TinkerKit - LAB

Code: K000005
The **Scuola Lab** is a complete pack of different TinkerKit Modules and Arduino accessories to kickstart your school's Lab.

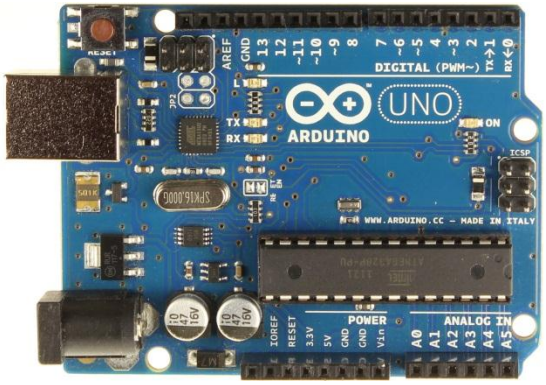
The **Scuola Lab** consists in 10 Sensor Shield V.2, 10 Arduino Uno Boards, every kind of sensors and actuators in different quantities, 2 Ethernet Shields, 10 Proto PCBs, 5 Kit Workshop Without Arduino and a copy of "Getting Started With Arduino" by Massimo Banzi.

Part List

- Arduino Uno Board x10
- Proto PCB x10
- 15mm Strip 6 and 8 ways x10
- strip 40x1 x4
- Kit Workshop Base Level Without Arduino Board x5
- Ethernet Shield x2
- Getting Started With Arduino x1
- Sensor Shield V.2 x10
- Button Module x4
- LDR Module x2
- Tilt Module x2
- Therm Module x2
- Accelerometer Module x3
- Hall Sensor x4
- Rotary Potentiometer Module x5
- Linear Potentiometer Module x4
- Touch Sensor Module x5
- Joystick Module x5
- Relay Module x5
- Mosfet Module x5
- High Power Led Module x2
- 5mm Green Led Module x2
- 5mm Yellow Led Module x2
- 5mm Red Led Module x2
- 10mm Green Led Module x2
- 10mm Blue Led Module x2
- 10mm Yellow Led Module x2
- 10mm Red Led Module x2
- 20cm Cables x20
- 50cm Cables x10
- 100cm Cables x5
- Usb Cables A/B x10

Arduino Uno Rev3

Code: A000066



The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.
Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.
Revision 3 of the board has the following new features:

1.0 pinout: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible both with the board that use the AVR, which operate with 5V and with the Arduino Due that operate with 3.3V. The second one is a not connected pin, that is reserved for future purposes.
Stronger RESET circuit.
Atmega 16U2 replace the 8U2.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

Summary

Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz

The **Arduino Prototyping Shield PCB** makes it easy for you to design custom circuits for your next Arduino project.

You can **solder parts** to the prototyping area to create your project, or use it with a small solderless breadboard (not included) to quickly test circuit ideas without having to solder. It's got extra connections for all of the Arduino I/O pins, and it's got space to mount through-hole and surface mount integrated circuits if you need to as well. It's a **convenient way to make your custom circuit** and Arduino into a single module.

Hundreds of thousands of Arduino boards are already fueling people's creativity all over the world, everyday. **Join us now, Arduino is you!**

Summary

- Requires and Arduino board (not included)
- Arduino 1.0 pinout
- Large 0.1 prototyping area
- Reset button
- 14 pin SMD footprint (50 mils pitch)
- 20 pin Trough Hole footprint (100 mils pitch)
- SPI header
- long and easy-to-solder ground / 5V rails

The 1.0 standard pinout consist in 4 additional pins: 2 of them placed near the AREF pin, that are used for TWI communication, and the other 2 are placed near the RESET pin. The IOREF pin is used to adapt the shield to the board on which is mounted. The last one is not connected and is reserved for future uses.

If you want to give a closer look to this shield we advise you to visit the official Proto Shield page in the Hardware Section.

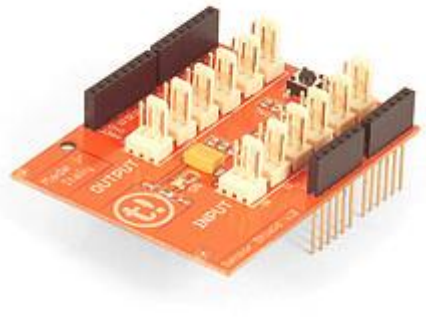
The Arduino Ethernet is a microcontroller board based on the Arduino Uno, and incorporating a WizNet W5100 TCP/IP Embedded Ethernet Controller. It can be programmed like an Uno via a six-pin FTDI -style serial connector. The Arduino USB 2 Serial adapter or any FTDI-style USB-to-serial connector can be used to program it.

