Intro to Open Hardware and Arduino

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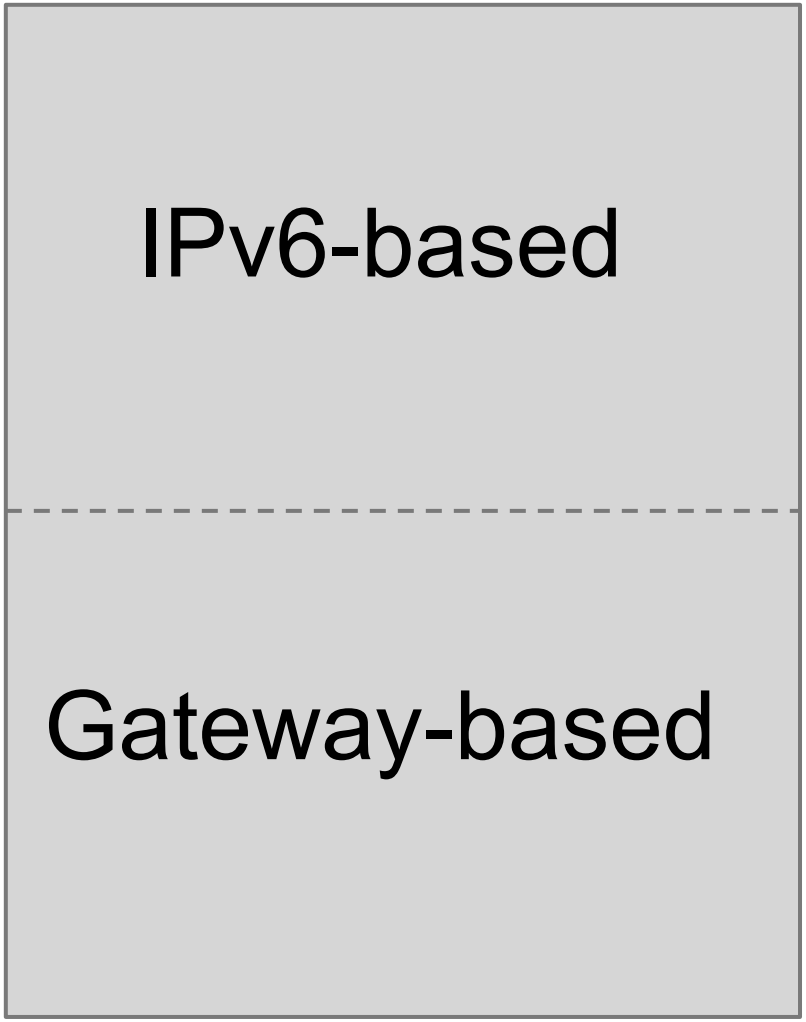
ICTP and UWC
Italy and South Africa

WSN options



WSN options

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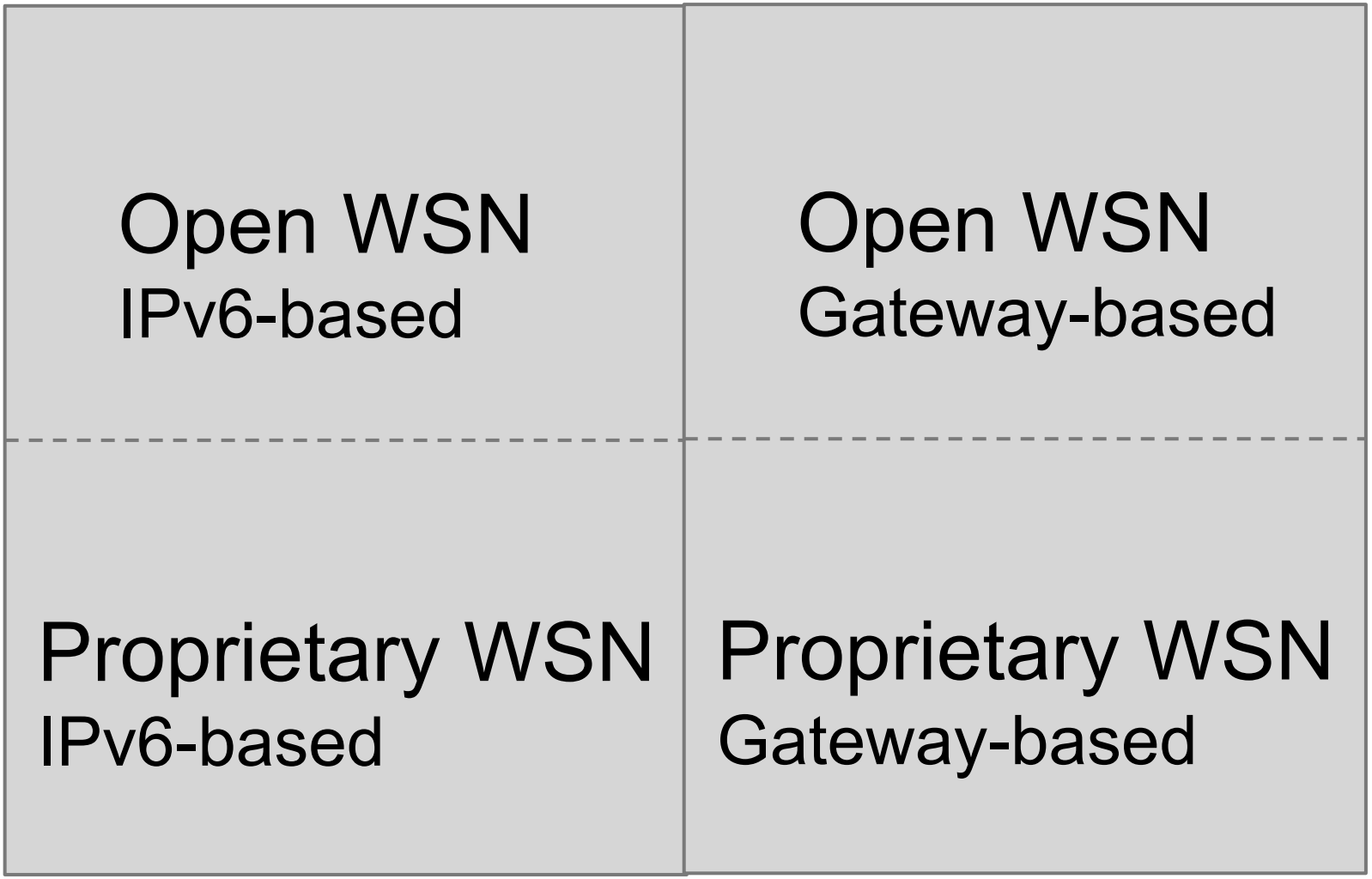
Open WSN
IPv6-based
Open WSN
Gateway-based
Proprietary WSN
IPv6-based
Proprietary WSN
Gateway-based

