GETTING STARTED

Learn to Plug, Sketch and Play with the basic Grove sensors and actuators with the classic Arduino UNO.

Introduction

The Arduino Sensor Kit is a great option for beginners with an Arduino UNO R3 board, who wish to work on their own D.I.Y projects or learn about different sensors and actuators, with minimal effort of both wiring and coding.

The Sensor Kit includes ten exciting Grove modules that can be used individually, or combined to make cool projects. All of the modules use a **Grove connector**, which can then be connected to the Arduino UNO R3 through a **Base Shield** in just a few seconds. The base shield, can then be mounted on to an Arduino UNO R3 board and be programmed through the Arduino IDE.

Note: The modules are mounted to a PCB, which is connected to the base shield. You can leave them like this and no wiring is needed. If you decide to try out individual modules keep in mind that they need to be wired and cannot be put ba (?) Help the main PCB.



Unboxing the tools

Let's take a look at what's included in the Breakout Board of the Arduino Sensor Kit:

- The Base Shield
- 4 Digital modules: LED, Button, Buzzer and a Rotary Angle Sensor
- 5 Sensors: Light, Sound, Barometer, Temperature & Humidity and Accelerometer
- 1 Oled Display
- Learning Materials

The Base Shield

The Base Shield is designed to fit on top of an Arduino UNO R3 board. It comes equipped with 16 grove connectors, which, when placed on top of the UNO R3, provide functionality to various pins. To interact with the components it uses the following pins:

- 7x digital pins D2, D3, D4, D5, D6, D7
- 4x analog pins A0, A1, A2, A3
- 4x I2C pins
- 1x UART pin



Additionally, all pins on the UNO R3 are still accessible with the use of jumper wires.

Note: ** The base shield has a power selector switch (3V3 and 5V) that supplies the modules, **keep it at 5V to follow correctly the content of this kit.



The Modules

The 10 included modules can be connected to the base shield, either through the digital, analog or I2C connectors on the shield. Let's take a quick look at them:





- The Grove Button pushbutton that can either be in a HIGH or LOW state.
- The Grove Potentiometer a variable resistor that increases or decreases resistance when turning its knob.
- The Grove Red LED simple LED that can be turned ON, OFF or dimmed.
- The Grove Buzzer a piezo speaker that is used to produced binary sounds.
- The Grove OLED Display 0.96" a screen that values or messages can be printed to.
- The Grove Light sensor a photoresistor that reads light intensity.
- The Grove Sound sensor a tiny microphone that m
 Help sound vibrations.

- The Grove Air Pressure Sensor (BMP280) reads air pressure, using I2C protocol.
- The Grove Temperature & Humidity sensor reads temperature and humidity at the same time.
- The Grove Accelerometer a sensor used for measuring the orientation, used for detecting movement.

Learning Materials

The kit comes with 10 lessons that will teach you how to connect the different modules, how they work and how they can be programmed. The lessons follow a **Plug-Sketch-Play** approach that allows you to quickly program the modules and understand how they work. **Plug** shows how to connect the components, **Sketch** gives you the program that needs to be uploaded and **Play** defines how you can experiment with the module.

Note: The lessons of the Sensor Kit can be used as reference guides and can be done in any order of your choice.



Arduino tools

In addition to the Grove components and the Base shield, you will need the following Arduino tools to build the projects.

- The Arduino UNO R3 Board
- Arduino Development Environment
- Arduino Sensor Kit library

The UNO R3 Board

To use the Base Shield you need an Arduino UNO R3 board to program the sensors. The Base Shield shares the same pinout as the UNO R3, and can be slotted in at the top of the board with ease. You can visit the Arduino Store to purchase one of the **Arduino UNO R3** that is compatible with the Base Shield.





Note: The Arduino UNO R3 is only included if you have purchased the **Sensor Kit Bundle**. The **Sensor Kit Base does not** come with the UNO R3 Board and you will bave to purchase the Arduino UNO R3 separately.

Development Environments

We also recommend you to use the official Arduino IDE, which is used for microcontroller software programming. The is both an online and an offline version of the IDE which is free to use by anyone.

Arduino Web Editor - the online editor (which also reate account).

 Arduino Offline IDE - the offline editor that can compile and run Sketches without an internet connection.



The Sensor Kit library

The **Arduino Sensor Kit Library** is a wrapper library which allows to interact with the accelerometer, air pressure sensor, temperature sensor and the OLED display. This library provides easy-to-use APIs that will help you build a clear mental model of the concepts you will be using.



Setting up the environment

Before you get started with the lessons and playing with the modules, we recommend you to set up the development environment. Follow the steps below to ensure that you have everything you need.

1. Select your IDE

Start by deciding on your preferred IDE that you will be using to write your Sketches.

The Offline IDE

The Offline IDE has a easy setup process. Download and Install **Arduino IDE** for your desired operating system here.

The Online IDE

If you decide to use the Web Editor, you only need to **create an account** and install **the Create plugin**. No other installations are required.

2. Add the Sensor Kit library

In the Offline IDE, open the **Library Manager** from **Tools > Manage Libraries**, look for the Arduino Sensor Kit Library and Install it.





For the Online IDE, you don't need to download the library, but you might need to search for it in the Libraries tab. Once it shows up, click on include to add it to your sketch file.



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3. Connect your Base Shield

Remove the Grove Base shield and the modules from the breakout board. You can also leave the modules attached to the breakout board if you prefer. Connect the base shield to your Arduino board and connect the board to your computer.



4. Plug-in the Modules

Let's try to control the **Grove Red LED module** through the **Grove Button module**. Connect one end of the Grove cable to the Grove Red LED module and the other end to pin **D6** of the Grove Base Shield. Similarly connect the Grove Button module to pin **D4**.





Note: If you havent taken the modules out of the breakout board, then you dont have to connect them using the Grove cables. Instead, the modules are already connected to the Grove Base Shield.

5. Upload the Sketch

Next, you will have to upload the *PlugSketchPlay* sketch to activate the LED through the button. This sketch can be found inside **File > Examples > Arduino Sensor Kit > Plug_Sketch_Play**



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To upload a sketch to an Arduino board, we first need to connect the board and click **Tools > Port** to select the correct port.

For **Windows** users, the board is generally connected through the **COMX** ports. For **Mac OS** users, it should be the **/dev** ports.



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In the upper left corner of both the online and offline versions of the Arduino IDE, there are two buttons, **Verify and Upload**. First, press the Verify button(\checkmark) to compile. When the compilation is successful, press the upload button(\rightarrow).

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6. Play with the Modules

After uploading the Sketch, press the button to turn the LED on and release the button to turn the LED off. Quite easy right? In a similar manner, you can easily connect other Grove modules and program them using the Arduino tools. Check out the lessons on how to connect, program and understand the individual modules.

