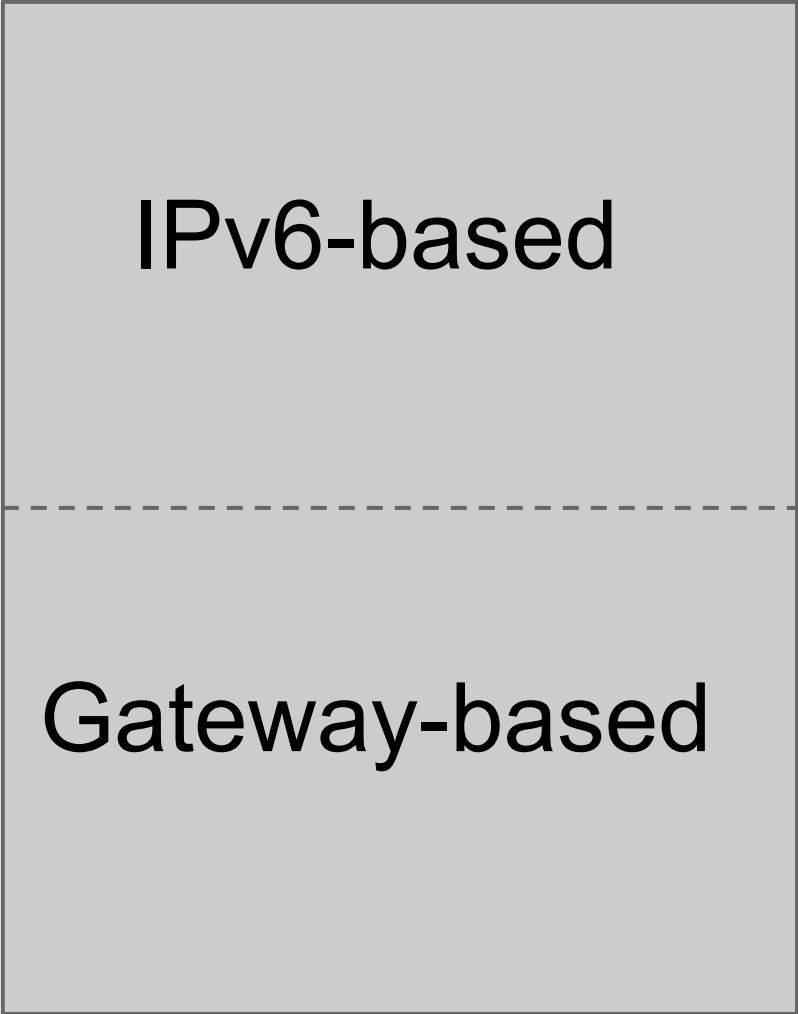


Intro to the Workshop and to the IoT training kit

Marco Zennaro
T/ICT4D Laboratory
ICTP-Italy

WSN options



IPv6-based

Gateway-based

WSN options



Open WSN

Proprietary WSN

WSN options

Open WSN
IPv6-based

Open WSN
Gateway-based

Proprietary WSN
IPv6-based

Proprietary WSN
Gateway-based

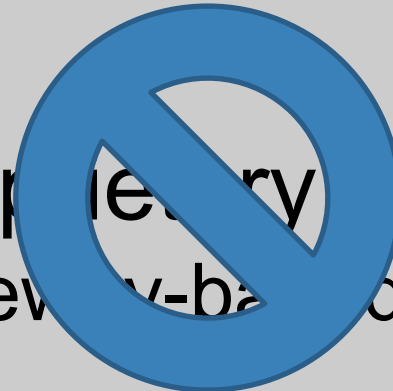
WSN options

Open WSN
IPv6-based

Open WSN
Gateway-based

Proprietary WSN
IPv6-based

Proprietary WSN
Gateway-based



WSN options

<p>Open WSN IPv6-based</p>	<p>Open WSN Gateway-based</p>
<p>Proprietary WSN IPv6-based</p>	<p>Proprietary WSN Gateway-based</p>

Open Hardware

Open-source hardware consists of physical artifacts of technology designed and offered by the open design movement.

Hardware design (i.e. mechanical drawings, schematics, bills of material, PCB layout data, HDL source code and integrated circuit layout data), in addition to the software that drives the hardware, are all released with the FOSS approach.

Arduino

Arduino is an
**open-source
electronics prototyping
platform**
based on flexible, easy-to-
use
hardware and software.



<http://www.arduino.cc>

Why Arduino?

Arduino is:

- Inexpensive
- Quite easy to learn
- Flexible
- Good for sensing and controlling
- Great for use in education

Software

The programming language is based on **wiring** and in terms of syntax (almost) identical to C++.

The development environment is based on **processing** - both wiring and processing are **open source** components.

Hardware

Arduino boards are based around Atmel processors (ATM168, ATM328).

