SEED TECHNOLOGY INC (SEEEDUINO)
GROVE - Starter Kit
Model: ELB152D2P

Introduction

The Grove system is a modular, safe and easy to use group of items that allow you to minimise the effort required to get started with microcontroller-based experimentation and learning. Although there are many choices available for microcontroller development environments, the Grove system will work very well with the Arduino system.

What is new in Grove Starter Bundle v1.1b:

- 9V battery adapter included
- Pin headers are left unsoldered on protoshield for your convenience

What is new in Grove Starter Bundle v1.0b:

- Upgrade 8 x 2 character LCD display kit to 16 x 2 character LCD display kit with Serial LCD Driver.
- Simplify Twin-LED Grove to one LED Grove module for uncomplicated the wiring, and the same as Twin-Button Grove module to one Button Grove .
- Dump the unnecessary edge mounting of the Grove modules except the Protoshield Grove module.

The Grove Starter Bundle v1.1b consists of one each of the following items:

1. Grove - Single Button
2. Grove - Single LED
3. Grove - Tilt
4. Grove - Buzzer
5. Grove - Rotary Angle Sensor
6. Grove - Temperature Sensor (Analog)
7. Grove - Smart Relay
8. Grove - Protoshield
9. Grove - Base Shield
10. LCD1602 Baseshield + LCD
11. GROVE Cable set (pack of 10)

And as pictured below:
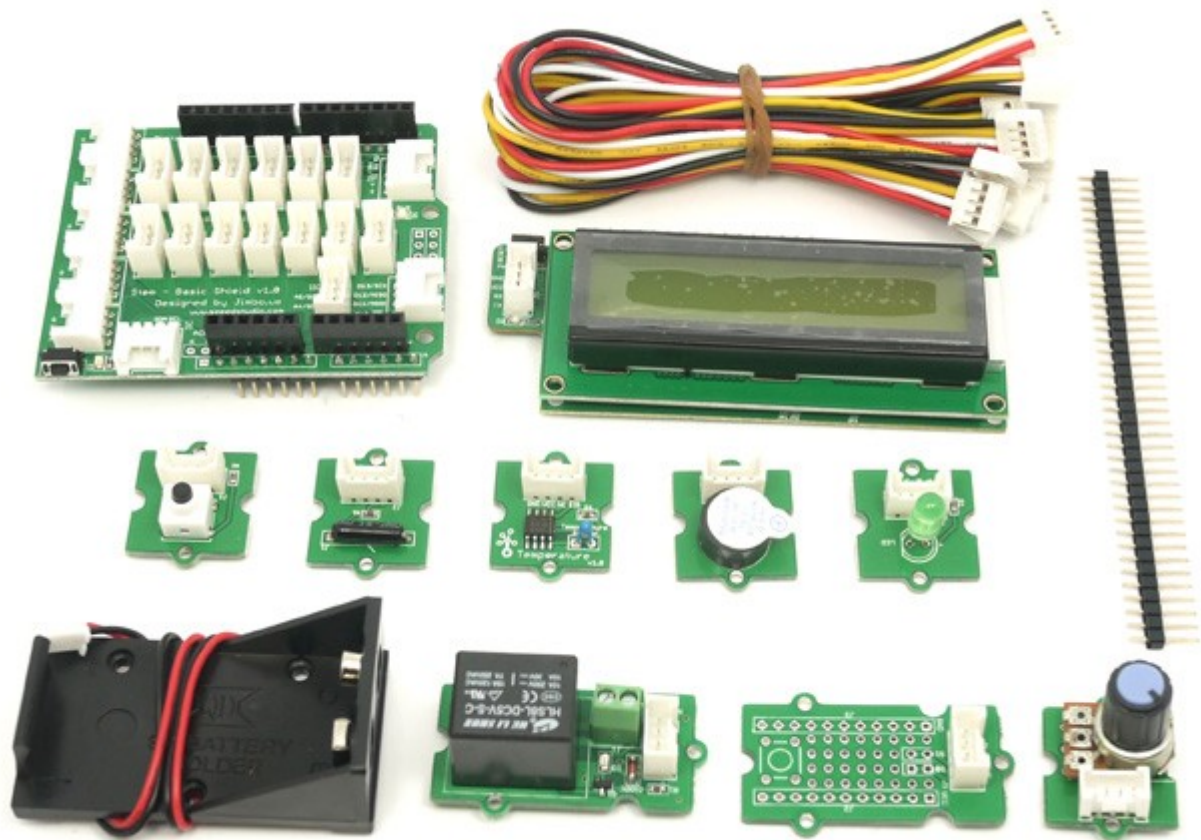
- One Grove "Stem" board – this allows you to connect various "Twigs" (below) to your Seeeduino board;
  - **Nine Grove "Twigs", consisting of:**
  - 16 x 2 character LCD display unit and matching Grove module;
  - Analog temperature sensor Grove module;
  - piezo buzzer Grove module;
  - button Grove module (with one buttons for digital input);
  - LED Grove module (with one green for digital output);
  - Tilt-switch Grove module;
  - potentiometer (variable resistor of value 10k ohms) for analog input
  - Relay Grove module
  - Protoshield Grove module (for adding your own components)
- Ten pre-formed connecting wires to bridge Grove modules to the basic board (not shown)

Now let's look at each component in more detail.

Grove - Base Shield

First we start with the Grove base shield board. Grove - Base Shield is the new version of Electronic Brick Shield.The Basic Shield is compatible with Seeeduino v2.21 (168p and 328p), and Arduino UNO and Duemilanove. We standardize all the connectors into 4 pins(Signal 1,Singal 2,VCC and GND) 2mm connectors, which simplify the wiring of electronics projects. The 4pins buckled connectors also make the wiring situation more stable. We build all kinds of Twigs to match up with Stem, still don't you need to worry about the compatibleness between Grove - Base Shield and your existing Electronic Bricks.We have many kinks of converter cables(still increasing) to deal with the the compatibleness.This is very similar in fashion to an Arduino

