Grove Starter Kit

FROM SEEEDSTUDIO

Grove

seeed

Grove Starter Kit for Arduino

About Grove

Before we had Grove, at least three wires were needed every time a module was connected to an Arduino, including power, signal, and ground. Soon the Arduino would be hard to manipulate among excessive wires. Why couldn't we simplify the building process? With this goal we designed and created the Grove system. Every Grove module has one function, such as sensing light, and it has pre-installed wires. You only need to plug one Grove cord into a socket on the Base Shield for the module to function reliably in your design.

First Date with Arduino?

If this is your first time using an Arduino, there's something about Arduino you must know. No Panic. We have a detailed step-by-step tutorial to guide you through. Find it in the"First Date with Aruino"section of the Grove – Starter Kit's wiki page:
www.seeedstudio.com/wiki/Grove_-_Starter_Kit_V2.0

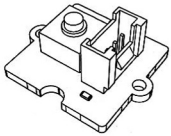
Sketchbook Download

If you succeed in blinking the led attached to pin 13,

you can start to tinker with Grove – Starter Kit. To simplify the coding task, we packed demos in Grove – Starter Kit into a sketchbook file and uploaded it to Github. Here is the link to download it:
github.com/Seeed-Studio/Sketchbook_Starter_Kit_V2.0

Modules Introduction
Following is the individual introduction to each Grove module.

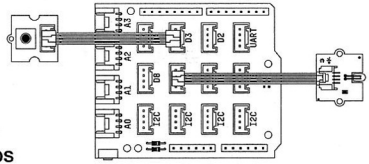
Grove – Button



This is a momentary button (see tips) and it's the most common input module we see.

Example

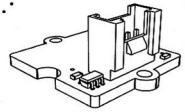
The example below shows you how to use this button to turn an LED on and off.Sketchbook path:
File → Sketchbook → Grove_Button



Tips

"Momentary" means the button rebounds after pressed. This button outputs HIGH when pressed,and LOW when released.

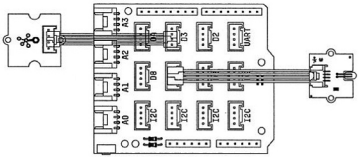
Grove – Touch Sensor



This "button" can sense the touch of your finger.

Example

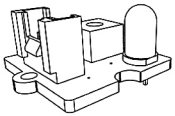
The code of Grove –Button works with this module.



Tips

This is an alternative to the momentary button. Grove - Touch Sensor detects the change in capacitance in the circular region; the closer your finger is to the region, the larger the change in capacitance. Even if there is paper between your finger and the sensor, it will still function reliably.

Grove - LED

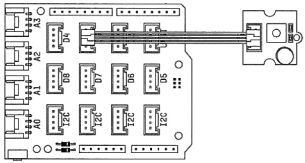


LED is a small lightbulb, a constituent of many colorful displays around us.

Example

Previously we controlled an LED with a button, now we change it up and make an LED light with breathing effects:

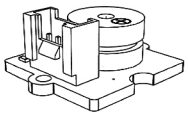
File → Sketchbook → Grove_LED.



Tips

We prepare three colors of LED bulbs for you. You can get the color you want by shifting the LED on the tiny Grove – LED PCB board. LEDs have an cathode on the flat side of the bulb, and a anode on the round side of the bulb. The anode needs to be installed corresponding to the "+" sign on the seat for the LED to work properly.

Grove – Buzzer

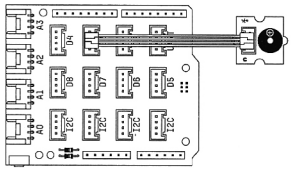


This buzzer can give you sound effects.

Example

You can use the code for Grove - Button to make the buzzer beep when you press the button. However, Grove-Buzzer can be much more fun—it can play songs! In this example provided by Oomlout.com, the buzzer will play "Twinkle Twinkle, Little Star" . Find the example via the path below:

File→Sketchbook→Grove_Buzzer.