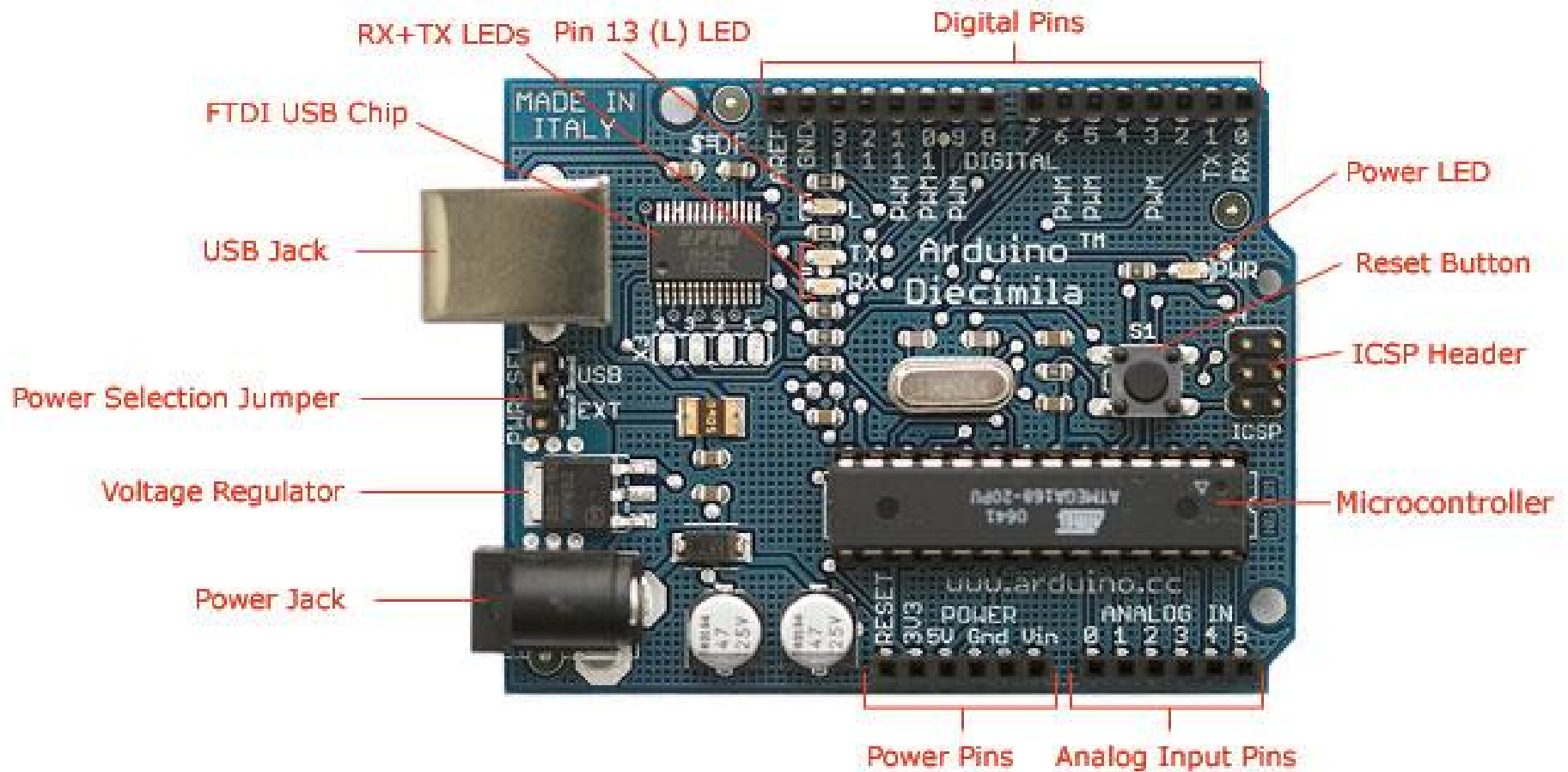
8 bit controllers (new DUE board is first with 32 bit)

16 / 8 Mhz

Approx. 32k of memory for code

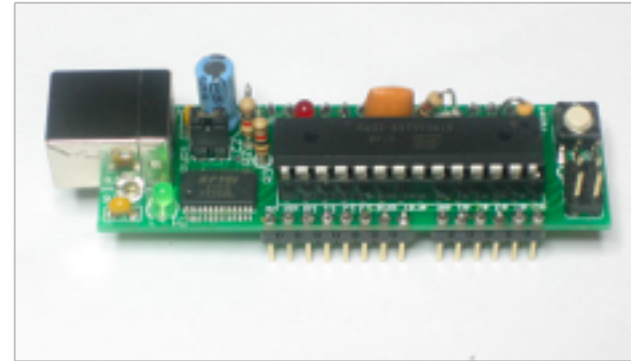
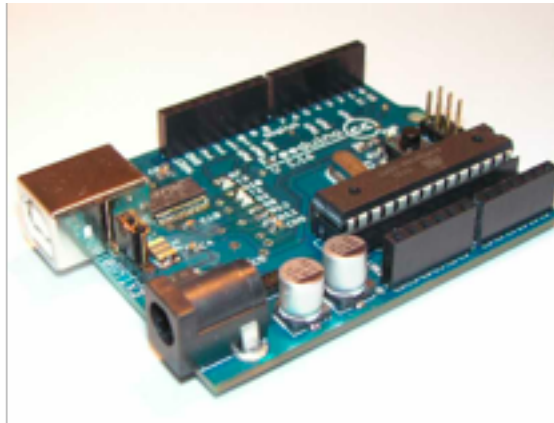
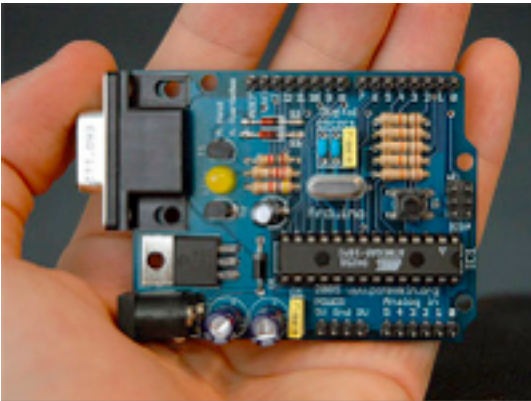
Run on 3.3, 5 (and up) Volts