shield board, and in fact is used as such with our Seeeduino or Mega board.In v1.0b, we move in the analog connectors a little so that it will fit the higher power connector and USB connector. Here is a top-down view:
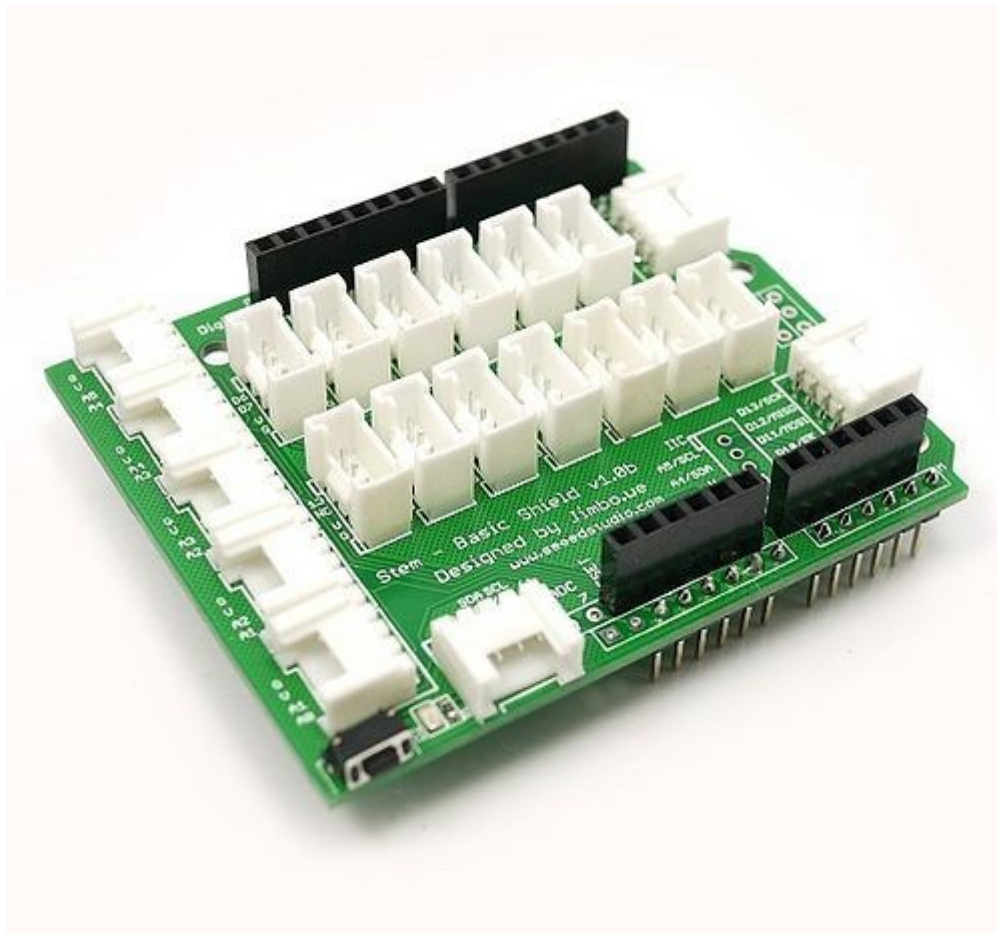

The purpose of the Grove - base shield is to allow easy connection of any microprocessor input and output pins to the small units. Each socket is clearly labelled with its matching I/O pin. For a more detailed examination of the Base Shield, please consider the following diagram:
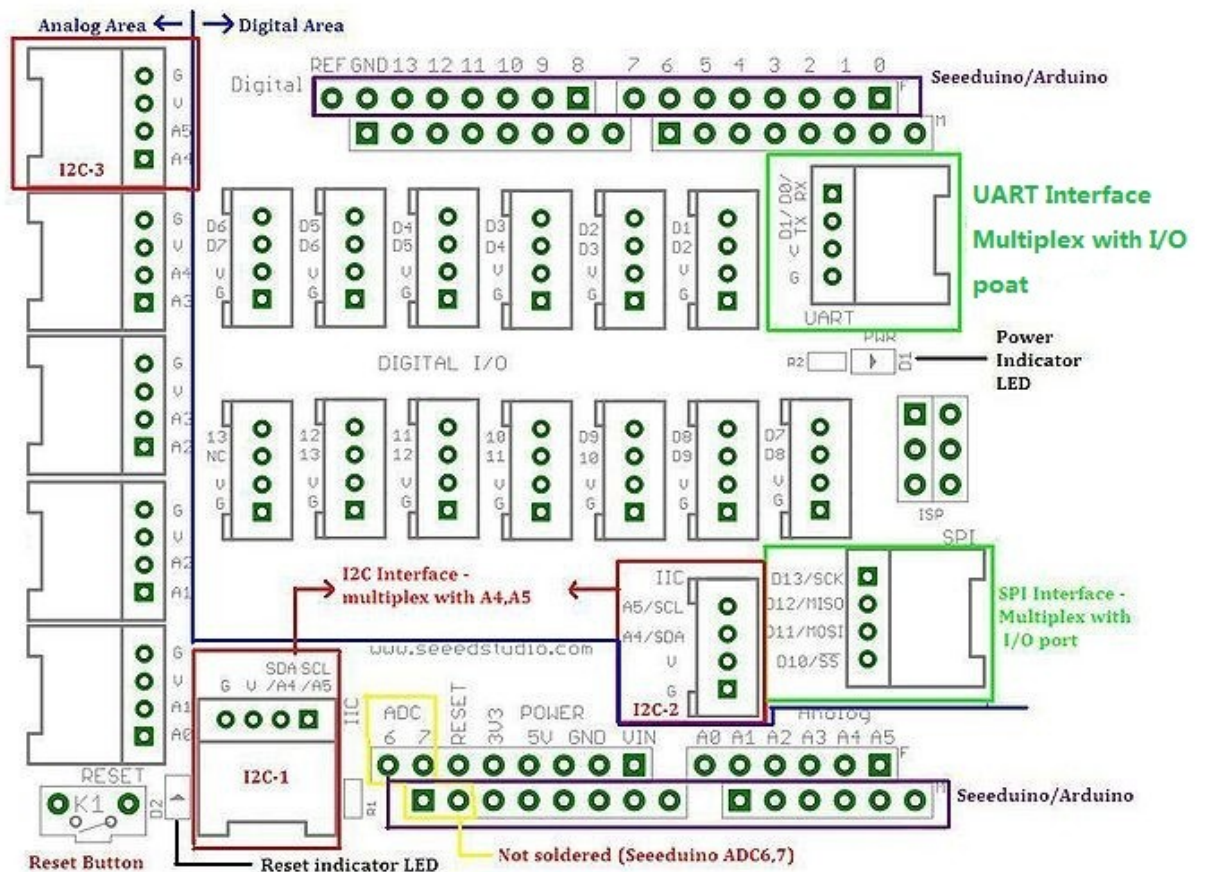
For those working with Seeeduino or Arduino boards, the layout should be quite familiar. The labels on the "Power" header pins may be confusing - the new Arduino Uno has two ground pins between the Vin and 5v, and label "GND" twice, but the Grove labels match the Duemilanove which label "GND" once, wider, to indicate both pins.

