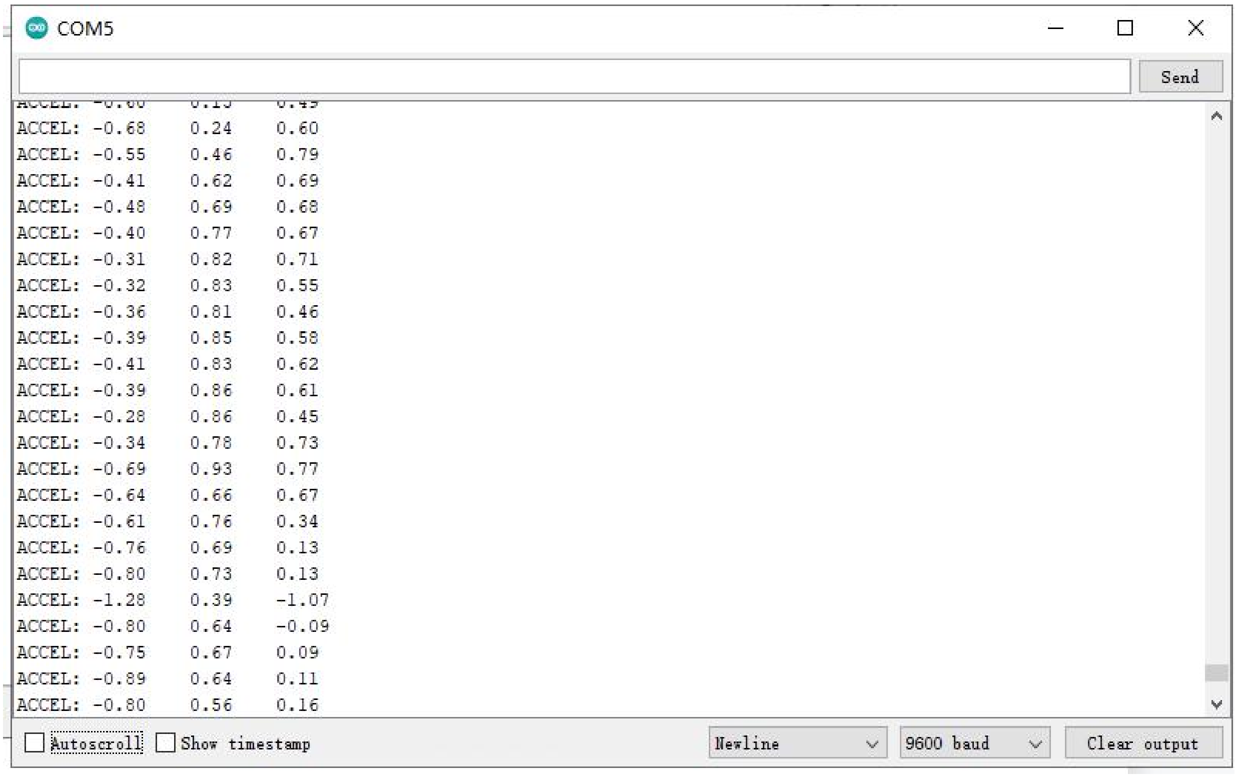
6.What You Should See

Open the Serial monitor to see the 3-axis acceleration data. See changes as you sway the Accelerometer.



```
ACCEL: -0.21    0.02    1.05
ACCEL: -0.21    0.01    1.05
ACCEL: -0.21    0.01    1.05
ACCEL: -0.21    0.01    1.05
ACCEL: -0.21    0.01    1.05
ACCEL: -0.21    0.01    1.05
ACCEL: -0.21    0.01    1.05
ACCEL: -0.21    0.01    1.05
ACCEL: -0.22    0.01    1.05
ACCEL: -0.21    0.01    1.05
ACCEL: -0.22    0.01    1.05
ACCEL: -0.22    0.01    1.05
ACCEL: -0.22    0.01    1.05
ACCEL: -0.22    0.01    1.05
ACCEL: -0.23    0.02    1.05
ACCEL: -0.22    0.01    1.05
ACCEL: -0.23    0.01    1.05
ACCEL: -0.22    0.01    1.05
ACCEL: -0.23    0.01    1.05
ACCEL: -0.23    0.01    1.07
ACCEL: -0.23    0.01    1.05
ACCEL: -0.23    0.00    1.05
ACCEL: -0.22    0.01    1.05
ACCEL: -0
```

☑ Autoscroll □ Show timestamp   Newline   9600 baud



```
ACCEL: -0.60    0.15    0.49
ACCEL: -0.68    0.24    0.60
ACCEL: -0.55    0.46    0.79
ACCEL: -0.41    0.62    0.69
ACCEL: -0.48    0.69    0.68
ACCEL: -0.40    0.77    0.67
ACCEL: -0.31    0.82    0.71
ACCEL: -0.32    0.83    0.55
ACCEL: -0.36    0.81    0.46
ACCEL: -0.39    0.85    0.58
ACCEL: -0.41    0.83    0.62
ACCEL: -0.39    0.86    0.61
ACCEL: -0.28    0.86    0.45
ACCEL: -0.34    0.78    0.73
ACCEL: -0.69    0.93    0.77
ACCEL: -0.64    0.66    0.67
ACCEL: -0.61    0.76    0.34
ACCEL: -0.76    0.69    0.13
ACCEL: -0.80    0.73    0.13
ACCEL: -1.28    0.39    -1.07
ACCEL: -0.80    0.64    -0.09
ACCEL: -0.75    0.67    0.09
ACCEL: -0.89    0.64    0.11
ACCEL: -0.80    0.56    0.16
```

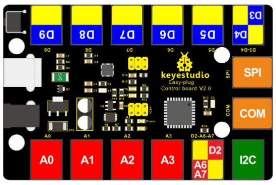
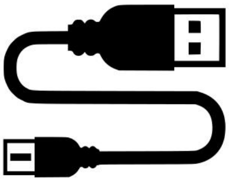
Project 22: 4-digit LED display

1.Overview

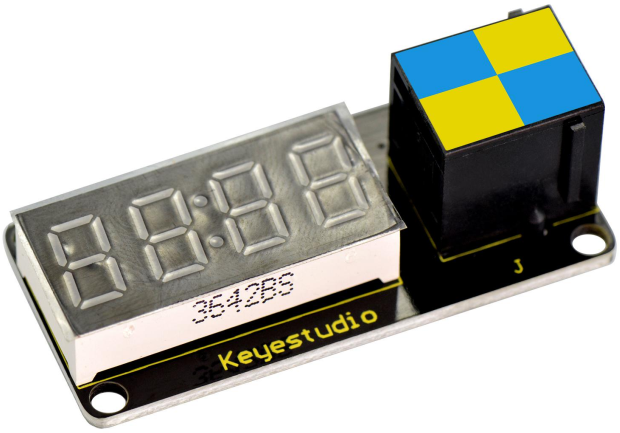
When you watch a ball game, you might often see the countdown.

Here comes an EASY Plug 4-digit 0.36’ ’ LED display! Through this project, you will learn how to control the 4-digit LED display show the time counting.

2. Component Required:

EASY plug control board*1	EASY plug 4-digit LED display *1	RJ11 cable*1	USB cable*1
			

3.Component Introduction:



EASY plug 4-digit LED display

This is a 4-digit 0.36′′ Common Anode LED display module, a 12-pin display module with score points. The driver chip used in the matrices is TM1637, using only two signal cables to make the microcontroller control the 4-digit LED display.

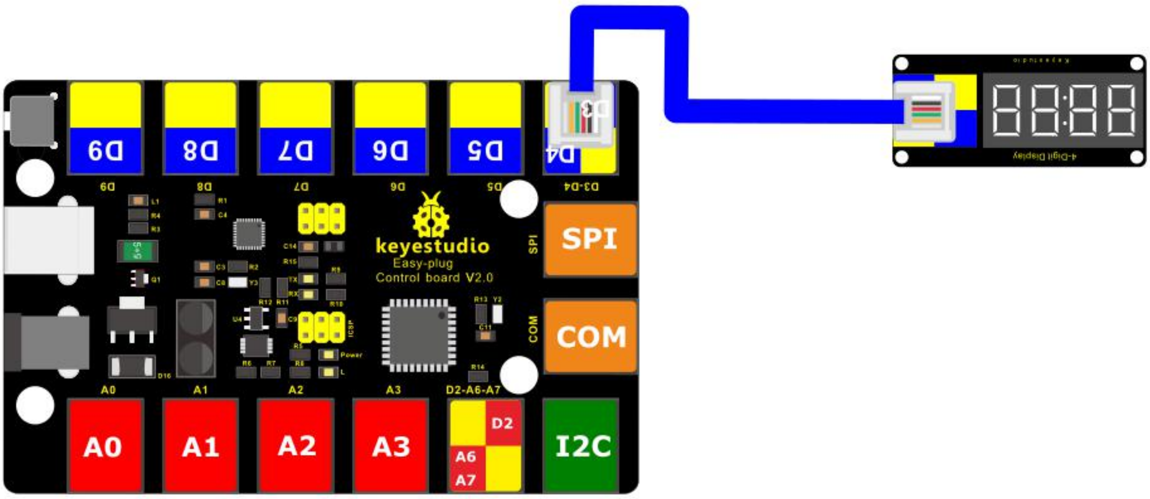
The four pins of LED display are GND、VCC、DIO、CLK. (GND is ground, VCC is for power supply, DIO is data IO pin, CLK is clock signal pin.)

The module pins are extended into Registered jack, so you can easily connect it to EASY Plug control board using a RJ11 cable.

- Operating Voltage: DC5V
- Operating Temperature Range: -40℃ ~ +85℃

4.Connect It Up

Connect the EASY Plug 4-digit LED display module to control board using RJ11 cable.



5. Upload the Code

```
/*

keyestudio Easy plug super kit

Project 22

4 digit 7 segment display

http://www.keyestudio.com

*/

// Include the library:

#include <TM1637Display.h>

// Define the connections pins:

#define CLK 4

#define DIO 3

// Create display object of type TM1637Display:

TM1637Display display = TM1637Display(CLK, DIO);

// Create array that turns all segments on:
```

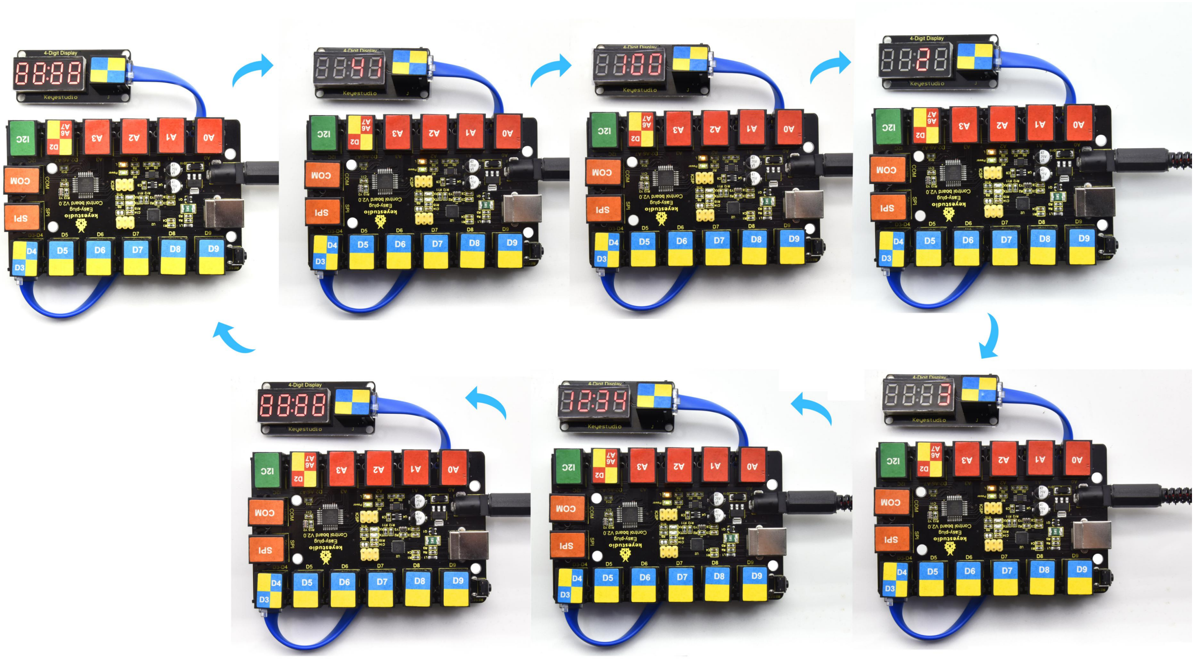
```
const uint8_t data[] = {0xff, 0xff, 0xff, 0xff};
// Create array that turns all segments off:
const uint8_t blank[] = {0x00, 0x00, 0x00, 0x00};
// You can set the individual segments per digit to spell words or create other
symbols:
const uint8_t done[] = {
  SEG_B | SEG_C | SEG_D | SEG_E | SEG_G,           // d
  SEG_A | SEG_B | SEG_C | SEG_D | SEG_E | SEG_F,   // O
  SEG_C | SEG_E | SEG_G,                           // n
  SEG_A | SEG_D | SEG_E | SEG_F | SEG_G            // E
};
// Create degree Celsius symbol:
const uint8_t celsius[] = {
  SEG_A | SEG_B | SEG_F | SEG_G,  // Circle
  SEG_A | SEG_D | SEG_E | SEG_F   // C
};
void setup() {
  // Clear the display:
  display.clear();
  delay(1000);
}
void loop() {
  // Set the brightness:
```

```
display.setBrightness(7);
// All segments on:
display.setSegments(data);


delay(1000);
display.clear();
delay(1000);
// Show counter:
int i;
for (i = 0; i < 101; i++) {
   display.showNumberDec(i);
   delay(50);
}
delay(1000);
display.clear();
delay(1000);


// Print number in different locations, loops 2 times:
int j;
for (j = 0; j < 2; j++) {
   for (i = 0; i < 4; i++) {
      display.showNumberDec(i, false, 1, i);
      delay(500);
```

```
          display.clear();
        }
    }
    delay(1000);
    display.clear();
    delay(1000);
    // Set brightness (0-7):
    int k;
    for (k = 0; k < 8; k++) {
       display.setBrightness(k);
       display.setSegments(data);
       delay(500);
    }
    delay(1000);
    display.clear();
    delay(1000);
    // Print 1234 with the center colon:
    display.showNumberDecEx(1234, 0b11100000, false, 4, 0);
    delay(1000);
    display.clear();
    delay(1000);
    display.setSegments(done);
}
```

6.What You Should See

Upload test code, the 4-digit LED display will flash and show number from 1 to 100, then delay in 1s, display 0123 twice; and display 13:34 gradually; circularly.

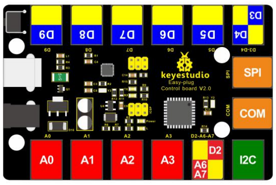
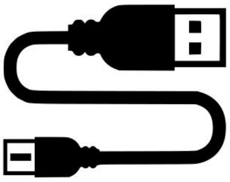


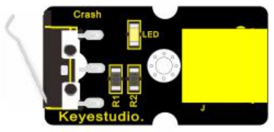
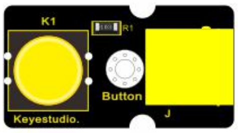
Project 23: simple counter

1. Overview

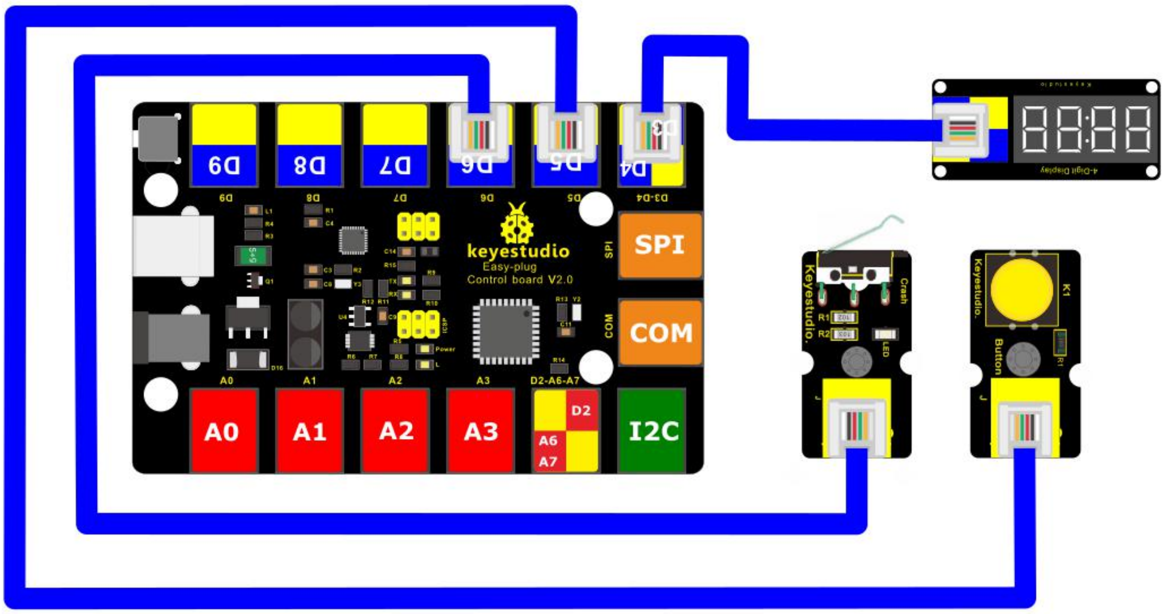
In this project, we use a button switch and a limit switch and a 4-digit digital tube to make a manual counter.

2.Component Required:

EASY plug control board*1	EASY plug 4-digit LED display *1	RJ11 cable*3	USB cable*1
			
EASY plug Crash Sensor*1	EASY plug Digital Push Button*1		

3. Connect It Up



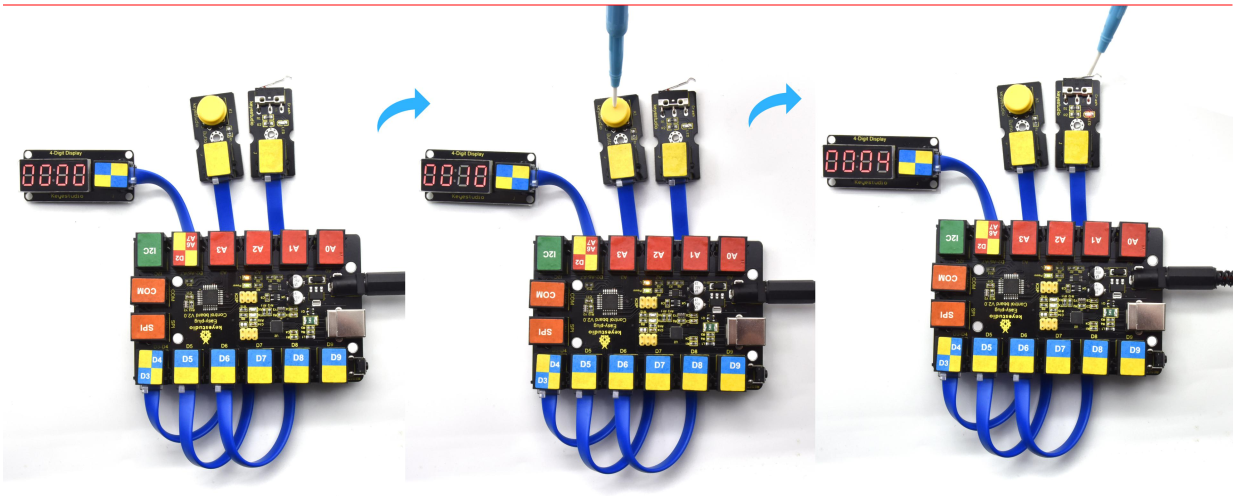
4.Upload the Code

```
/*
keyestudio Easy plug super kit
Project 23
simple counter
http://www.keyestudio.com
*/
#include <TM1637Display.h>
#define UP 5
#define DOWN 6
```

```
const int CLK = 4; //Set the CLK pin connection to the display
const int DIO = 3; //Set the DIO pin connection to the display
const uint8_t blank[] = {0x00, 0x00, 0x00,0x00};
TM1637Display display(CLK, DIO); //set up the 4-Digit Display.
int num = 0;
void setup()
{
    pinMode(UP, INPUT_PULLUP);
    pinMode(DOWN,
INPUT_PULLUP);
    display.setBrightness(0x0a); //set the diplay to maximum brightness
    display.setSegments(blank);//clear display
}

void loop()
{
   display.showNumberDec(num, true, 4, 0);
   delay(200); //wait 200 milliseconds
   if( digitalRead(UP) ==0)
  { // if the UP button is presses
    num++;          // increment 'num'
    if(num > 9999)
      num = 0;
  }
   if( digitalRead(DOWN)==0 )
  { // if the DOWN button is presses
    num--;         // decrement 'num'
    if(num < 0)
      num = 9999;
  }
}
//*******************************************
```

5.What You Should See

Upload test code, the digital tube will show 0. When you press the button switch, the value will increase 1; if you release the button, the value will reduce 1.

