# Arduino

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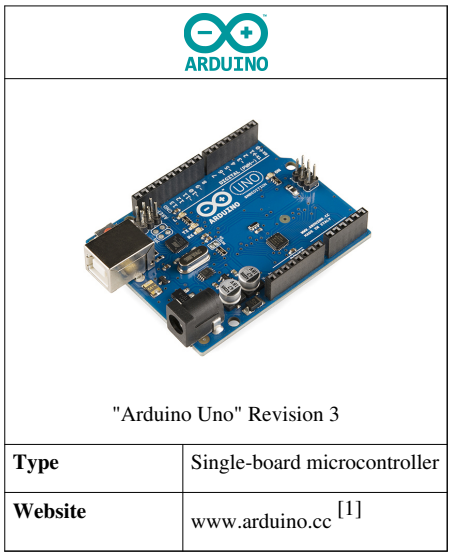
# Arduino

For other uses, see Arduino (disambiguation).

**Arduino**




"Arduino Uno" Revision 3

| | |
|---|---|
| **Type** | Single-board microcontroller |
| **Website** | www.arduino.cc [1] |

**Arduino** is a single-board microcontroller, intended to make the application of interactive objects or environments more accessible. The hardware consists of an open-source hardware board designed around an 8-bit Atmel AVR microcontroller, or a 32-bit Atmel ARM. Current models feature a USB interface, 6 analog input pins, as well as 14 digital I/O pins which allows the user to attach various extension boards.

Introduced in 2005, the Arduino platform was designed to provide an inexpensive and easy way for hobbyists, students and professionals to create devices that interact with their environment using sensors and actuators. Common examples for beginner hobbyists include simple robots, thermostats and motion detectors. It comes with a simple integrated development environment (IDE) that runs on regular personal computers and allows users to write programs for Arduino using C or C++.

The current prices of Arduino boards run around €20, or $27 and those of related "clones" as low as $9. Arduino boards can be purchased pre-assembled or as do-it-yourself kits. Hardware design information is available for those who would like to assemble an Arduino by hand. It was estimated in mid-2011 that over 300,000 official Arduinos had been commercially produced, and in 2013 that 700,000 official boards were in users' hands.

## History

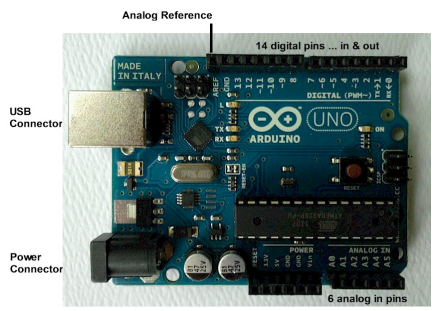
Arduino started in 2005 as a project for students at the Interaction Design Institute Ivrea in Ivrea, Italy. At that time program students used a "BASIC Stamp" at a cost of $100, considered expensive for students. Massimo Banzi, one of the founders, taught at Ivrea.

A hardware thesis was contributed for a wiring design by Colombian student Hernando Barragan. After the wiring platform was complete, researchers worked to make it lighter, less expensive, and available to the open source community. The school eventually closed down, so these researchers, one of them David Cuartielles, promoted the idea.

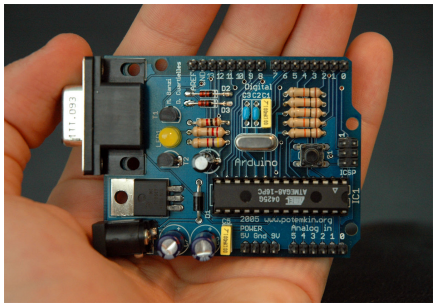
The current prices run around $30 and related "clones" as low as $9. A simple Arduino Mini Pro clone may be had from China for less than $4, post paid.

## Hardware

An Arduino board consists of an Atmel 8-bit AVR microcontroller with complementary components to facilitate programming and incorporation into other circuits. An important aspect of the Arduino is the standard way that connectors are exposed, allowing the CPU board to be connected to a variety of interchangeable add-on modules known as *shields*. Some shields communicate with the Arduino board directly over various pins, but many shields are individually addressable via an I²C serial bus, allowing many shields to be stacked and used in parallel. Official Arduinos have used the megaAVR series of chips, specifically the ATmega8, ATmega168, ATmega328, ATmega1280, and ATmega2560. A handful of other processors have been used by Arduino compatibles. Most boards include a 5 volt linear regulator and a 16 MHz crystal oscillator (or ceramic resonator in some variants), although some designs such as the LilyPad run at 8 MHz and dispense with the onboard voltage regulator due to specific form-factor restrictions. An Arduino's microcontroller is also pre-programmed with a boot loader that simplifies uploading of programs to the on-chip flash memory, compared with other devices that typically need an external programmer. This makes using an Arduino more straightforward by allowing the use of an ordinary computer as the programmer.




An official Arduino Uno with descriptions of the I/O locations



An early Arduino board with an RS-232 serial interface (upper left) and an Atmel ATmega8 microcontroller chip (black, lower right); the 14 digital I/O pins are located at the top and the six analog input pins at the lower right.