Hardware



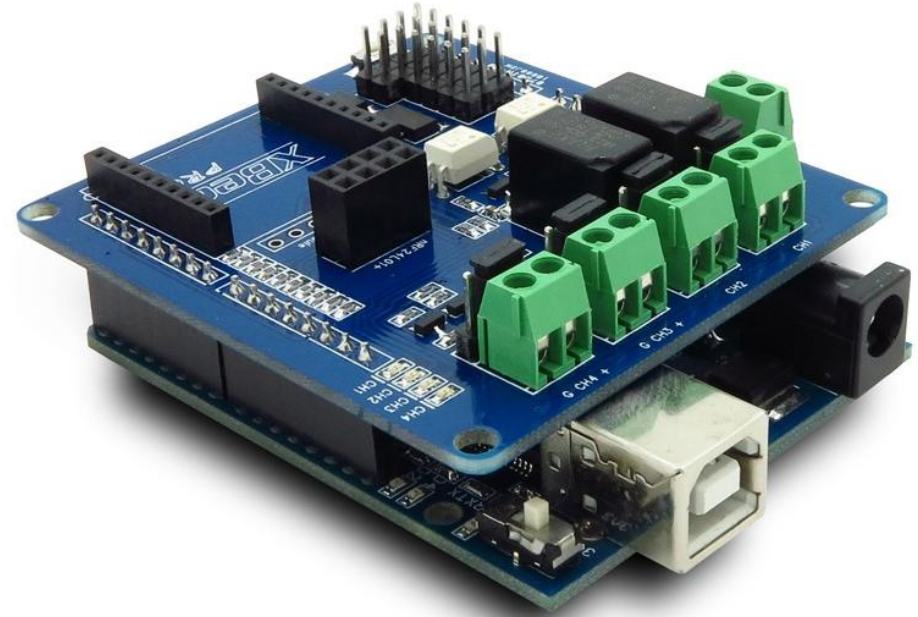
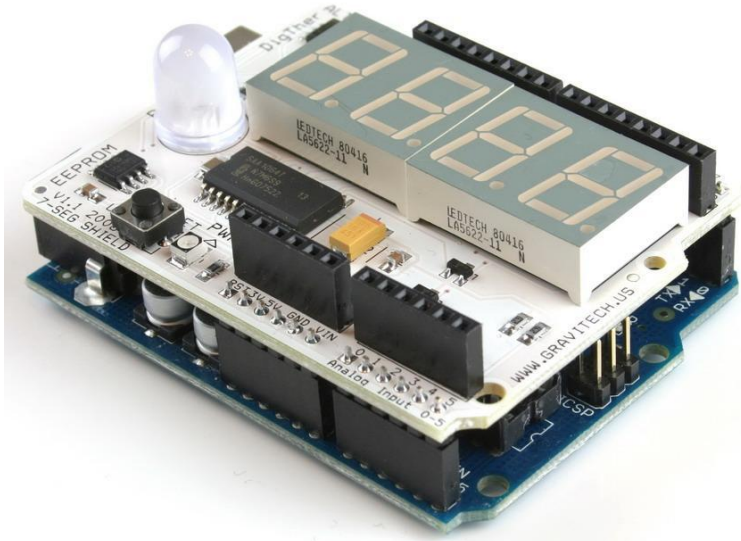
Photograph by SparkFun Electronics. Used under the Creative Commons Attribution Share-Alike 3.0 license.

Arduino compatible boards



[List of Arduino compatible boards](#)

Arduino shields



Pin usage details for 317 shields from 125 makers, and counting!

