TINKERKIT ACCELEROMETER

Measures an acceleration.

Range: -5 g to +5 g approximately, on two axes
Ease of use: medium
Uses: measuring an acceleration, an angle, detect a shock, a movement ...
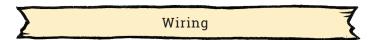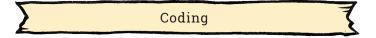**Necessary hardware**: a Tinkerkit shield, and two Tinkerkit cables

This sensor measures the acceleration in two directions, X and Y, represented on the sensor. The acceleration in the third direction, Z, is not available. This sensor requires two cables for the connection, one for each direction.

Wiring

Install the Tinkerkit library on your computer, and the Tinkerkit shield on your Arduino board. Connect the sensor to the I0 input of the shield (channel X), and to the input I1 (channel Y). If you do not have a suitable cable, or no Tinkerkit shield, connect your sensor to the A0 and A1 inputs of your Arduino board (see "Tinkerkit shield" sheet).

Coding

Once the Tinkerkit library is installed, open the sample program available from the File menu, Examples, Tinkerkit, Accelerometer program.

<Tinkerkit.h>: this library defines the coding instructions necessary to communicate with the sensor.
TKAccelerometer acc(I0,I1): creates a variable 'acc', of type TKAccelerometer (defined in the library Tinkekit), corresponding to a Tinkekit accelerometer connected to the input I0 (channel X) and I1 (channel Y). The name of the variable can be changed, as can the input ports.
acc.readX() or **acc.readY()**: these instructions return the acceleration value in the X direction or the Y direction. These values are integers between 0 and 1023.

The following program will have the same behavior as the Tinkerkit library example:

```
int AccelerationXMeasure ;
int AccelerationYMeasure ;

void setup() {
  Serial.begin(9600) ;   // the serial communication between board and computer is initialized
}

void loop() {
  AccelerationXMeasure = analogRead(A0) ;   // channel X must be connected to I0, or A0
  Serial.print("Acceleration in the X direction = ") ;
  Serial.println(AccelerationXMeasure) ;
  AccelerationYMeasure = analogRead(A1) ;   // channel Y must be connected to I1, or A1
  Serial.print("Acceleration in the Y direction = ") ;
  Serial.println(AccelerationYMeasure) ;
  delay(1000) ;
}
```

UPLOAD

Open the serial monitor to observe the measurements made by the sensor as you slowly rotate it around. Due to its design, this sensor actually measures its acceleration minus the acceleration due to gravity, g.
This allows to calibrate the sensor:
- when the sensor is immobile and horizontal, the acceleration along X and Y is zero, and the sensor measures about 512;
- when the Y direction remains horizontal but the X direction is put vertical, the acceleration of the sensor is still zero, but the sensor will measure 1 g in the X direction, about 412 or 612 depending on the direction of the X channel.

This operation makes it possible to calibrate the accelerometer in the X direction,. Repeat ir in the Y direction for a complete calibration.

The unit of an acceleration is m s^{-2}, and we have the following relation: 1 g = 9.8 m s^{-2}

Possible uses of the sensor:
- Measuring the acceleration of a physical device (pendulum for example);
- This sensor can determine the angle of its X and Y directions relative to the vertical.