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编号	材质工艺要求	日期
图（一）	整体尺寸:400*283(mm) 铜版纸128g	2016/01/27

折线

400mm

283mm

### Grove Starter Kit for Arduino/Genuino 101

**About Grove**

Grove system is designed to connect a processor to real world through different transducers (such as sensors and motors) and Grove wires which look like ribbon cable. With Grove system, you will not bother to handle excessive and complicated connections as we used to do. No soldering, breadboard or jumper wire were required. You just need to plug plenty of transducers to development board with Base Shield and Grove wires. Grove system is very helpful for accelerating your project development process, especially for a novice.

Note that all content herein also apply to Genuino 101.

#### Fundamentals with Arduino

You need to know some essential knowledge if it is the first time that you get involved with Arduino. We have prepared some documentations for you to start with Arduino quickly and effectively. You can visit: <https://www.arduino.cc/en/Tutorial/Foundations>.

**Sketchbook Download**

After you have gotten an LED blinking for Windows user, you can find it at <https://www.arduino.cc/en/Guide/Windows>, you can find other versions for Mac OS and Linux variants at <https://www.arduino.cc/en/Guide/HomePage>. You still need to get familiar with SeeedStudio Grove system at [http://www.seeedstudio.com/wiki/Grove\\_System](http://www.seeedstudio.com/wiki/Grove_System). And now, you can do some more practical quizzes which are specialized designed for this kit. Download the sketches of quizzes at [https://github.com/Seeed-Studio/Sketchbook\\_Starter\\_Kit\\_1](https://github.com/Seeed-Studio/Sketchbook_Starter_Kit_1) or Arduino.

Read the section Base shield on bottom-right corner of this manual.

#### Grove - Rotary Angle Sensor(P)

Grove - Rotary Angle Sensor(P) is a sensor to detect angular position, with Grove port and shaft on either side.

**Example**

This example shows you how to read the value of a rotary angle sensor.

File -> Sketchbook -> Grove\_Rotary\_Angle\_Sensor

**Tips**

The maximum angle is 300°(53m) and the maximum resistance of inside potentiometer is 10 KΩ. As you rotate the shaft, it will produce an analog signal(voltage) which will be converted to digital numbers in development board. The analog voltage produced will be either 3.3 V or 5 V which depends on the voltage you apply to Grove port. The output number range depends on the ADC of the development board. For Arduino UNO, it uses 10-bit ADC, so the number range will be 0-1023. For connection, you need to use a Grove wire.

#### Grove - Sound Sensor

Grove - Sound Sensor is intended to detect sound amplitude, and it can also detect sound presence.

**Example**

We provide you with an example named Grove\_Sound\_Sensor for the module. In this example, an LED will fade (dim in or fading out) appropriately to the sound amplitude detected.

#### Grove - Light Sensor

Grove - Light Sensor is a sensor to measure light levels in daily life.

**Example**

This example will create an LED that turns on automatically when the ambient light is dim.

File -> Sketchbook -> Grove\_Light\_Sensor

**Tips**

It is an analog module and output various electrical signals which can be converted to different ranges that depends on the Analog-to-Digital-Converter on your controller board. For example, it will output 0-255 for an 8-bit ADC.

Sensor readings	Light condition	Illuminance level (Lux)
25	Pitch dark	0.4 ~ 1
40	Very Dark	0 ~ 5
175	Dark indoors	5 ~ 15
220	Dim indoor	15 ~ 45
240	Indoor	45 ~ 100
260	Indoor	100 ~ 200
470	Sunny outdoors	200 ~ 300
740	Reading	300 ~ 350

#### Grove - Temperature Sensor

Grove - Temperature Sensor is a sensor to measure ambient temperature.

**Example**

The code in this example shows you how to convert the raw output of the sensor into temperatures. You can see the output data in Celsius in the serial monitor.

File -> Sketchbook -> Grove\_Temperature\_Sensor

**Tips**

Grove - Temperature Sensor can only measure temperature range from 0 to 125 °C. The accuracy of measured temperature is ±1.5 °C.

#### Grove - Relay

This is a switch controlled by electric signals.

**Example**

The example shows you a button control relay.

File -> Sketchbook -> Grove\_Relay

**Tips**

A relay switch is a mechanical switch controlled by electric signals in a circuit. Because it is safe to work with, relay switches are common in automation and remote control projects.

#### Grove - Servo

Grove - Servo is a servo that can control rotating position accurately. Servo is a kind of motor with feedback mechanisms.

**Example**

We provide you with an example named Grove\_Relay for this module. In this example, we will make the servo rotate precisely as we rotate a shaft of a potentiometer. Note that we reuse the code for Grove-Relay. You just need to replace Grove-Relay with Grove-Servo. And all other connections are the same.