Additional features coming with the R3 version are:

- 1.0 pinout: added SDA and SCL pins for TWI communication placed near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board and the second one is a not connected pin, that is reserved for future purposes.
- stronger RESET circuit.

A separate power-over-Ethernet (PoE) module can be soldered to the board to provide power from a conventional twisted pair Category 5 Ethernet cable. It is IEEE802.3af compliant, and works with all compliant PoE injectors currently available.

The **Sensor Shield v.2** allows you to hook up the TinkerKit **SENSORS** and **ACTUATORS** directly to the Arduino, without the use of the breadboard.



It has 12 standard TinkeKit 3pin connectors. The 6 labeled **I0** through **I5** are **Analog Inputs**. The ones labeled **O0** through **O5** are **Analog Outputs** connected to the PWM capable outputs of the Arduino Board (it is possible to change these to Digital Inputs, in which case they will report either HIGH or LOW, but nothing in between).

On a Standard Arduino DuemilaNove board the pins are:
Pin 11 on the Arduino is O0 on the shield.
Pin 10 on the Arduino is O1 on the shield.
Pin 9 on the Arduino is O2 on the shield.
Pin 6 on the Arduino is O3 on the shield.
Pin 5 on the Arduino is O4 on the shield.
Pin 3 on the Arduino is O5 on the shield.

Module description: A green LED signals that the shield is correctly powered, a standard 6mm pushbutton allows you to RESET the board.

The **4pin TWI socket** allows communication to any device supporting the I2C protocol through the Wire library on Arduino. 5V and Ground are provided on the socket. Note that on Arduino the I2C bus uses Analog Input 4 and 5, using the TWI connection precludes the use of those analog inputs.

The **4pin SERIAL socket** allows the board to communicate with other devices that support serial communication. 5V and Ground are provided on the socket for your convenience.

Note: If you're sending or receiving data to and from the computer this serial connector is not available.

Two mounting holes are provided in the same position found on the Arduino board. A third hole allows you to see the led connected to pin 13 of the Arduino.

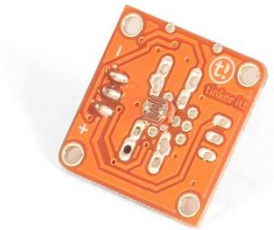
The **Pushbutton Module** is possibly the simplest sensor available. It detects when a person or an object presses on its circular cap.

Output:This module outputs 5v when the button is pressed and 0v when released. Pressing the button closes the circuit. When connected to an input on the Arduino using the TinkerKit Shield, you can expect a value of 1023 while the button is pressed and 0 when released.

Module Description: This module features a 12mm pushbutton , the standard TinkerKit 3pin connector, a green LED that signals that the module is correctly powered and a yellow LED that is lit only when the button is pressed.

This module is a **SENSOR**. The connector is an **OUTPUT** which must be connected to one of the **INPUT** connectors on the **TinkerKit Shield**

LDR (or **Light Dependant Resistor**, or **Photoresistor**) is a variable resistor. Light falling on the sensor decreases its resistance.



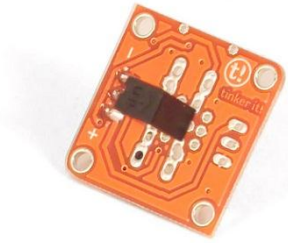
Output: This module outputs 5v when the sensor receives no light (the circuit is open) and 0v when exposed to bright light (the circuit is closed). When

connected to an input on the Arduino using the TinkerKit Shield, you can expect to read values from 0 to 1023.

Module Description: This module features a Light Dependent Resistor, a signal amplifier, the standard TinkerKit 3pin connector, a green LED that signals that the module is correctly powered and a yellow LED whose brightness changes according to the amount of lightness.

This module is a **SENSOR**. The connector is an **OUTPUT** which must be connected to one of the **INPUT** connectors on the **TinkerKit Shield**.

The **Tilt Sensor** can detect when it is at an angle.