At a conceptual level, when using the Arduino software stack, all boards are programmed over an RS-232 serial connection, but the way this is implemented varies by hardware version. Serial Arduino boards contain a level shifter circuit to convert between RS-232-level and TTL-level signals. Current Arduino boards are programmed via USB, implemented using USB-to-serial adapter chips such as the FTDI FT232. Some variants, such as the Arduino Mini and the unofficial Boarduino, use a detachable USB-to-serial adapter board or cable, Bluetooth or other methods. (When used with traditional microcontroller tools instead of the Arduino IDE, standard AVR ISP programming is used.)

The Arduino board exposes most of the microcontroller's I/O pins for use by other circuits. The Diecimila, Duemilanove, and current Uno provide 14 digital I/O pins, six of which can produce pulse-width modulated signals, and six analog inputs. These pins are on the top of the board, via female 0.10-inch (2.5 mm) headers. Several plug-in application shields are also commercially available.

The Arduino Nano, and Arduino-compatible Bare Bones Board and Boarduino boards may provide male header pins on the underside of the board to be plugged into solderless breadboards.

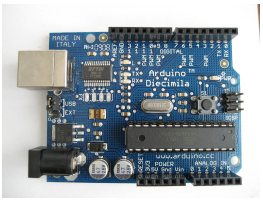
There are many Arduino-compatible and Arduino-derived boards. Some are functionally equivalent to an Arduino and may be used interchangeably. Many are the basic Arduino with the addition of commonplace output drivers, often for use in school-level education to simplify the construction of buggies and small robots. Others are electrically equivalent but change the form factor, sometimes permitting the continued use of Shields, sometimes not. Some variants use completely different processors, with varying levels of compatibility.

## Official boards

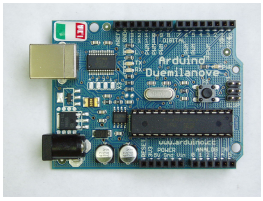
Further information: List of Arduino boards and compatible systems

The original Arduino hardware is manufactured by the Italian company Smart Projects. Some Arduino-branded boards have been designed by the American company SparkFun Electronics.[2] Sixteen versions of the Arduino hardware have been commercially produced to date.

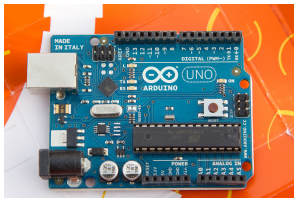
### Example Arduino boards



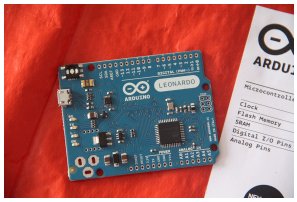
Arduino Diecimila in Stoicheia



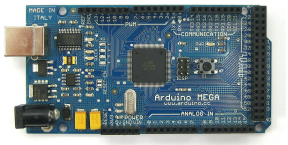
Arduino Duemilanove (rev 2009b)



Arduino UNO

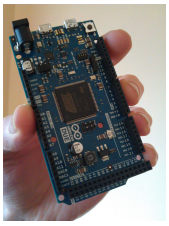


Arduino Leonardo

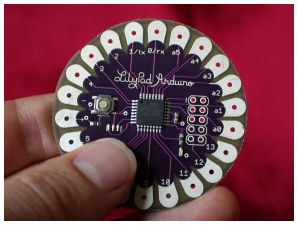


Arduino Mega

Arduino Nano



Arduino Due (ARM-based)

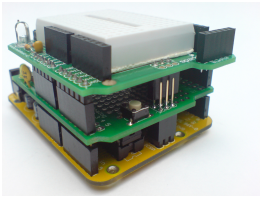


LilyPad Arduino (rev 2007)

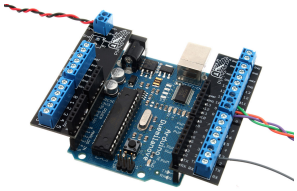
## Shields

Arduino and Arduino-compatible boards make use of *shields*—printed circuit expansion boards that plug into the normally supplied Arduino pin-headers. Shields can provide motor controls, GPS, ethernet, LCD, or breadboarding (prototyping). A number of shields can also be made DIY.

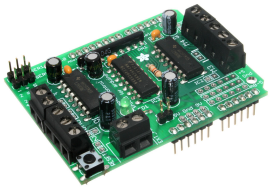
### Example Arduino shields



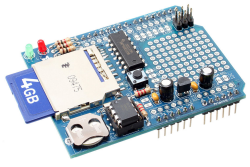
Multiple shields can be stacked. In this example the top shield contains a solderless breadboard



Screw-terminal breakout shield in a wing-type format



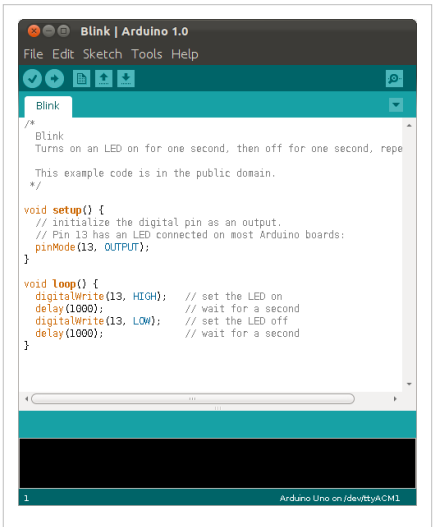
Adafruit Motor Shield with screw terminals for connection to motors