WSN options


Open WSN
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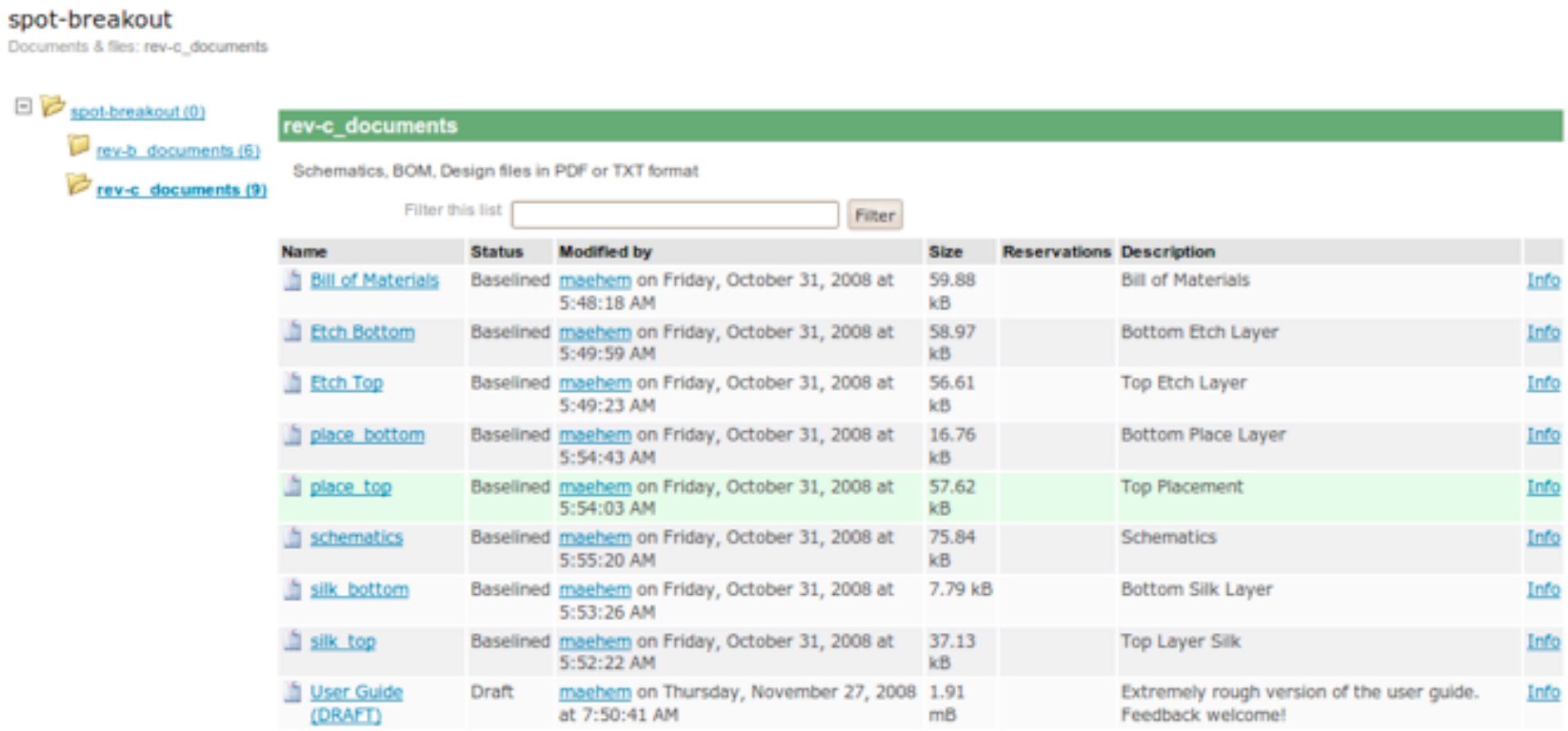
Open Hardware

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.

SunSpot

SunSpot as Open Hardware



spot-breakout

Documents & files: rev-c_documents

spot-breakout (0)

rev-b_documents (6)

rev-c_documents (9)