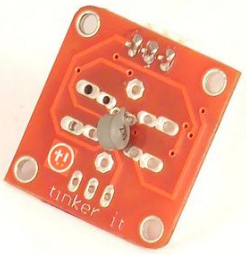


Output: This module contains two contacts and a small metal ball. When the sensor is in its upright position, the ball bridges the two contacts, completing the circuit. When the board is tilted, the ball moves, and the circuit opens. When upright, the module outputs 5V and when it is tilted, it outputs 0V. When connected to an input on the Arduino using the TinkerKit Shield, you can expect to read a value of 1023 when in its upright position and 0 when it is titled.

Module description: this module features a Tilt Sensor, a signal amplifier, the standard TinkerKit 3pin connector, a green LED that signals that the module is correctly powered and a yellow LED that lights up when a connection is made (the sensor is upright).

This module is a **SENSOR**. The connector is an **OUTPUT** which must be connected to one of the **INPUT** connectors on the TinkerKit Shield.

The **Thermistor** is a resistor whose resistance varies significantly (more than in standard resistors) with temperature.



Output: This module's output approches 5v as the temperature increases. As the temperature decreases, it approaches 0V. When connected to an input on the Arduino using the TinkerKit Shield, expect to read values between 0 and 1023

(NB: any changes in the values will be slow and may not vary a great deal).

Module Description: This module features a Thermistor, a signal amplifier, the standard TinkerKit 3pin connector, a green LED that signals that the module is correctly powered and a yellow LED whose brightness changes according to the temperature.

This module is a **SENSOR**. The connector is an **OUTPUT** which must be connected to one of the **INPUT** connectors on the **TinkerKit Shield**.

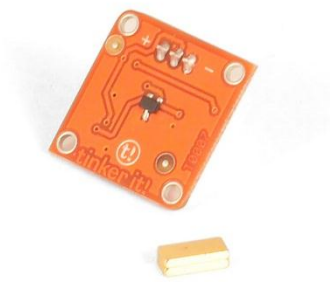
An **accelerometer** is a device that measures acceleration. It is very common in consumer electronics such as portable electronic devices and video game controllers to detect movement using accelerometers.

Output: This module outputs 0V to 5V on one of its two signal pins when its G-force is changed (e.g. is moved). The value is approximately 2.5V when there is 0G on the X or Y axis. When you connect this module to the input on an Arduino using the TinkerKit Shield, you can expect to read values between 0 to 1023 while moving the module.

Module description: On the back of the module you can find two signal amplifier and a green LED that signals that the module is correctly powered. The module is based on the LIS344AL by ST Microelectronics, and is a three-axis acceremoter. You can get data about the third axis (referred to as Z) by soldering a header to the thru-hole labeled "Z".

This module is a **SENSOR**. The connector is an **OUTPUT** which must be connected to one of the **INPUT** connectors on the **TinkerKit Shield**.

A **Hall sensor** creates a voltage related to the magnetic field around the sensor. This can be used to detect distance from a nearby magnet. Hall sensors can also be used to detect the magnetic field induced in a wire or coil.



Output: This module outputs 5v when a magnetic field (e.g. a human body) is close to the sensor, and roughly 0v when there is nothing nearby. When connected to an input on the Arduino using the TinkerKit Shield, you can see values between 0 (no presence) and 1023 (presence detected).

Module description: An Hall Sensor is mounted on a standard TinkerKit board; on the back of the module you can find a signal amplifier, a green LED that signals that the module is correctly powered and a yellow LED whose brightness depends on the values output by the module.

NB: There are exposed electrical contacts on the sensor surface - be careful to not touch the board with metallic objects, you may cause a short.

This module is a **SENSOR**. The connector is an **OUTPUT** which must be connected to one of the **INPUT** connectors on the **TinkerKit Shield**.

A **Potentiometer** is a commonly used variable resistor. Turning the knob, you vary the output voltage between 0 and 5V. This value is sent through the middle pin of the pot.

Output: This module outputs 5v when turned in one direction, and 0v when turned in the opposite way. When connected to an input on the Arduino using the TinkerKit Shield, you can expect to read values between 0 and 1023.

Module Description: This module features a 4k7 Ohm linear potentiometer, a signal amplifier, the standard TinkerKit 3pin connector, a green LED that signals that the module is correctly powered and a yellow LED whose brightness changes according to the position of the potentiometer.

This module is a **SENSOR**. The connector is an **OUTPUT** which must be connected to one of the **INPUT** connectors on the **TinkerKit Shield**.