There is one small thing to take note of when connecting to analog or digital sockets. Each socket contains 5V, GND, and two I/O pin connections:
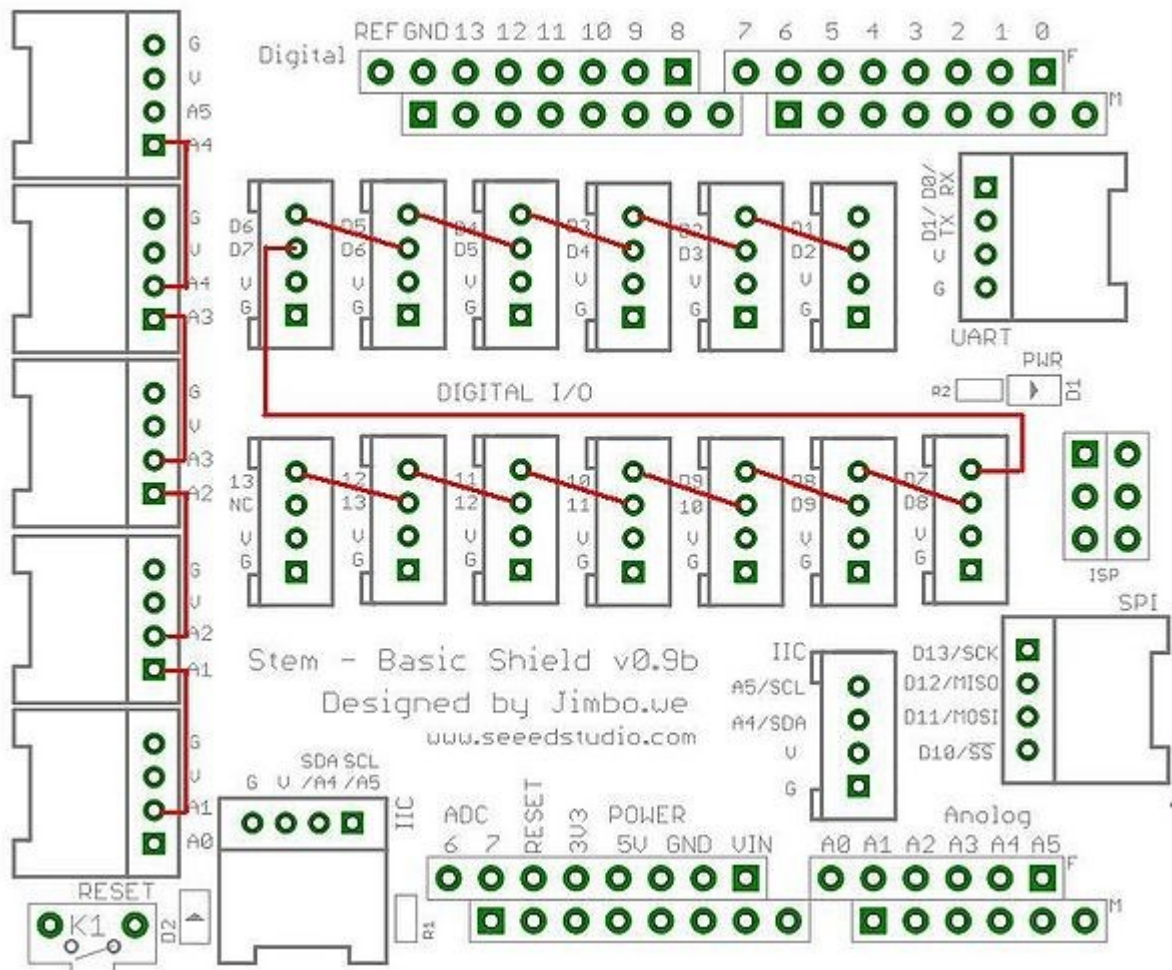
When using the digital I/O, note the staggered alignment of the pins – that is, one socket handles D1 and D2, the next D2 and D3, and so on. If you are going to use an input the small unit and an output Unit which have two signal pins simultaneously (now the starter bundle v1.0b doesn't have two signal pins Grove module), separate your wires so that a socket is between them as such:
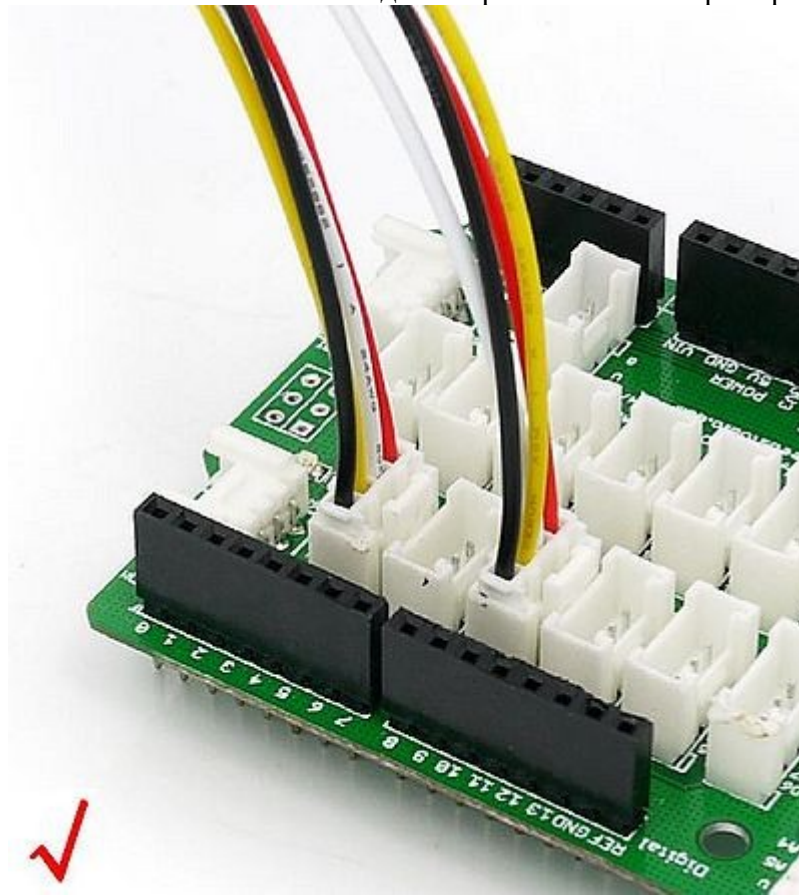
Wires for two signal Grove modules cannot sit side-by-side on the Base board because one pin (such as D2) will be multi-using. Or, if two Grove modules only use one digital pin, such as the tilt-switch and the piezo, they can sit together on the Base board as they only use one of the digital lines in the connecting wire and therefore will not interfere with each other. It is the same as the Analog I/O sockets. Make sure you know the silkscreen of each socket before you start wiring.