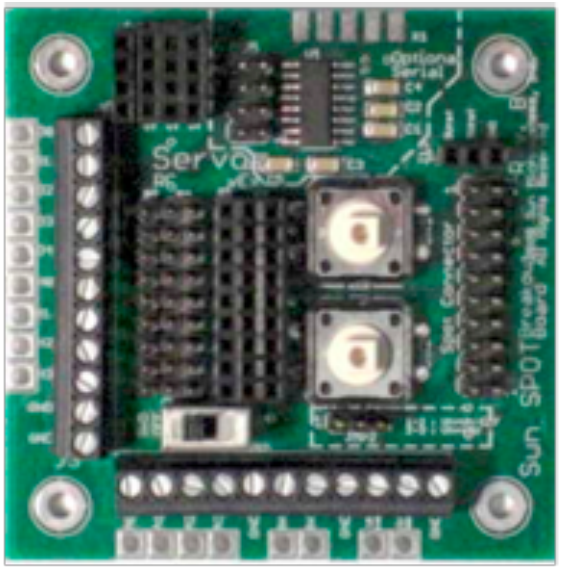
rev-c_documents

Schematics, BOM, Design files in PDF or TXT format

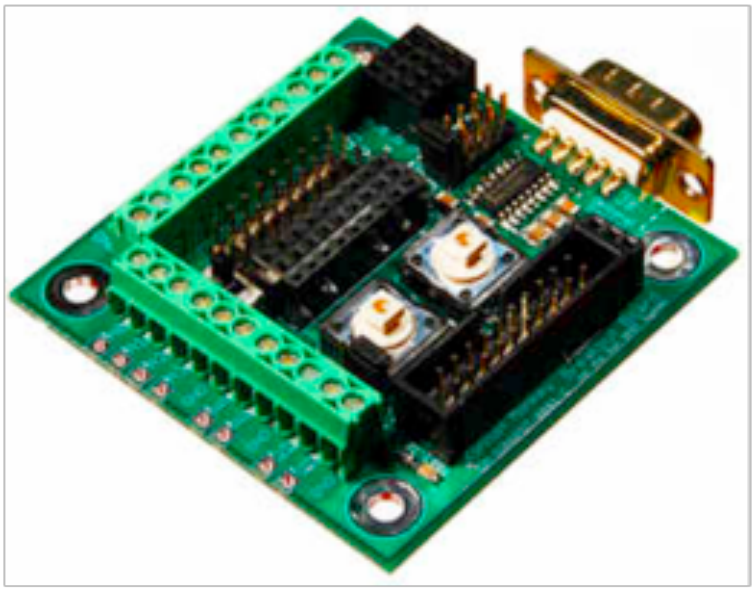
Filter this list Filter

Name	Status	Modified by	Size	Reservations	Description	
Bill of Materials	Baselined	maehem on Friday, October 31, 2008 at 5:48:18 AM	59.88 kB		Bill of Materials	Info
Etch Bottom	Baselined	maehem on Friday, October 31, 2008 at 5:49:59 AM	58.97 kB		Bottom Etch Layer	Info
Etch Top	Baselined	maehem on Friday, October 31, 2008 at 5:49:23 AM	56.61 kB		Top Etch Layer	Info
place_bottom	Baselined	maehem on Friday, October 31, 2008 at 5:54:43 AM	16.76 kB		Bottom Place Layer	Info
place_top	Baselined	maehem on Friday, October 31, 2008 at 5:54:03 AM	57.62 kB		Top Placement	Info
schematics	Baselined	maehem on Friday, October 31, 2008 at 5:55:20 AM	75.84 kB		Schematics	Info
silk_bottom	Baselined	maehem on Friday, October 31, 2008 at 5:53:26 AM	7.79 kB		Bottom Silk Layer	Info
silk_top	Baselined	maehem on Friday, October 31, 2008 at 5:52:22 AM	37.13 kB		Top Layer Silk	Info
User Guide (DRAFT)	Draft	maehem on Thursday, November 27, 2008 at 7:50:41 AM	1.91 mB		Extremely rough version of the user guide. Feedback welcome!	Info

SunSpot and market opportunities



Sun breakout board



Circuit Monkey breakout board

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
- Low power
- 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++.

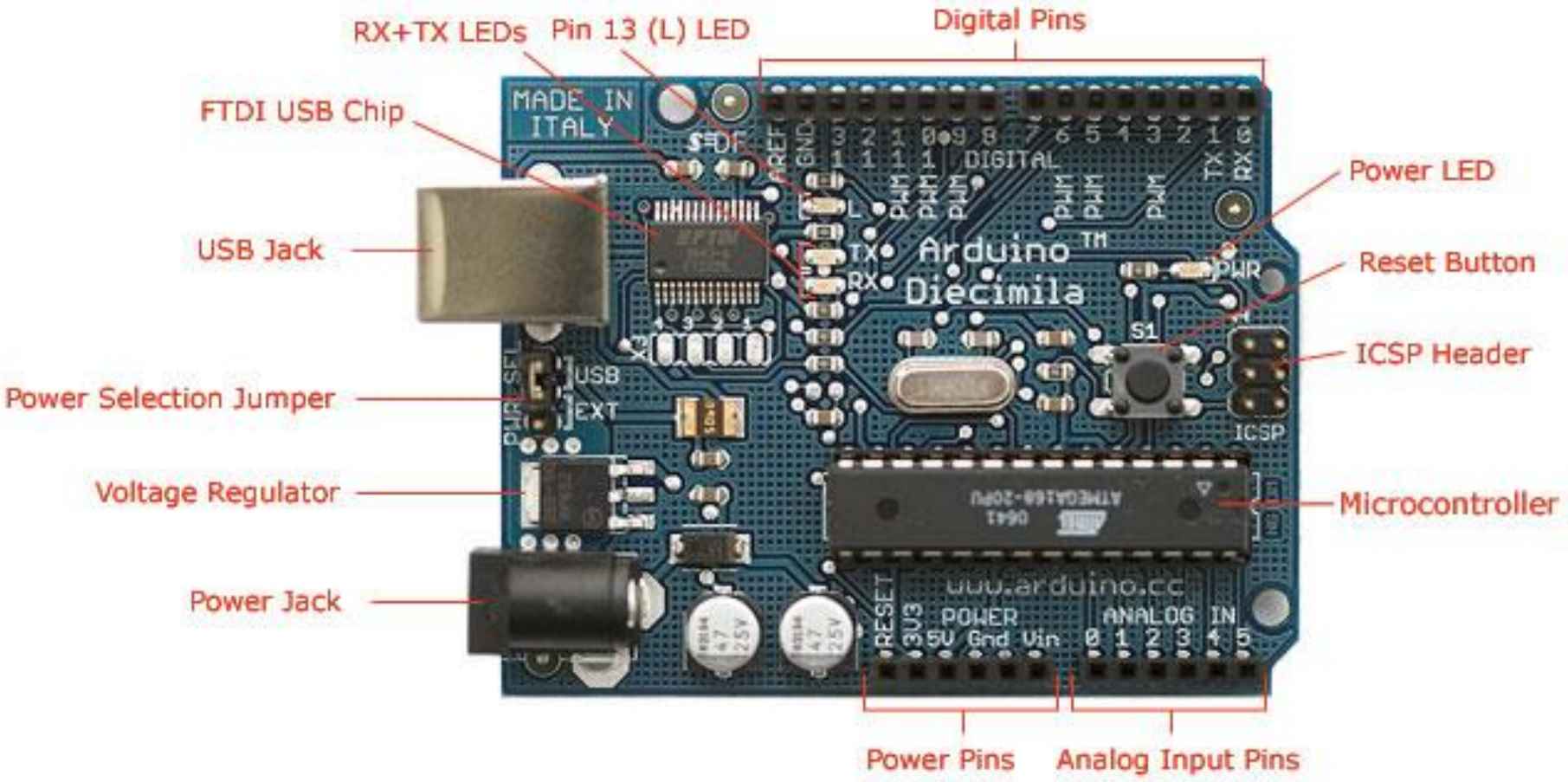
The development environment is based on **processing** - both wiring and processing are open source components.