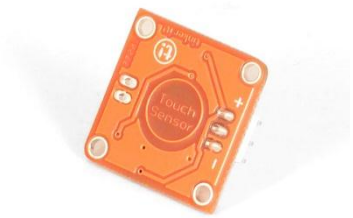
A **Linear Potentiometer** is a commonly used variable resistor. It can often be found as a volume controller on radios and TVs. By moving the slider you can vary the output voltage between 0 and 5V. This value is sent through the middle pin of the pot.

Output: This module outputs 5v when the slider is at one end and 0v when moved in the opposite way. When connected to an input on the Arduino using the TinkerKit Shield, you can expect to read values going from 0 to 1023.

Module Description: this module features a 4k7 Ohm linear potentiometer, a signal amplifier, the standard TinkerKit 3pin connector, a green LED that signals that the module is correctly powered and a yellow LED whose brightness changes according to the position of the potentiometer.

This module is a **SENSOR**. The connector is an **OUTPUT** which must be connected to one of the **INPUT** connectors on the **TinkerKit Shield**.

The **Touch Sensor** is sensitive to skin contact.



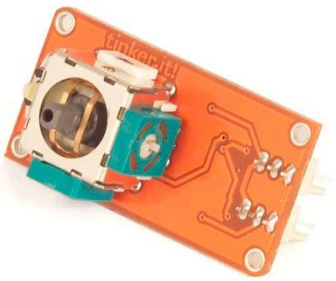
Output: This module normally outputs 0v, but when touched, sends 5v. When connected to an input on the Arduino using the TinkerKit Shield, you will see 0 when there is no touch, and 1023 when touched.

Module Description: on the back of the module you can find a signal amplifier, a capacitor, a QT 100A single touch controller, a green LED that signals that the module is correctly powered and a yellow LED whose brightness depends on the values output by the module.

Please note this device performs an auto calibration when it is turned on, so if someone is touching the switch surface when it is turned on it will not work. To reset, cycle power and make sure no one is touching it as you restart.

This module is a **SENSOR**. The connector is an **OUTPUT** which must be connected to one of the **INPUT** connectors on the **TinkerKit Shield**.

The **Joystick module** is similar to analog joysticks found in gamepads. It is made made by mounting two potentiometers at a 90 degrees angle. The potentiometers are connected to a short stick centered by springs.

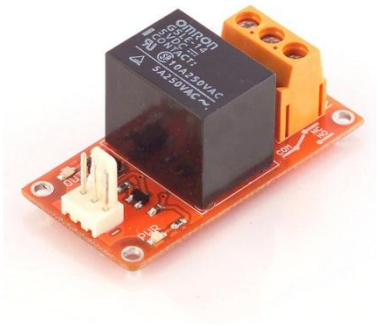


Output: This module will output roughly 2.5 volts from both outputs when in its resting position. Moving the stick will cause the outputs to change from 0v to 5v depending on its direction. If you connect this module to an Arduino through the Tinkerkit Shield, you can expect to read a value of roughly 512 in its resting position (expect small variations due to tiny imprecisions of the springs and mechanism) When you move the joystick you should see the values change from 0 to 1023 depending on its position.

Module Description: This module features two 4k7 Ohm linear potentiometers, two standard TinkerKit 3pin connector, two signal amplifiers, a green LED that signals that the module is correctly powered and two yellow LED whose brightness depends on the values output by the module.

This module is a **SENSOR**. Its connectors are **OUTPUTs** which must be be connected to two of the **INPUT** connectors on the TinkerKit Shield.

A **relay** is an **electrically operated switch** that allows you to turn on or off a circuit using voltage and/or current much higher than the Arduino could handle. There is no connection between the low voltage circuit operated by Arduino and the high power circuit. The relay protects each circuit from each other.



Warning: We don't recommend you operate circuits powered at more than 24V without the supervision of an expert.

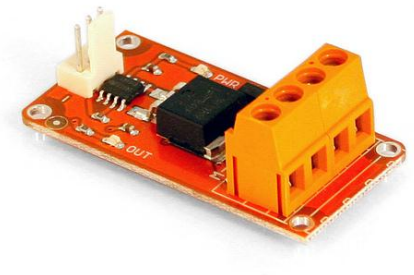
Input: The relay is a simple mechanical on/off switch. It activates when the input reaches 5v and turns off when the input is 0v. You can control it though the digitalWrite() function on Arduino.