Twigs

Each "Twig" is a peripheral board that connects to the GROVE System "Base Shield" shield using a consistent 4-wire connectorised cable. The connector leads are Ground, Vcc, D2, and D1, where the D1 and D2 leads may be digital or analog input or output, depending on the equipment on the Grove modules . The same format also supports I2C (IIC) signalling, and several of the Stem shield connectors are tied to Analog pins 4 and 5 to support it for future I2C-based Twigs.

Most of the Twigs use a 2cm x 2cm format, looking like jigsaw puzzle pieces which fit together with tabs, and bring the Ground and Vcc out to the corners and the D1 and D2 out to each side.
(Request for description from the designer - the pieces don't actually snap together, so I can't tell if there's any way to use the connectors on the edges. Are they meant to connect to header pins on a metric-spaced breadboard? Are they meant to connect I2C Grove module together, or are there other reasons to connect non-I2C Grove modules like that?)

*A circuit diagram would look really nice here.*

Next, let's examine each of our "Grove modules", and then use each on in an example Arduino sketch that we can use with our Seeeduino boards...

Button Twig

This new version of button Grove module contains one independent button, which are configured with pull-down resistor – ready for use with our microcontrollers as digital input. The button signals the SIG wire,NC is not used on this Grove module.
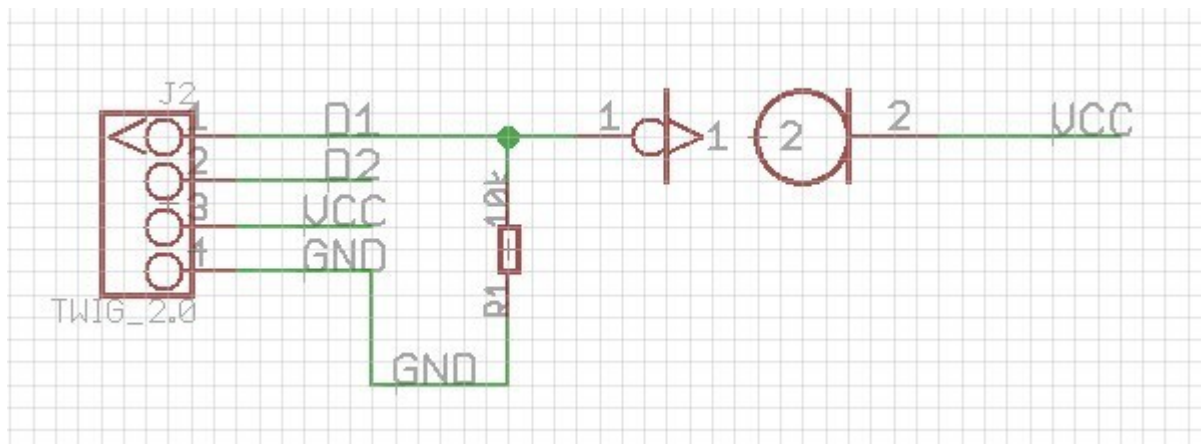
ButtonSchematic
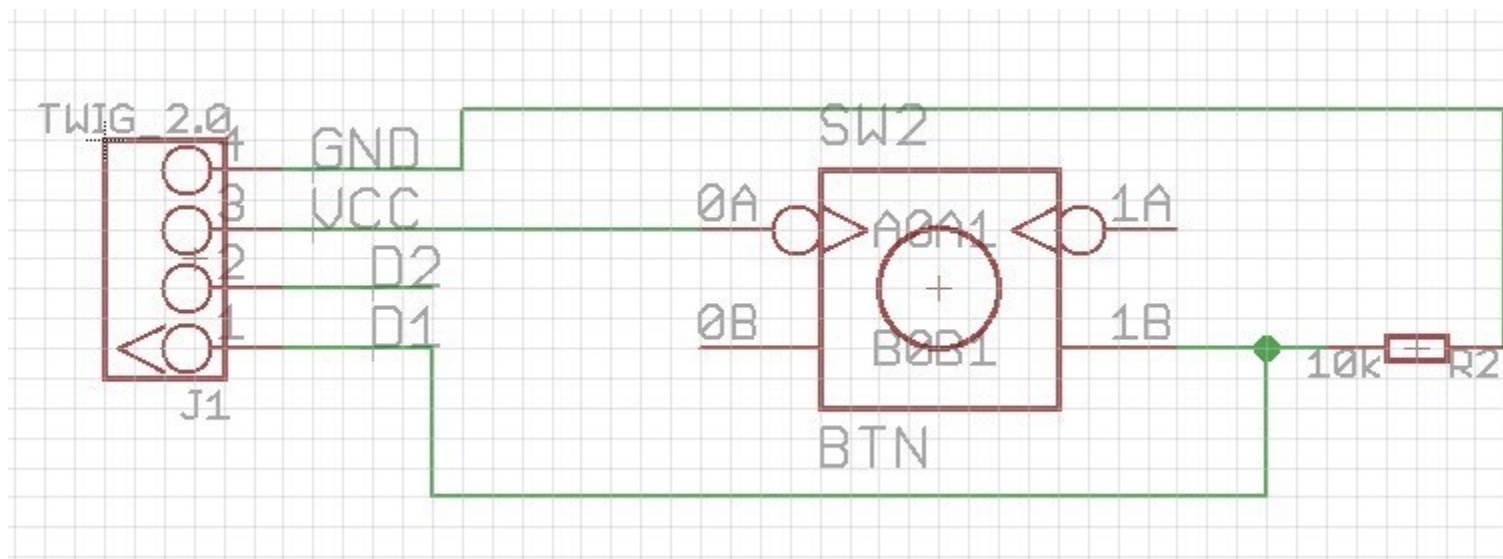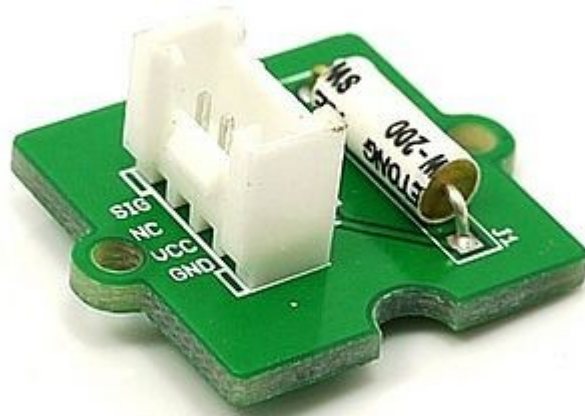
Tilt-switch Twig