Adafruit Datalogging Shield with a SD slot and Real-Time Clock chip

# Software

## Arduino Software IDE




A screenshot of the Arduino IDE showing the "Blink" program, a simple beginner program

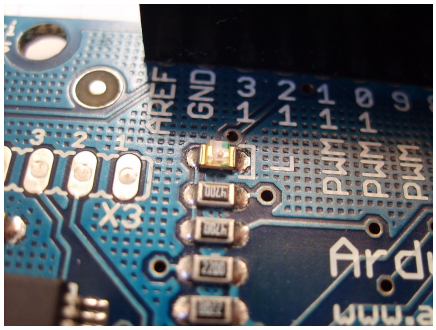
| | |
|---|---|
| **Developer(s)** | Arduino Software |
| **Stable release** | 1.0.5 / May 15, 2013 |
| **Preview release** | 1.5.6-r2 Beta / February 21, 2014 |
| **Written in** | Java, C and C++ |
| **Operating system** | Cross-platform |
| **Type** | Integrated development environment |
| **License** | LGPL or GPL license |
| **Website** | arduino.cc [3] |

The Arduino integrated development environment (IDE) is a cross-platform application written in Java, and is derived from the IDE for the Processing programming language and the Wiring projects. It is designed to introduce programming to artists and other newcomers unfamiliar with software development. It includes a code editor with features such as syntax highlighting, brace matching, and automatic indentation, and is also capable of compiling and uploading programs to the board with a single click. A program or code written for Arduino is called a "sketch".

Arduino programs are written in C or C++. The Arduino IDE comes with a software library called "Wiring" from the original Wiring project, which makes many common input/output operations much easier. Users only need define two functions to make a runnable cyclic executive program:

- `setup()`: a function run once at the start of a program that can initialize settings
- `loop()`: a function called repeatedly until the board powers off

A typical first program for a microcontroller simply blinks an LED on and off. In the Arduino environment, the user might write a program like this:




The integrated pin 13 LED

```
#define LED_PIN 13

void setup () {
  pinMode (LED_PIN, OUTPUT); // Enable pin 13 for digital output
}

void loop () {
  digitalWrite (LED_PIN, HIGH); // Turn on the LED
  delay (1000); // Wait one second (1000 milliseconds)
  digitalWrite (LED_PIN, LOW); // Turn off the LED
  delay (1000); // Wait one second
}
```

It is a feature of most Arduino boards that they have an LED and load resistor connected between pin 13 and ground; a convenient feature for many simple tests. The previous code would not be seen by a standard C++ compiler as a valid program, so when the user clicks the "Upload to I/O board" button in the IDE, a copy of the code is written to a temporary file with an extra include header at the top and a very simple main() function at the bottom, to make it a valid C++ program.

The Arduino IDE uses the GNU toolchain and AVR Libc to compile programs, and uses avrdude to upload programs to the board.

As the Arduino platform uses Atmel microcontrollers, Atmel's development environment, AVR Studio or the newer Atmel Studio, may also be used to develop software for the Arduino.

## Development

Arduino is open source hardware: the Arduino hardware reference designs are distributed under a Creative Commons Attribution Share-Alike 2.5 license and are available on the Arduino Web site. Layout and production files for some versions of the Arduino hardware are also available. The source code for the IDE is available and released under the GNU General Public License, version 2.

Although the hardware and software designs are freely available under copyleft licenses, the developers have requested that the name "Arduino" be exclusive to the official product and not be used for derivative works without permission. The official policy document on the use of the Arduino name emphasizes that the project is open to incorporating work by others into the official product. Several Arduino-compatible products commercially released have avoided the "Arduino" name by using "-duino" name variants.

## Applications

See also: List of open source hardware projects

- Xoscillo: open-source oscilloscope
- Scientific equipment
- Arduinome: a MIDI controller device that mimics the Monome
- OBDuino: a trip computer that uses the on-board diagnostics interface found in most modern cars
- The Humane Reader and Humane PC from Humane Informatics: low-cost electronic devices with TV-out that can hold a five thousand book library (e.g. offline Wikipedia compilations) on a microSD card
- Ardupilot: drone software / hardware
- ArduinoPhone[4]

## Reception

The Arduino project received an honorary mention in the Digital Communities category at the 2006 Prix Ars Electronica.

## References

[1] http://www.arduino.cc
[2] Schmidt, M. ["Arduino: A Quick Start Guide"], *Pragmatic Bookshelf*, January 22, 2011, Pg. 201
[3] http://arduino.cc/en/Main/Software
[4] ArduinoPhone (http://www.instructables.com/id/ArduinoPhone/). Instructables.com (2013-07-17). Retrieved on 2013-08-04.