The module provides three connections labeled **COM**, **NC** and **NO**. **NC** stands for "**NORMALLY CLOSED**". This means that when the relay has no signal (LOW or 0V from an Arduino), the connected circuit wil be active; conversely, if you apply 5V or pull the pin HIGH, it will turn the connected circuit off. **NO** stands for "**NORMALLY OPEN**", and functions in the opposite way; when you apply 5V the circuit turns on, and at 0V the circuit turns off. Relays can replace a manual switch. Remove the switch and connect its wires to**COM** and **NO**. When the relay is activated the circuit is closed and current can flow to the device you are controlling.

Module Description: this module features an 250v 10A mounted on a 2 module TinkerKit board, one standard TinkerKit 3pin connector, one transistor, a green LED that signals that the module is correctly powered and an yellow LED that indicates when the relay is active.

This module is an **ACTUATOR**. The connector is an **INPUT** which must be connected to one of the **OUTPUT** connectors on the **TinkerKit Shield**.

This module switches a high current load using a high power transistor. Unlike a mechanical relay, this is capable of high speed switching for use with PWM.

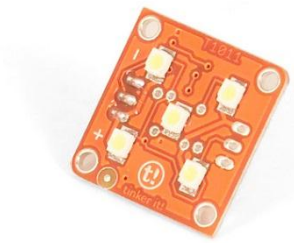


Input: This module lets you control devices operating at a maximun of 24VDC with an Arduino pin. To wire the module, connect the power supply for your device (max 24 V) to the V+ and GND terminals. Connect the device to M+ and M-. Be aware of your circuit's polarity, you could damage your components if it is not wired correctly.

Module Description: This module features an IRF520 power MOSFET transistor, a kick-back diode, a standard TinkerKit 3pin connector,a signal amplifier, a green LED that signals that the module is correctly powered and one yellow LED whose brightness depends on the input signal received by the module.

This module is a **ACTUATOR**. The connector is an INPUT that must be connected to an **OUTPUT** on the **TinkerKit Shield**.

The **Power LED** is an actuator. Five ultra-bright LEDs can be powered from an Arduino pin. **Input**: Arduino provides a maximum of 40 mA per pin, enough to light up the five LEDs using the DigitalWrite() and AnalogWrite() functions.



Module description: This module features Five **AWT801-S LEDs from Seoul Semi Conductor**, the standard TinkerKit 3pin connector and a green LED that signals that the module is correctly powered and a yellow LED that is lit only when the LED is lit. A resistor limits the voltage from the Arduino, protecting the lights.

This module is an **ACTUATOR**. The connector is an **INPUT** which must be connected to an **OUTPUT** connector on the **TinkerKit Shield**.

The **LED** is possibly the simplest actuator available. It's a low power light source available in many colors. It lights up when powered from an Arduino pin.

Input: Arduino provides a maximum of 40 mA per pin; this is enough to light up the LED through the **digitalWrite()** and **analogWrite()** functions.

Module description: This module features a 5mm Blue Light Emitting Diode, the standard TinkerKit 3pin connector and a green LED that signals that the module is correctly powered and a tiny yellow LED that shows the current brightness of the blue LED. A resistor provides the optimal amount of current when connected to an Arduino.

This module is an **ACTUATOR** therefore the connector is an INPUT that need to be connected to one of the **OUTPUT** connectors on the **TinkerKit Shield**.

The **LED** is possibly the simplest actuator available. It's a low power light source available in many colors. It lights up when powered from an Arduino pin.

Input: Arduino provides a maximum of 40 mA per pin; this is enough to light up the LED through the **digitalWrite()** and **analogWrite()** functions.

Module description: this module features a 5mm Green Light Emitting Diode, the standard TinkerKit 3pin connector and a green LED that signals that the module is correctly powered and a tiny yellow LED that shows the current brightness of the main green LED. A resistor provides the optimal amount of current when connected to an Arduino.

This module is an **ACTUATOR** therefore the connector is an INPUT that need to be connected to one of the **OUTPUT** connectors on the **TinkerKit Shield**.

The **LED** is possibly the simplest actuator available. It's a low power light source available in many colors. It lights up when powered from an Arduino pin.

Input: Arduino provides a maximum of 40 mA per pin; this is enough to light up the LED through the **digitalWrite()** and **analogWrite()** functions.