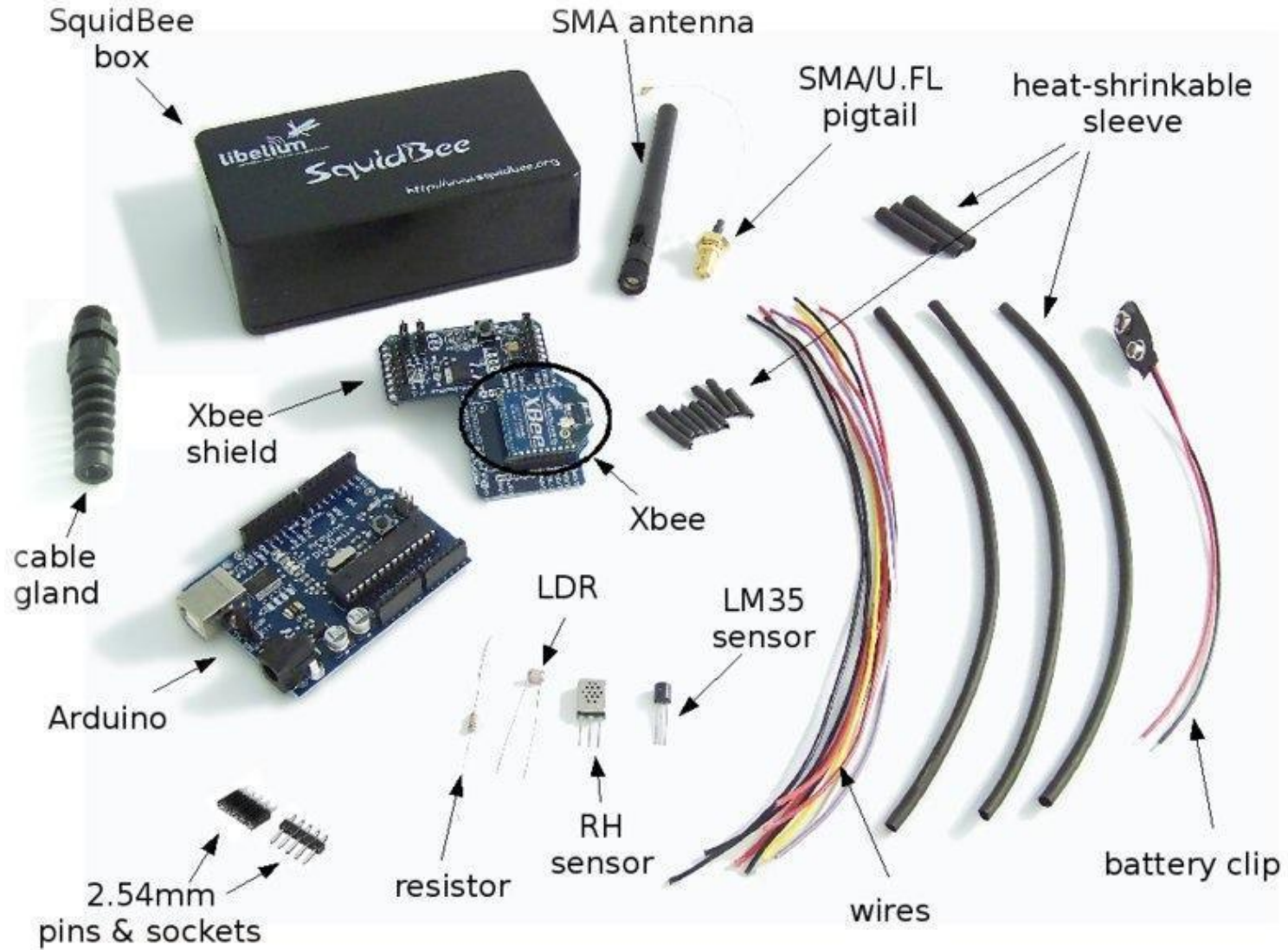
[List of Arduino compatible shields](#)