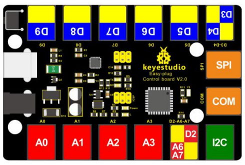
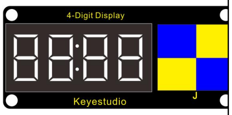
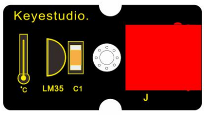
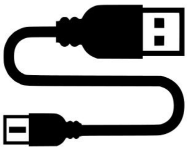


Project 24: Temperature meter

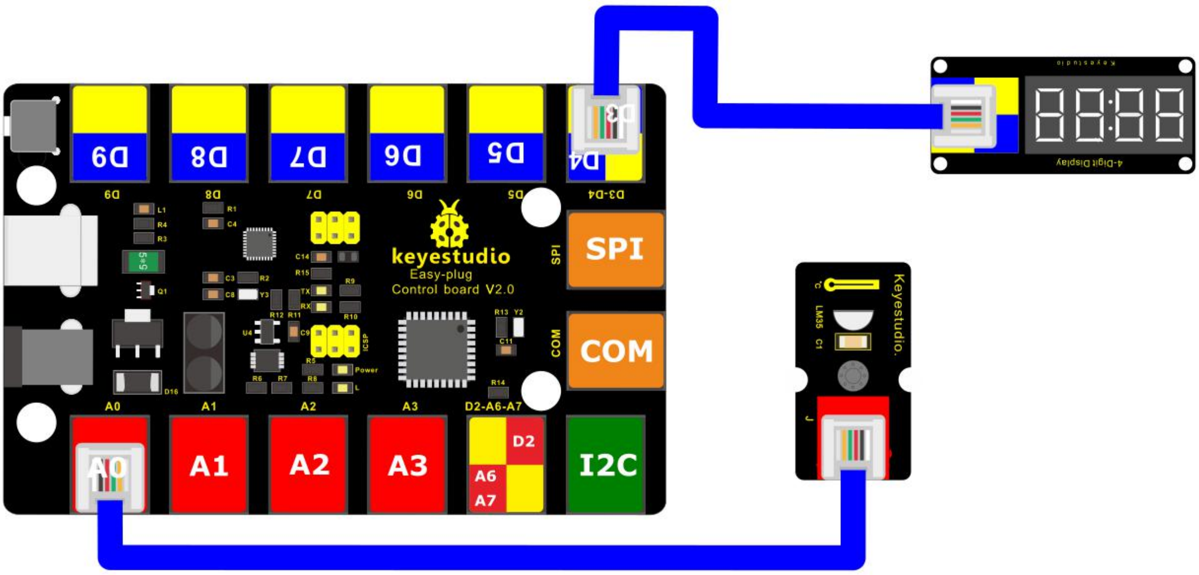
1. Overview

A thermometer is a device that measures temperature, which is very common in our lives. In this project, we use LM35 temperature sensor and 4-digit digital tube to make a simple thermometer.

2.Component Required:

EASY plug control board*1	EASY plug 4-digit LED display *1	EASY plug LM35 Temperature Sensor *1	USB cable*1	RJ11 cable*2
				

3. Connect It Up



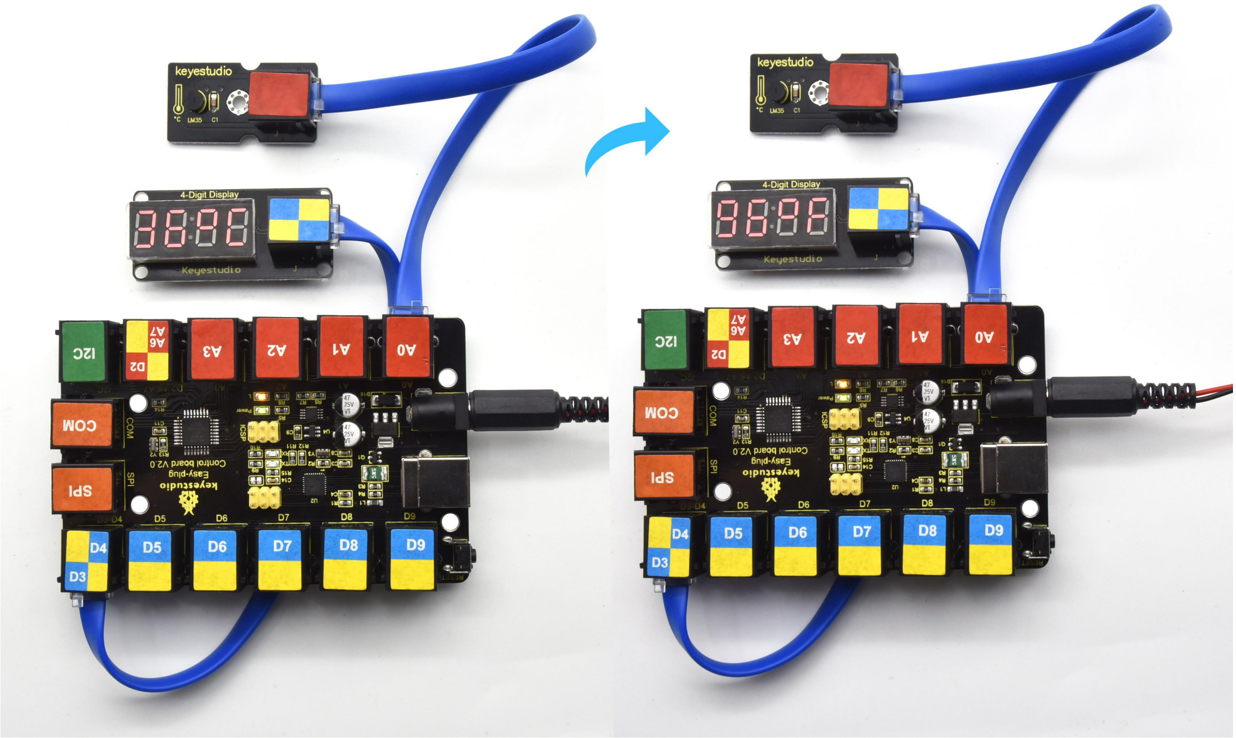
4.Upload the Code

```
/*
keyestudio Easy plug super kit
Project 24
Temperature meter
http://www.keyestudio.com
*/
#include <TM1637Display.h>
const int CLK = 4; //Set the CLK pin connection to the display
const int DIO = 3; //Set the DIO pin connection to the display
const uint8_t blank[] = {0x00, 0x00, 0x00,0x00};
const int tempPin = A0;
// Create degree Celsius symbol:
const uint8_t celsius[] = {
  SEG_A | SEG_B | SEG_F | SEG_G,   // Circle
  SEG_A | SEG_D | SEG_E | SEG_F     // C
};

// Create degree Fahrenheit symbol:
const uint8_t fahrenheit[]
= {
  SEG_A | SEG_B | SEG_F | SEG_G,   // Circle
  SEG_A | SEG_E | SEG_F | SEG_G     // F
};
```

```
TM1637Display display(CLK, DIO); //set up the 4-Digit Display.
 void setup()
{
    display.setBrightness(0x0a); //set the diplay to maximum brightness
    display.setSegments(blank);//clear display
}
void loop()
{
  int value = analogRead(tempPin); // read the value from sensor
  float millivolts = (value / 1024.0) * 5000;
  int t = millivolts / 10;   // temperature in degrees celcius
  int f = (t * 9)/5 + 32;   // convert celcius to fahrenheit

  // Show the temperature on the TM1637 display:
  display.showNumberDec(t, false, 2, 0);
  display.setSegments(celsius, 2, 2);
  delay(2000);
  display.showNumberDec(f, false, 2, 0);
  display.setSegments(fahrenheit, 2, 2);
  delay(2000);
 }
//*************************************************************
```

5. What You Should See

Upload test code, you will spot the temperature value（°C）then fahrenheit value（°F）on the digital tube

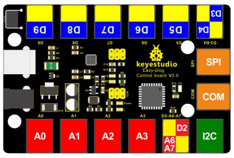
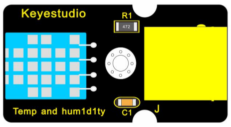
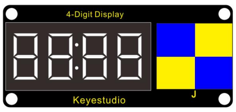
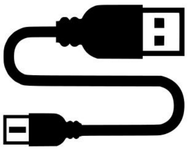


Project 25：Thermometer

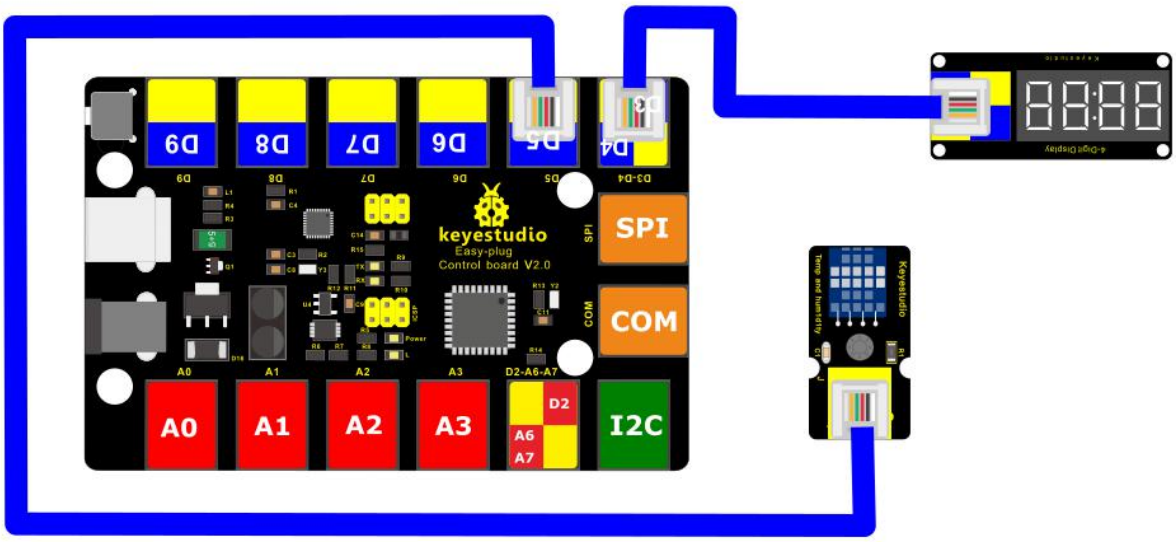
1. Overview

Temperature and humidity have the greatest impact on human health. When the indoor temperature is too high, it will affect the temperature regulation function of human body; when the temperature is too low, the metabolic function and resistance of the person will reduce. The rage of the suitable relative humidity for the human body is not more than 80%, and not less than 30%. We will use the temperature and humidity sensor and digital tube to make a simple temperature and humidity meter, so that we can detect the indoor temperature and humidity data at any time.

2.Component Required:

EASY plug control board*1	EASY plug DHT11 Sensor *1	EASY plug 4-digit LED display *1	USB cable*1	RJ11 cable*2
				

3. Connect It Up



4.Upload the Code

/*

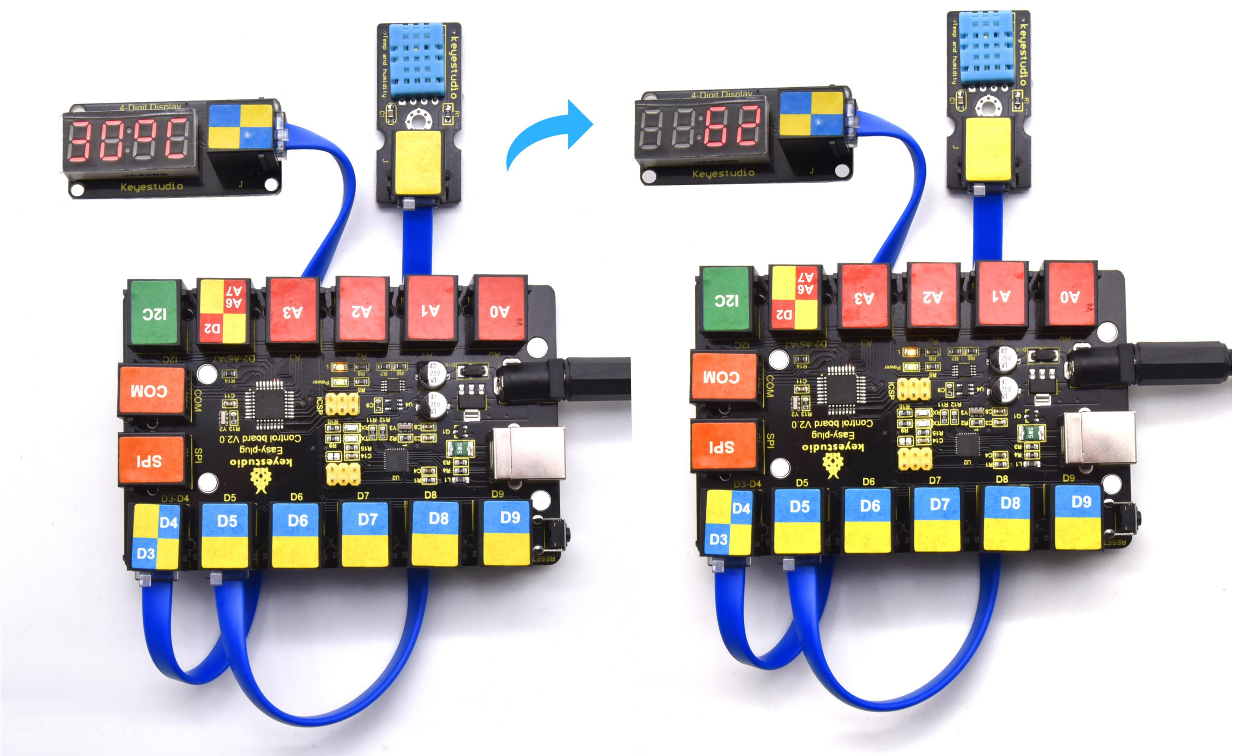
keyestudio Easy plug super kit

Project 25

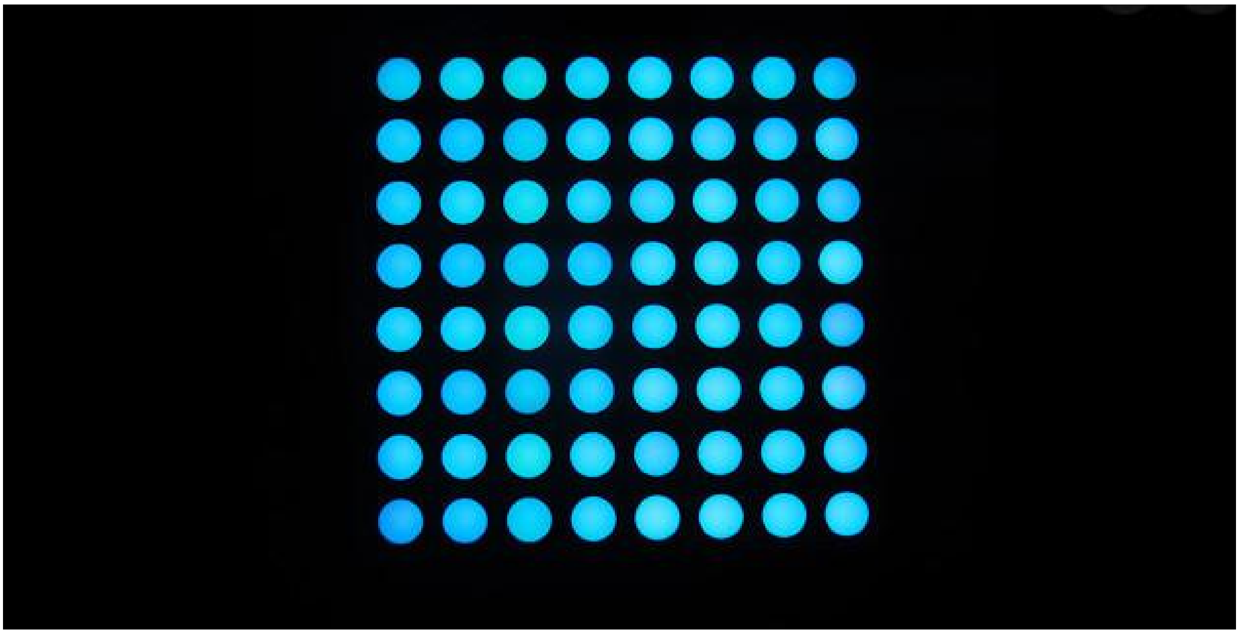
```
thermometer
http://www.keyestudio.com
*/
#include <dht11.h>
#include <TM1637Display.h>
#define DHT11PIN 5 // broche DATA -> pin 5
dht11 DHT11;
// Module connection pins (Digital Pins)
#define CLK 4
#define DIO 3
TM1637Display display(CLK, DIO);
// Create degree Celsius symbol:
const uint8_t celsius[] = {
  SEG_A | SEG_B | SEG_F | SEG_G,  // Circle
  SEG_A | SEG_D | SEG_E | SEG_F    // C
};
void setup()
{
display.setBrightness(0x0f);
}
void loop()
{
DHT11.read(DHT11PIN);
display.showNumberDec((float)DHT11.temperature,2,2);// Display Temperature in TM1637 Display
display.setSegments(celsius, 2, 2);
delay(2000);
display.showNumberDec((float)DHT11.humidity);//Display humidity in TM1637 Display
delay(2000);
}
//*********************************************************
```

5. What You Should See

Upload test code, then you will see the digital tube show the temperature value and humidity value.



Project 26: 8*8Matrix Display Turn On A Led



1.Overview

Dot matrix seems to be a very unfamiliar thing, but in fact it is everywhere in our lives. It is widely used in some outdoor billboards, game consoles, and supermarkets.

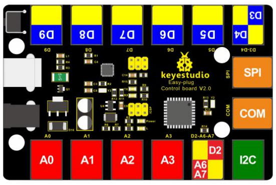
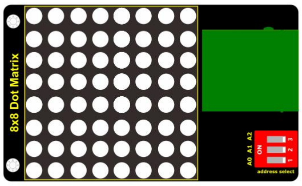
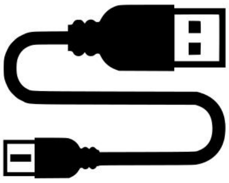
LED dot matrix has many advantages, such as power saving, long service life, low cost, high brightness, wide viewing angle, long visual range, waterproof and so on. It can meet different needs, so it has great development prospects.

The 8*8 dot matrix integrated on the coding box uses I2C communication. As long as 2 signal pins, up to 64 LEDs can be controlled, and interesting displays such as numbers, characters, and graphics can be displayed.

The 8*8 dot matrix uses a HT16K33 driver chip that does all the heavy lifting for you. This chip has a built in clock so they multiplex the display. Through a simple I2C interface, you can control the chip work and drive 8*8 Dot matrix screen.

Now we are about to start many 8*8 dot matrix projects, let’ s first turn on a light on the dot matrix.

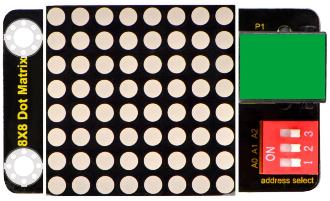
2. Component Required:

EASY plug control board*1	EASY plug I2C 8x8 LED Matrix *1	RJ11 cable*1	USB cable*1
			

- EASY plug control board*1
- EASY plug I2C 8x8 LED Matrix *1
- EASY plug button module*1
- RJ11 cable*1
- USB cable*1

3.Component Introduction:

EASY Plug 8x8 LED Matrix



What's better than a single LED? Lots of LEDs! A fun way to make a small display is to use an 8x8 matrix.