## Further reading

- *Exploring Arduino: Tools and Techniques for Engineering Wizardry*; Jeremy Blum; 384 pages; 2013; ISBN 978-1118549360.
- *Arduino Workshop: A Hands-On Introduction with 65 Projects*; John Boxall; 392 pages; 2013; ISBN 978-1593274481.
- *Beginning C for Arduino: Learn C Programming for the Arduino and Compatible Microcontrollers*; Jack Purdum; 280 pages; 2012; ISBN 978-1430247760.
- *Programming Arduino: Getting Started With Sketches*; Monk Simon; 162 pages; 2011; ISBN 978-0071784221.

## External links

Wikimedia Commons has media related to ***Arduino***.

- Official website (http://arduino.cc/)
- *Arduino The Documentary* (http://www.imdb.com/title/tt1869268/) at the Internet Movie Database, YouTube (https://www.youtube.com/watch?v=8zB2KIm4EEQ), Vimeo (http://vimeo.com/18539129)
- Documentary about Arduino (http://tv.wired.it/entertainment/2012/12/06/arduino-creare-e-un-gioco-da-ragazzi-eng-sub.html), Wired Magazine (in Italian/English)
- How to install additional Arduino libraries? (http://arduino.cc/en/Guide/Libraries)
- Arduino Cheat Sheet (http://robodino.org/resources/arduino)
- Arduino Projects (http://codeduino.com/projects), Examples of Arduino Projects
- Arduino Board Pinout Diagrams: Due (http://arduino.cc/forum/index.php?/topic,132130.0.html), Esplora (http://www.flickr.com/photos/28521811@N04/8469564216/sizes/l/in/photostream/), Leonardo (http://www.flickr.com/photos/28521811@N04/8466547410/sizes/l/in/photostream/), Mega (http://www.flickr.

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- Evolution tree for Arduino (http://i.imgur.com/yGRLPvL.jpg)
- Massimo Banzi (http://twit.tv/show/triangulation/110/) interviewed on the TV show Triangulation on the TWiT.tv network
- Massimo Banzi (http://twit.tv/show/floss-weekly/61/) interviewed on the TV show FLOSS weekly on the TWiT.tv network
- Arduino Stack Exchange (http://arduino.stackexchange.com/) a question and answer site

# Comparison of single-board computers

Comparison of single-board computers.