**Tips**

Grove - Servo can be used for different projects. For example, you can use them to drive a small fan, lift an object, or mimic a clock hand. Not that if you dozens of servo, you might need an external power supply.

#### Grove - RGB Backlight LCD

Grove - LCD RGB Backlight, is a 16 x 2(16-characters) width for each row and 2 rows in total LCD display with black text and RGB backlighting.

**Example:**

The example shows you how to print text on the screen and change the color of backlight. Find it via the path: File -> Sketchbook -> Grove\_LCD\_RGB\_Backlight

**Tips**

Grove - LCD RGB Backlight, is a 16 x 2(16-characters width and 2 row) LCD display with black text and color(RGB) backlighting. It features Grove port (an integrated port for connecting all wires) and adopt I2C protocol which will keep you away from complicated and irritating wiring work. We also provide you with a tested library to accelerate your development process.

#### Demo Projects

What project do you like to create with Grove - Starter Kit? For your reference, we prepared some demo projects.

#### FitMemory

FitMemory is an interesting memory game that keeps your mind sharp.

**Materials List:**

- Grove - LCD RGB Backlight
- Grove - Button
- Grove - Touch Sensor
- Grove - Rotary Angle Sensor
- Grove - Buzzer
- Base Shield
- Seeeduino

Find the complete recipe here: [www.instructables.com/id/FitMemory/](http://www.instructables.com/id/FitMemory/)

#### Lucky Dumping

Lucky box is a box to tell today's luck. Note that it is not real luck-teller. It is just a funny demo.

**Materials List:**

- Grove - LCD RGB Backlight
- Grove - Button
- Base Shield
- Seeeduino

Find the detailed instructions here: [www.instructables.com/id/Grove-Lucky-Dumping/](http://www.instructables.com/id/Grove-Lucky-Dumping/)

#### Servometer

Servometer is a funny and a little wired thermometer. It shows air temperature like a dashboard in a car.

**Materials List:**

- Grove - Servo
- Grove - Temperature Sensor
- Base Shield
- Seeeduino

Find the complete recipe here: [www.instructables.com/id/Grove-Minimal-Thermometer/](http://www.instructables.com/id/Grove-Minimal-Thermometer/)

#### Base Shield

Base Shield is an expansion board for Grove port. You will prepare it if you need more Grove ports for connecting more external transducers. In a Base Shield, it has eight digital ports, four analog ports and four I2C port.

**1) Digital Ports**

Digital ports (UART, D2-D6) are same with digital pin on Arduino board. The function is identical to Arduino digital pins. We integrate pins with a simpler ports which will save your time in wiring. UART can function as either UART or digital pins.

**2) Analog Input Ports**

On the edge of Base Shield, you can find analog pins(A0-A3). It is same with analog pins on Arduino board. You can use it as same with Arduino pins. The analog pins output a continuous originality. The voltage measured. Voltage will be converted a number by a ADC.

**3) I2C Ports**

On Base Shield, there are still four I2C ports. I2C is a low-speed bus protocol that transfers data via two wires: SCL and SDA. SCL is the clock line that synchronizes data transfer over the I2C bus, and SDA is the data line. The following diagram illustrates the framework of an I2C bus.

Some of these ports are multi-purpose and can function as PWM (pulse width modulation) outputs. They are port 3, port 5 and port 6. You will need these ports when driving a servo or fading an LED.

Digital ports are a must for serial communication too. There is one built-in hardware serial port, AKA UART, on port 1. This is the Arduino's default port for serial communication with the PC.

In some occasions, where you need at least two serial devices or you need an available serial port for debugging purposes. Other digital ports, software serial ports, can be used as well. We will encounter them a lot in our Grove system.

There is no limit to the amount of devices that can hang off of the I2C bus; however, only one of them can work in master mode, while all of the others work in slave mode. For Grove, the master is the Arduino board. It generates the clock signals and sends commands to and/or receives data from all of the devices. In theory, each slave device has a unique hardware address and the master device can find slave devices via their addresses.

I2C ports are generally used when the amount of data is overwhelming for simple digital and analog ports. For example, when we want to obtain complex information such as angular acceleration, or read the current time from an RTC module, we need to use the I2C ports.

Resources

Arduino website: [www.arduino.cc](http://www.arduino.cc)

Seeed website: [www.seeedstudio.com](http://www.seeedstudio.com)

Seeed wiki main page: [www.seeedstudio.com/wiki](http://www.seeedstudio.com/wiki)

客 户	
文件名称	Grove Starter Kit 说明书
设 计	周建
整 理	梁家威
核 准	韩孝涛