Hardware

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

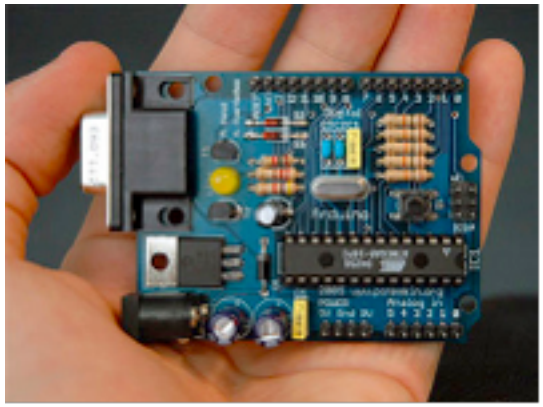
8 bit controllers (new DUE board is first with 32 bit)
16 / 8 Mhz
Approx. 32k of memory for code
Run on 3.3, 5 (and up) Volts

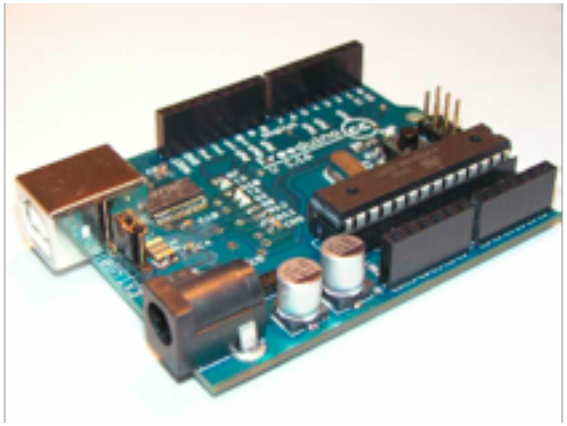
Hardware

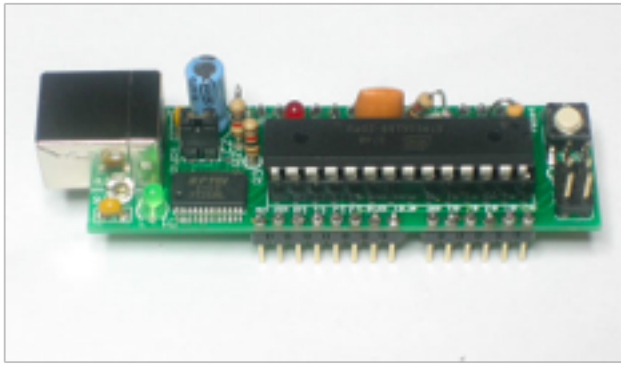


Photograph by SparkFun Electronics. Used under the Creative Commons Attribution Share-Alike 3.0 license.

Arduino compatible boards

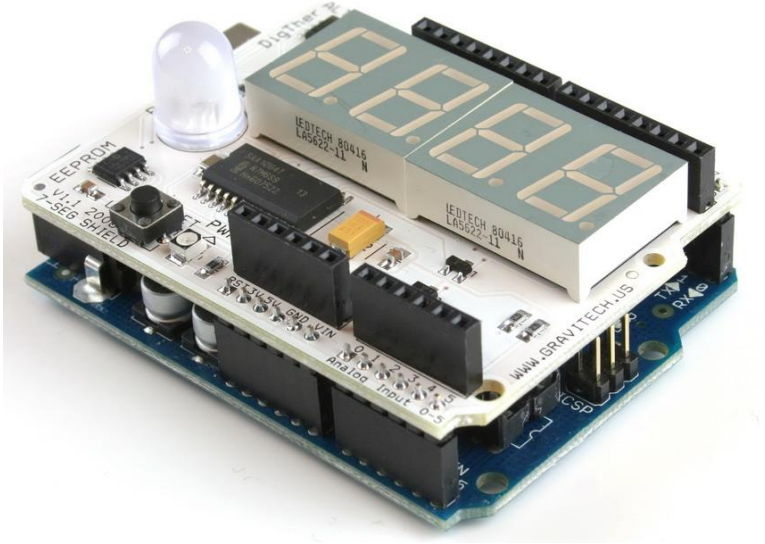


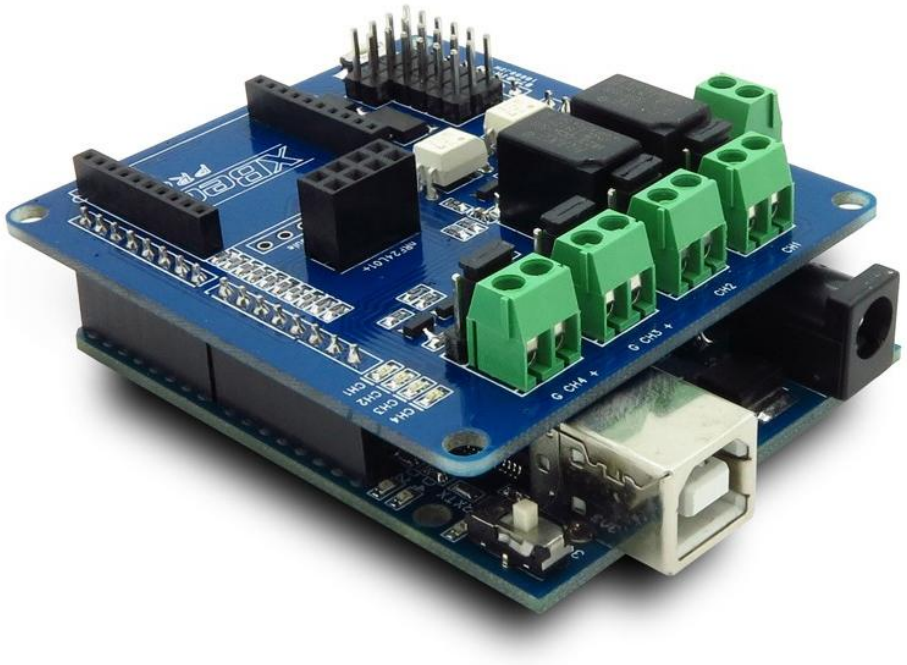




[List of Arduino compatible boards]