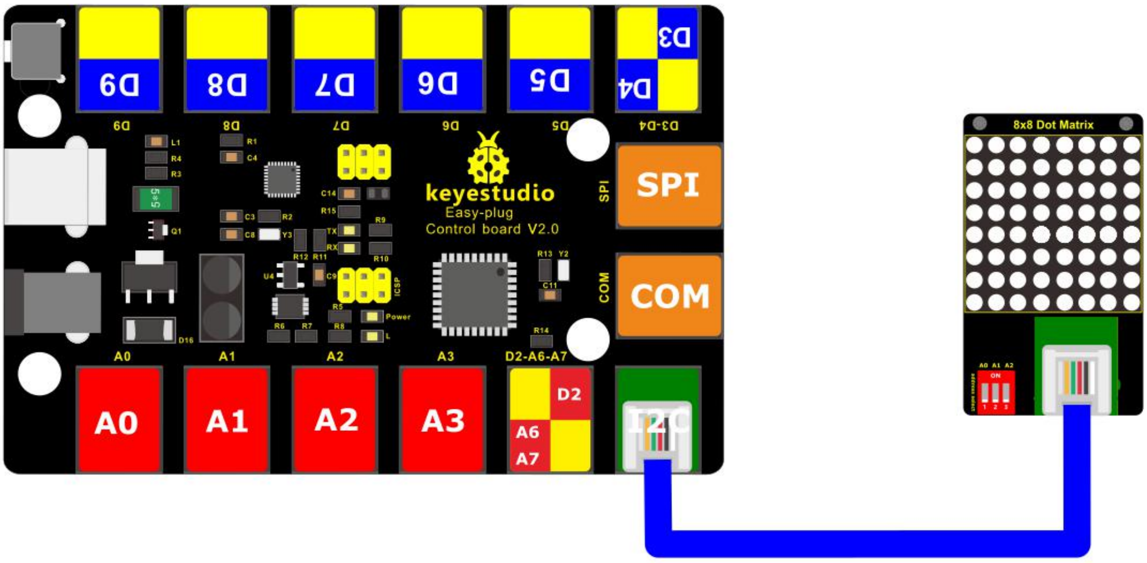
This module uses HT16K33 chip to drive an 8x8 dot matrix. Just need to use the I2C communication port of microcontroller to control the dot matrix, which can save more port resources of microcontroller.

The four pin of this module is integrated into a crystal plug. All you need to do is connect the module to control board for communication using an RJ11 cable.

- Interface: Easy plug
- Supply voltage: 4.5V-5.5V

4.Connect It Up

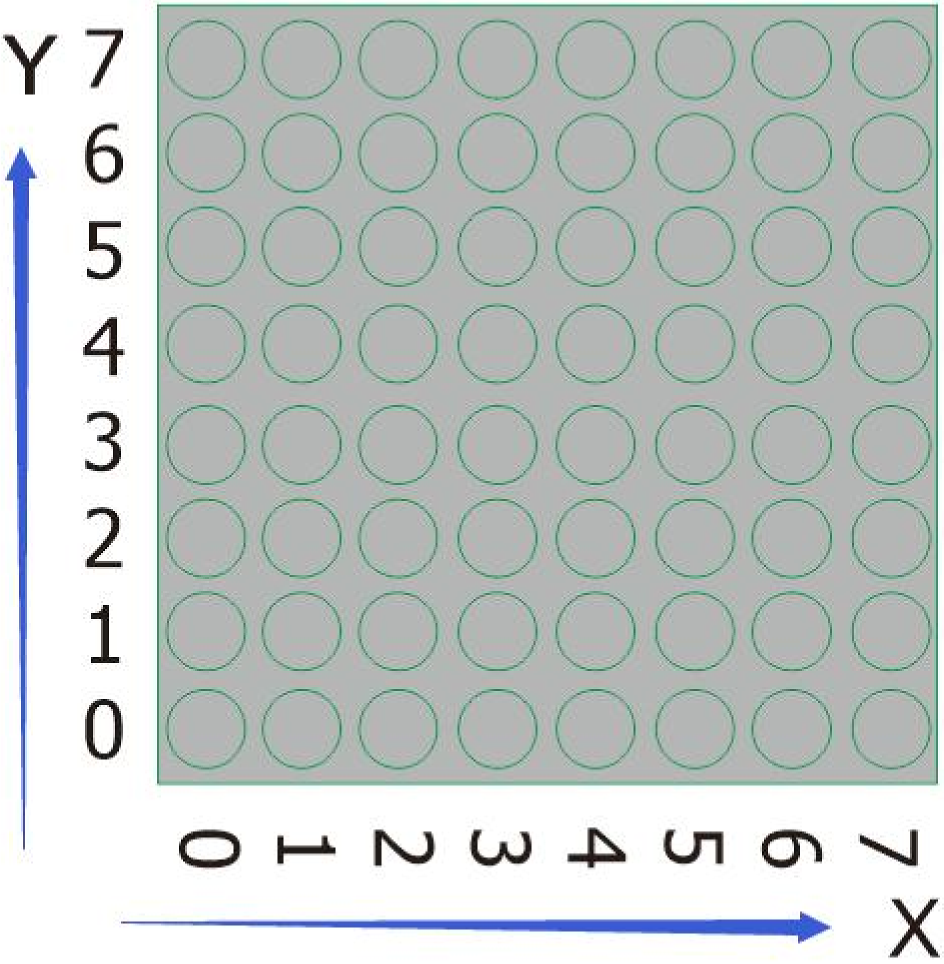
Connect the EASY Plug 8x8 LED Matrix module to control board using an RJ11 cable.



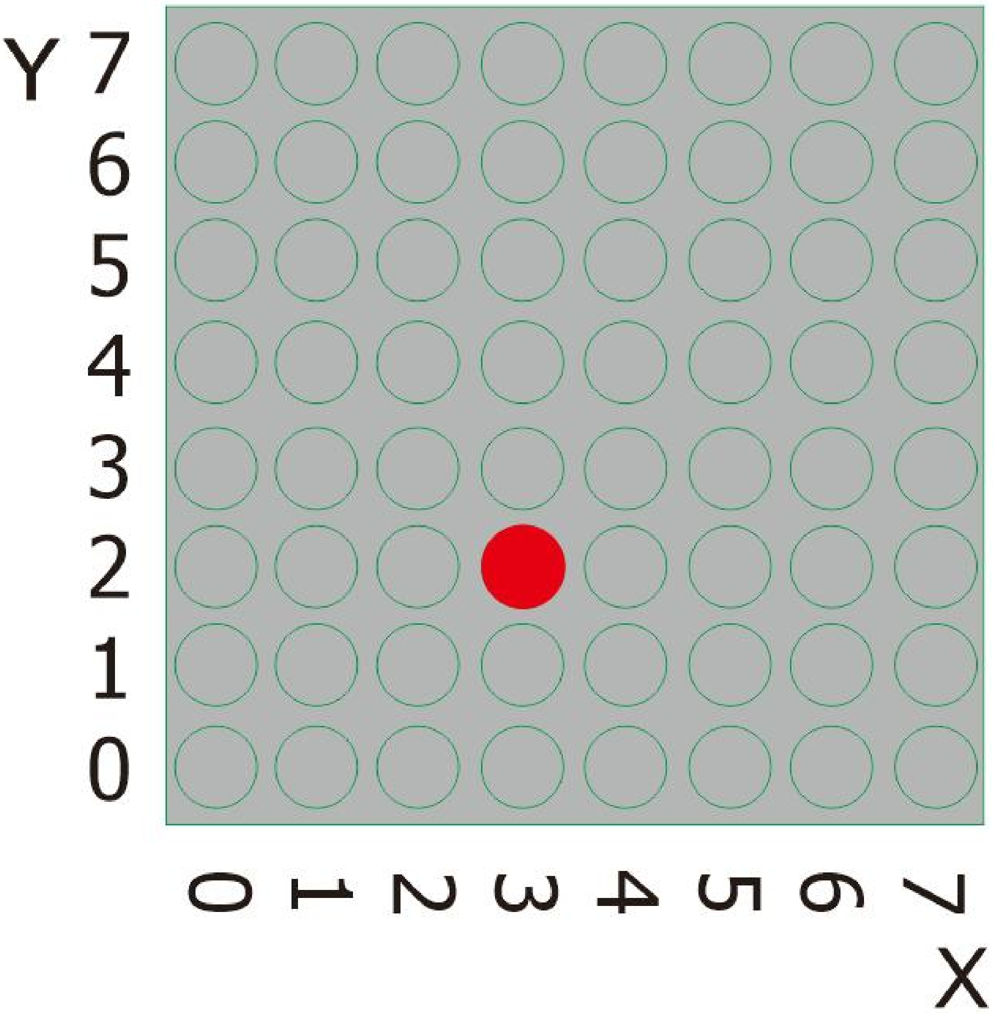
5.Project Principle:

The display principle of 8*8 dot matrix is very simple. We have seen the circuit diagram above to know that the single-chip microcomputer drives 8*8 dot matrix through the HT16K33 chip.

The arrangement of the dot matrix is as follows: 8 LED lights in the horizontal direction and 8 LED lights in the vertical direction. The total number of lights is 64. In order to quickly find the position of the light, we number the horizontal lights from 0-7, and the vertical lights from 0-7.



So how to light up an LED? Let’ s view the following picture;



The coordinate of the point in the picture is （3,2), then we put it in the following test code.

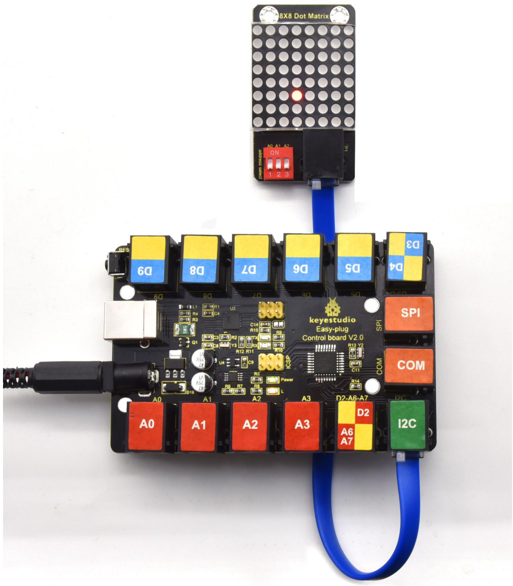
6. Project code：

```
/*
keyestudio Easy plug super kit
Project 26
8*8 dot matrix-turn on a LED
http://www.keyestudio.com
*/
```

```
#include <ks_Matrix.h>

Matrix myMatrix(A4,A5);

void setup() {

  myMatrix.begin(112);

  myMatrix.clear();

}

void loop() {

  myMatrix.drawPixel(3,2,HIGH);

  myMatrix.writeDisplay();

}

//*********************************
```

7.Project results:

Upload the code to the coding box. After success, the LED dot matrix will display as shown in the figure below.



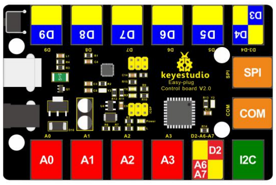
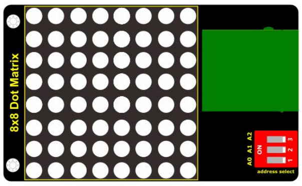
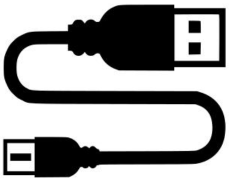
Project 27: Turn On One Line

1. Overview

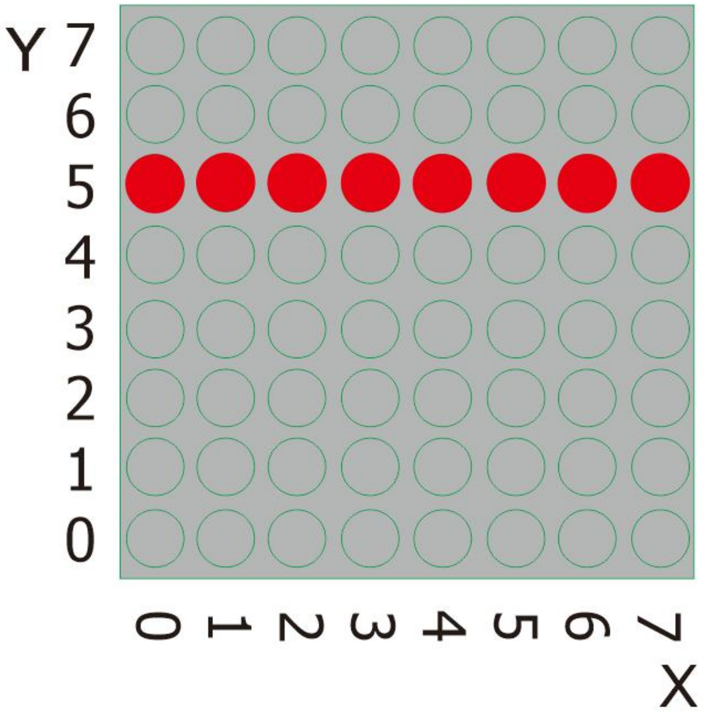
In previous program, we light up a coordinate point.

In this project, we will light up a row of LEDs.

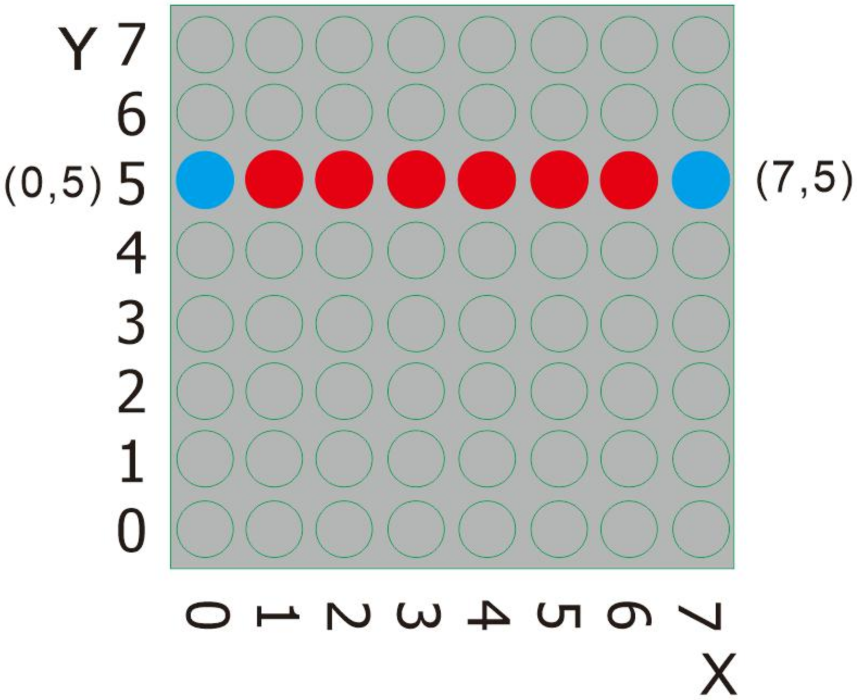
2.Component Required:

EASY plug control board*1	EASY plug I2C 8x8 LED Matrix *1	RJ11 cable*1	USB cable*1
			

3.Project Principle:

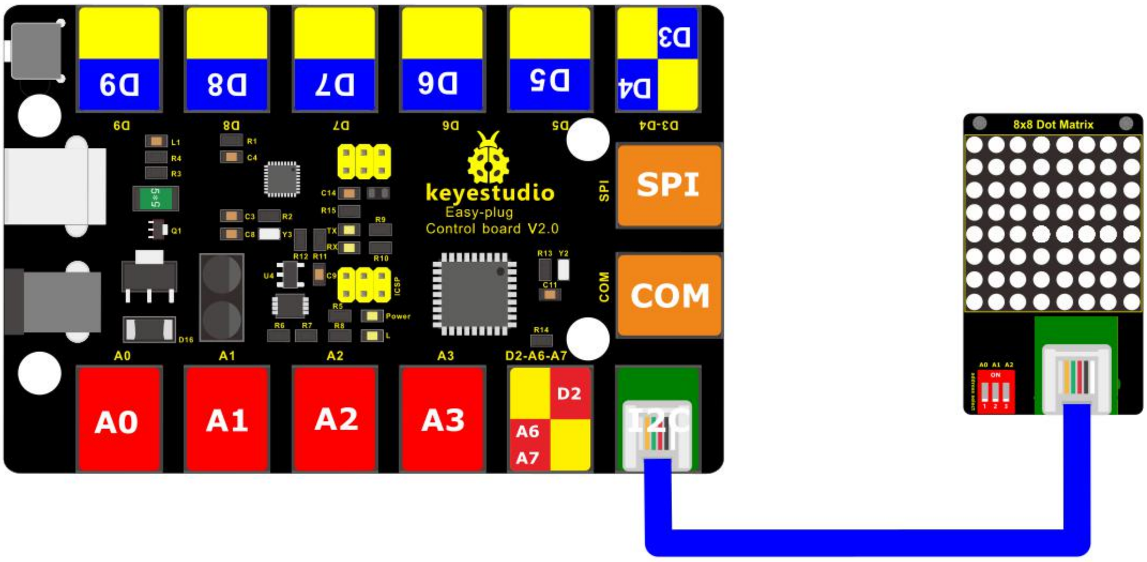


To light a row of LEDs, we need to make use of function matrix.drawLine. Lighting up the start and terminal point on a row of LEDs indicates all LEDs on this row are turned on, therefore, we need to decide the start and terminal point of this row of LEDs



Seeing from the above picture, the start point locates (5,0) and the end one is (7,5). Next, we place the value in the below code.

4. Connect It Up



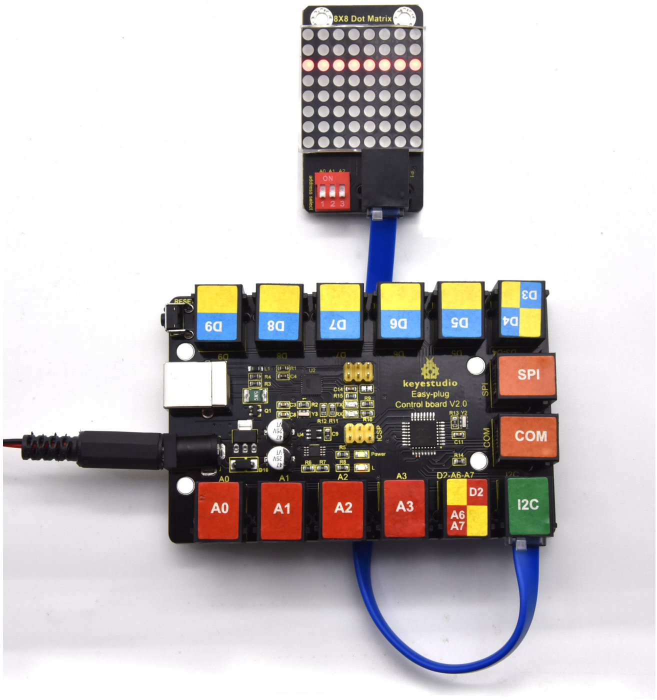
5.Upload the Code

```
/*
keyestudio Easy plug super kit
Project 27
8*8 dot matrix-turn on a line
http://www.keyestudio.com
*/
#include <ks_Matrix.h>
Matrix myMatrix(A4,A5);
void setup()
  {
    myMatrix.begin(112);
    myMatrix.clear();
}
void loop()
```

```
{
  myMatrix.drawLine(0, 5, 7, 5, HIGH);
  myMatrix.writeDisplay();
}
//*********************************
```

6.What You Should See

Upload the code to the coding box. After success, the LED dot matrix will display as shown in the figure below.