## General comparison

| Name | Model | Release date | SoC | CPU | Graphics | RAM | On-board storage |
|---|---|---|---|---|---|---|---|
| Arduino Uno | R3 | 2010/09 | Atmel ATmega328P | Atmel AVR @16 MHz, 8-bit | N/A | 2 KB | 32 KB Flash + 1 KB EEPROM |
| Arndale Board | 5250-AA | ? | Samsung Exynos 5 | 2x ARM Cortex-A15 @1.7 GHz | Mali-T604MP4 | 2 GB DDR3(L) | No |
| Banana Pi | | 2014/03 | Allwinner A20 | 2x ARM Cortex-A7 @1 GHz | Mali-400MP2 | 1 GB DDR3 | No |
| BeagleBoard | D | 2012/10 | TI OMAP 3530 | ARM Cortex-A8 @720 MHz | TMS320C64x @430 MHz, DSP | 256 MB LPDDR | 512 MB NAND Flash |
| BeagleBoard-xM | | 2010/09 | TI Sitara AM37x | ARM Cortex-A8 @1 GHz | C64x, DSP | 512 MB LPDDR | ? |
| BeagleBone | A6 | 2011/10 | TI Sitara AM335x | ARM Cortex-A8 @720 MHz | LCD | 256 MB DDR2 | 4 GB Flash |
| BeagleBone Black | C | 2013/04 | TI Sitara AM335x | ARM Cortex-A8 @1 GHz | PowerVR SGX530 | 512 MB DDR3L | 4 GB Flash |
| Cotton Candy | ? | ? | Samsung Exynos 4 Dual | 2x ARM Cortex-A9 @1.2 GHz | Mali-400MP4 | 1 GB | No |
| Cubieboard | | 2012/09 | Allwinner A10 | ARM Cortex-A8 @1 GHz | Mali-400 | 1 GB DDR3 @480 MHz | 4 GB NAND Flash |
| Cubieboard 2 | | 2013/06 | Allwinner A20 | 2x ARM Cortex-A7 @1 GHz | Mali-400MP2 | 1 GB DDR3 @480 MHz | 4 GB NAND Flash |
| Cubieboard 3 | | 2013/10 | Allwinner A20 | 2x ARM Cortex-A7 @1 GHz | Mali-400MP2 | 2 GB DDR3 @480 MHz | 8 GB NAND Flash |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Cubieboard 8 | | ? | Allwinner A80 | 4x ARM Cortex-A15 @ 4x ARM Cortex-A7 | ? | 2 GB DDR3 @480 MHz | 8 GB NAND Flash |
| Cubox-i | i2 | 2013/11 | Freescale i.MX6 | 2x ARM Cortex-A9 @1 GHz | Vivante GC880 | 1 GB DDR3 @800 MHz, 32-bit | No |
| Cubox-i | i2eX | 2013/11 | Freescale i.MX6 | 2x ARM Cortex-A9 @1 GHz | Vivante GC2000 | 1 GB DDR3 @1066 MHz, 64-bit | No |
| Cubox-i | i4Pro | 2013/11 | Freescale i.MX6 | 4x ARM Cortex-A9 @1 GHz | Vivante GC2000 | 2 GB DDR3 @1066 MHz, 64-bit | No |
| DreamPlug | | 2011/02 | Marvell Kirkwood 88F6281 | ARM9E@1.2 GHz | N/A | 512 MB DDR2 | 4 GB micro-SD + 2 MB SPI NOR Flash for boot loader |
| Embest SBC8600B | | 2013/01 | TI Sitara AM3359 | ARM Cortex-A8 @720 MHz | PowerVR SGX530 | 512 MB DDR3 | 512 MB NAND Flash |
| Foxconn AT-5570 | ? | ? | ? | AMD C-70 | Radeon HD 7290 | 8 GB DDR3 | ? |
| GameStick | | 2013/11 | Amlogic 8726-MX | 2x ARM Cortex-A9 | Mali-400 | 1 GB DDR3 | 8 GB Flash |
| Gigabyte BRIX | GB-BXBT-2807 | 2014/06 | Intel Celeron N2807 | 2x Bay Trail-M @1.58-2.16 GHz, 64-bit | Intel HD Graphics | DDR3L-1333 SO-DIMM socket | No |
| Gizmo Board | | ? | AMD Embedded G-Series T40E APU | 2x Bobcat @1.0 GHz, 64-bit | Radeon HD 6250 | 1 GB DDR3 | 2 MB SPI Flash |
| Gumstix Overo EarthSTORM + Summit | | ? | TI Sitara AM3703 | ARM Cortex-A8 @1 GHz | ? | 512 MB LP-DDR | 512 MB NAND Flash |
| Hackberry A10 | ? | ? | Allwinner A10 | ARM Cortex-A8 @1.2 GHz | Mali-400 | 512 MB / 1 GB DDR3 | 4 GB NAND Flash |
| Hiapad Hi-802 | | 2013/01 | Freescale i.MX6 | 4x ARM Cortex-A9 | ? | 1 GB | Internal microSD card |
| Hummingboard | i1 | 2014/07 | Freescale i.MX6 Solo | ARM Cortex-A9 | Vivante GC880 | 512 MB @800 MHz, 32 bit | No |
| Hummingboard | i2 | 2014/07 | Freescale i.MX6 DualLite | 2 x ARM Cortex-A9 | Vivante GC880 | 1024 MB @800 MHz, 64 bit | No |
| Hummingboard | i2eX | 2014/07 | Freescale i.MX6 Dual | 2 x ARM Cortex-A9 | Vivante GC2000 | 1024 MB @1066 MHz, 64 bit | No |
| Intel NUC | see Next Unit of Computing | | | | | | |
| MarsBoard | A10 New | ? | Allwinner A10 | ARM Cortex-A8 | Mali-400MP2 | 1 GB DDR3 @480 MHz | 8 GB NAND Flash |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MarsBoard | A20 New | ? | Allwinner A20 | 2x ARM Cortex-A7 @1 GHz | Mali-400MP2 | 1-2 GB DDR3 @480 MHz | 8 GB NAND Flash |
| MarsBoard | RK3066 | ? | Rockchip RK3066 | 2x ARM Cortex-A9 @1.6 GHz | Mali-400MP4 | 1-2 GB DDR3 | 4 GB NAND Flash |
| MinnowBoard | ? | 2013 | ? | Intel Atom E640 1 GHz, 32-bit | GMA600 | 1 GB DDR2 | ? |
| MiraBox | | 2014/06 | Marvell Armada 370 | ARMv7 @1.2 GHz | N/A | 1 GB DDR3L-1333 | 1 GB NAND Flash |
| MK808 | ? | ? | Rockchip RK3066 | 2x ARM Cortex-A9 @1.6 GHz | Mali-400MP4 @250 MHz | 1 GB DDR3 | 8 GB NAND Flash |
| MTB025 | ? | ? | VIA WM8850 | ARM Cortex-A8 @1.2 GHz | Mali-400 | 512 MB | 4 GB Flash |
| MYIR MYD-AM335X | | 2013/12 | TI Sitara AM335x | ARM Cortex-A8 @800-1000 MHz | PowerVR SGX530 (optional) | 512 MB DDR3 | 512 MB NAND Flash |
| Netduino Plus 2 | | 2012/11 | STMicro STM32 F4 | ARM Cortex-M4 @168 MHz | N/A | 100+ KB | 384 KB Flash |
| Nitrogen6x | Rev 3 | 2013/06 | Freescale i.MX6 | 4x ARM Cortex-A9 @1 GHz | Vivante GC2000 + Vivante GC355 + Vivante GC320 | 1 GB DDR3 @532 MHz | No |
