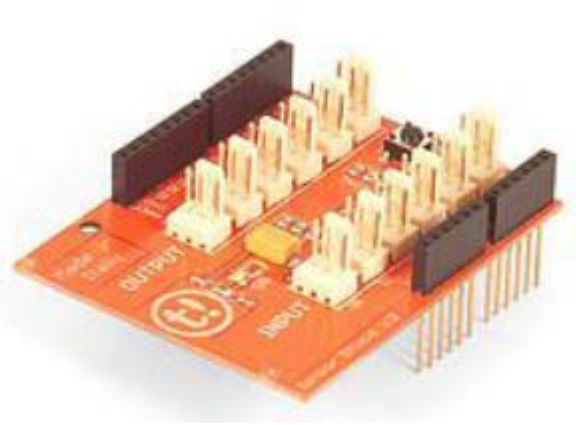
USING THE TINKERKIT WITH ARDUINO

This week we will use a different type of board, called an **ARDUINO SHIELD**, shown below



Open your TINKERKIT box, and remove gently the ARDUINO SHIELD. Place the shield on top of the Arduino board and align ALL the pins.

VERY GENTLY push the shield on top of the Arduino, and make sure that the pins are entering gently in the proper holes.

The Sensor Shield allows you to hook up the TinkerKit SENSORS and ACTUATORS directly to the Arduino, without the use of the whiteboard. In other words, NO WIRES TO STICK IN THE WTHITEBOARD!

The shield has 12 standard TinkeKit 3pin connectors.

The 6 connectors labeled **I0 through I5 are Analog Inputs**.

The 6 connectors labeled **O0 through O5 are Analog Outputs.** It is also possible to change these to **Digital Inputs**, in which case they will report either HIGH or LOW, but nothing in between.

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.

EXPERIMENT #1: USING A PHOTORESISTOR (ANALOG INPUT)

1. Find the LED in your kit. We will connect this to connector O0 on the shield, which is Pin 11 on the Arduino. Use one of the wires to connect **GENTLY** the LED to the connector O0.

As usual, we can make this an OUTPUT by using the command

pinMode(11, OUTPUT);

Have your instructor check your connections at this point!

2. Find the LDR (or Light Dependant Resistor, or Photoresistor) in your box.
   This is a variable resistor. Light falling on the sensor decreases its resistance.

This sensor outputs 5 Volts when the sensor receives no light (the circuit is open) and 0 Volts when exposed to bright light (the circuit is closed). When connected to the TinkerKit Shield, you can expect to read values from 0 to 1023.

Connect this to analog pin I0 of the shield, this is pin A0 on the Arduino. As before, we can read the signal from this photoresistor using:

analogRead(A0)

If you want to print this value on the Serial Monitor, use:

Serial.print(analogRead(A0));

WRITING THE BURGLAR ALARM PROGRAM

Let's try to make a burglar alarm!

Write a program that will read the photoresistor.

If there is a lot of light falling on the photoresistor, then all is quiet, the LED blinks one time per second, and the Serial Monitor prints "ALL IS QUIET MY FRIEND! " on the screen.

If somebody blocks the light on the photoresistor, then the LED blinks fast twenty times, and the Serial Monitor prints "DANGER! DANGER! " on the screen.

You must show me your working program.

EXPERIMENT #2: USING A TOUCH SENSOR (DIGITAL SENSOR)

1. Find the **Touch Sensor** in your box.
   This is a sensitive surface, when you touch it the Arduino will read either HIGH (1) or LOW (0). It is then a DIGITAL SENSOR.

Connect the TOUCH SENSOR to analog pin I0 of the shield. Since this is a digital sensor, we can read the signal from this sensor using:

digitalRead(A0)

If you want to print this value on the Serial Monitor, use:

Serial.println(digitalRead(A0));

Or

Serial.println(digitalRead(A0));

WRITING THE PROGRAM

Let's try to make a burglar alarm based on an intruder touching the sensor!

Write a program that will read the touch sensor.

If nobody is touching the sensor, then all is quiet, and a GREEN LED blinks one time per second, and the Serial Monitor prints "ALL IS WELL! " on the screen.

If somebody is touching the sensor, then a RED LED blinks fast five times, and the Serial Monitor prints "TOUCHED! TOUCHED! " on the screen.

You must show me your working program.

EXPERIMENT #3: USING A LINEAR POTENTIOMETER

1. Find the **Linear potentiometer** in your box.
   Connect it to analog pin A0 of the shield.

Write a program that will read the potentiometer setting.
If the potentiometer slider is less than half way , then all is quiet, and a GREEN LED blinks 10 times per second.

If the potentiometer slider is more than half way , then the RED LED blinks 30 times per second. Our eyes can see events as fast as 30 times per second, so if the LED is blinking at 30 times per second you should just about see it flicker ON/OFF.