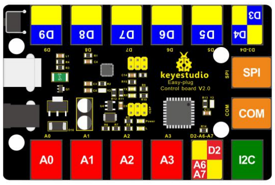
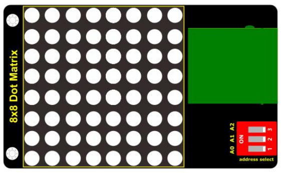
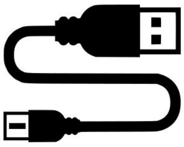


Project 28: Display A Rectangle

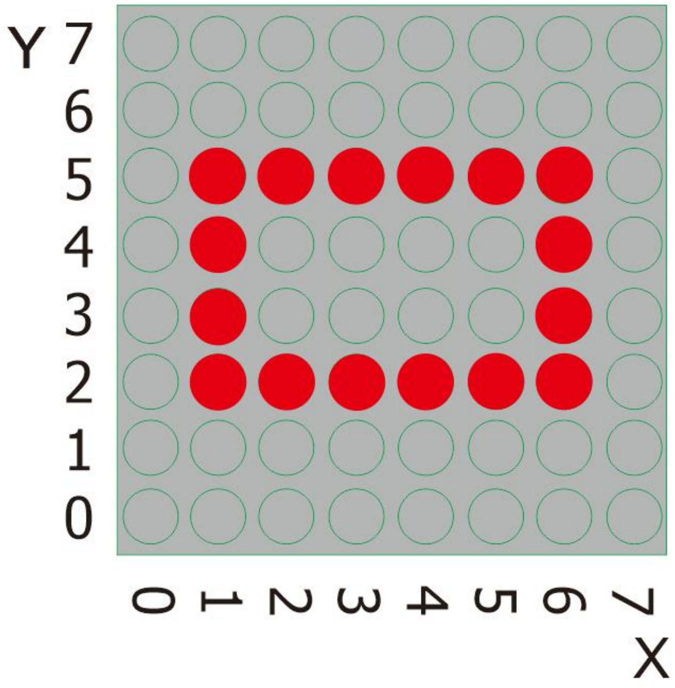
1. Overview

I believe that you get more interested in our programs. In this part, we will display a rectangle on 8*8 dot matrix.

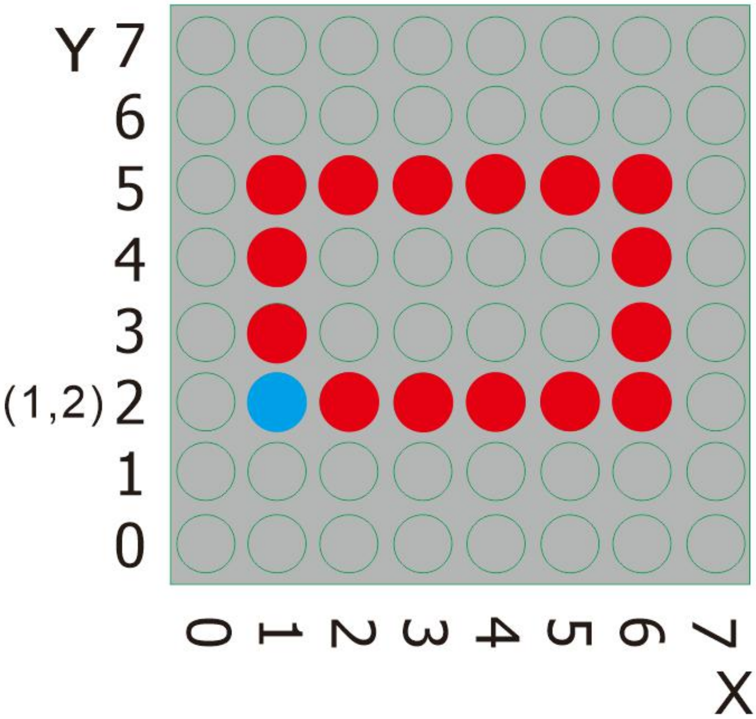
2.Component Required:

EASY plug control board*1	EASY plug I2C 8x8 LED Matrix *1	RJ11 cable*1	USB cable*1
			

3.Project Principle:



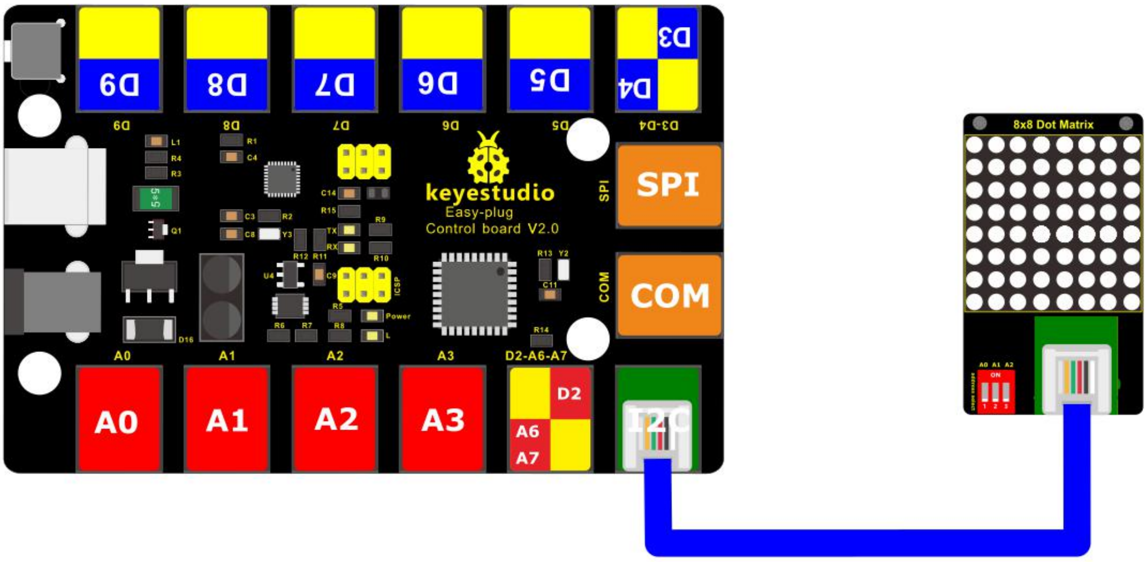
So, how to show a rectangle? We need use a function matrix.fillRect, which implies that you have to make sure a point on dot matrix so as to draw a square or rectangle, as shown below:



For example, we will draw a rectangle 4 in width and length in 6 from the point (2.2). What we need to do is put the value of width and length behind the point (1.2). Therefore, we get the code (1, 2, 6, 4).

If display a square with 4 in width and length, its code are supposed to be (1， 2， 4,4) .

4.Connect It Up



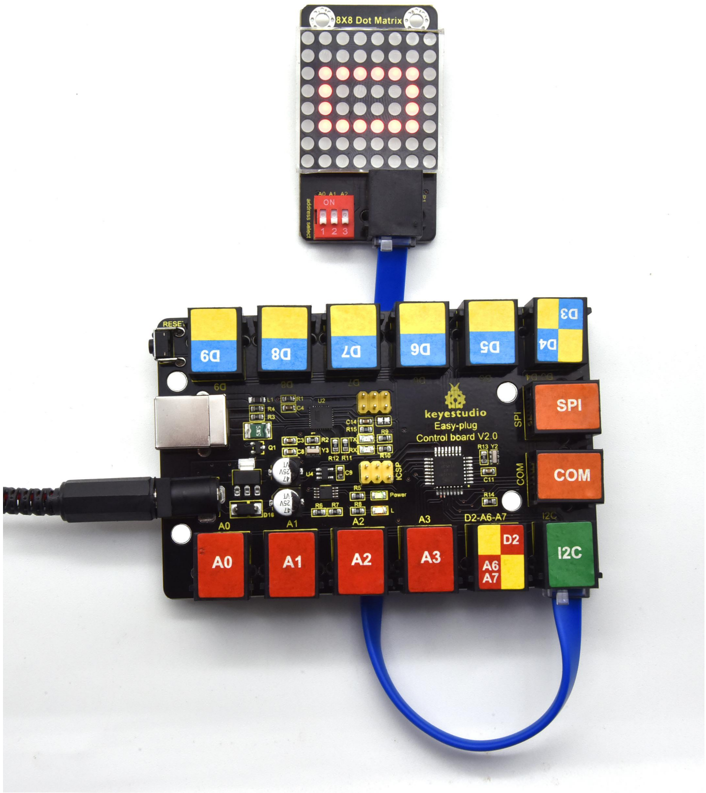
5. Upload the Code

```
/*
keyestudio Easy plug super kit
Project 28
8*8 dot matrix-turn on a rectangle
http://www.keyestudio.com
*/
#include <ks_Matrix.h>
Matrix myMatrix(A4,A5);
void setup()
 {
   myMatrix.begin(112);
   myMatrix.clear();
}
void loop()
```

```
{
myMatrix.drawRect(1,2,6,4,HIGH);
myMatrix.writeDisplay();
}
//*********************************
```

6.What You Should See

Upload the code to the coding box. After success, the LED dot matrix will display as shown in the figure below.

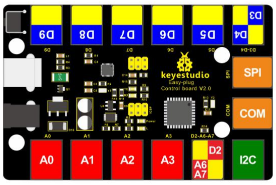
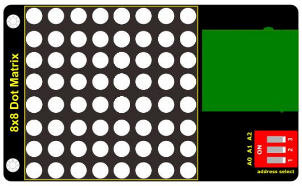
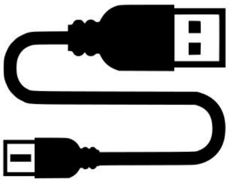


Project 29: Display A Circle

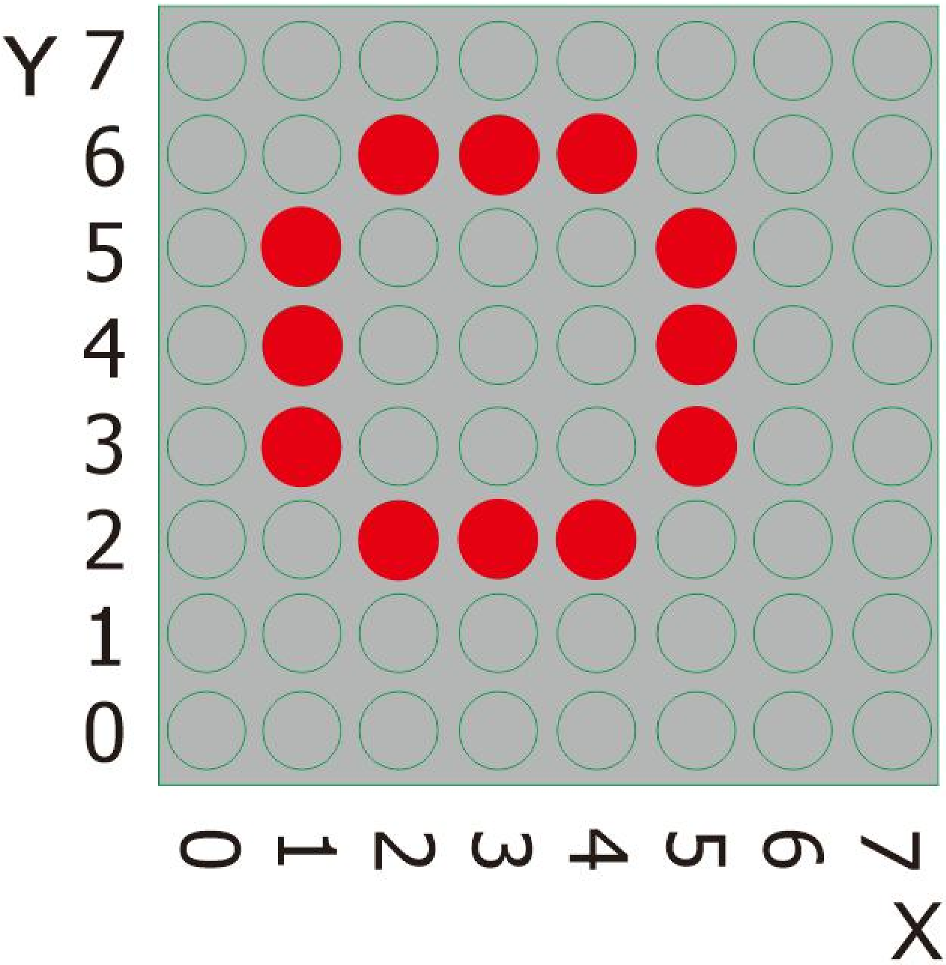
1. Overview

In this program, we will generate a circle on 8*16 dot matrix.

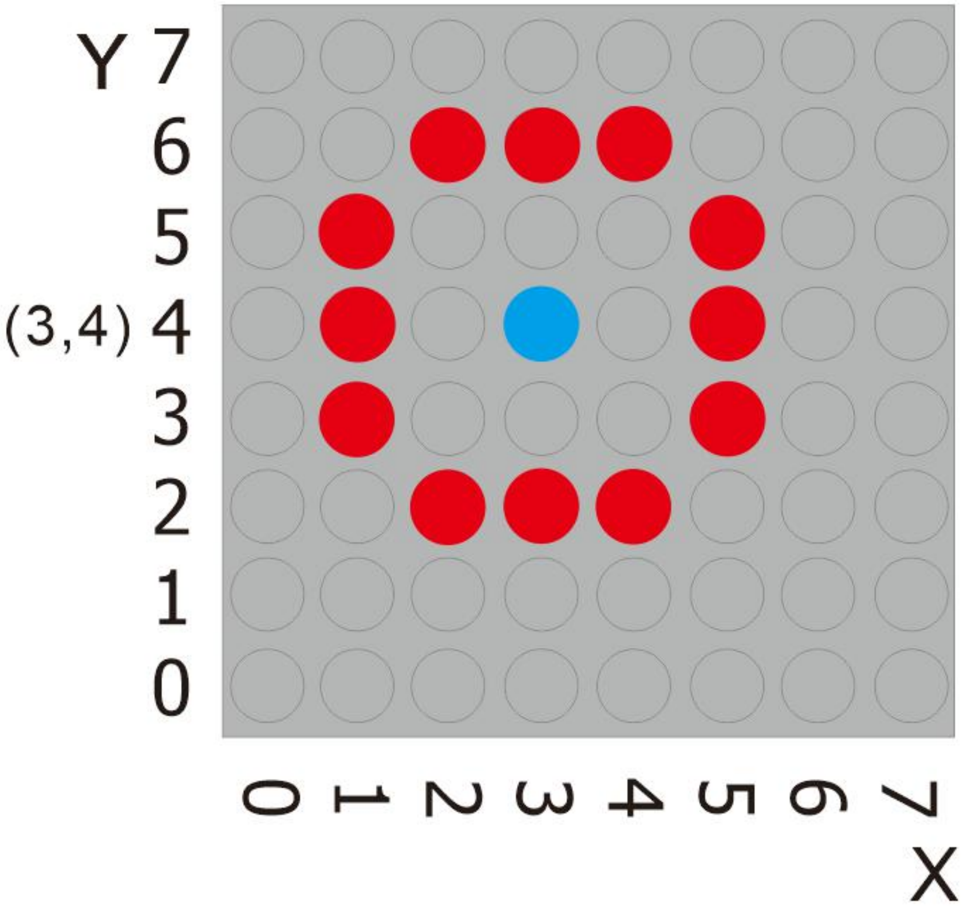
2.Component Required:

EASY plug control board*1	EASY plug I2C 8x8 LED Matrix *1	RJ11 cable*1	USB cable*1
			

3.Project Principle：

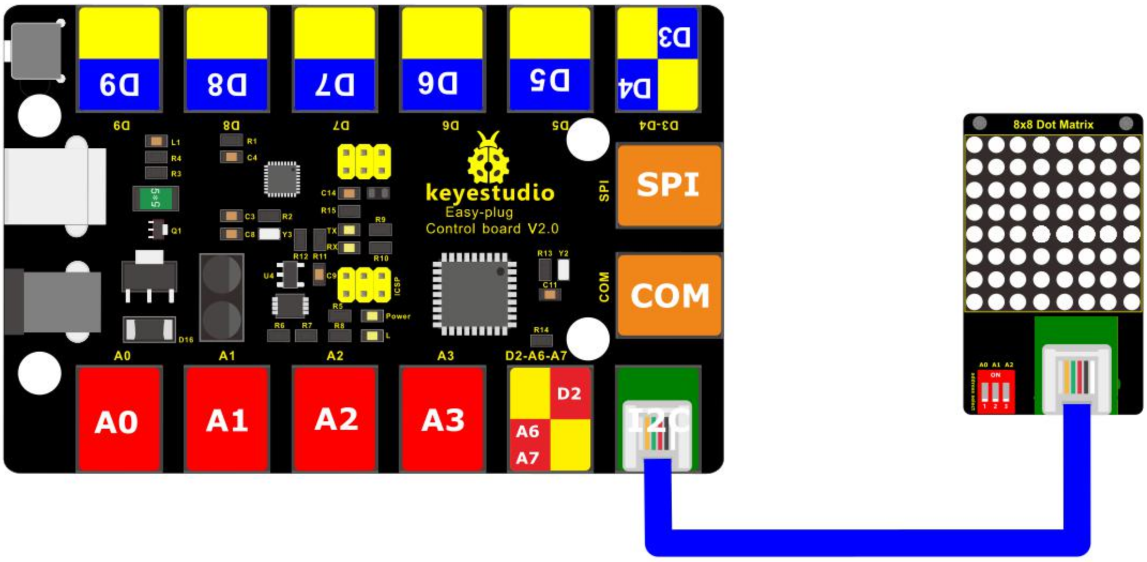


To show a circle with a radius of 2, we can use a function matrix.drawCircle. Select a central point to decide its coordinate and check radius value, as shown below:



The coordinate of center point of circle is （3,4), its radius is 2. We could put value（3,4, 2, ）in the following code. If we want to draw a circle with a constant center point and a radius of 2, we just need to change the value behind coordinate of center point into 3.

4.Connect It Up



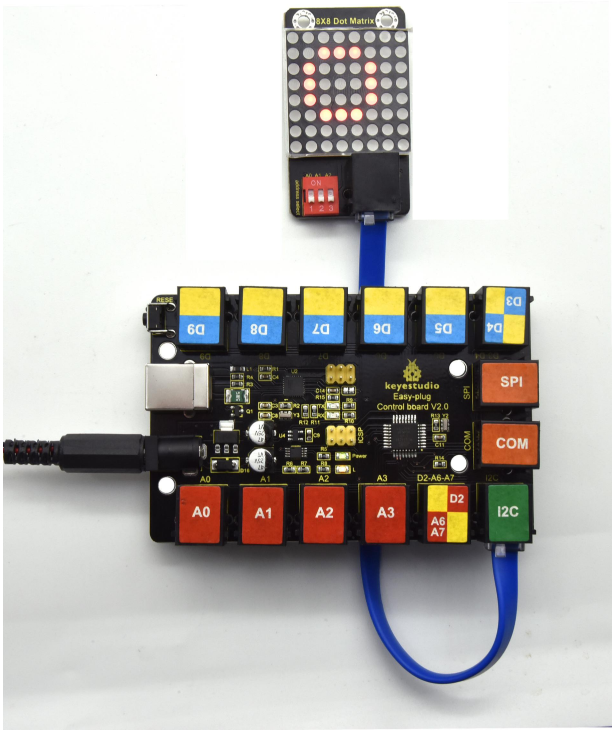
5. Upload the Code

```
/*
keyestudio Easy plug super kit
Project 29
8*8 dot matrix-turn on a circle
http://www.keyestudio.com
*/
#include <ks_Matrix.h>
Matrix myMatrix(A4,A5);
void setup()
  {
    myMatrix.begin(112);
    myMatrix.clear();
}
void loop()
```

```
{
myMatrix.drawCircle(3,4,2,HIGH);
myMatrix.writeDisplay();
}
//********************************
```

6.What You Should See

Upload the code to the coding box. After success, the LED dot matrix will display as shown in the figure below.

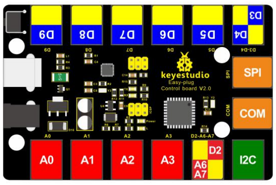
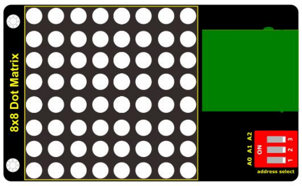
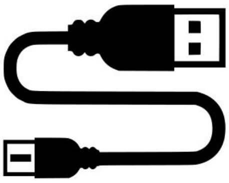


Project 30: Display Text and Numbers

1. Overview

In this project, we will make 8*8 dot matrix to produce some numbers and texts, like advertisement board at bus station.