The tilt-switch Grove is the equivalent of a button, and is used as a digital input. When the switch is level it is open, and when tilted, the switch closes. It is wired to the SIG line, NC is not used on this Grove . There's a surface-mount resistor .
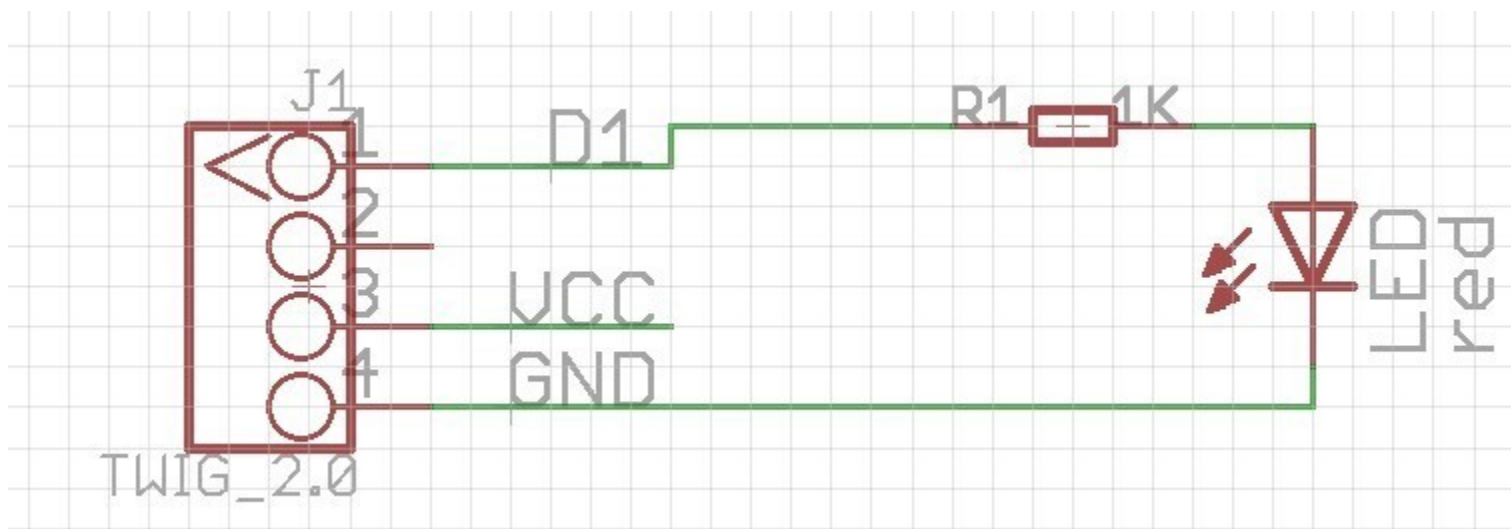
Tilt-switch Twig Schematic

LED Twig

This new version of LED Grove consists of one green LED. It operates from 5V DC. Perfect for use on Seeeduino digital outputs, or also can be controlled using pulse-width modulation. Each LED has a current-limiting resistor, which protects the LED and the Arduino from high current.

LED Twig Schematic

Potentiometer Twig

The potentiometer Grove produces analog output between 0 and Vcc (5V DC with Seeeduino) on its D1 connector. The D2 connector is not used. The angular range is 300 degrees with a linear change in value. The resistance value is 10k ohms, perfect for Arduino use. This may also be known as a "rotary angle sensor".

Potentiometer Schematic

Temperature Sensor Twig
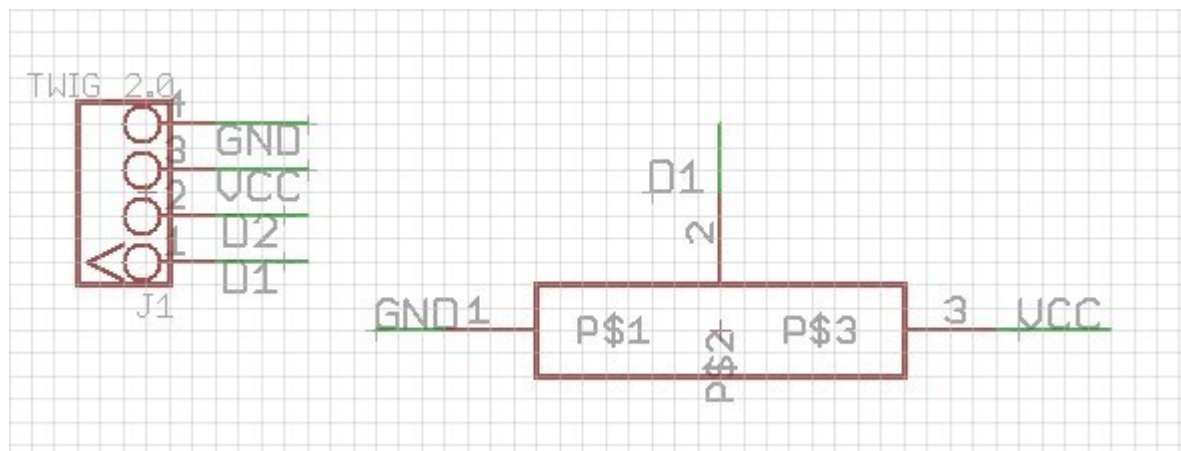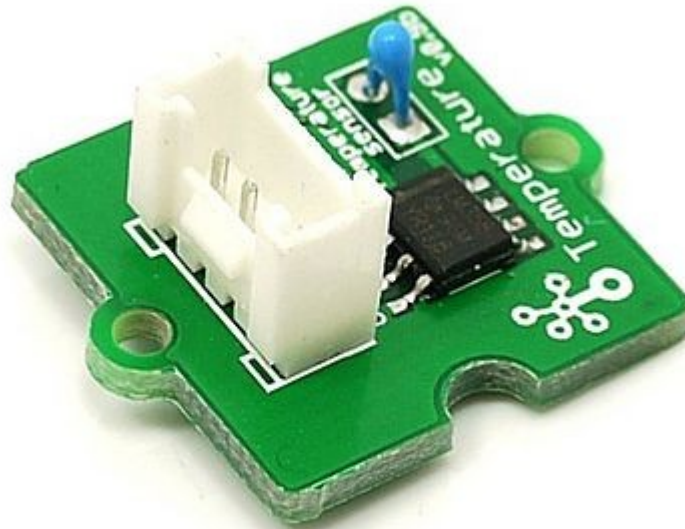
The temperature sensor Grove uses a thermistor which returns the ambient temperature in the form of a resistance value, which is then used to alter Vcc (5V with our Seeeduinos). Our board then converts this voltage value measured by an analog input pin to a temperature. The operating range is -40 to 125 degrees Celsius, with an accuracy of ±1.5ºC.