Module description: this module features a 5mm Yellow Light Emitting Diode, the standard TinkerKit 3pin connector and a green LED that signals that the module is correctly powered and a tiny yellow LED that shows the current brightness of the yellow LED. A resistor provides the optimal amount of current when connected to an Arduino.

This module is an **ACTUATOR** therefore the connector is an INPUT that need to be connected to one of the **OUTPUT** connectors on the **TinkerKit Shield**.

The **LED** is possibly the simplest actuator available. It's a low power light source available in many colors. It lights up when powered from an Arduino pin.

Input: Arduino provides a maximum of 40 mA per pin; this is enough to light up the LED through the **digitalWrite()** and **analogWrite()** functions.

Module description: This module features a 5mm Red Light Emitting Diode, the standard TinkerKit 3pin connector and a green LED that signals that the module is correctly powered and a tiny yellow LED that shows the current brightness of the red LED. A resistor provides the optimal amount of current when connected to an Arduino. This module is an **ACTUATOR** therefore the connector is an INPUT that need to be connected to one of the **OUTPUT** connectors on the **TinkerKit Shield**.

The **LED** is possibly the simplest actuator available. It's a low power light source available in many colors. It lights up when powered from an Arduino pin.

Input: Arduino provides a maximum of 40 mA per pin; this is enough to light up the LED through the **digitalWrite()** and **analogWrite()** functions.

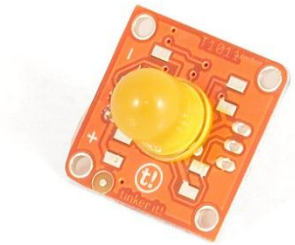
Module description: this module features a 10mm Green Light Emitting Diode, the standard TinkerKit 3pin connector and a green LED that signals that the module is correctly powered and a tiny yellow LED that shows the current brightness of the large green LED. A resistor provides the optimal amount of current when connected to an Arduino. This module is an **ACTUATOR** therefore the connector is an INPUT that need to be connected to one of the **OUTPUT** connectors on the **TinkerKit Shield**.

The **LED** is possibly the simplest actuator available. It's a low power light source available in many colors. It lights up when powered from an Arduino pin.

Input: Arduino provides a maximum of 40 mA per pin; this is enough to light up the LED through the **digitalWrite()** and **analogWrite()** functions.

Module description: this module features a 10mm Blue Light Emitting Diode, the standard TinkerKit 3pin connector and a green LED that signals that the module is correctly powered and a tiny yellow LED that shows the current brightness of the blue LED. A resistor provides the optimal amount of current when connected to an Arduino. This module is an **ACTUATOR** therefore the connector is an INPUT that need to be connected to one of the **OUTPUT** connectors on the **TinkerKit Shield**.

The **LED** is possibly the simplest actuator available. It's a low power light source available in many colors. It lights up when powered from an Arduino pin.



Input: Arduino provides a maximum of 40 mA per pin; this is enough to light up the LED through the **digitalWrite()** and **analogWrite()** functions.

Module description: this module features a 10mm Yellow Light Emitting Diode, the standard TinkerKit 3pin connector and a green LED that signals that the module is correctly powered and a tiny yellow LED that shows the current brightness of the yellow LED. A resistor provides the optimal amount of current when connected to an Arduino.

This module is an **ACTUATOR** therefore the connector is an INPUT that need to be connected to one of the **OUTPUT** connectors on the **TinkerKit Shield**.

The **LED** is possibly the simplest actuator available. It's a low power light source available in many colors. It lights up when powered from an Arduino pin.

Input: Arduino provides a maximum of 40 mA per pin; this is enough to light up the LED through the **digitalWrite()** and **analogWrite()** functions.

Module description: This module features a 10mm Red Light Emitting Diode, the standard TinkerKit 3pin connector and a green LED that signals that the module is correctly powered and a tiny yellow LED that shows the current brightness of the red LED. A resistor provides the optimal amount of current when connected to an Arduino.

This module is an **ACTUATOR** therefore the connector is an INPUT that need to be connected to one of the **OUTPUT** connectors on the **TinkerKit Shield**.

20 cm long wires for the TinkerKit with a 3 pin jumper on both sides

50 cm long wires for the TinkerKit with a 3 pin jumper on both sides.

100 cm long wires for the TinkerKit with a 3 pin jumper on both sides

USB cable type A/B.

Use it to connect Arduino Uno, Mega, Duemilanove or FTDI USB Adapter to your computer