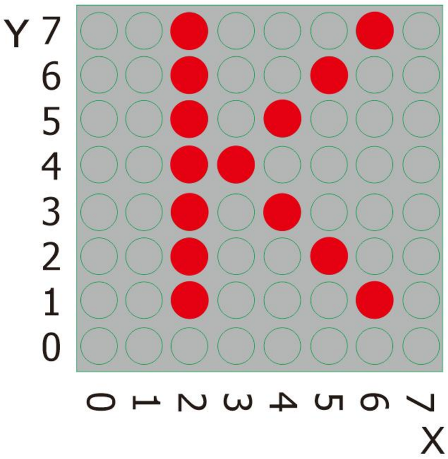
2.Component Required:

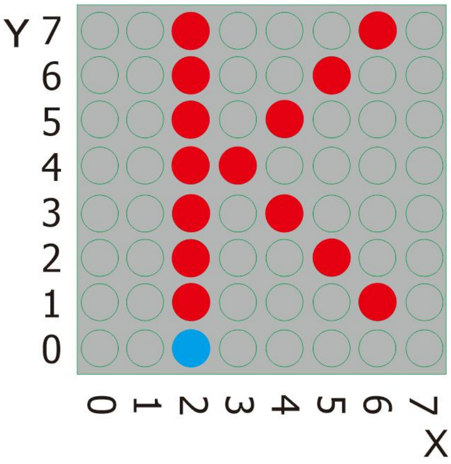
EASY plug control board*1	EASY plug I2C 8x8 LED Matrix *1	RJ11 cable*1	USB cable*1
			

3.Project Principle:

This program is pretty easy. We only need to confirm the coordinate of texts and numbers. Let' s conduct an experiment to illustrate.

We set the display area("OK") to start from number 2 on horizontal coordinate and number zero on vertical coordinate, as shown below

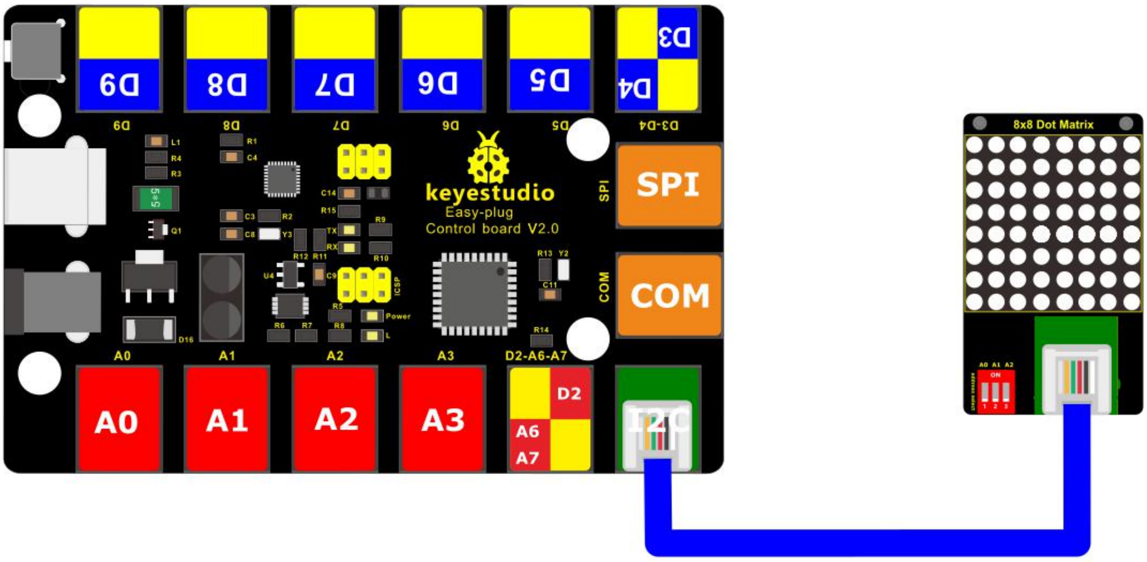




We add the texts to be shown in the code matrix.print after getting the coordinate of text.

Note: numbers can be shown directly, but texts need adding double quotes.

4. Connect It Up

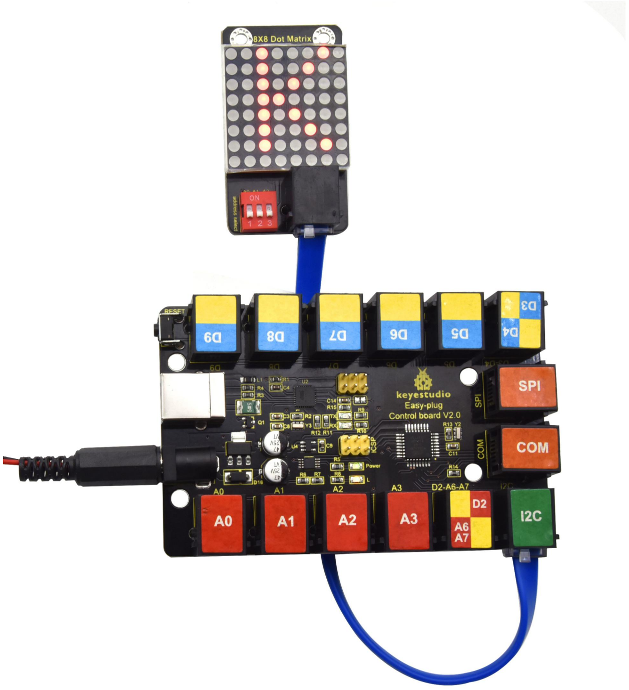


5.Upload the Code

```
/*
keyestudio Easy plug super kit
Project 30
8*8 dot matrix-display text and numbers
http://www.keyestudio.com
*/
#include <ks_Matrix.h>
Matrix myMatrix(A4,A5);
void setup() {
   myMatrix.begin(112);
   myMatrix.clear();
}
void loop() {
  myMatrix.setTextSize(1);//Set font size
  myMatrix.setTextWrap(false);   // we don’ t want text to wrap so it scrolls nicely
  myMatrix.setTextColor(1);
  myMatrix.setRotation(0);//   show rotation
  myMatrix.clear();
  myMatrix.setCursor(2,0);//set the coordinate of text
  myMatrix.print("K");     //show K
  myMatrix.writeDisplay();
  delay(1000);
}
//*********************************
```

6.What You Should See

Upload the code to the coding box. After success, the LED dot matrix will display as shown in the figure below.

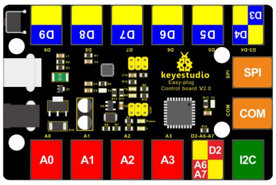
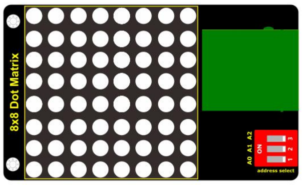
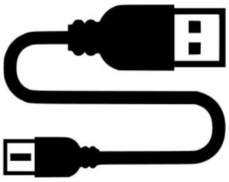


Project 31: Display Images

1. Overview

A large number of display devices, like cellphone, computer screen and advertisement board, are made of tiny light-emitting unit. The 8*8 dot matrix aren’ t able to show exquisite and high pixel pictures but some cute and customized heart-shape picture, smiley face and so on, even though consisting of 64 pcs light-emitting units.

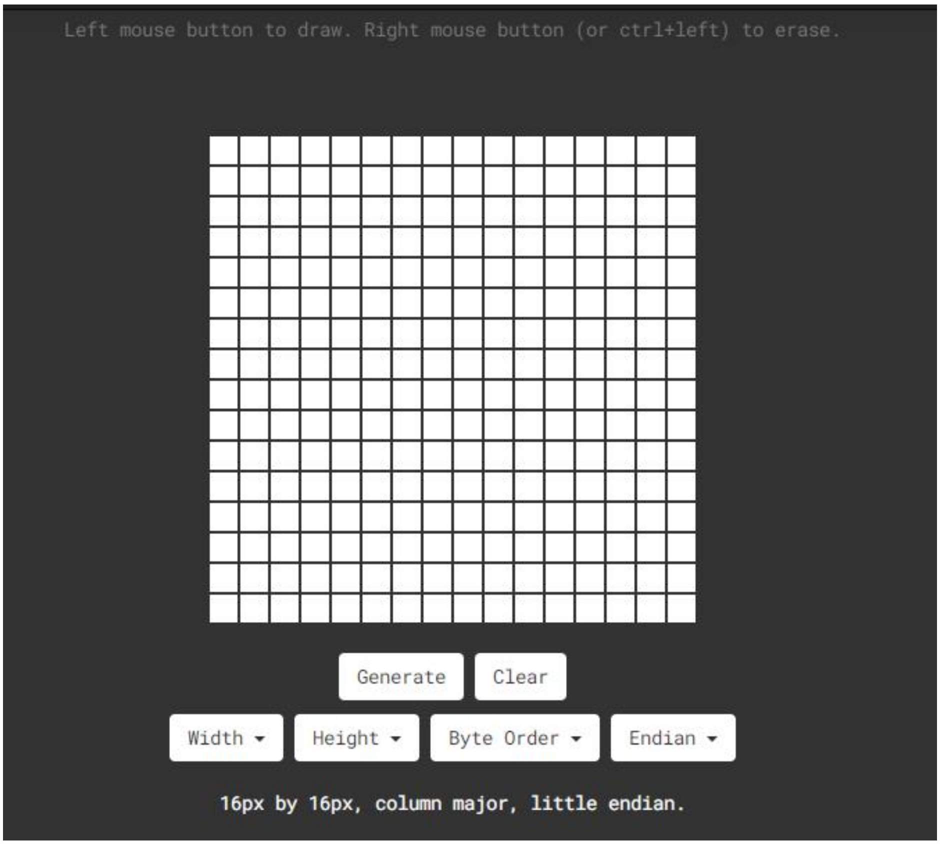
2.Component Required:

EASY plug control board*1	EASY plug I2C 8x8 LED Matrix *1	RJ11 cable*1	USB cable*1
			

3.Project Principle:

The online version of dot matrix modulus tool:

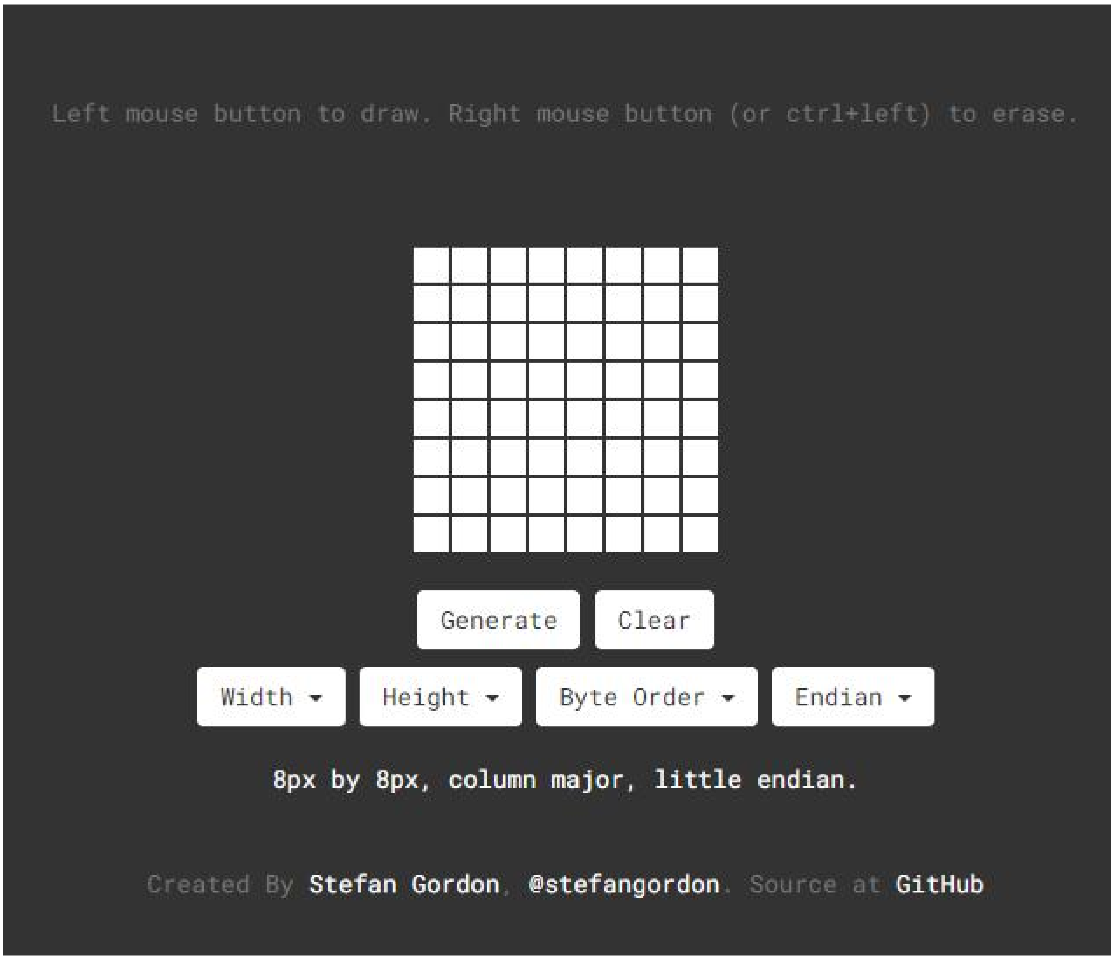
http://dotmatrixtool.com/#



Left mouse button to draw. Right mouse button (or ctrl+left) to erase.

16px by 16px, column major, little endian.

The dot matrix is 8*8 in this project, thereby, set the height to 8, width to 8, as shown below.



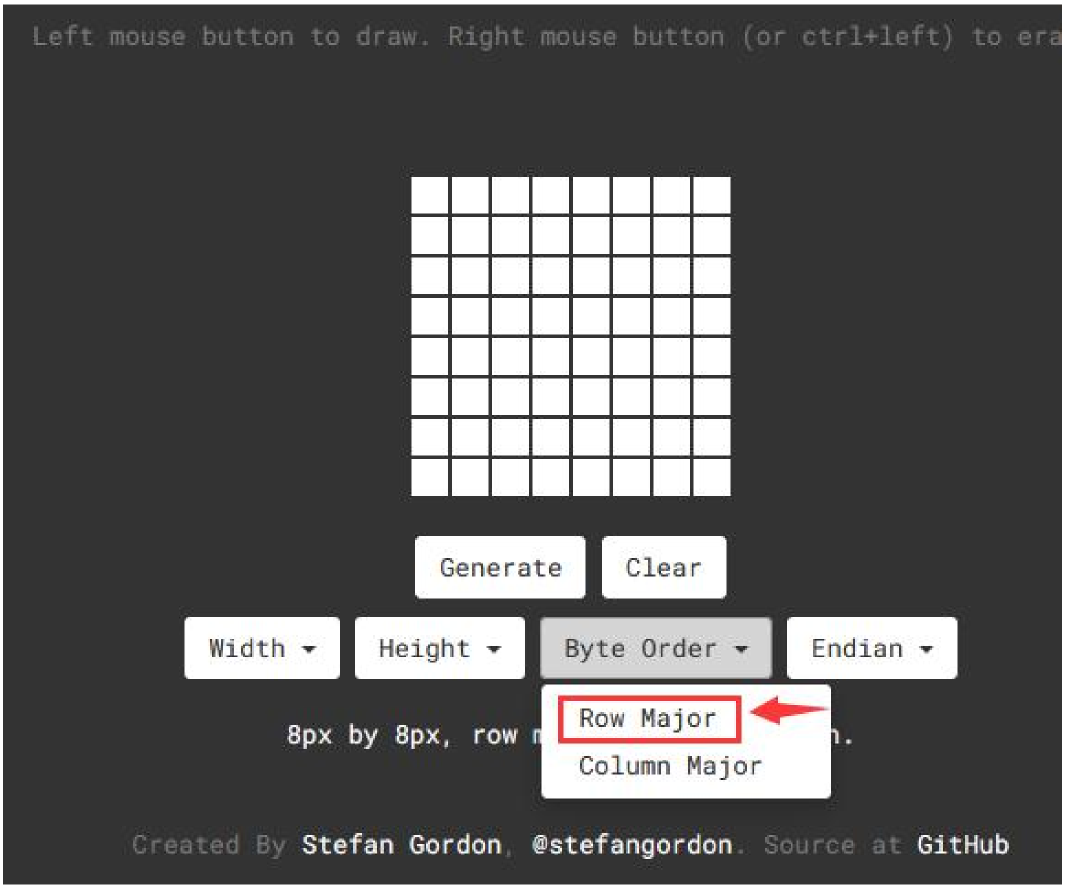
Left mouse button to draw. Right mouse button (or ctrl+left) to erase.

8px by 8px, column major, little endian.

Created By Stefan Gordon, @stefangordon. Source at GitHub

As same as dot matrix on Max board

Click Byte order to select “Row Major”

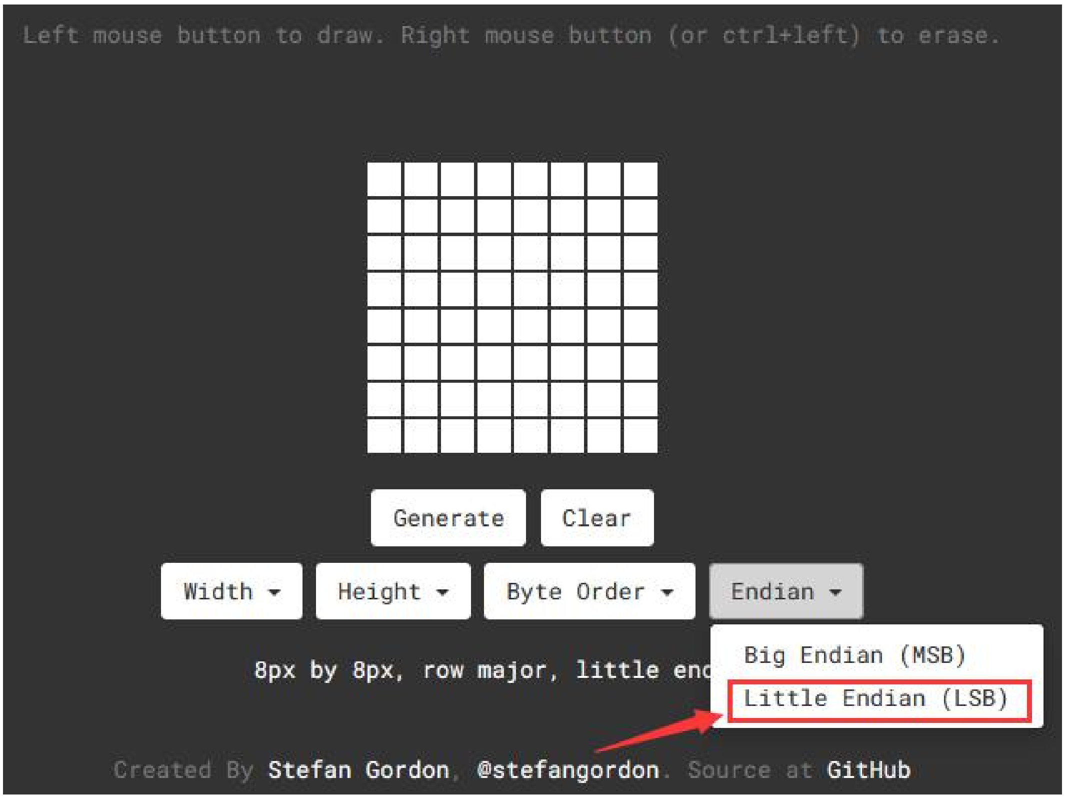


Left mouse button to draw. Right mouse button (or ctrl+left) to era

8px by 8px, row m n.