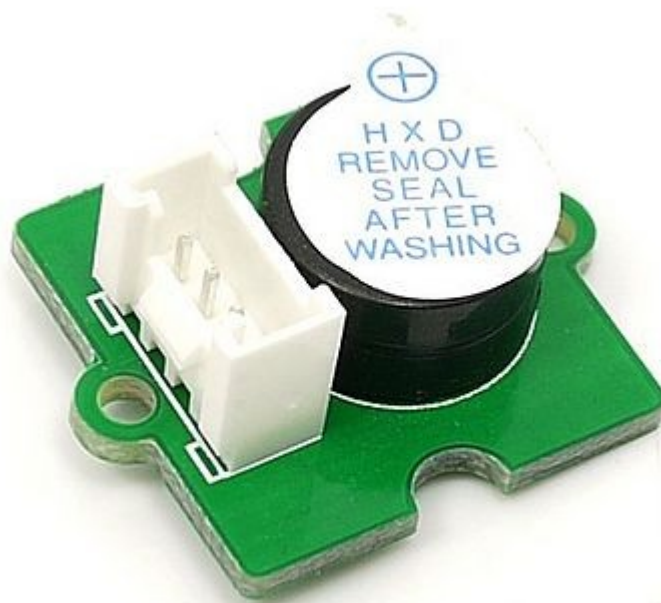As the temperature increases, the resistance value of the sensor decreases:
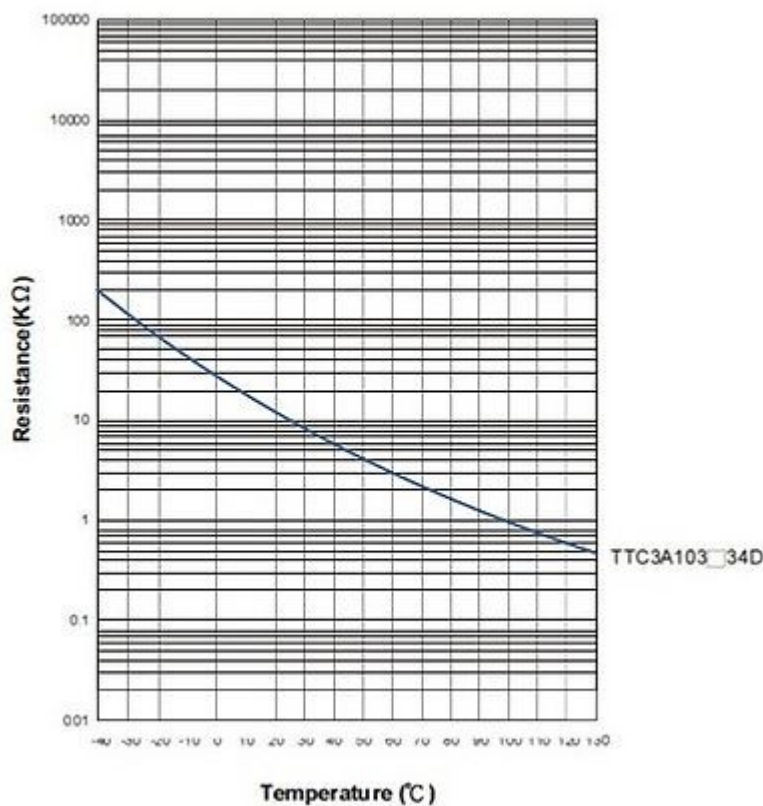
Although the calculation of the actual temperature can seem quite complex, it is simple to execute. For an example of how this is done, please refer to project seven described later in this guide.