Arduino shields

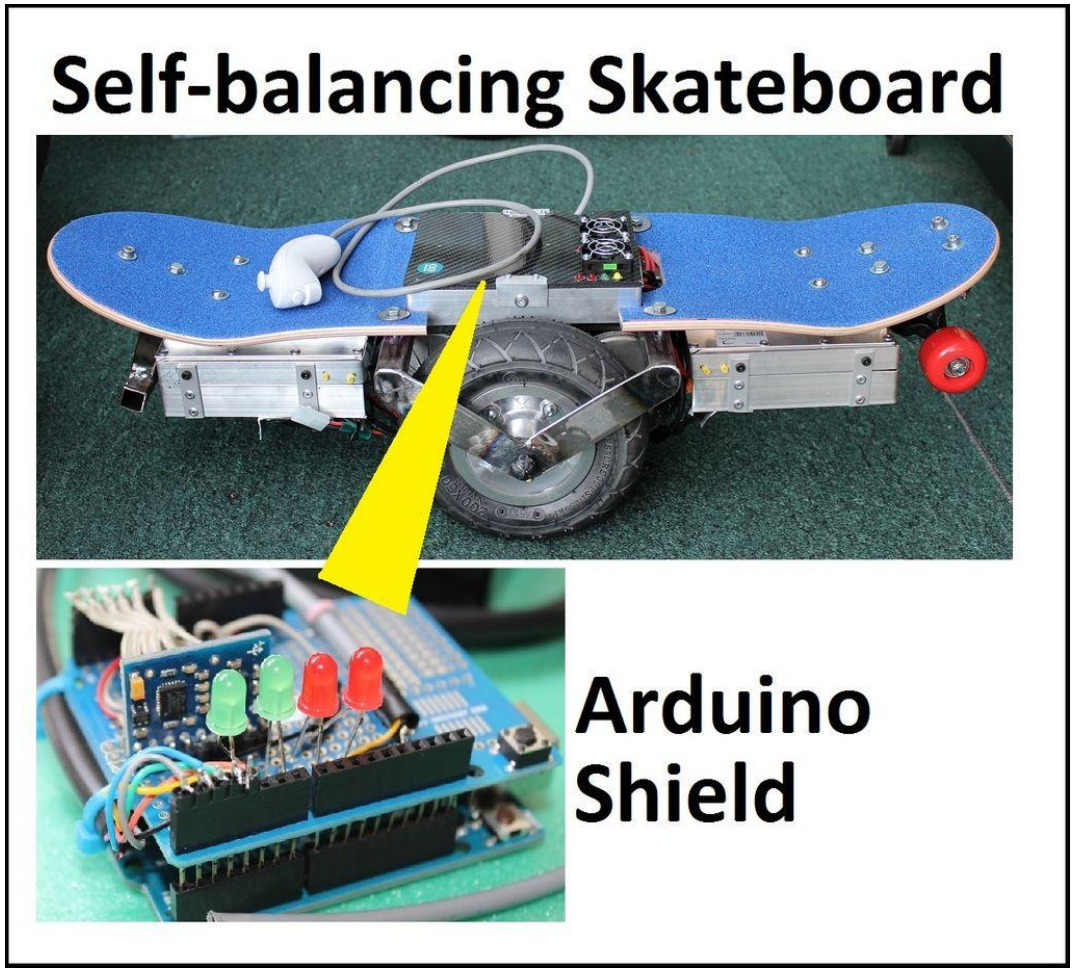




Pin usage details for 317 shields from 125 makers, and counting!

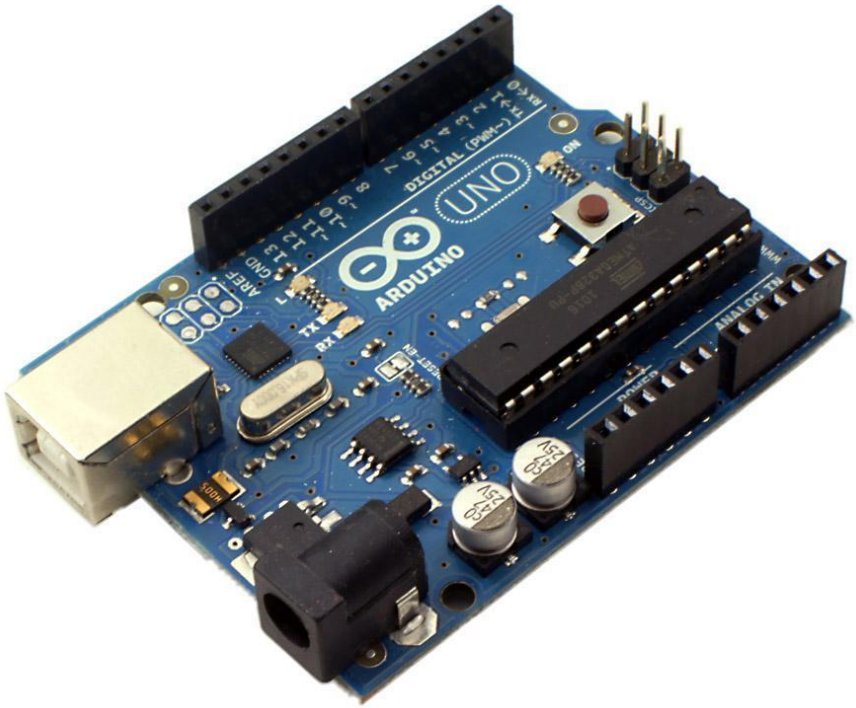
List of Arduino compatible shields

Arduino shields



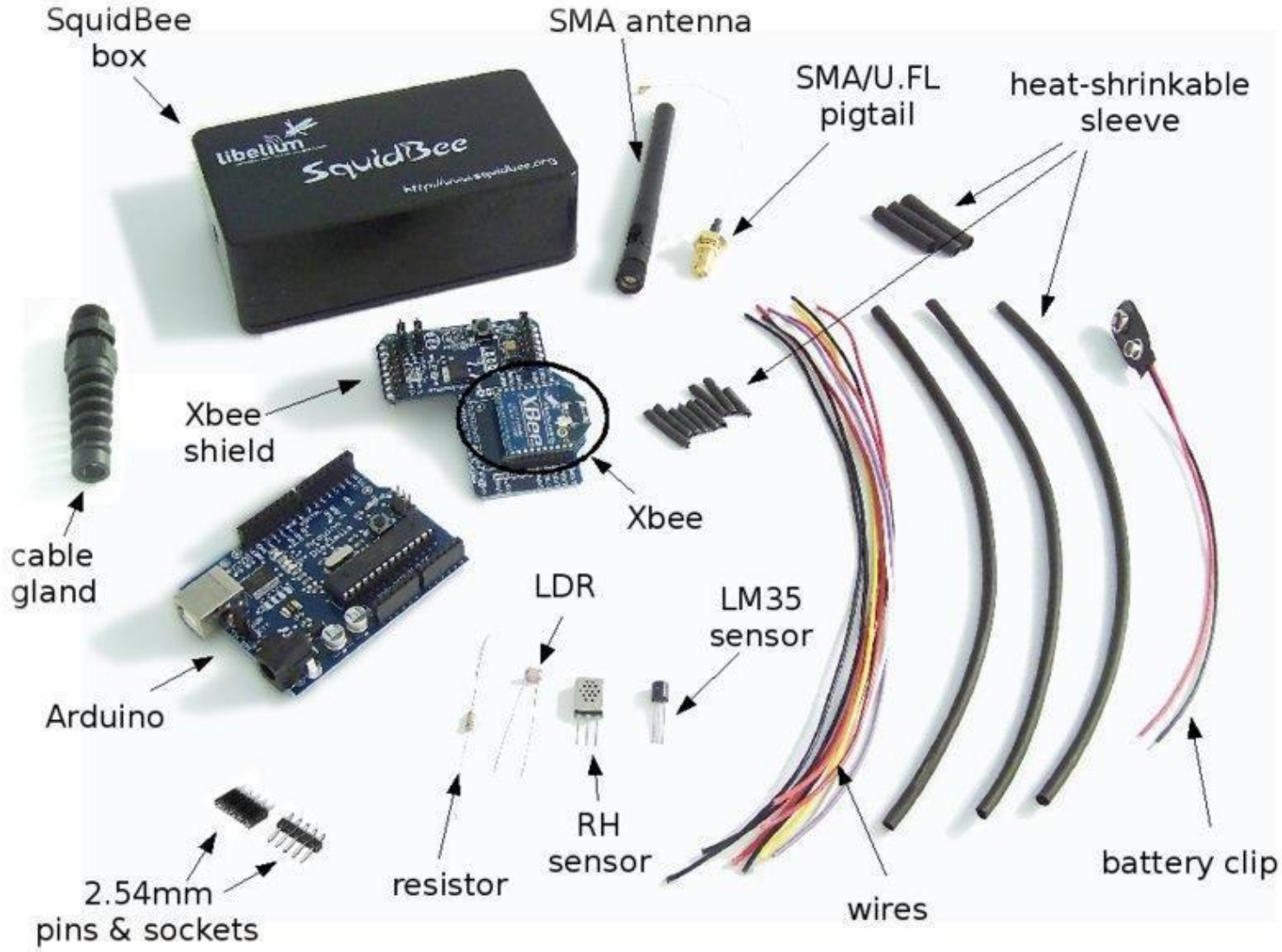
[Self-balancing machines shield]