Created By Stefan Gordon, @stefangordon. Source at GitHub

Tap endian to set little endian(lsb)

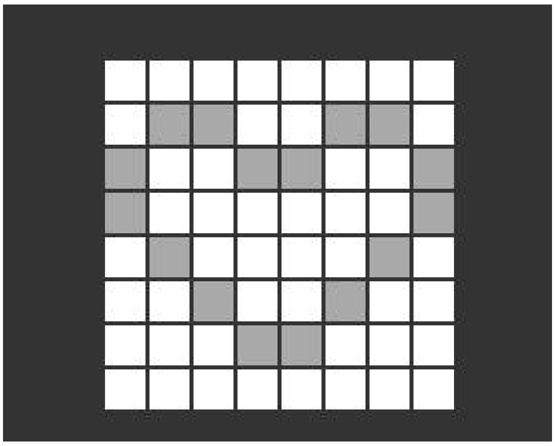


Left mouse button to draw. Right mouse button (or ctrl+left) to erase.

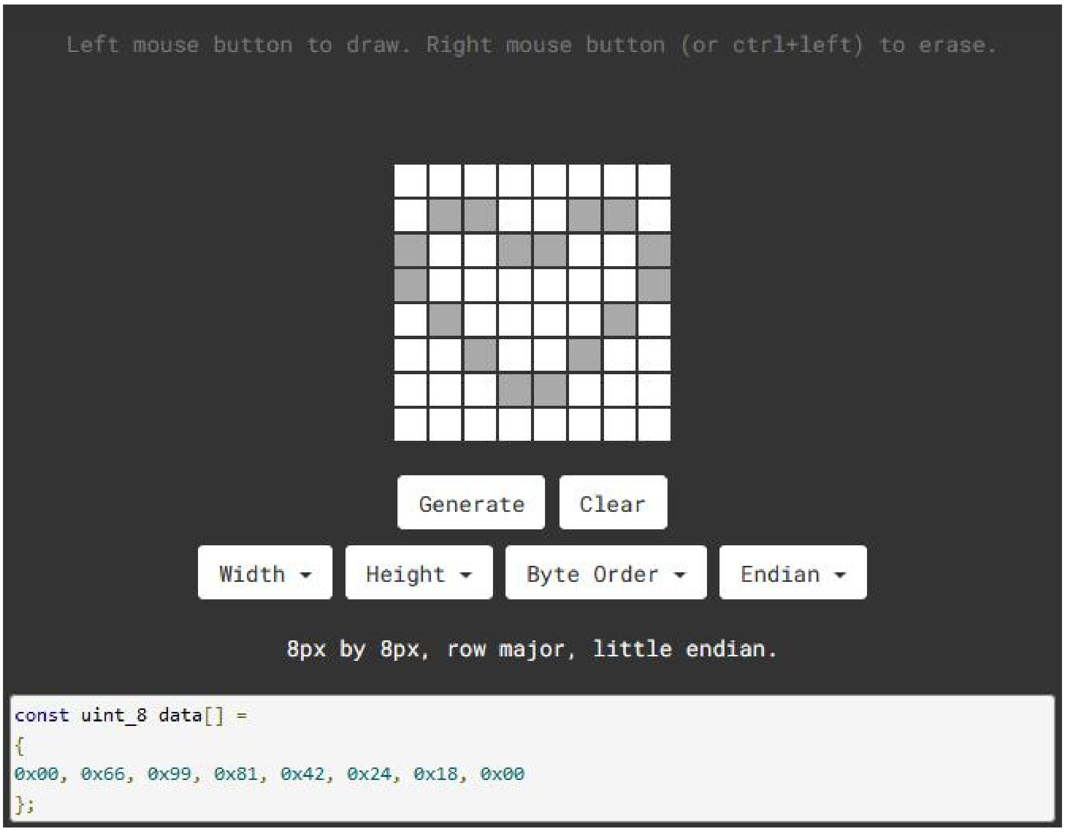
8px by 8px, row major, little enc

Created By Stefan Gordon, @stefangordon. Source at GitHub

Then we draw the pattern we need.



Click generate to get hexadecimal code.


Left mouse button to draw. Right mouse button (or ctrl+left) to erase.
Generate
Clear
Width
Height
Byte Order
Endian

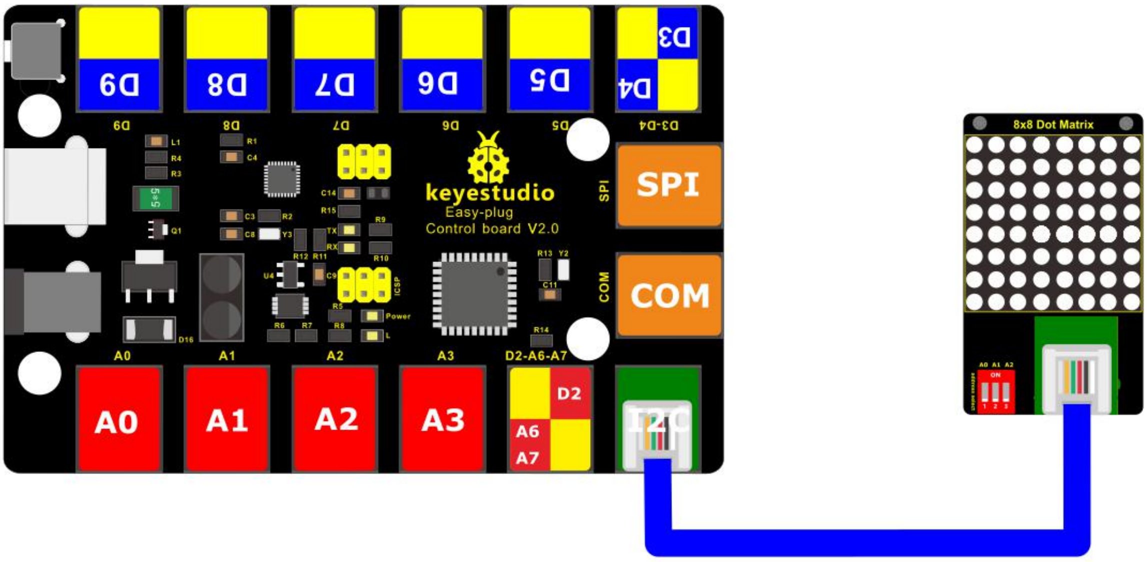
8px by 8px, row major, little endian.

```
const uint_8 data[] =
{
0x00, 0x66, 0x99, 0x81, 0x42, 0x24, 0x18, 0x00
};
```

0x00, 0x66, 0x99, 0x81, 0x42, 0x24, 0x18, 0x00

Move the above hexadecimal code into the code of the below program.

4.Connect It Up



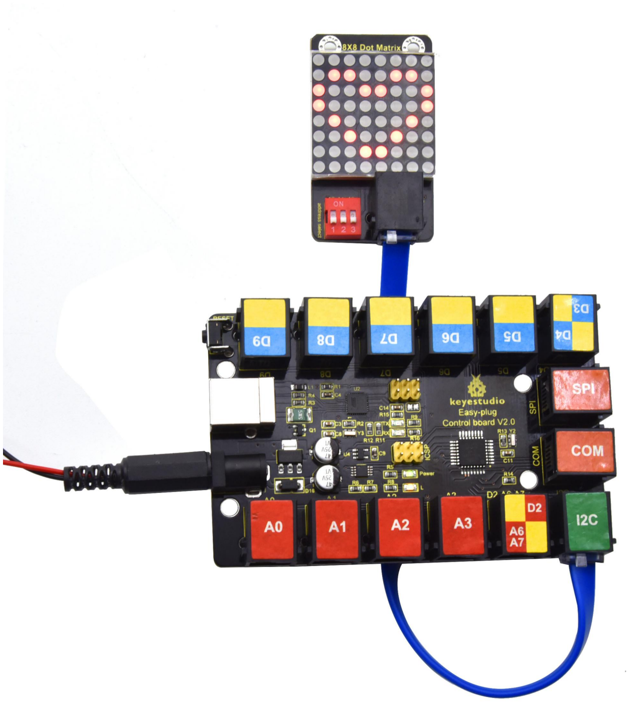
5.Upload the Code

```
/*
keyestudio Easy plug super kit
Project 31
8*8 dot matrix-display images
http://www.keyestudio.com
*/
#include <ks_Matrix.h>
Matrix myMatrix(A4,A5);
uint8_t LedArray1[8]={0x00, 0x66, 0x99, 0x81, 0x42, 0x24, 0x18, 0x00};
uint8_t   LEDArray[8];

void setup(){
   myMatrix.begin(0x70);
}
```

```
void loop(){
  myMatrix.clear();
  for(int i=0; i<8; i++)
  {
    LEDArray[i]=LedArray1[7-i];
    for(int j=7; j>=0; j--)
    {
      if((LEDArray[i]&0x01)>0)
      myMatrix.drawPixel(j, i,1);
      LEDArray[i] = LEDArray[i]>>1;
    }
  }
  myMatrix.writeDisplay();
}
//*******************************
```

6.What You Should See

Upload the code to the coding box. After success, the LED dot matrix will display as shown in the figure below.

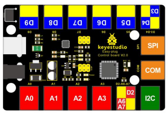
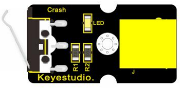
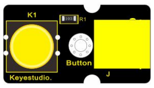
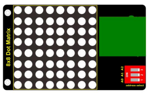
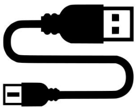


Project 32: Digital Sensor and 8*8 Dot Matrix

1. Overview

In the previous project, we have finished the experiments to control the light by button switches and limit switches. Here we are going to combine buttons switches, limit switches and a 8*8 dot matrix to make an interactive display project.

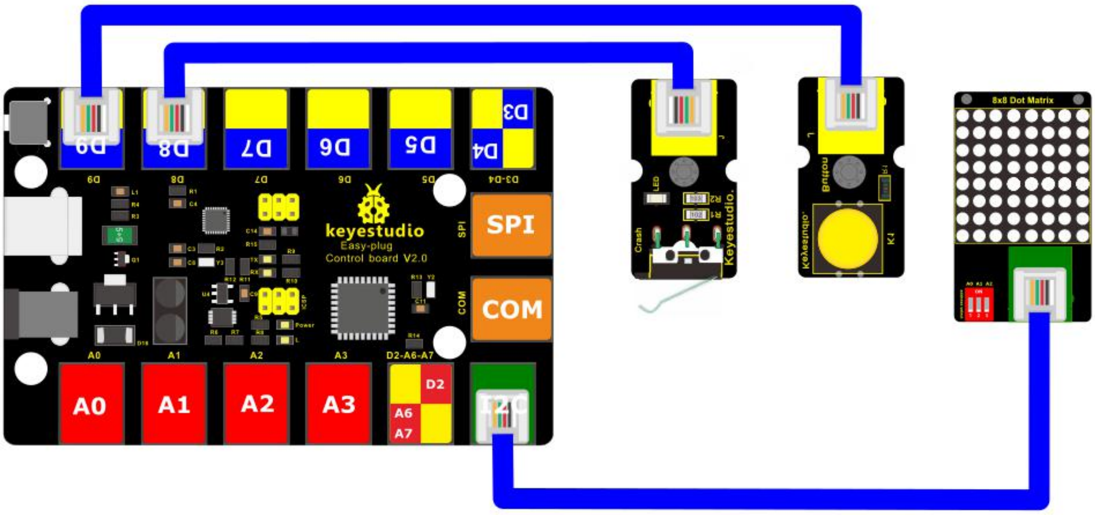
2. Component Required:

EASY plug control board*1	EASY plug Crash Sensor *1	EASY plug Digital Push Button	EASY plug I2C 8x8 LED Matrix *1	RJ11 cable*3	USB cable*1
					

3.Project Principle:

The pins of two buttons are connected to D8 and D9 and we know how to display test on 8*8 dot matrix. Therefore, we will make 8*8 dot matrix show “L” and “R” by pressing the button and the limit switch

4. Connect It Up



5. Upload the Code

/*

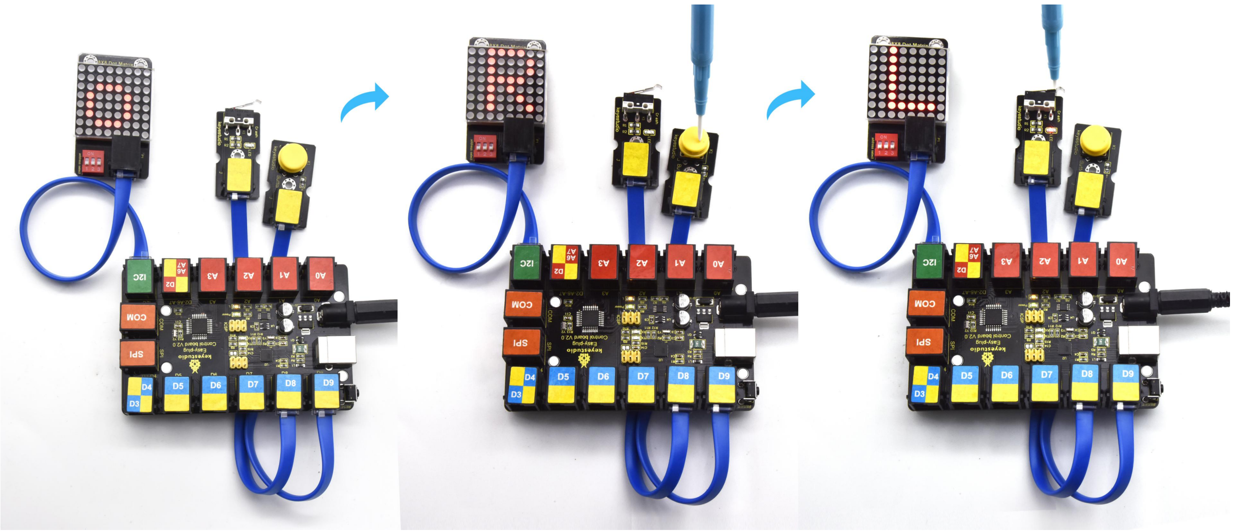
keyestudio Easy plug super kit

Project 32

```
8*8 dot matrix-digital control
http://www.keyestudio.com
*/
#include <ks_Matrix.h>
Matrix myMatrix(A4,A5);
int K1=8;
int K2=9;
int x;
void setup()
{
  myMatrix.begin(112);
  myMatrix.clear();
  pinMode(K1,INPUT);
  pinMode(K2,INPUT);
  myMatrix.drawCircle(3,3, 2, 1);
  myMatrix.writeDisplay();   // write the changes we just made to the display
}
void loop()
{
  int K1_level=digitalRead(K1);
  int K2_level=digitalRead(K2);
  if(K1_level==0)
{
  myMatrix.setTextSize(1);
  myMatrix.setTextWrap(false);   // we dont want text to wrap so it scrolls nicely
  myMatrix.setTextColor(1);
  myMatrix.setRotation(0);
  myMatrix.clear();
  myMatrix.setCursor(2,0);
  myMatrix.print("L");
  myMatrix.writeDisplay();
}
  if(K2_level==0)
{
  myMatrix.setTextSize(1);
  myMatrix.setTextWrap(false);   // we dont want text to wrap so it scrolls nicely
  myMatrix.setTextColor(1);
  myMatrix.setRotation(0);
  myMatrix.clear();
  myMatrix.setCursor(2,0);
  myMatrix.print("R");
  myMatrix.writeDisplay();
}}
//*******************************
```

6.What You Should See

Upload the code to the coding box, after success,The LED dot matrix first displays a circle,Press the left button and the LED dot matrix displays the letter "L",Press the right button and the LED dot matrix displays the letter "R".

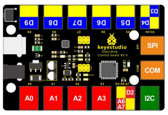
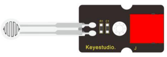
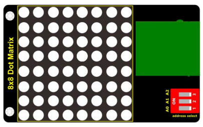
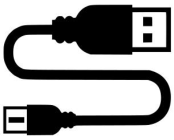


Project 33: Pressure Sensor and 8*8 Dot Matrix

1. Overview

We read the analog value of the thin film pressure sensor in the previous project. Then we use the pressure sensor and 8*8 dot matrix to make an interactive project. When we press the sensor, the longer the light beam is displayed on the dot matrix.

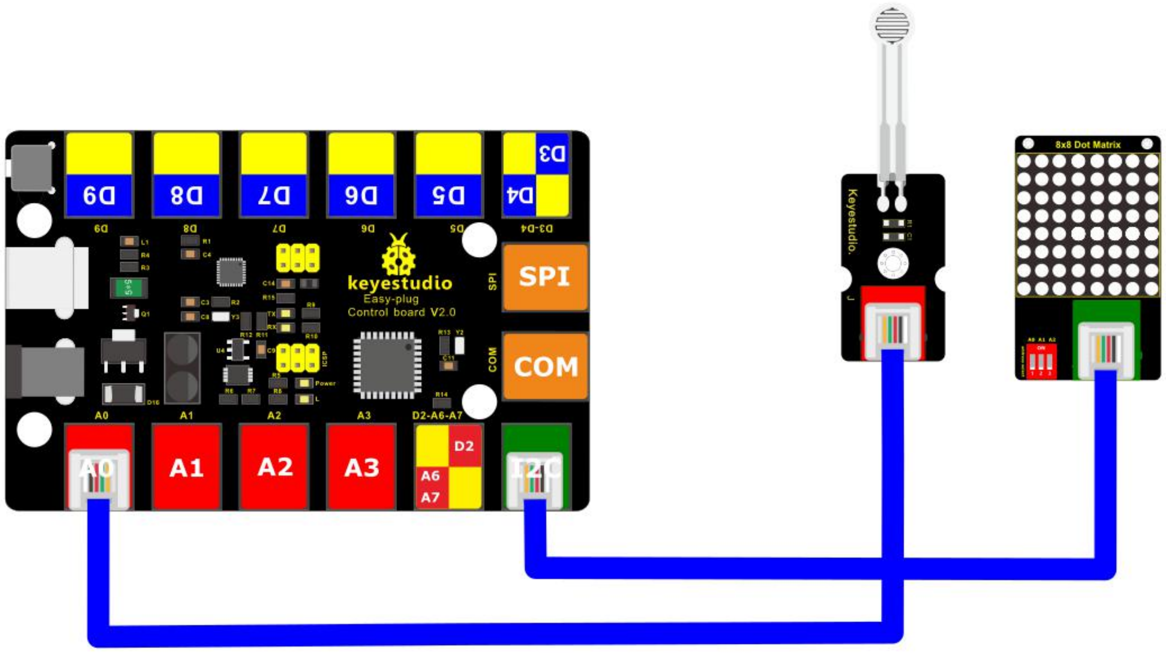
2. Component Required:

EASY plug control board*1	EASY plug pressure sensor Sensor *1	EASY plug I2C 8x8 LED Matrix *1	RJ11 cable*2	USB cable*1
				

3.Project Principle:

The signal pin of light sensor is linked with A0 of MAX development board. 8*16 dot matrix will show the height of light column, the larger the pressure is, the higher the height of light column.

4. Connect It Up



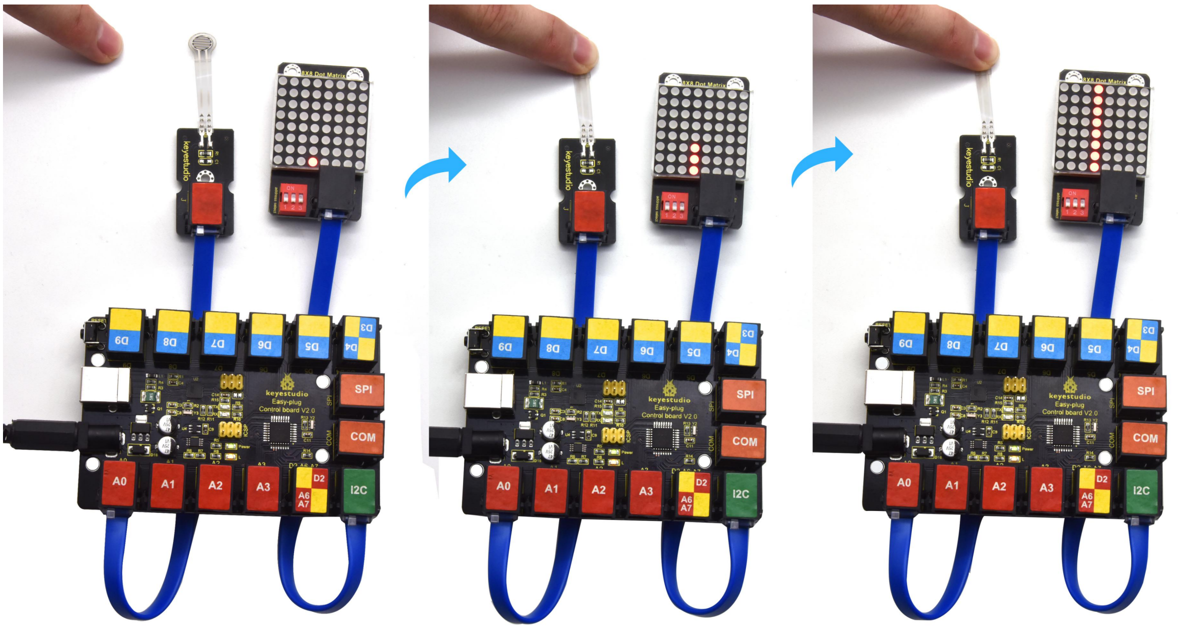
5.Upload the Code

```
/*

keyestudio Easy plug super kit

Project 33

8*8 dot matrix-Film pressure control

http://www.keyestudio.com

*/

#include <ks_Matrix.h>

Matrix myMatrix(A4,A5);

int pressure = A0;

int pressure_val;

void setup() {

   pinMode(A0,INPUT);

   myMatrix.begin(112);
```

```
  myMatrix.clear();
}
void loop() {
  pressure_val=analogRead(A0);
  pressure_val=map(pressure_val,0,1023,0,15);
  myMatrix.clear();
  myMatrix.drawLine(3,0, 3,pressure_val, 1);
  myMatrix.writeDisplay();  // write the changes we just made to the display
  delay(10);
}
//*********************************
```

6. What You Should See

Upload test code, the length of a column of LEDs will vary with the pressure value detected by the pressure sensor.