From Arduino to WSN

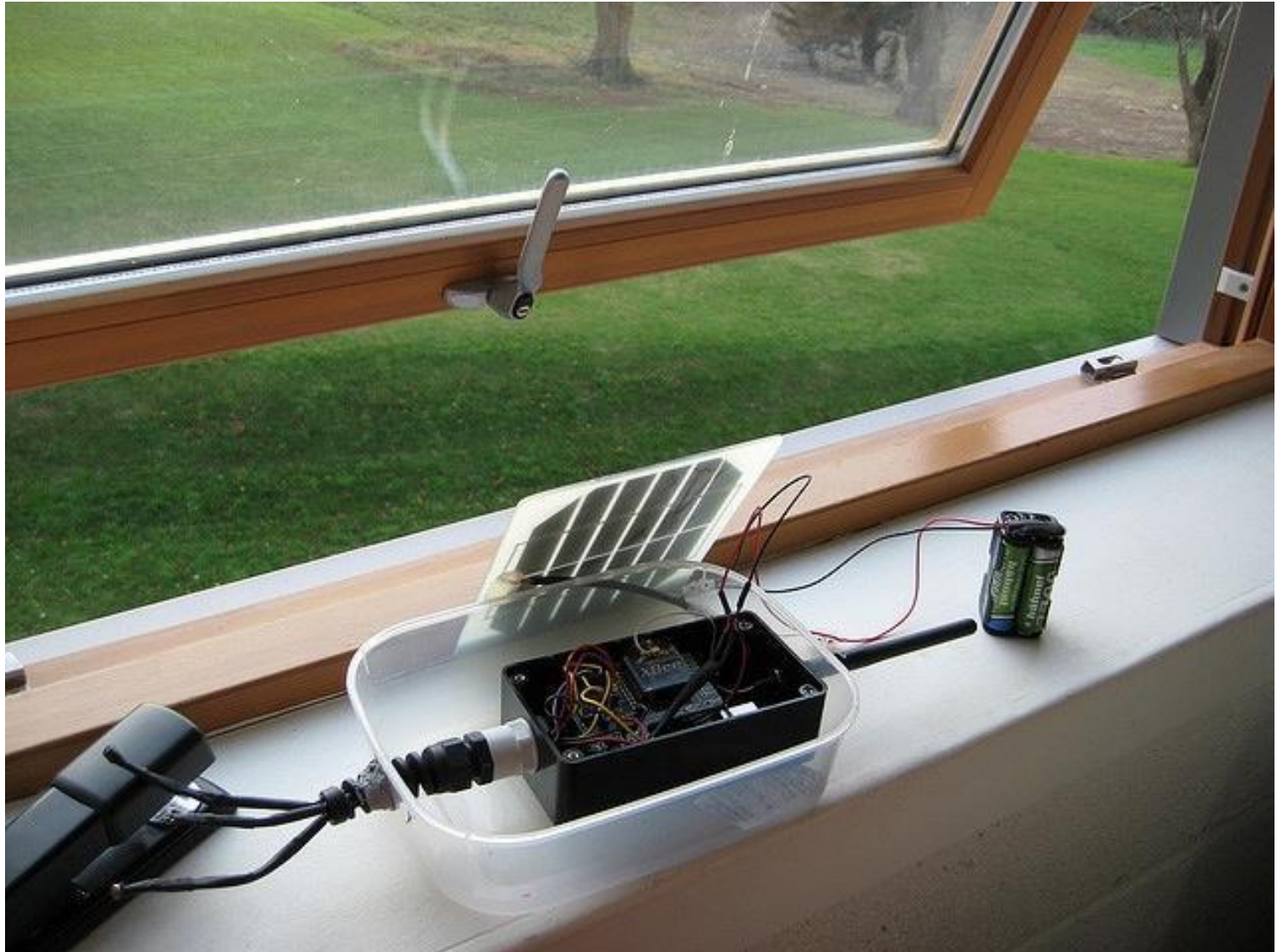


- ~~external sensors~~
- wireless
- batteries

Squidbee by Libelium



Squidbee by Libelium



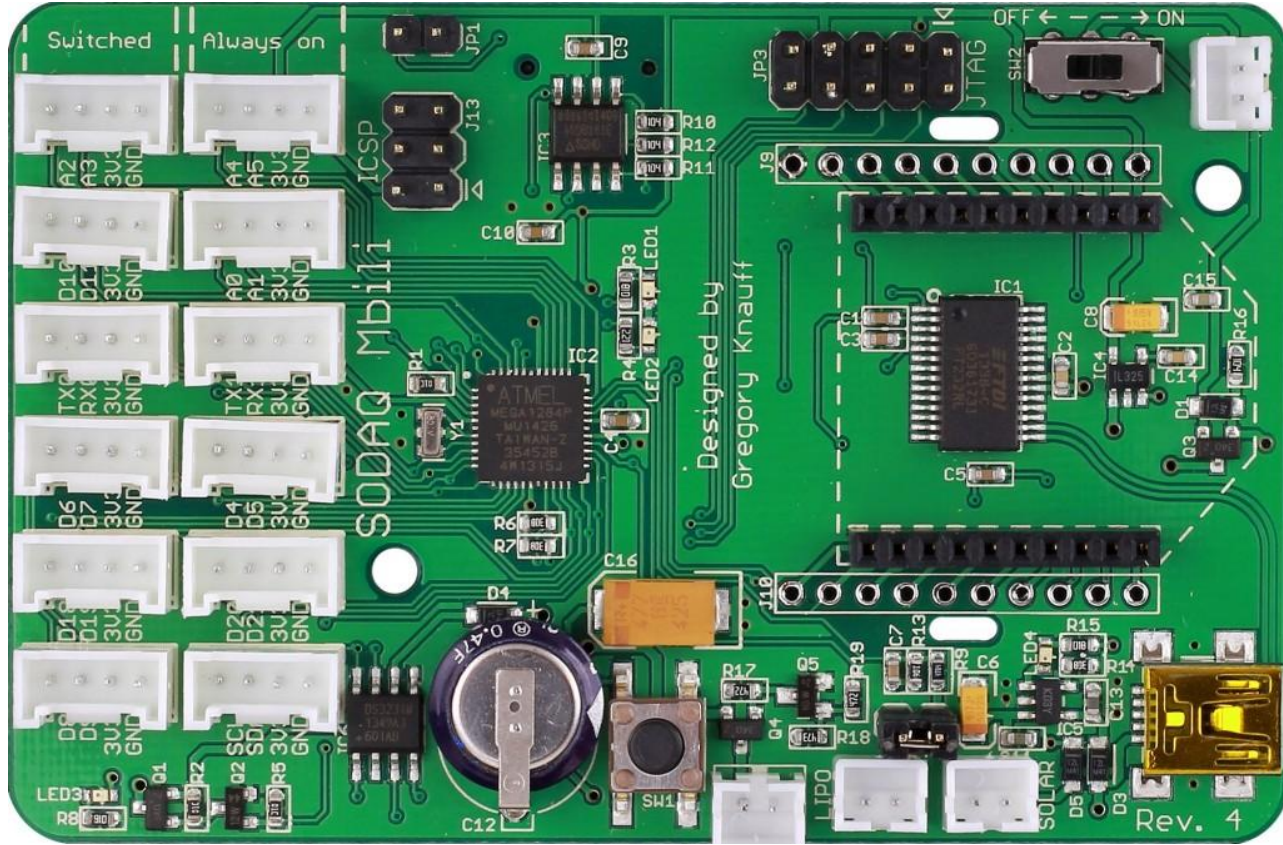
Seeeduino



Seeeduino



SODAQ Mbilii



SODAQ Mbili - features

The Atmega 1284P is the 'big brother' of the 328P.

128kB flash for your programs (that's 4x more than the 328P)

16kB memory (that's 8x more!)

Two hardware serials (allowing USB and the Bee module to work at the same time).