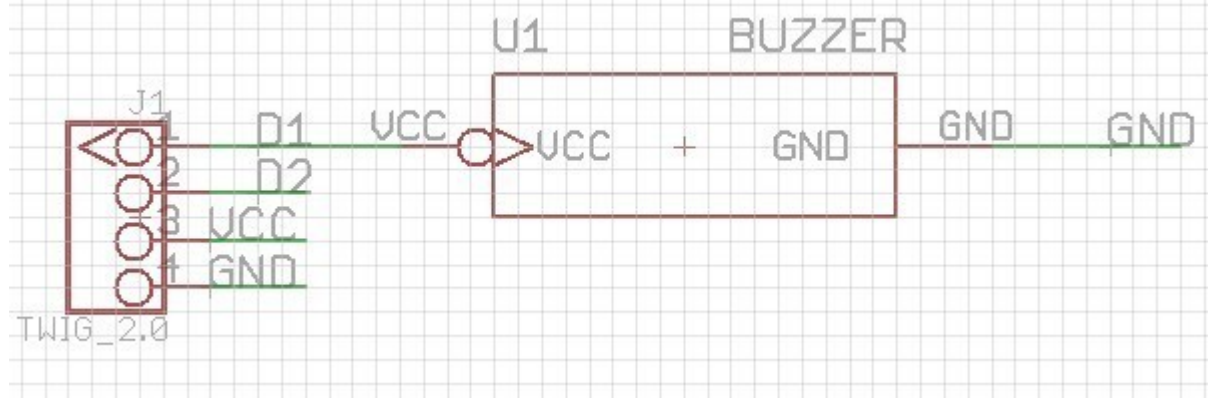**Temperature Sensor Twig Schematic**
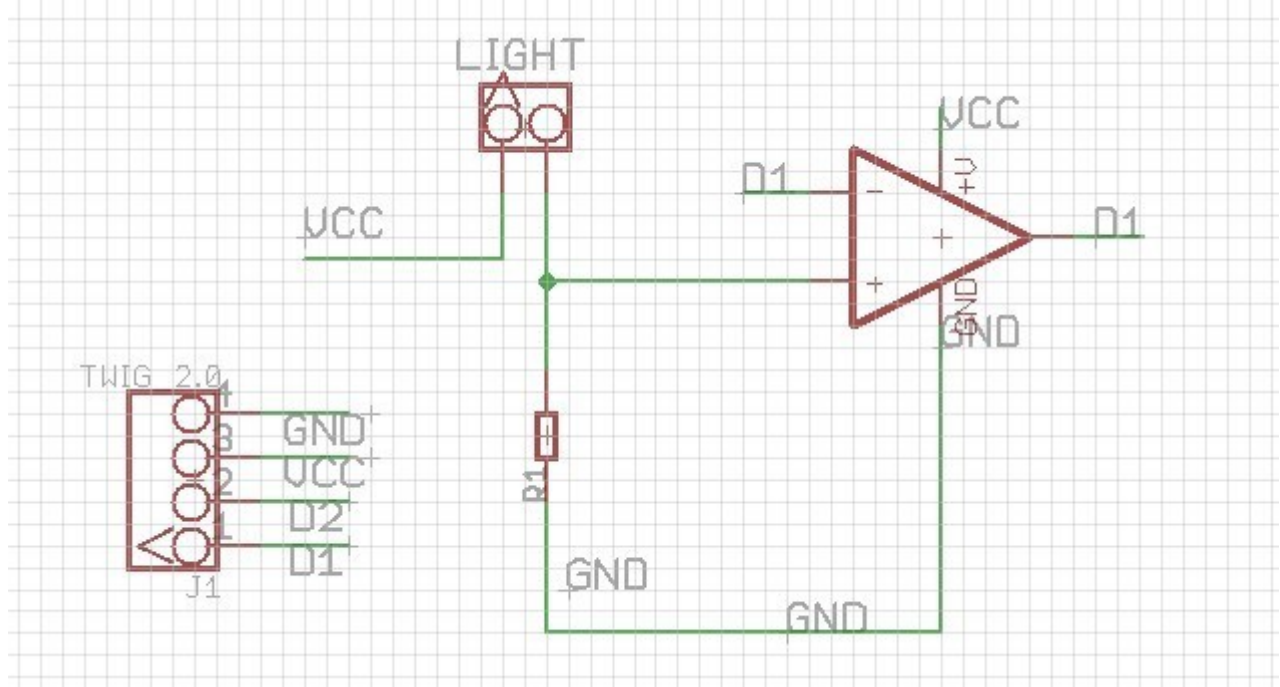
Piezo Buzzer Twig

This is a simple yet enjoyable Grove to use. The piezo can be connected to digital outputs, and will emit a tone when the output is high. Alternatively it can be connected to an analog pulse-width modulation output to generate various tones and effects.

Buzzer Twig Schematic

Relay Twig

The relay Grove is a digital normally-open switch that controls a relay capable of switching much higher voltages and currents than your normal Seeeduino boards. When set to HIGH the LED will light, and the relay will close allowing current to flow. The peak voltage capability is 250V at 10 amps.

Please exercise great care when working with mains voltages – if in doubt contact a professional such as a licensed electrician for help.

Relay Schematic
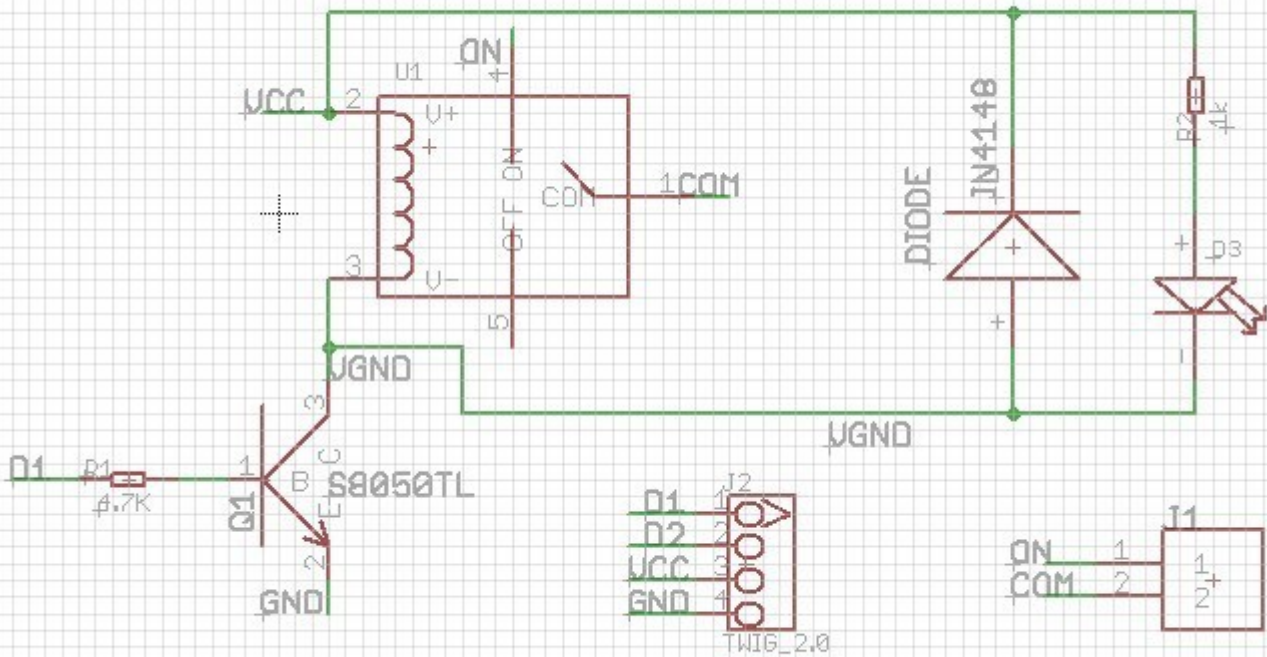
Serial LCD Twig

This consists of two parts, a module holding an 16 character by 2 line LCD, and the Grove itself(most may receive the two-units-soldered together-version). The LCD has an interface that is easily used under the Arduino IDE using the special Seeedstudio SerialLCD library.

Before using your LCD Grove , download the library from:
http://garden.seeedstudio.com/images/1/19/SerialLCD-Library.zip ,**or click** Seeedstudio SerialLCD library. Then extract the "SerialLCD-Library.zip" folder and copy it into your Arduino libaries folder, usually located at **..\Arduino-xx\libraries.**

Please see project six described later on in this guide.For a detailed information on how to use your Serial LCD Grove ,you can go to Twig - Serial LCD page,there are plenty of examples.