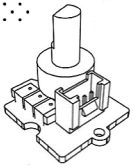


Tips

How does the Piezoceramic buzzer work? There are two ceramic wafers in each buzzer. When voltage is applied, the ceramic wafers attract or reject each other, causing them to shake. The air vibration makes the audible sound. When the shaking frequency changes (which we can control in the Arduino code), the sound frequency will also change.

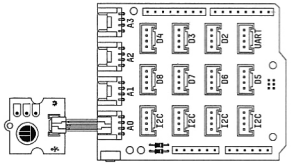
Grove – Rotary Angle Sensor

This is an input device controlled via turning the knob



Example

This example shows you how to read the value of a rotary angle sensor:
File → Sketchbook → Grove_Rotary_Angle_Sensor

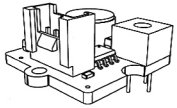


Tips

Grove-Rotary Angle Sensor is a 10k Ohm linear rotary potentiometer with a turning radius range of 300 degrees. A rotary potentiometer looks very similar to a rotary encoder, but they are not the same. A rotary potentiometer is essentially a slide potentiometer. It reflects the position in an analog way just like a slide potentiometer does; however, the rotary encoder counts the turns so you can tell how much and in which direction the encoder has been turned.

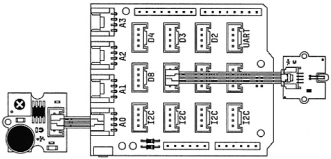
Grove - Sound Sensor

This is a sensor to evaluate the intensity of sound.



Example

The code for the Grove—Sound Sensor can be used to make an LED light whose brightness reflects the intensity of the ambient sound.
File → Sketchbook → Grove_Sound_Sensor

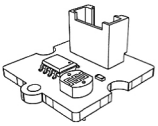


Tips

The electric microphone collects sound intensity for all frequencies, and the potentiometer acts as the doorman. When you rotate it clockwise to the extreme, it lets everything go through, and when you rotate it fully counterclockwise, nothing goes through.

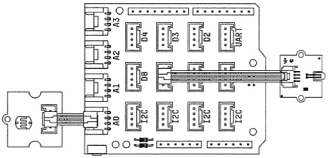
Grove – Light Sensor

This is a sensor that detects the change of light.



Example

This example will create an LED that turns on automatically when the ambient light is dim:
File → Sketchbook → Grove_Light_Sensor



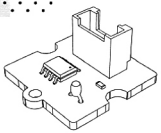
Tips

The output of the analog light sensor ranges from 0 to 1023, but it is not linear with respect to the ambient light intensity. Below is a table to help you understand what the output really means.

Sensor Value	LUX	Description
100	<1	
200	~1	Full moon overhead at tropical latitudes
300	~3	Twilight in the city
400	~6	
500	~10	
600	~15	
700	~35	Family living room
800	~80	Office building light in hallway
900	>100	Very dark, overcast day

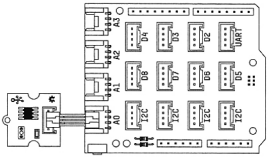
Grove – Temperature Sensor

This is a sensor for 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

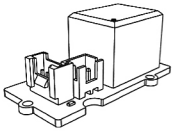


Tips

Grove - Temperature Sensor is used to detect environment temperature. Its value ranges from40 to 125 degrees Celsius and the accuracy is within ± 1.5 ℃.

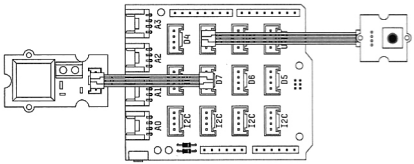
Grove – Relay

This is a switch controlled by electric signals.



Example

The example shows you a button control relay:
File → Sktechbook → Grove_Relay

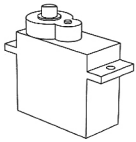


Tips

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.