From Arduino to WSN

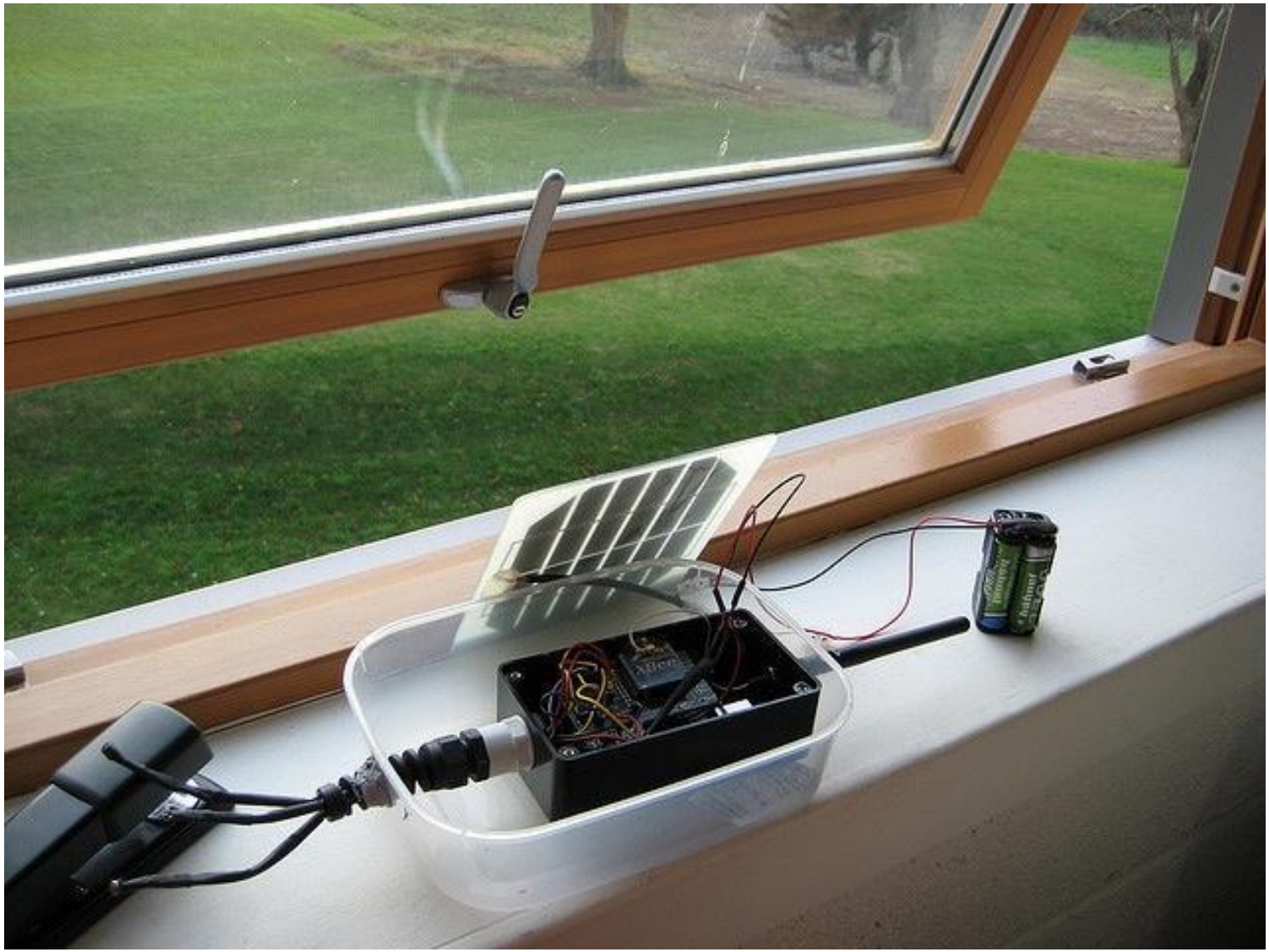


- ~~external sensors~~
- wireless
- batteries

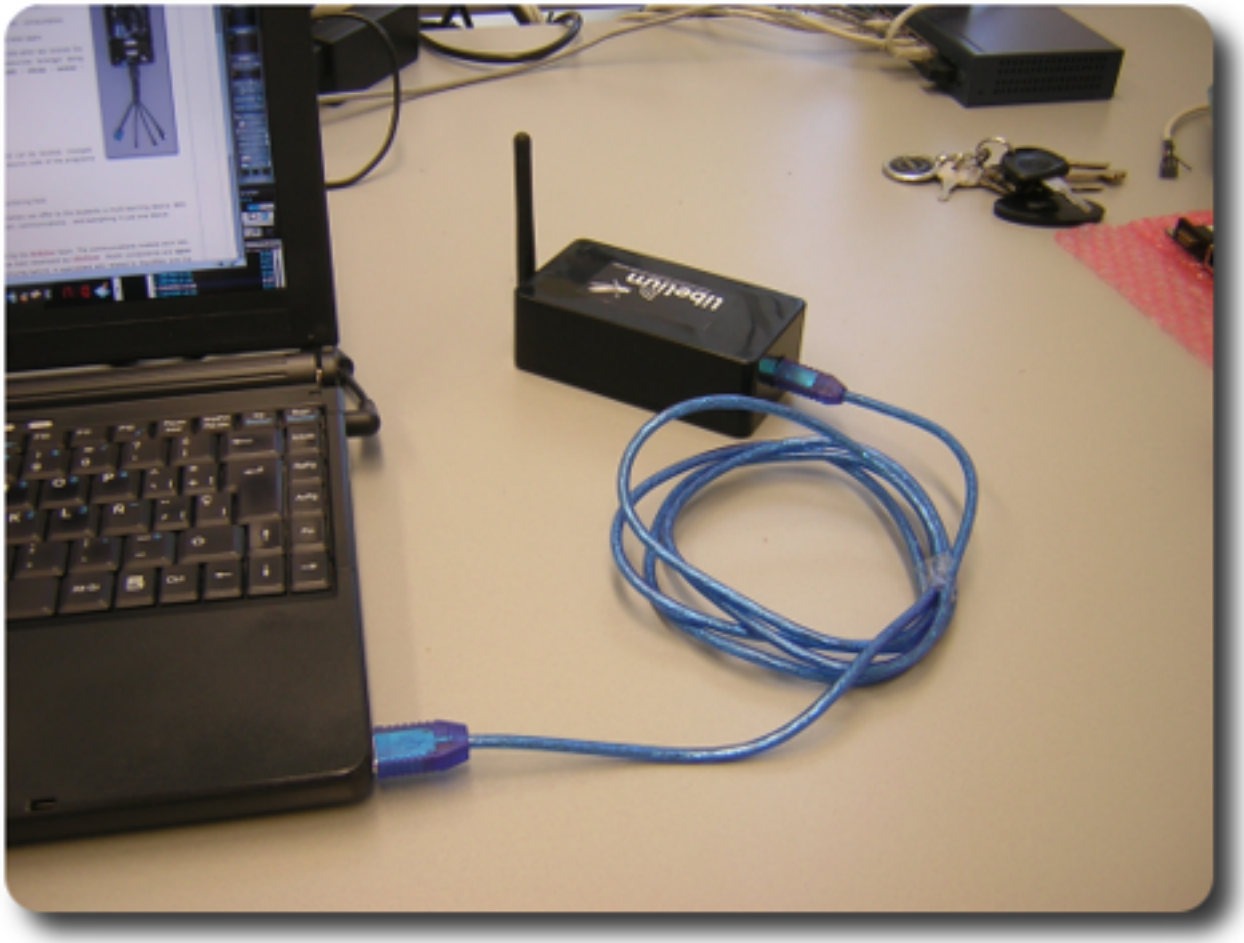
Squidbee by Libelium



Squidbee by Libelium



Squidbee by Libelium



Seeeduino

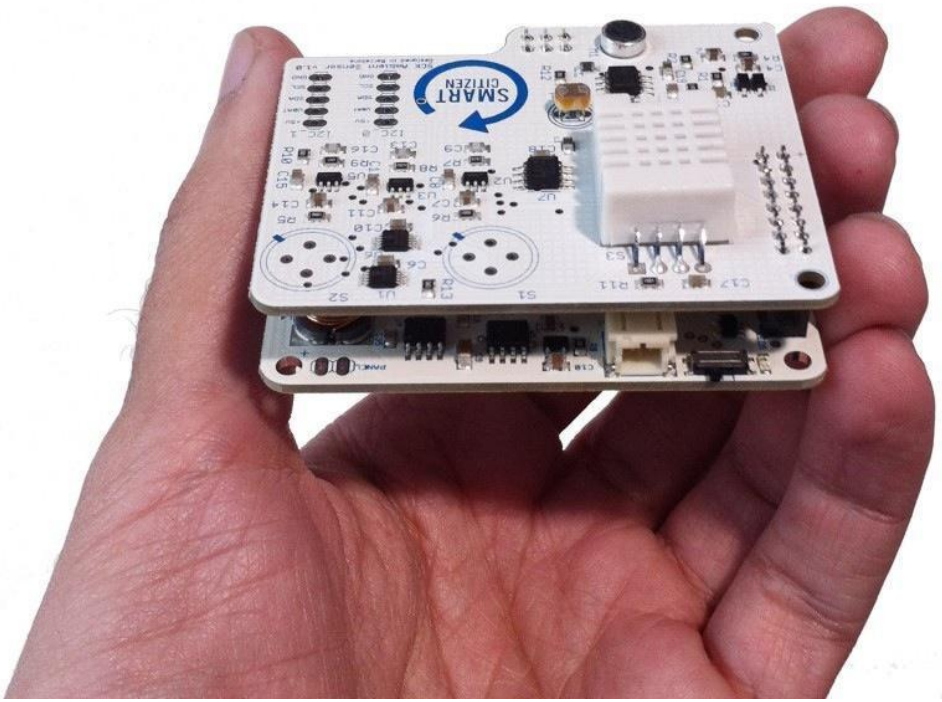

AtMega328P
Arduino Compatible Sockets
SD Card Socket
Reset button for Bee Module
RTC
Reset button for AtMega328P
Bee series socket
ISP
I2C Connector
Connectors for LiPo Battery and Solar Cell
Programming Connector (use with UartSBee)
Charge Controller
CR2032 Socket