Note: when you have connected Serial LCD to Base Shield and downloaded the example to the Seeeduino/arduino, make sure you reset the Seeeduino/arduino first, then push the Serial LCD's reset button.

Protoshield Twig
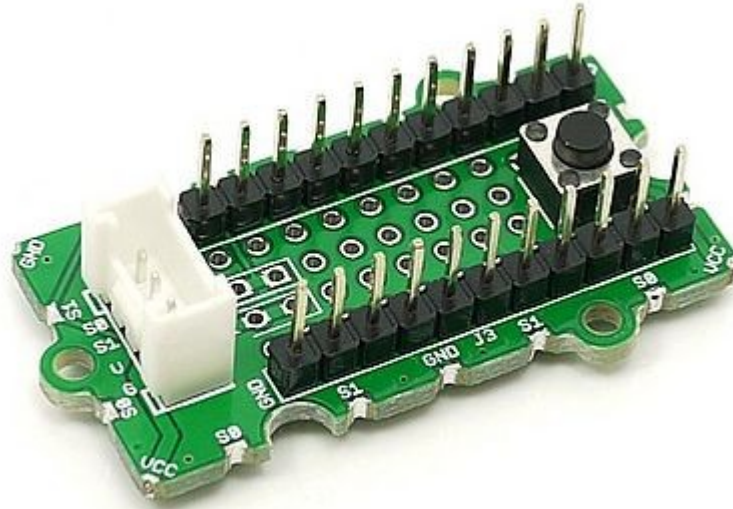
This Grove allows you to add your own circuitry or components to your [Grove system prototypes](). This allows you access to all four lines from the connector cable – S0, S1, VCC and GND. There is also an extra normally-open button to take advantage of. The hole spacing makes using normal DIP-format ICs and other components very simple. You may wish to purchase more for future use in advance.

Features

- **Standardized** – scalable Jigsaw shape, unified 4 pin connector, screw hole grid, edge solder pad, reduce duplicate developing, reuse in different projects to reduce environment impact

- **Compact** – size from 2cm*2 cm, seamless combination, surface mounting components, 2.0mm pitch cable

- **Friendly** – easy buckled connection, dumb proof, various extension modes, open for DIY, libraries and demo codes

- **Plentiful**- large selection of common circuits from basic (button, LED) to professional sensor (Gyro, Compass), keep adding per demand, 3rd party contributions, reusable

- **Community based** – satisfying needs through voting, democratized design, project and recipe sharing, profit sharing business pattern, Renting and Reuse

Usage

Hardware Installation

Here is how to assemble Stardle Bundle with [Starter bundle harness]().
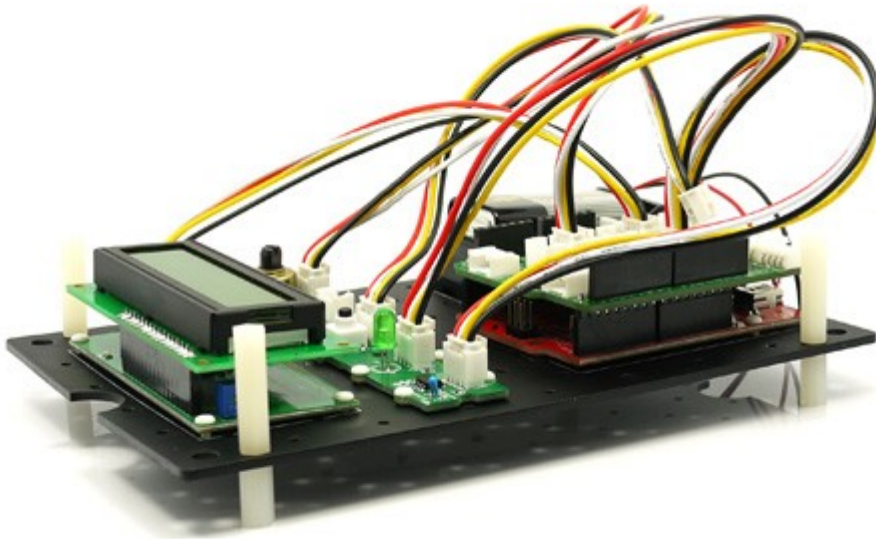
For more infornation you can go to [Starter bundle harness](#).

Example

Now you should be familiar with your Base Shield and [Grove modules](#), so let's examine them in more detail with the following projects:

- [Project One - Blink](#)
- [Project Two - Digital Input v1.0b](#)
- [Project Three – Analog Input v1.0b](#)
- [Project Four – Noise Maker](#)
- [Project Five – Relay Control](#)
- [Project Six – LCD Demonstration](#)
- [Project Seven - Temperature](#)
- [Project Eight - Thermostat](#)

They are written for use with the Arduino environment. All of the following projects can be made with only a [Seeeduino](#) board and the Grove starter bundle. If you have not already done so, download and install the latest version of the [Arduino IDE](#) from: http://arduino.cc/en/Main/Software.

Furthermore, if you are using a [Seeeduino](#) or [Seeeduino Mega](#), make sure you have the switches set to 5V and auto, as such:

This ensures the board is running at 5V DC from the USB cable, and that the board will auto-reset upon uploading your sketch. Otherwise you will have to manually reset your Seeeduino before the sketch starts operation.

By now we hope you have enjoyed experimenting with your Seeeduino and the Grove starter bundle. You will find it simple and convenient to use this system to develop your ideas and prototypes. For technical support please email info@seeedi.com.

In the meanwhile, don't forget to regularly check the Seeedstudio Bazaar website for new Grove modules and other interesting and useful products at: http://seeedstudio.com/depot/

Bill of Materials (BOM) /parts list

FAQ

For more question and suggestions, please list them here:

Support

If you have questions or other better design ideas, you can go to our forum or wish to discuss.

Version Tracker

Revision	Descriptions	Release Date
GROVE Starter Bundle v1.0b	draft release	Dec 31, 2010

Bug Tracker

There is no bug found until now. Have you found? Please write them here, we want to know what you have to say!

Additional Idea

What do you think of our [GROVE System](#) and [GROVE - Starter Bundle](#)? Don't forget that we always welcome your views on our goods and services so that we can continue to meet all your stock requirements. You can write them here or go to [Seeedstudio](#) [Wish](#) page.

Resources

The resources need to be downloaded, like Eagle file, Demo code, project or other datasheet.

Licensing

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External Links

Links to external webpages which provide more application ideas, documents/datasheet or software libraries