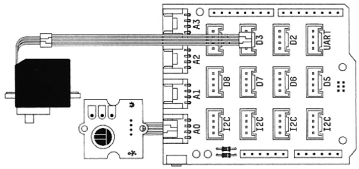
Grove – Servo

This is an actuator whose position can be precisely controlled.



Example

We prepared an example of how we use a potentiometer to control the position of the servo:
File → Sktechbook → Grove_Relay

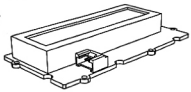


Tips

Grove – Servo has several mounting hardware options for different purposes: you can use them to drive a small fan, lift an object, or mimic a clock hand.

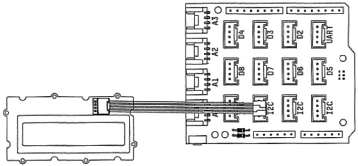
Grove – RGB Backlight LCD

This LCD screen can display rich text and image content.



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



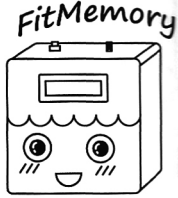
Tips

This is a 16x2 LCD screen. It is capable of displaying two rows of sixteen-character texts, supporting languages including English and Japanese. Aside from the built-in languages, you can have custom characters. You can build unique characters by defining their display patterns. You can find an example of making a custom character here:Custom Character.

Demo Projects

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

FitMemory



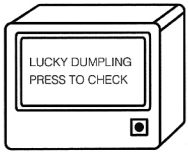
FitMemory is a fun memory game that keeps your mind sharp.

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/

Lucky Dumpling



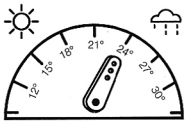
Lucky Dumpling is a fortune teller box. Press to gain a glimpes into your future.

Materials List:

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

Find the complete recipe here:
www.instructables.com/id/Grove-Lucky-Dumpling/

Servometer



Different from traditional thermometer, Servometer shows you the air temperature with its shaking arm.

Materials List:

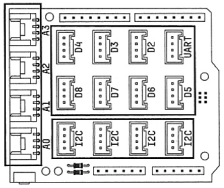
- Grove - Servo
- Grove - Temperature Sensor
- Base Shield
- Seeeduino

Find the complete recipe here:
www.instructables.com/id/Grove-Minimal-Thermometer/

Base Shield

Base Shield is an interface between Arduino and Grove modules. There are 16 Grove sockets on the base shield, whichcan be divided into three different functional areas: digital ports (8), analog ports (4), and I2C ports (4).

The Grove modules communicate via different protocols, and you can quickly figure out how to use them by familiarizing yourself with the communication methods of each module.



Base Shield

1) Digital Ports

Surrounded by the red lines are eight digital Grove ports. They are equivalent to digital pins 0 through 9 on the Arduino Uno. Normally, they are used when reading a digital sensor that only outputs 0 or 1, or turning on or off an actuator.

Some of these ports are multi-purpose and çan 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 hardwired serial port, AKA UART, on port 1. This is the Arduino' s default port for serial communication with the PC.

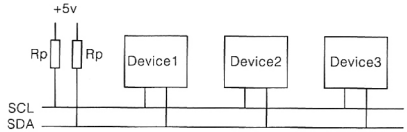
In cases where you need at least two serial devices or you need an available serial port for debugging purposes, other digital ports, software serial ports, can be used as well. We will encounter them a lot in our Grove system.

2) Analog Input Ports

On the left-hand side are four Grove ports for taking analog readings. Analog sensors can return readings ranging from 0 – 1024. Compared with digital sensors that only return 0 or 1, analog readings are more detailed and precise.

3) I2C Ports

Below the digital ports are four I2C Grove 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.



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. 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 should use the I2C ports.

Resources
Arduino website: www.arduino.cc
Seeed website: www.seeedstudio.com
Seeed wiki main page: www.seeedstudio.com/wiki/Main_Page