Seeeduino

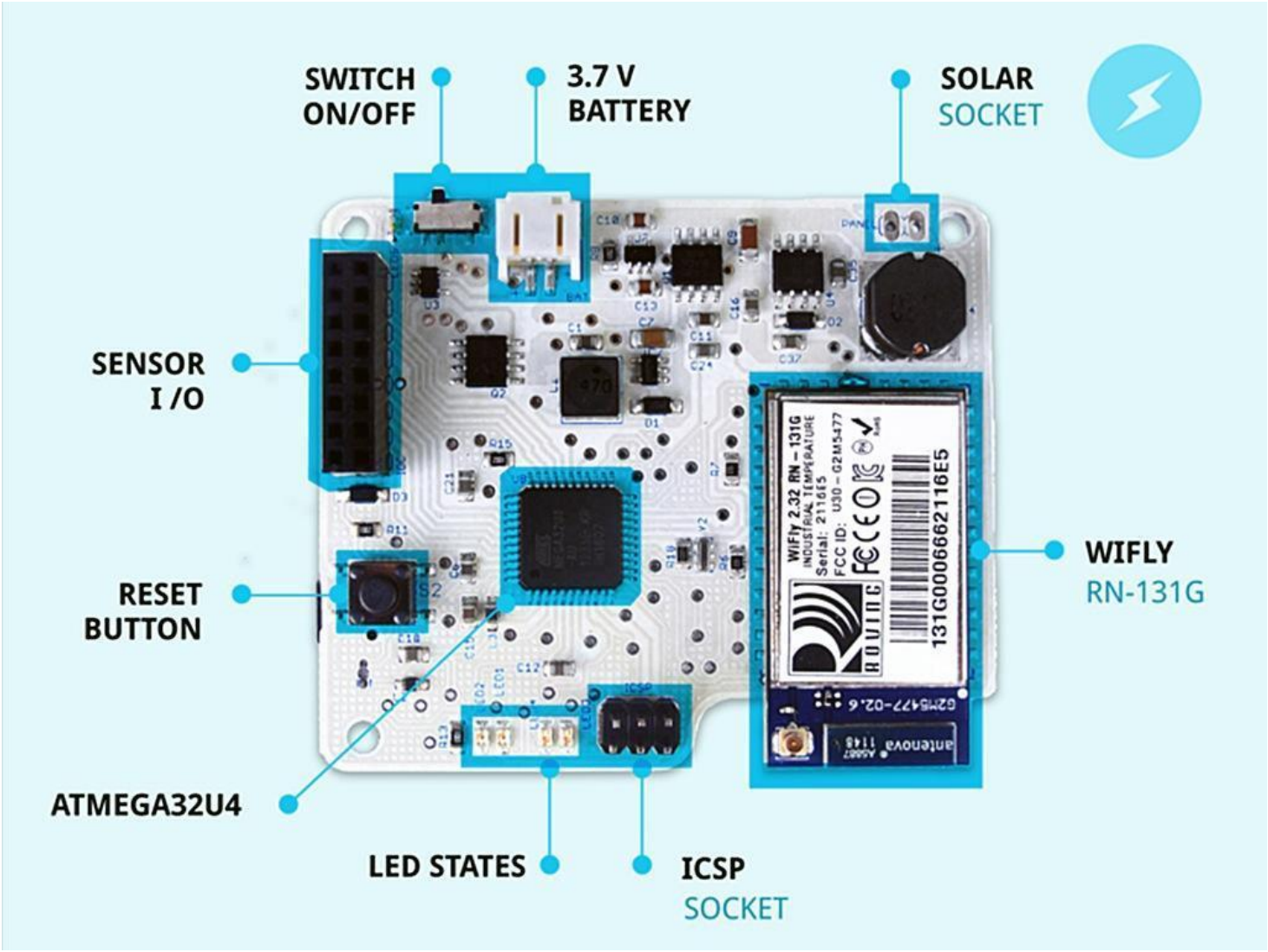

BATTERY PACK
SKT 603450 3.7WH
3.7V 1000 mAh LI-ion
CAUTION:
SanDisk

Seeeduino

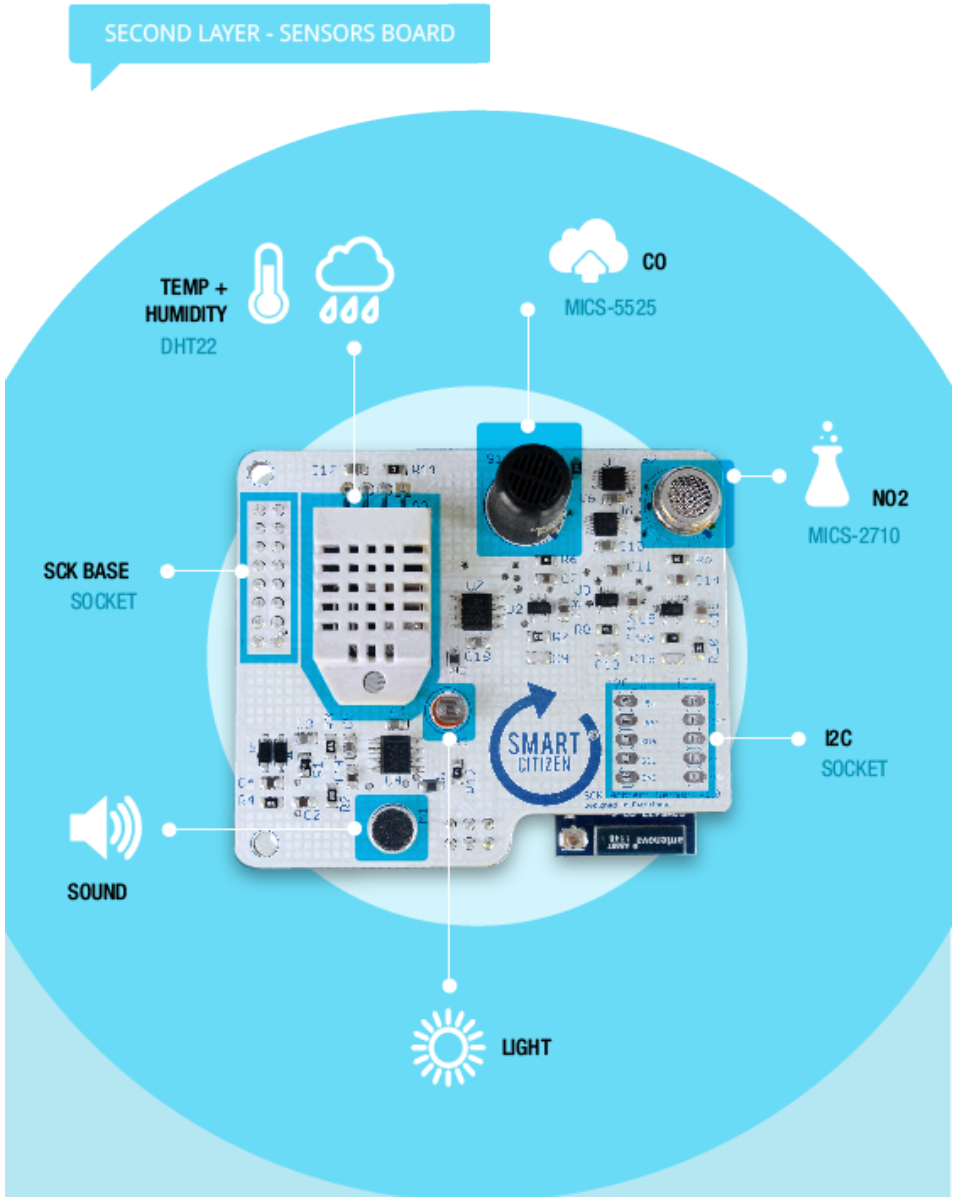
Smart Citizen Kit



Smart Citizen Kit



Smart Citizen Kit



Smart Citizen Kit

Smart Citizen Kit