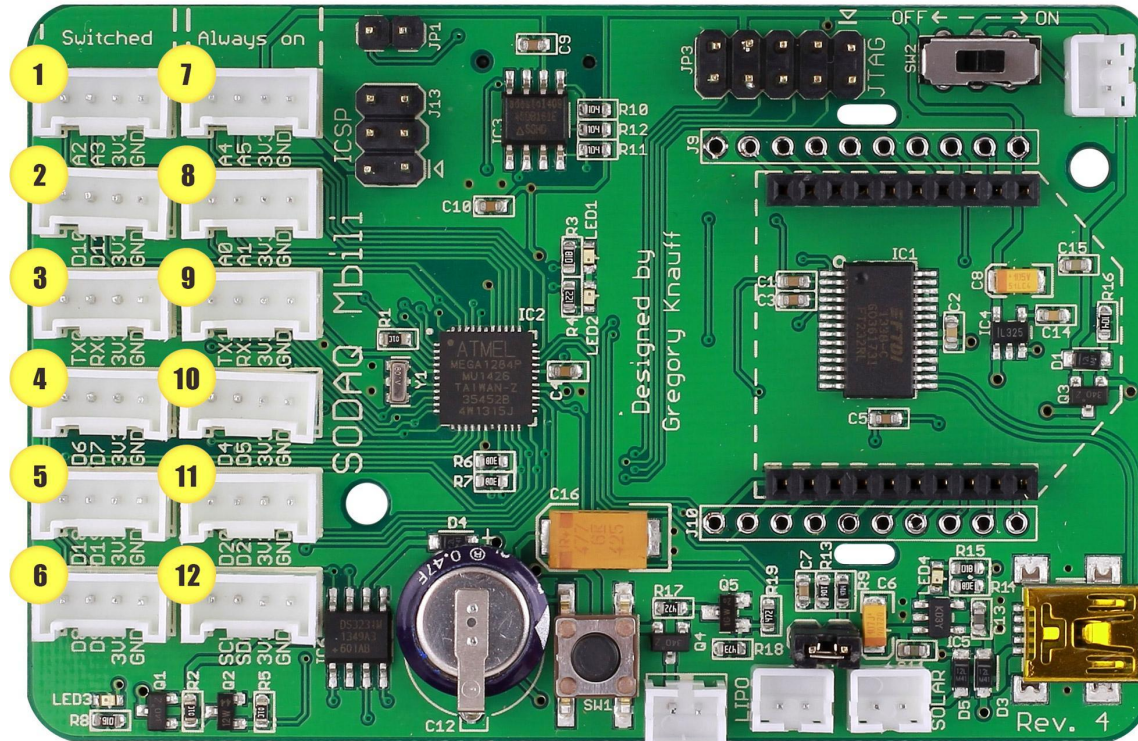
SODAQ Mbili - features

Micro SD card slot has been added for storage (as well as the existing 16Mb Flash memory).

A super-capacitor has been added for the Real Time Clock. This allows the RTC to remain ticking (for several days) after the battery has been removed.

The board still runs on 8MHz and at 3.3V.

SODAQ Mbili - Grove

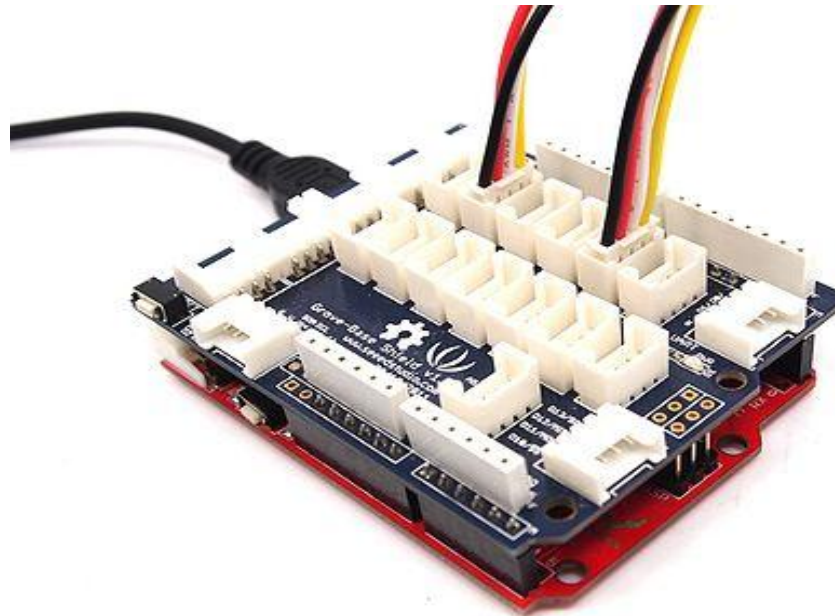


Grove switched row now switches.