| Nvidia Jetson TK1 | | 2014/04 | Nvidia Tegra K1 | 4x ARM Cortex-A15 R3 @2.3 GHz + 1x “low-power core” | Nvidia GK20A (192 CUDA cores) @950 MHz | 2 GB DDR3L @933 MHz, 64-bit | 16 GB eMMC + 4 MB SPI Flash for boot loader |
| ODROID-U3 | ? | 2014/01 | Samsung Exynos 4 Quad | 4x ARM Cortex-A9 @1.7 GHz | Mali-400MP4 @440 MHz | 2 GB LP-DDR2 @880 MHz | eMMC module |
| ODROID-X2 | ? | ? | Samsung Exynos 4 Quad | 4x ARM Cortex-A9 @1.7 GHz | Mali-400MP4 @440 MHz | 2 GB LP-DDR2 | eMMC module |
| OLinuXino A10 | LIME | ? | Allwinner A10 | ARM Cortex-A8 @1 GHz | Mali-400 | 512 MB DDR3 | No |
| OLinuXino A13 | | ? | Allwinner A13 | ARM Cortex-A8 @1 GHz | Mali-400 | 512 MB DDR3 | No |
| OLinuXino A13 | MICRO | ? | Allwinner A13 | ARM Cortex-A8 @1 GHz | Mali-400 | 256 MB DDR3 | No |
| OLinuXino A13 | WIFI | ? | Allwinner A13 | ARM Cortex-A8 @1 GHz | Mali-400 | 512 MB DDR3 | 4 GB NAND Flash |
| OLinuXino A20 | LIME, LIME-4GB | 2013/06 | Allwinner A20 | 2x ARM Cortex-A7 @1 GHz | Mali-400MP2 | 512 MB DDR3 | 4 GB NAND Flash |
| OLinuXino A20 | MICRO, MICRO-4GB | 2013/06 | Allwinner A20 | 2x ARM Cortex-A7 @1 GHz | Mali-400MP2 | 1 GB DDR3 | 4 GB NAND Flash |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Ouya | ? | 2013 | ? | 4x ARM Cortex-A9 @1.7 GHz | Nvidia ULP GeForce | 1 GB | 8 GB Flash |
| PandaBoard ES | ? | ? | ? | ARM Cortex-A9 @1.2 GHz | PowerVR SGX540 | 1 GB | ? |
| pcDuino | Lite | 2013/10 | Allwinner A10 | ARM Cortex-A8 @1 GHz | Mali-400 | 512 MB DRAM | No |
| pcDuino | v2 | 2013/09 | Allwinner A10 | ARM Cortex-A8 @1 GHz | Mali-400 | 1 GB DRAM | 4 GB Flash |
| pcDuino3 | | 2014/02 | Allwinner A20 | 2x ARM Cortex-A7 @1 GHz | Mali-400MP2 | 1 GB DRAM | 4 GB Flash |
| pcDuino3Nano | | 2014/07 | Allwinner A20 | 2x ARM Cortex-A7 @1 GHz | Mali-400MP2 | 1 GB DRAM | 4 GB Flash |
| PC Engines APU [1] | APU.1C [2] | 2014/04 | AMD Embedded G-Series T40E APU | 2x Bobcat @1.0 GHz, 64-bit | N/A (disabled in BIOS) | 2 GB DDR3-1066 | No |
| PC Engines APU [1] | APU.1C4 [3] | 2014/04 | AMD Embedded G-Series T40E APU | 2x Bobcat @1.0 GHz, 64-bit | N/A (disabled in BIOS) | 4 GB DDR3-1066 | No |
| Radxa Rock | ? | 2014/01 | Rockchip RK3188 | 4x ARM Cortex-A9 @1.6 GHz | Mali-400MP4 | 2 GB DDR3 | 8 GB NAND Flash |
| Radxa Rock | Lite | 2014/01 | Rockchip RK3188 | 4x ARM Cortex-A9 @1.6 GHz | Mali-400MP4 | 1 GB DDR3 | 4 GB NAND Flash |
| Raspberry Pi | Model A | 2013/02 | Broadcom BCM2835 | ARM11 @700 MHz | Broadcom VideoCore IV | 256 MB | No |
| Raspberry Pi | Model B rev 1 | 2012/02 | Broadcom BCM2835 | ARM11 @700 MHz | Broadcom VideoCore IV | 256 MB | No |
| Raspberry Pi | Model B rev 2 | 2012/10 | Broadcom BCM2835 | ARM11 @700 MHz | Broadcom VideoCore IV | 512 MB | No |
| Raspberry Pi | Model B+ | 2014/07 | Broadcom BCM2835 | ARM11 @700 MHz | Broadcom VideoCore IV | 512 MB | No |
| Rikomagic MK802 | MK802 | ? | Allwinner A10 | ARM Cortex-A8 @1.0 GHz | AMD Z430, AMD Z160 | 512 MB DDR3 | 4 GB Flash |
| Rikomagic MK802 | MK802+ / MK802 II | ? | Allwinner A10 | ARM Cortex-A8 @1.0 GHz | AMD Z430, AMD Z160 | 1 GB DDR3 | 4 GB Flash |
| RIoTboard | ? | 2014/01 | Freescale i.MX6 | ARM Cortex-A9 @1.0 GHz | Vivante GC880 | 1 GB DDR3 | 4 GB Flash |
| Snowball | SKY-S9500 | ? | ? | 2x Cortex-A9 @1 GHz | Mali-400 | 1 GB LP-DDR2 | ? |
| TBS 2910 Matrix | | 2014/01 | Freescale i.MX6 Quad | 4x ARM Cortex-A9 @1 GHz | Vivante GC2000 | 2 GB DDR3 | 16 GB eMMC |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| UDOO | Dual, Dual Lite | 2013/10 | Freescale i.MX6 Dual + Atmel SAM3X8E | 2x ARM Cortex-A9 @1 GHz + 1x ARM Cortex-M3 | Vivante GC880 + Vivante GC320 | 1 GB DDR3 | No |
| UDOO | Quad | 2013/10 | Freescale i.MX6 Quad + Atmel SAM3X8E | 4x ARM Cortex-A9 @1 GHz + 1x ARM Cortex-M3 | Vivante GC2000 + Vivante GC355 + Vivante GC320 | 1 GB DDR3 | No |
| Utilite | Value, Standard, Pro | 2013/07 | Freescale i.MX6 Solo/Dual/Quad | 1x, 2x or 4x ARM Cortex-A9 @1 GHz | Vivante GC880 or GC2000 | 512 MB or 2 GB DDR3 @1066 MHz | Optional 32 GB mSATA SSD. Warranty-breaking upgrades exist for 'Pro' model. |
| VIA APC | 8750 | ? | WonderMedia WM8750 | 1176JZF @800 MHz | 720p | 512 MB DDR3 | 2 GB NAND Flash |
| VIA APC | Rock | ? | WonderMedia WM8750 | 1176JZF @800 MHz | 720p | 512 MB DDR3 | 4 GB NAND Flash |
| VIA EPIA-P910-10 | ? | ? | ? | 4x VIA E @1 GHz | VIA Chromotion 5.0 DX11 | DDR3 800/1066/1333 SO-DIMM socket | ? |
| Wandboard | Solo | 2013 | Freescale i.MX6 | 1x ARM Cortex-A9 @1 GHz | Vivante GC880 + Vivante GC320 | 512 MB DDR3 | No |
| Wandboard | Dual | 2013 | Freescale i.MX6 | 2x ARM Cortex-A9 @1 GHz | Vivante GC880 + Vivante GC320 | 1 GB DDR3 | No |
| Wandboard | Quad | 2013 | Freescale i.MX6 | 4x ARM Cortex-A9 @1 GHz | Vivante GC2000 + Vivante GC355 + Vivante GC320 | 2 GB DDR3 | No |
| Zealz GK802 | | 2012/12 | Freescale i.MX6 | 4x ARM Cortex-A9 @1.2 GHz | Vivante GC2000 | 1 GB DDR3 | 8 GB microSD |