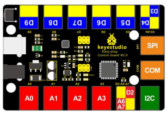
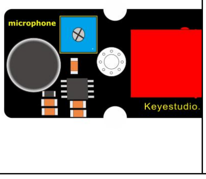
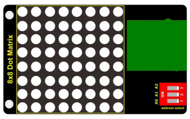
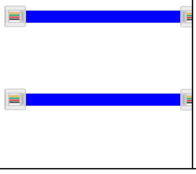
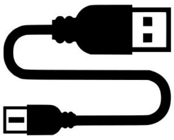


Project 34: Microphone Sensor and 8*8 Dot Matrix

1. Overview

In this lesson, we will create more fantastic programs with microphone sensor and 8*8 dot matrix.

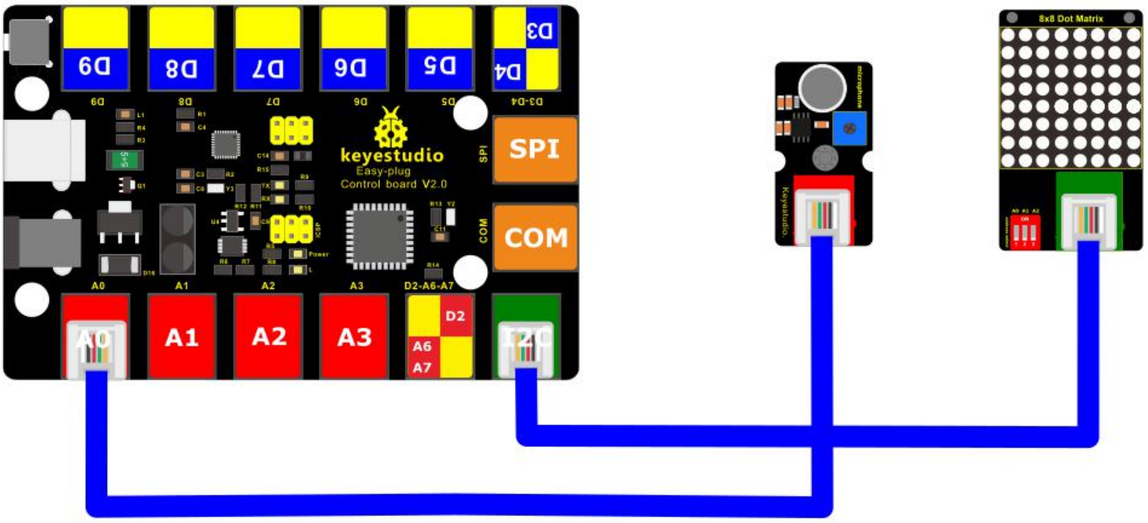
2. Component Required:

EASY plug control board*1	EASY plug Sound Sensor *1	EASY plug I2C 8x8 LED Matrix *1	RJ11 cable*2	USB cable*1
				

3.Project Principle:

The circle on dot matrix will enlarge with the sound intensity. The stronger the sound intensity, the larger the circle gets.

4. Connect It Up



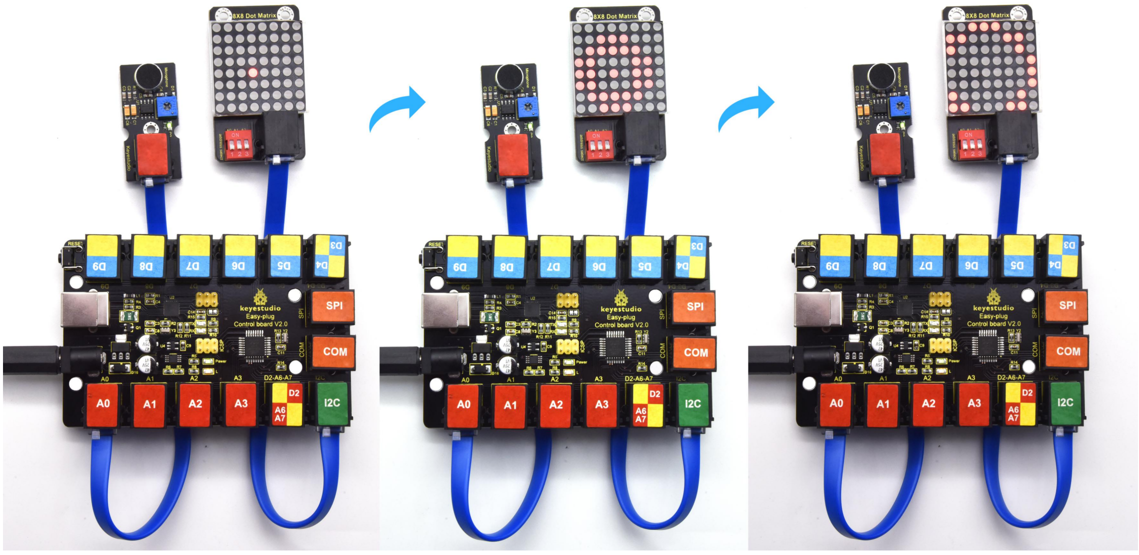
5.Upload the Code

```
/*
keyestudio Easy plug super kit
Project 34
8*8 dot matrix-sound control
http://www.keyestudio.com
*/
#include <ks_Matrix.h>
Matrix myMatrix(A4,A5);
int mic = A0;
int Mic_val;
void setup() {
pinMode(mic,INPUT);
myMatrix.begin(112);
myMatrix.clear();
}
void loop() {
   Mic_val=analogRead(mic);
   Mic_val=map(Mic_val,0,1023,0,10);
   myMatrix.clear();
   myMatrix.drawCircle(3,3,Mic_val, 1);
   myMatrix.writeDisplay();   // write the changes we just made to the display
   delay(10);
}
//********************************
```

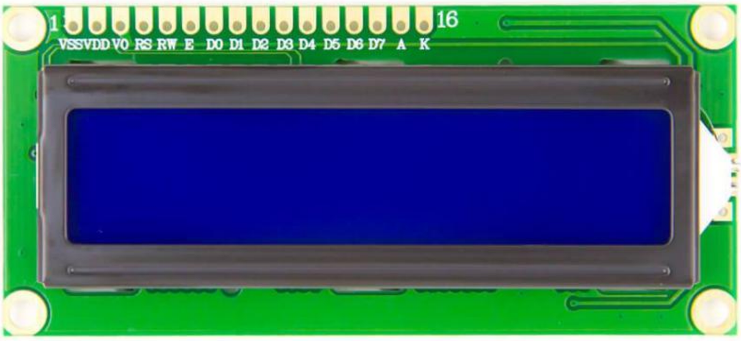
6.What You Should See

Upload the code to the coding box, after success, the LED dot matrix displays a dot,When the sound sensor detects sound,

The LED dot matrix displays a circle with a point as the center. The louder the sound, the larger the circle.



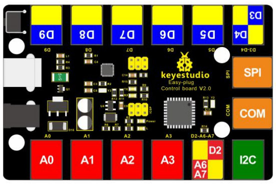
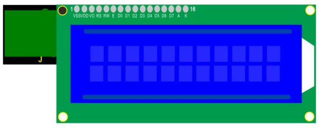
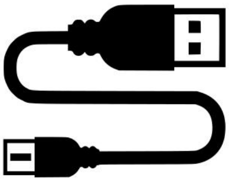
Project 35: LCD 1602 Display



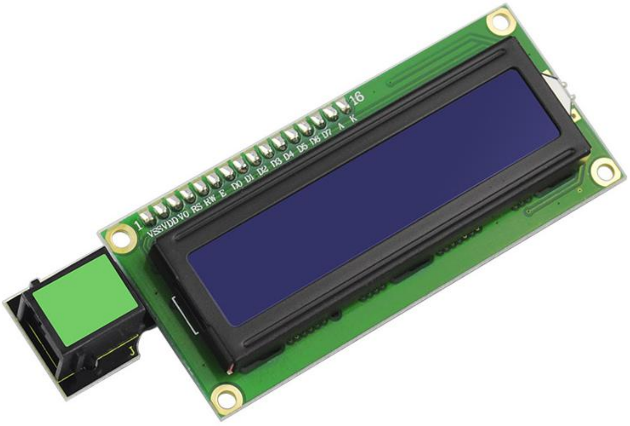
1.Overview

In this project, you will learn how to use an LCD module. An LCD, or liquid crystal display, is a simple screen that can display commands, bits of information, or readings from your sensor - all depending on how you program your board.

2. Component Required:

EASY plug control board*1	EASY plug 1602 LCD Module *1	RJ11 cable*1	USB cable*1
			

3.Component Introduction:



EASY plug 1602 LCD Module

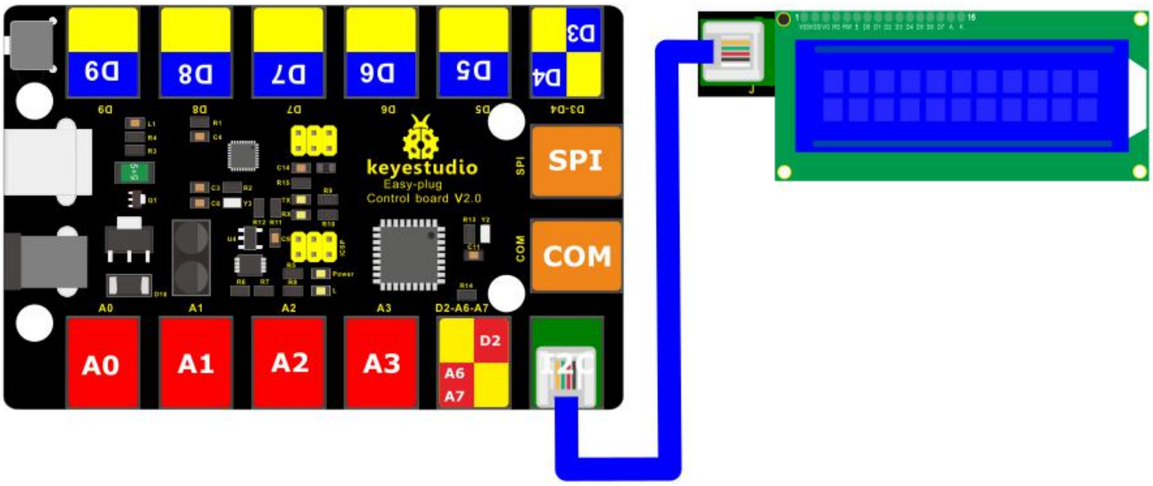
This is a basic 16 character by 2 line LCD display with white text on blue background.

It comes with EASY Plug connector, you can use one line for simple connection.

- Compatible with Arduino LiquidCrystal Library
- White text on blue background
- 16 characters wide, 2 rows
- I2C Address: 0x27
- Back Light: Blue
- Text Color: White
- Supply Voltage: 5V
- Adjusting contrast by a potentiometer

4.Connect It Up

Connect the EASY Plug 1602 LCD module to control board using an RJ11 cable.



5. Upload the Code

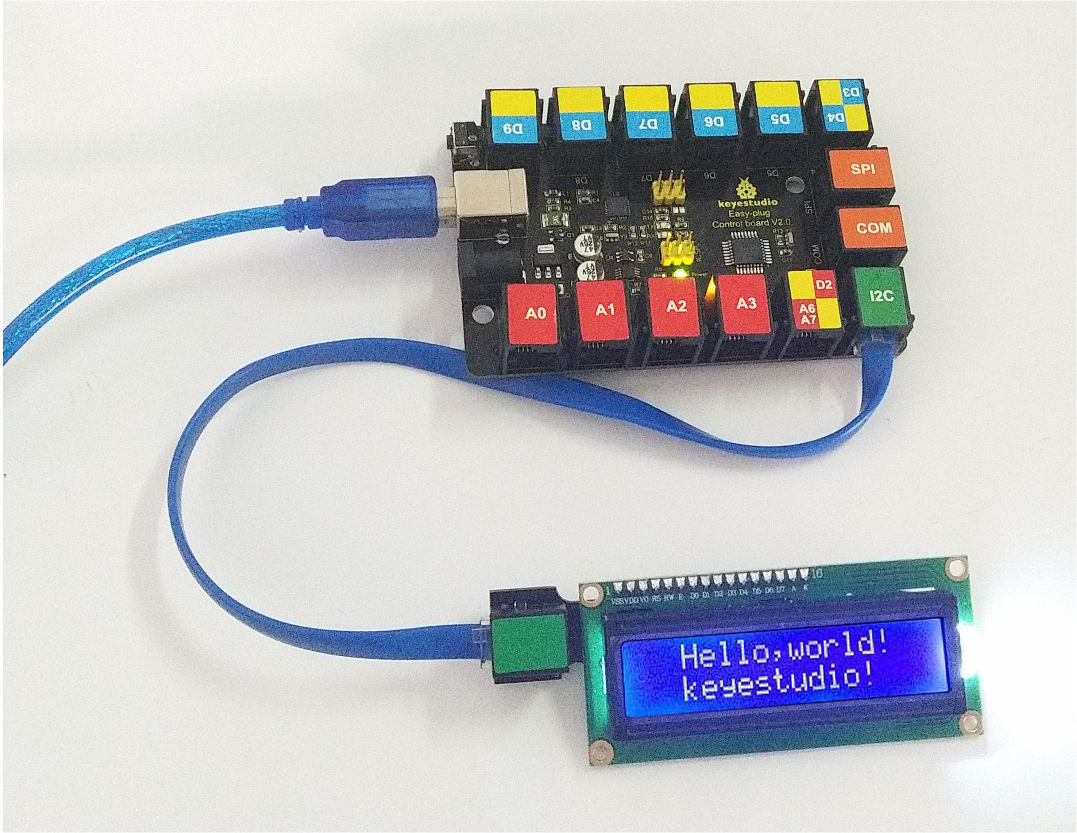
```
/*

keyestudio Easy plug super kit

Project 35

LCD 1602

http://www.keyestudio.com

*/
```

```
#include <Wire.h>

#include <LiquidCrystal_I2C.h>

LiquidCrystal_I2C lcd(0x27,16,2); // set the LCD address to 0x27 for a 16 chars and

2 line display

void setup()

{

lcd.init(); // initialize the lcd

lcd.init();

// Print a message to the LCD.

lcd.backlight();

}

void loop()

{

lcd.setCursor(2,0);

lcd.print("Hello, world!");

lcd.setCursor(2,1);

lcd.print("keyestudio!");

}

//*******************************************************************
```

6.What You Should See

Initially, you should see the words “hello, word!” and “keyestudio!” pop up on your LCD.

Remember you can adjust the contrast using the potentiometer on the module back if you can’t make out the words clearly.



Little Knowledge:

- ✓ If you want to change the characters showed on the LCD screen, you can modify it in the code shown below.

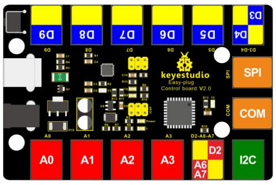
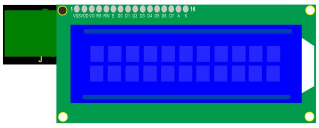
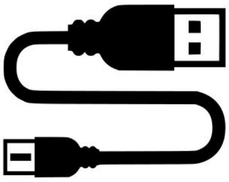
- ✓ Remember you can adjust the contrast by rotating a blue potentiometer on the LCD back if you can’ t make out the words clearly.

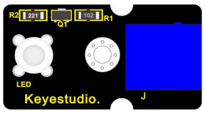
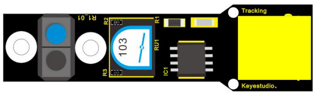
Project 36: Intruder Alarm System

1. Overview

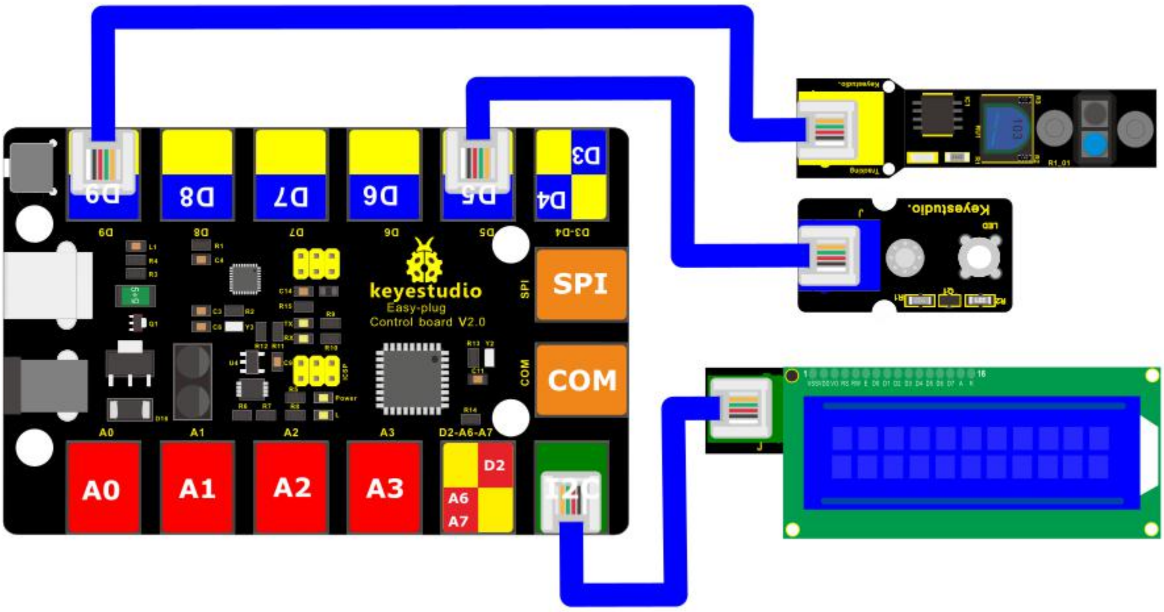
The intruder alarm system will be activated and output signals when hazards happen. If detecting the illegal intrusion, it will call the police. In this project we can make an intruder alarm with a line tracking sensor and an LCD1602 display. When the sensor detects the illegal intrusion, the LED will flash and LCD 1602 display will show the data.