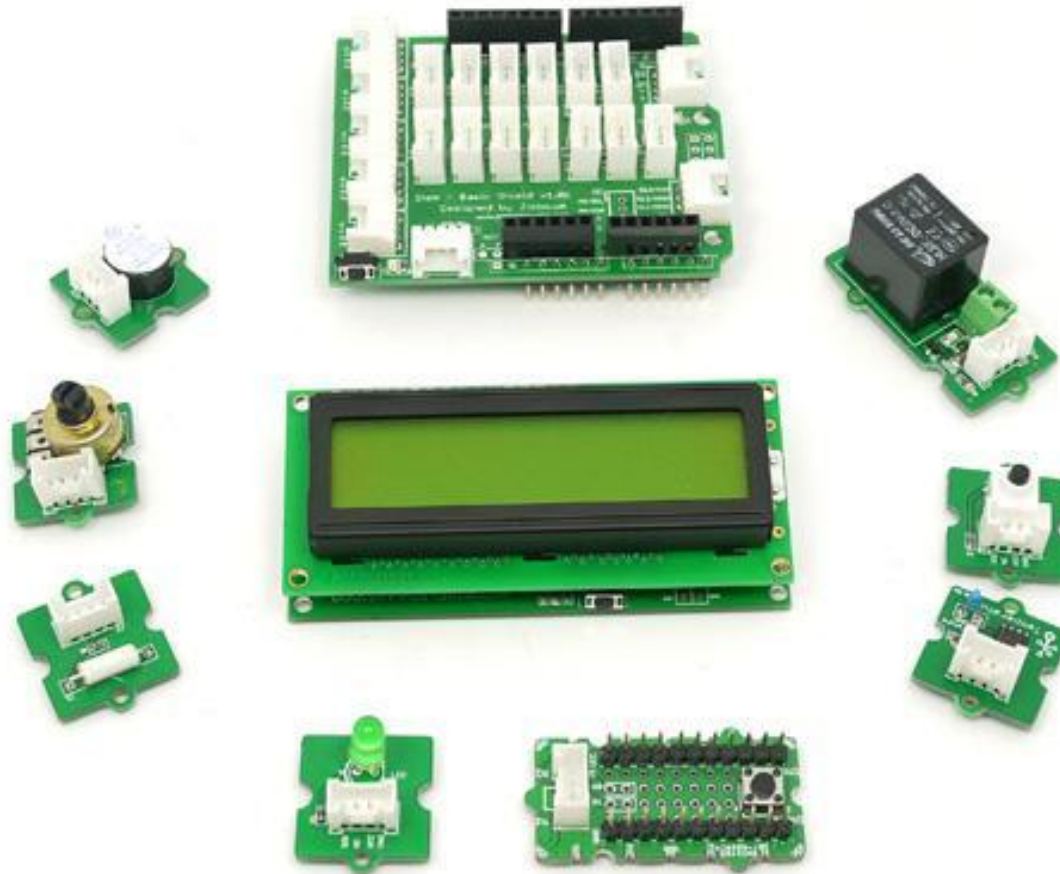
Additional I/O lines have been added, in total there are: 6 analog lines, 10 digital lines, two serial ports and the I²C which are available through the Grove sockets.

Grove system

The Grove system is a modular, safe and easy to use group of items that allow you to minimise the effort required to get started with microcontroller-based experimentation and learning.