## Operating system

| Name | Linux | Android | BSD | Windows | Other |
|---|---|---|---|---|---|
| Arduino Uno | No | No | No | No | |
| Arndale Board | ? | ? | ? | ? | |
| Banana Pi | With out-of-tree patches (and binary BLOBs?) | Yes | ? | ? | |
| BeagleBoard | ? | ? | ? | ? | |
| BeagleBoard-xM | ? | Yes | ? | ? | |
| BeagleBone | ? | ? | ? | ? | |
| BeagleBone Black | With out-of-tree patches (and binary BLOBs?) | Yes | ? | ? | |
| Cotton Candy | ? | ? | ? | ? | |
| Cubieboard | With out-of-tree patches (and binary BLOBs?) | Yes | ? | ? | |
| Cubieboard 2 | With out-of-tree patches (and binary BLOBs?) | Yes | ? | ? | |
| Cubieboard 3 | ? | Yes | ? | ? | |
| Cubieboard 8 | ? | ? | ? | ? | |
| CuBox-i | ? | Yes | ? | ? | |
| DreamPlug | Yes | ? | Yes | ? | |
| Embest SBC8600B | With out-of-tree patches (and binary BLOBs?) | Yes | ? | CE 7.0 | |
| Foxconn AT-5570 | ? | ? | ? | ? | |
| GameStick | ? | Yes | ? | ? | |
| Gigabyte BRIX GB-BXBT-2807 | ? | ? | ? | 7 (64-bit), 8/8.1 (32-/64-bit) | |
| Gizmo Board | ? | ? | ? | ? | |
| Gumstix Overo EarthSTORM + Summit | With out-of-tree patches (and binary BLOBs?) | ? | ? | ? | |
| Hackberry A10 | ? | ? | ? | ? | |
| Hiapad Hi-802 | ? | Yes | ? | ? | |
| Hummingboard | ? | ? | ? | ? | |
| Intel NUC | ? | ? | ? | ? | |
| MarsBoard | ? | ? | ? | ? | |
| MinnowBoard | ? | ? | ? | ? | |
| MiraBox | With out-of-tree patches (and binary BLOBs?) | ? | ? | ? | |
| MK808 | ? | ? | ? | ? | |
| MTB025 | ? | ? | ? | ? | |
| MYIR MYD-AM335X | With out-of-tree patches (and binary BLOBs?) | Yes | ? | CE 7.0 | |
| Netduino Plus 2 | No | No | No | No | .NET Micro Framework 4.2/4.3 |
| Nitrogen6x | Basic support (device tree) merged upstream, still needs Freescale patches and optional video binary BLOB | Yes | ? | CE | QNX |
| Nvidia Jetson TK1 | With out-of-tree patches (and binary BLOBs?) | ? | ? | ? | |

