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Electric Imp impExplorer Kit

The Electric Imp impExplorer™ Kit is the ideal basis for building self-contained connected devices. It includes not only a trio of temperature and humidity, motion, and pressure sensors, but also an RGB LED for visible feedback. In addition, it provides Grove System headers for expansions. Two of these connectors are intended for I²C peripherals, the others for analog and/or digital devices.

Project Files

- Schematics (/docs/attachments/hardware/reference/explorerkit/impee-sensor-kit-rev1.2-schematic-20160901.pdf)
- Gerber Files (/docs/attachments/hardware/reference/explorerkit/impee-sensor-kit-rev1.2-gerber-20160901.zip)
- Bill of Materials (/docs/attachments/hardware/reference/explorerkit/impee-sensor-kit-rev1.2-bom-20160901.xls)
- Altium Source Files (/docs/attachments/hardware/reference/explorerkit/impee-sensor-kit-rev1.2-altium-20160901.zip)

Power

The impExplorer Kit can be powered either by a standard mini USB cable fed from an AC adaptor or a suitable (ie. powered) USB port on another device, such as a computer, TV or set-top box. The Kit's USB port is wired for power only — no data can be exchanged this way.

The underside of the impExplorer Kit is fitted with a holder for three AA batteries. If you choose to fit rechargeable cells, please be aware that the impExplorer Kit does not include charge management circuitry — your cells will need to be recharged externally.

The impExplorer Kit will always use USB power, if present, in preference to battery power.

Power Gate

The impExplorer Kit is power gated, with control of the gate applied to **hardware.pin1**. To support high-power (5V) peripherals, such as the the RGB LED, and to make use of the Grove Analog/Digital ports, make sure you include the following line at the start of your device code:

```
hardware.pin1.configure(DIGITAL_OUT, 1);
```

Note Because the impExplorer Kit's three built-in sensors use **hardware.pin1** as their interrupt trigger, you will not be able to use this aspect of their functionality if you also wish to make use of the RGB LED and/or Grove Analog/Digital ports.

impExplorer Kit Sensors

The impExplorer Kit incorporates three components for environment sensing:

Sensor	Measured Quantity	I²C Address (8-bit)	Datasheet
HTS221	Temperature and humidity	0xBE	Link (http://www.st.com/content/ccc/resource/technical/document/datasheet/4d/9a/9c/ad/25/07/42/34/DM00116291.pdf/files/DM00116291.pdf/jcr:co
LIS2DH12	Motion in three axes	0x32	Link (http://www.st.com/content/ccc/resource/technical/document/datasheet/12/c0/5c/36/b9/58/46/f2/DM00091513.pdf/files/DM00091513.pdf/jcr:co
LPS22HB	Air pressure	0xB8	Link (http://www.st.com/content/ccc/resource/technical/document/datasheet/bf/c1/4f/23/61/17/44/8a/DM00140895.pdf/files/DM00140895.pdf/jcr:co

All three sensors operate over I²C and connect to the on-board imp001's **hardware.i2c89** bus. In addition, each sensor has an interrupt line used for signalling critical value alerts. All of these lines connect to the imp001's **hardware.pin1**: an interrupt from any of the sensors will cause **hardware.pin1** to be high.
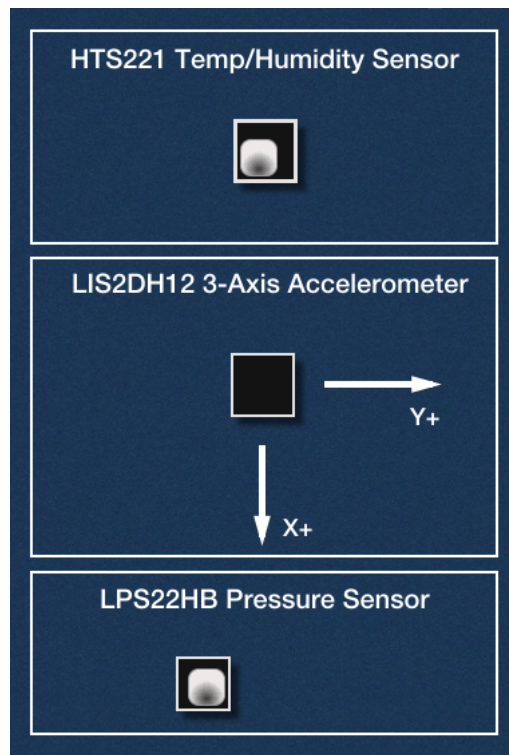
All of the sensors can be easily accessed in application code using the following Electric Imp libraries:

```
#require "HTS221.class.nut:1.0.0"
#require "LPS22HB.class.nut:1.0.0"
#require "LIS3DH.class.nut:1.3.0"
```

Note The LIS2DH12 intentionally makes use of the LIS3DH library as these two devices are functionally equivalent.

RGB LED

The impExplorer Kit's RGB LED is a WS2812 device which can be accessed via the imp001's **hardware.spi257** bus set to *MSB_FIRST* mode and a speed of 7500KB/s. Only imp001 pin 7 is actually used in this role, so it is possible to make use of the Grove Analo/Digital ports *(see below)*, which operate from **hardware.pin2** and **hardware.pin5**. It you are making use of the LED and either of these pins with Grove sensors, you should configure the LED first and then configure the Grove sensors.

The LED is best driven in application code via Electric Imp's WS2812 library: add

```
#require "WS2812.class.nut:2.0.2"
```

to the top of your device code. You will also need to add the following line at the start of your device code:

```
hardware.pin1.configure(DIGITAL_OUT, 1);
```

Grove System Headers

The impExplorer Kit incorporates four Grove System-compatible headers, each of which connects to a four-wire cable with two data wires (yellow and white) plus 3V3 (red) and GND (black). For more information on the Grove System, please see the Seeed Wiki (http://wiki.seeed.cc/Grove_System/).
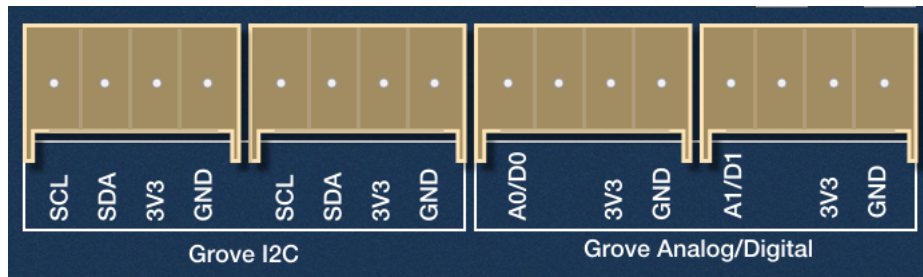
I²C

The data wires can be used to drive a variety of Grove-compatible devices, though only those which operate over I²C are supported by the impExplorer Kit's two Grove I²C headers, both of which connect to the imp001's **hardware.i2c89** bus. The yellow wire provides the clock line; the white wire the data line. Only 3V3 I²C devices are supported.

Analog and Digital

The other two headers are intended for Grove Analog and/or Grove Digital peripherals — the two headers are connected to the imp001's **hardware.pin2** and **hardware.pin5** (A0/D0 and A1/D1, respectively). These pins connect to the headers' primary data wires (yellow) **only** — the headers' secondary wires (white) are disconnected.

For Analog/Digital operation, you will need to add the following line at the start of your device code:

```
hardware.pin1.configure(DIGITAL_OUT, 1);
```

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