2.Component Required:

EASY plug control board*1	EASY plug 1602 LCD Module *1	RJ11 cable*1	USB cable*1
			

EASY plug LED Module *1	EASY plug Line Tracking Sensor *1		
			

3.Connect It Up



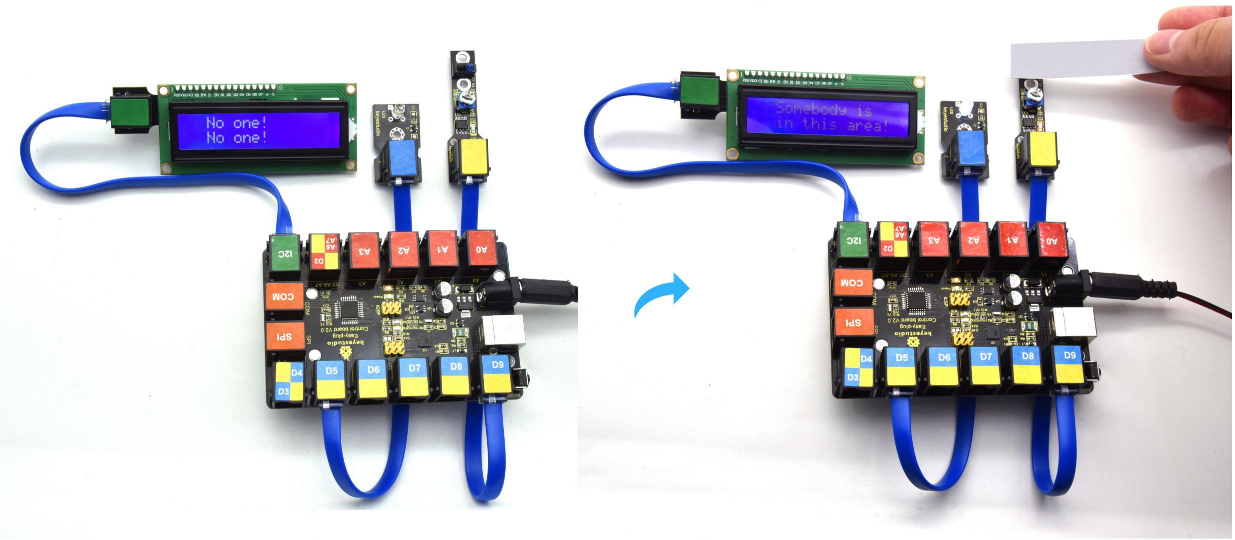
4.Upload the Code

```
/*

keyestudio Easy plug super kit

Project 36

Intrusion alarm

http://www.keyestudio.com

*/

#include <Wire.h>

#include <LiquidCrystal_I2C.h>

LiquidCrystal_I2C lcd(0x27,16,2);

byte sensorPin = 9;
byte indicator = 5;
void setup()
{
   lcd.init();   // initialize the lcd
   lcd.init();
   // Print a message to the LCD.
   lcd.backlight();
   pinMode(sensorPin,INPUT);
   pinMode(indicator,OUTPUT);
   Serial.begin(9600);
}

void loop()
{
   byte state = digitalRead(sensorPin);

   if(state == 0)
   {
   lcd.setCursor(2,0);
   lcd.print("Somebody is");
   lcd.setCursor(2,1);
   lcd.print("in this area!");
   digitalWrite(indicator,HIGH);
```

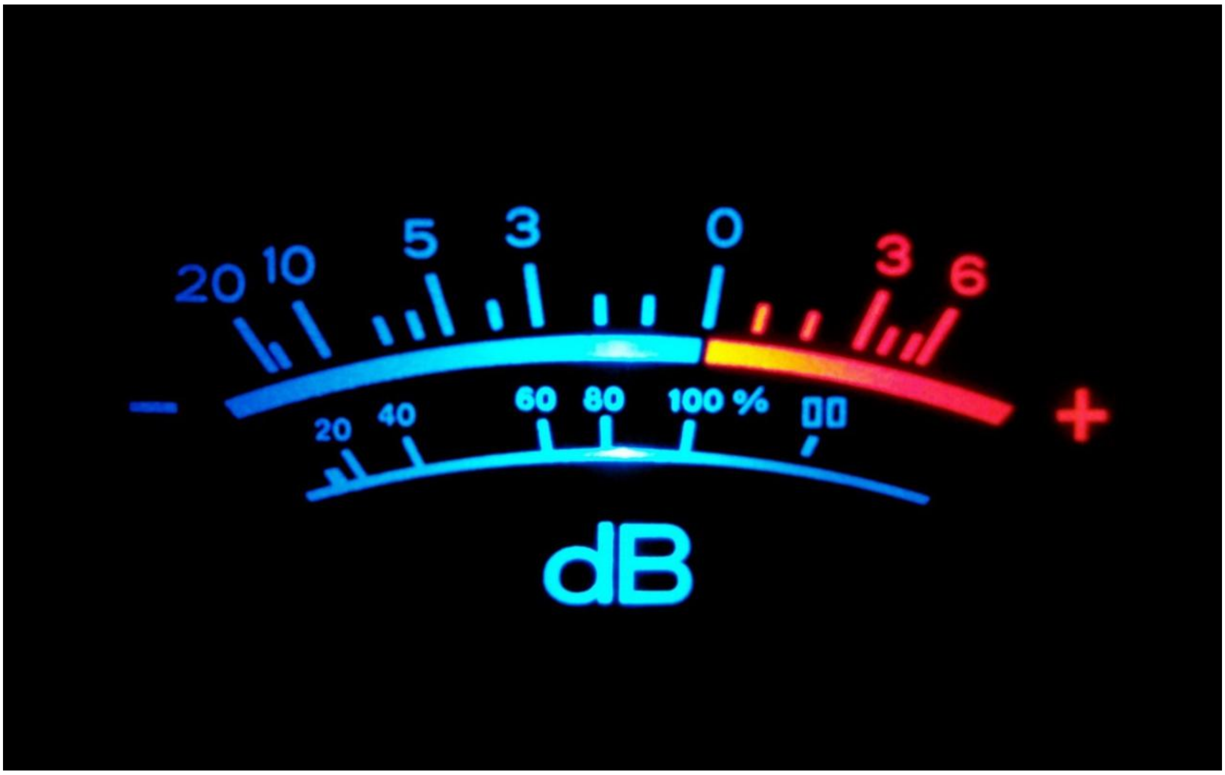
```
  delay(100);

  digitalWrite(indicator,LOW);

  delay(100);

  }

  else if(state == 1)

  {

  lcd.setCursor(2,0);

  lcd.print("No one!");

  lcd.print("          ");

  lcd.setCursor(2,1);

  lcd.print("No one!");

  lcd.print("          ");

  delay(500);

  }

}

//*********************************
```

5. What You Should See

After uploading the code, when something other than black is sensed, the LCD1602 display will display "Somebody is" and "in this area!", and the LED will flash; if no object is detected, the LCD1602 display will show "No one!" ", the LED won’t flash.



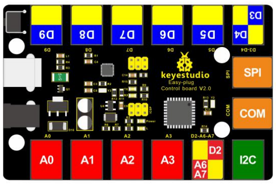
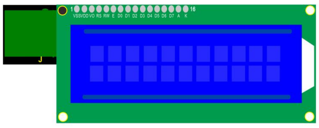
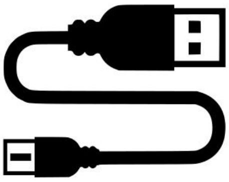
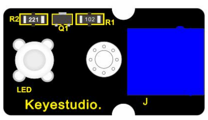
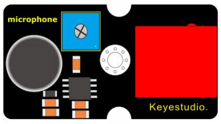
Project 37: Decibel tester



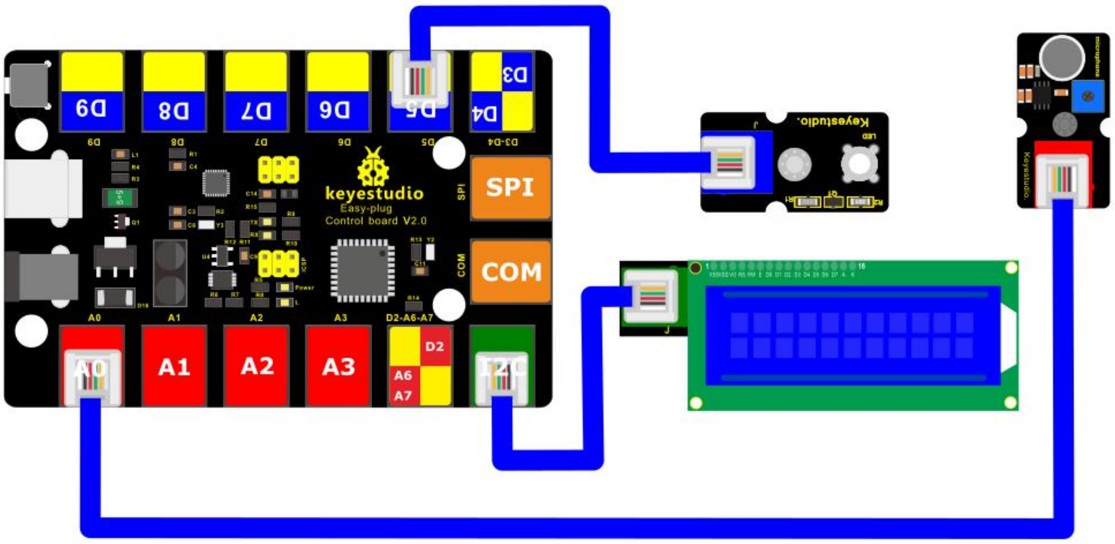
1. Overview

Noise pollution is one of the environmental pollution that have a greater impact. Higher decibel noise can even lead to serious damage to the eardrum of a person, Noise tester is an instrument used for noise detection and testing in public places such as workplace and squares. In this project, we will use the combination of sound sensor and LCD1602 display to make a simulated noise tester. We also connect an LED to display the sound intensity. If the sound is loud, the LED will be bright, and if no sound, the LED will be off.

2. Component Required:

EASY plug control board*1	EASY plug 1602 LCD Module *1	RJ11 cable*1	USB cable*1
			
EASY plug LED Module *1	EASY plug Sound Sensor *1		
			

3. Connect It Up



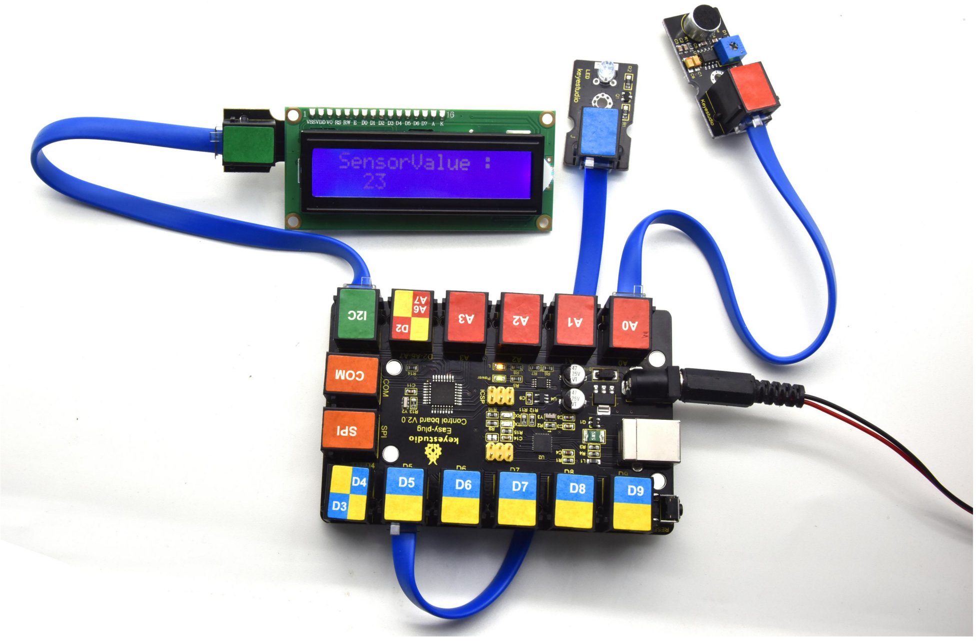
4.Upload the Code

```
/*
keyestudio Easy plug super kit
Project 37
Decibel tester
http://www.keyestudio.com
*/
#include <Wire.h>
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27,16,2);
int ledpin=5;// initialize digital pin 5, output regulating the brightness of LED
int val=0;// initialize variable va
int sensorValue=0;
void setup() {
    pinMode(ledpin,OUTPUT);// set digital pin 11 as  “output”
    lcd.init();                    // initialize the lcd
    lcd.init();
    // Print a message to the LCD.
    lcd.backlight();
 }
// the loop routine runs over and over again forever:
void loop()
{
      val= map(analogRead(A0),0,1023,0,255);
      analogWrite(ledpin,val);// turn on the LED and set up brightness
 （maximum output value 255）
      delay(10);// wait for 0.01

      sensorValue=analogRead(A0);// read the input on analog pin 0:
      lcd.setCursor(1,0);
      lcd.print("SensorValue :   ");
      lcd.setCursor(3,1);
      lcd.print(sensorValue);// print out the value you read:
      delay(1000);
      lcd.clear();
      delay(1);        // delay in between reads for stability
```

```
}
/////////////////////////////////////////////////////////////////////
```

5. What You Should See

Upload the test code, LCD1602 display shows the analog value detected by the sound sensor and LED’ s brightness is proportion to the analog value of the sound sensor.



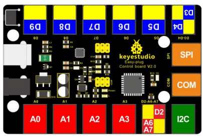
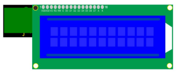
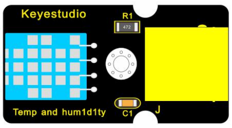
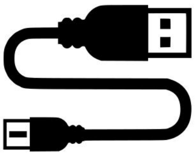
Project 38: LCD Thermometer

1. Overview

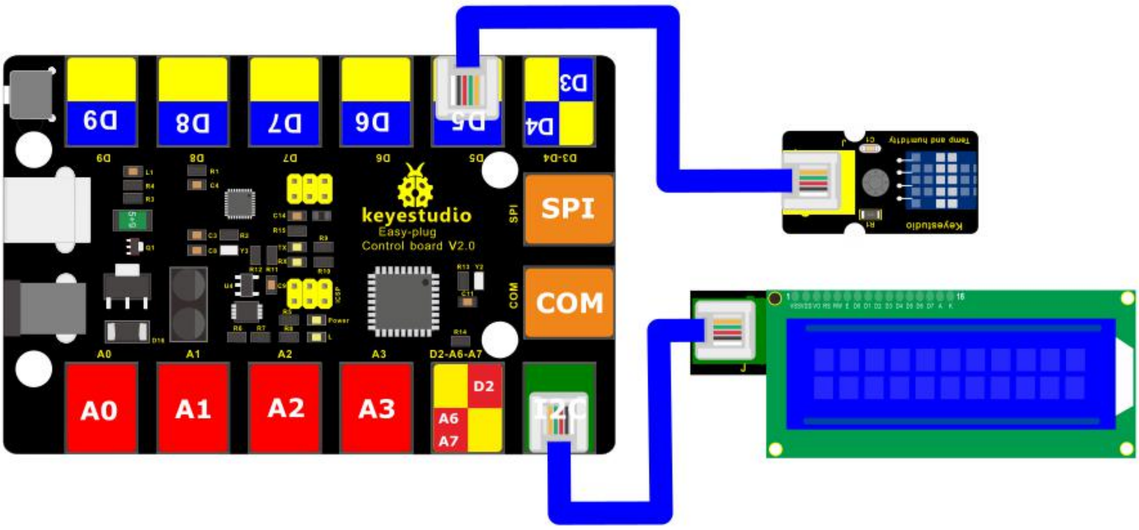
Digital thermometer and hygrometer are very common things in our daily life.

In this project, we combine the DHT11 temperature and humidity sensor with the 1602 liquid crystal display to make a digital thermometer and hygrometer.

2.Component Required:

EASY plug control board*1	EASY plug 1602 LCD Module *1	EASY plug DHT11 Sensor *1	USB cable*1	RJ11 cable*1
				

3. Connect It Up



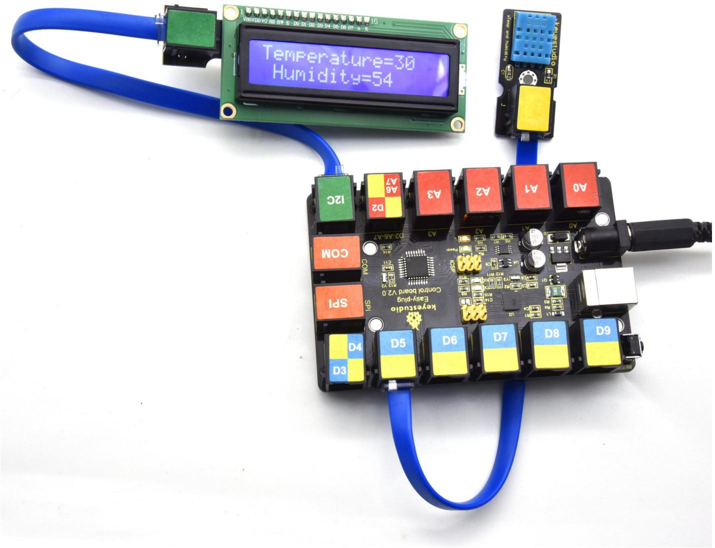
4.Upload the Code

```
/*

keyestudio Easy plug super kit

Project 38

LCD Thermometer

http://www.keyestudio.com

*/

 #include <dht11.h>

 dht11 DHT;

 #define DHT11_PIN 5


#include <Wire.h>

#include <LiquidCrystal_I2C.h>

LiquidCrystal_I2C lcd(0x27,16,2); // set the LCD address to 0x27 for a 16 chars and

2 line display
```

```
void setup()
{
Serial.begin(9600);
lcd.init(); // initialize the lcd
lcd.init();
// Print a message to the LCD.
lcd.backlight();
}
void loop()
{
int chk;
chk = DHT.read(DHT11_PIN); //Read data temperature from DHT11 pin
lcd.setCursor(0,0);
lcd.print("Temperature=");
lcd.println(DHT.temperature);
lcd.setCursor(1,1);
lcd.print("Humidity=");
lcd.println(DHT.humidity);
delay(1000);
}
//********************************
```

5.What You Should See

Upload test code, LCD1602 display will show the ambient temperature and humidity value.



6. Resources

- Keyestudio Official Website: http://www.keyestudio.com/
- Keyestudio WIKI Website: http://wiki.keyestudio.com/
- User Guide Download:
- Arduino Software:

https://www.arduino.cc/en/Main/OldSoftwareReleases

7. Our Tutorial

From the tutorial, you will learn all the basic information about EASY Plug controller board, sensor module, very easy to play and and to make interactive projects. Enjoy your time!

Well, it's just the beginning of programming journey. There are more and more awesome projects for you to explore.

Furthermore, our KEYESTUDIO research and development team will continue to explore on this path, walking you through the basics up to complex projects.

Hope that you can enjoy our works!

8. About keyestudio

Located in Shenzhen, the Silicon Valley of China, KEYES DIY ROBOT CO.,LTD is a thriving technology company dedicated to open-source hardware research & development, production and marketing.

Keyestudio is a best-selling brand owned by KEYES Corporation, our product lines range from Arduino boards, shields, sensor modules, Raspberry Pi, micro:bit extension boards and smart car to complete starter kits designed for customers of any level to learn programming knowledge.

All of our products comply with international quality standards and are greatly appreciated in a variety of different markets throughout the world.

For more details of our products, you can check it from the links below.

Official website: http://www.keyestudio.com/

US Amazon storefront: http://www.amazon.com/shops/A26TCVWBQE4D9T

CA Amazon storefront: http://www.amazon.ca/shops/A26TCVWBQE4D9T

UK Amazon storefront:http://www.amazon.co.uk/shops/A39F7KX4U3W9JH

DE Amazon storefront: http://www.amazon.de/shops/A39F7KX4U3W9JH

FR Amazon storefront: http://www.amazon.de/shops/A39F7KX4U3W9JH

ES Amazon storefront: http://www.amazon.de/shops/A39F7KX4U3W9JH

IT Amazon storefront: http://www.amazon.de/shops/A39F7KX4U3W9JH

US Amazon storefront: http://www.amazon.com/shops/APU90DTITU5DG

CA Amazon storefront: http://www.amazon.ca/shops/APU90DTITU5DG

JP Amazon storefront: http://www.amazon.jp/shops/AE9VWCCXQIC6J

9. Customer Service

As a continuous and fast growing technology company, we keep striving our best to offer you excellent products and quality service as to meet your expectation. We look forward to hearing from you and any of your critical comment or suggestion would be much valuable to us.

You can reach out to us by simply drop a line at **keyestudio@126.com**

Thank you in advance.

keyestudio