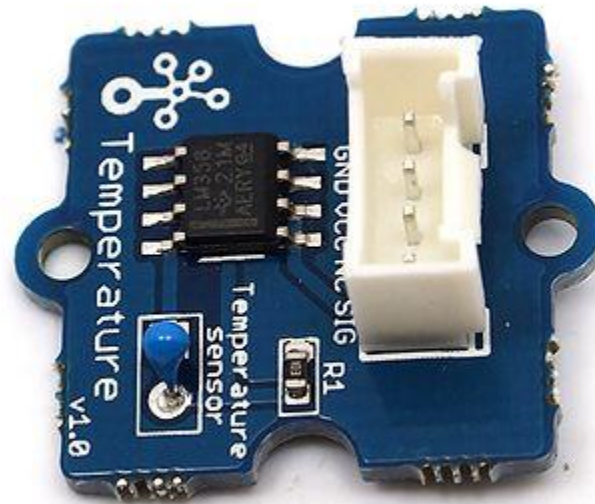
Grove system



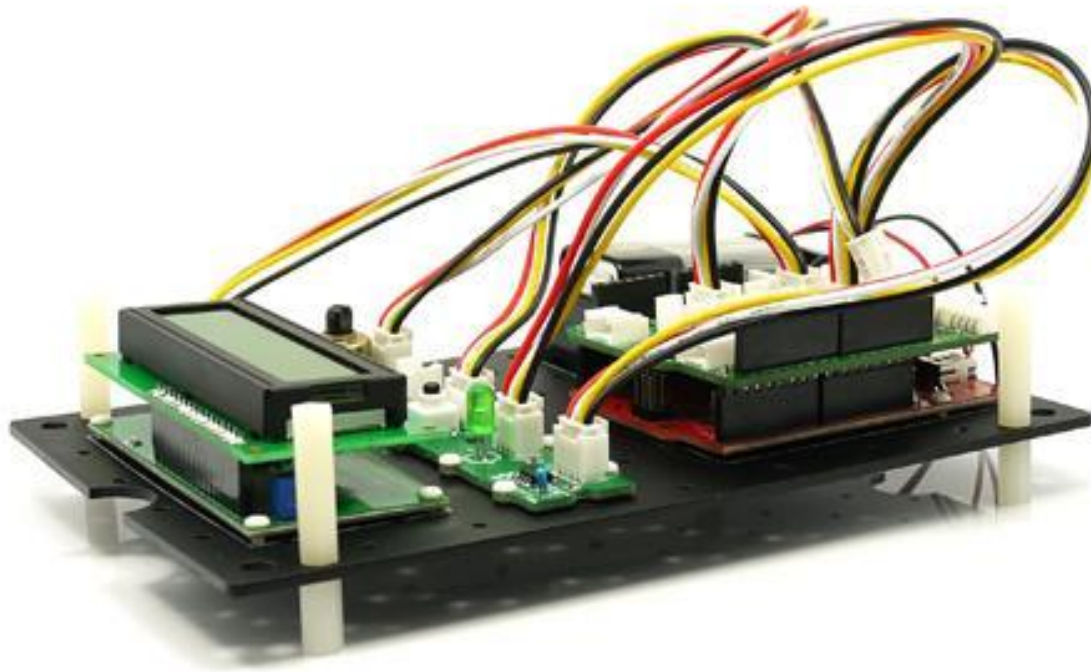
Grove units: LED



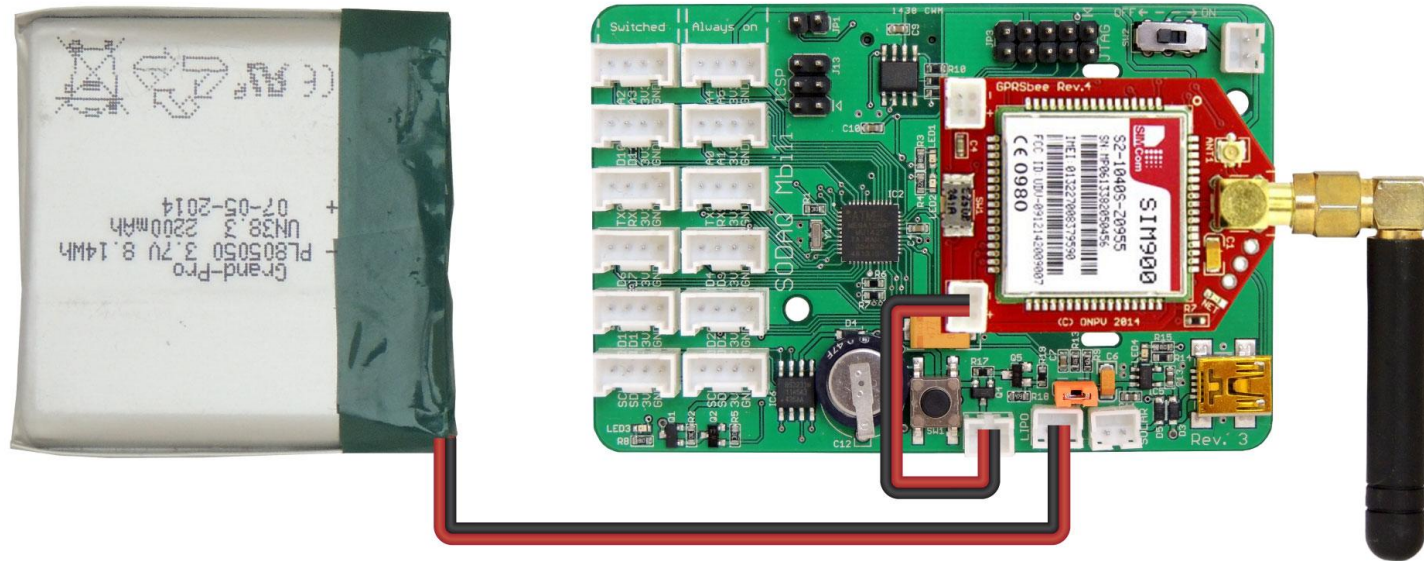
Grove units: Temperature



Grove units

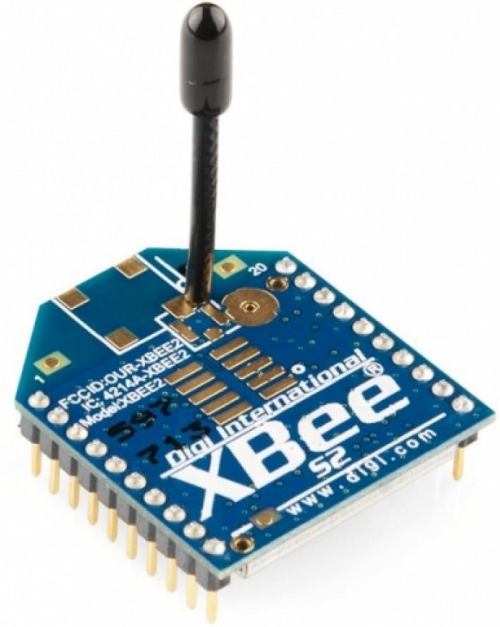


SODAQ Mbili - Xbee



Switchable power supply for the GPRSbee. Allowing for better control and complete power down of the GPRSbee module (saving several μ Amps).

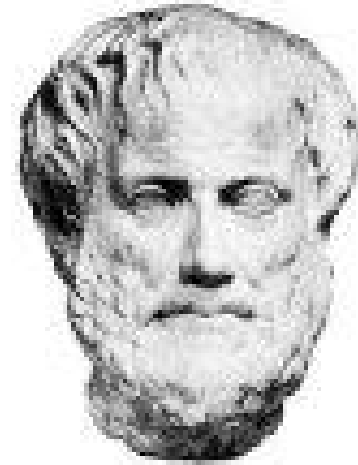
Xbee



Philosophy

"What we have to
learn to do,
we learn by **doing**."

Aristotle



Thanks

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<http://wireless.ictp.it>