| | | | | | |
|---|---|---|---|---|---|
| ODROID-U3 | With out-of-tree patches (and binary BLOBs?) | Yes | ? | ? | |
| ODROID-X2 | With out-of-tree patches (and binary BLOBs?) | Yes | ? | ? | |
| OLinuXino A10 | With out-of-tree patches (and binary BLOBs?) | ? | ? | ? | |
| OLinuXino A13 | With out-of-tree patches (and binary BLOBs?) | Yes | ? | ? | |
| OLinuXino A20 | With out-of-tree patches (and binary BLOBs?) | Yes | ? | ? | |
| Ouya | ? | ? | ? | ? | |
| PandaBoard ES | With out-of-tree patches (and binary BLOBs?) | ? | ? | ? | |
| pcDuino Lite | With out-of-tree patches (and binary BLOBs?) | No | ? | ? | |
| pcDuino v2 | With out-of-tree patches (and binary BLOBs?) | Yes | ? | ? | |
| pcDuino3 | With out-of-tree patches (and binary BLOBs?) | Yes | ? | ? | |
| pcDuino3Nano | With out-of-tree patches (and binary BLOBs?) | Yes | ? | ? | |
| PC Engines APU | Yes | Yes | FreeBSD, OpenBSD, pfSense | ? | |
| Radxa Rock | ? | ? | ? | ? | |
| Raspberry Pi | With out-of-tree Broadcom GPU firmware as binary BLOB or as source not yet merged upstream due to MPEG licensing | ? | FreeBSD, NetBSD | ? | RISC OS, Plan 9 |
| Rikomagic MK802 | ? | ? | ? | ? | |
| RIoTboard | ? | ? | ? | ? | |
| Snowball | ? | ? | ? | ? | |
| TBS 2910 Matrix | With out-of-tree patches (and binary BLOBs?) | Yes | ? | ? | |
| UDOO | ? | Yes | ? | ? | |
| Utilite series | With out-of-tree patches; i.MX6 patches are merging upstream; also with 3D acceleration BLOB, with future open-source alternative etnaviv [4] | Yes | ? | ? | |
| VIA APC 8750 / Rock | ? | Yes | ? | ? | Firefox OS |
| VIA EPIA-P910-10 | ? | ? | ? | ? | |
| Wandboard | With out-of-tree patches (and binary BLOBs?) | ? | FreeBSD | ? | |
| Zealz GK802 | With out-of-tree patches (and binary BLOBs?) | Yes | ? | ? | |

## Physical and electrical comparison

| Name | Size [mm] | Weight | Input voltage | Power consumption | Power source |
|---|---|---|---|---|---|
| Arduino Uno | 75 × 53 | ? | 7–12 V | 0.172-0.233 W | ? |
| Arndale Board | 195 × 140 × 20 | ? | 5 V | 11.5 W | ? |
| Banana Pi | 92 × 60 | 48 g | 5 V | 10 W supply, 1.15 W idle in Linux | micro USB |
| BeagleBoard | 78.74 × 76.2 | ? | 2.7–4.5 V | ? | miniUSB or DC jack |
| BeagleBoard-xM | 82.5 × 82.5 | ? | 5 V | ? | DC jack |
| BeagleBone | 86 × 53 | ? | 5 V | 0.85 W | miniUSB or DC jack |
| BeagleBone Black | 86.4 × 53.3 | 40 g | 5 V | 1.05–2.3 W | miniUSB or DC jack or via expansion header |
| Cotton Candy | ? | ? | ? | ? | ? |
| Cubieboard | 100 × 60 | 45 g | 5 V | ? | DC jack or USB OTG input |
| Cubieboard 2 | 100 x 60 | ? | 5 V | ? | DC jack or USB OTG input |
| Cubieboard 3 | 110 × 80 | 220 g (kit) | 5 V | ? | miniUSB or DC jack or LiPo batteries |
| Cubieboard 8 | ? | ? | ? | ? | ? |
| CuBox-i2, i2eX | 55 × 55 × 42 | ? | 5 V | 10 W supply | DC jack |
| CuBox-i4Pro | 55 × 55 × 42 | ? | 5 V | 15 W supply | DC jack |
| DreamPlug | 170 × 82 × 33 | 310 g | 5 V | 0.5-1.5 W | PSU included |
| Embest SBC8600B | 95 × 95 | ? | 12 V | ? | DC jack |
| Foxconn AT-5570 | 190 × 135 × 38 | ? | ? | ? | ? |
| GameStick | ? | ? | 5 V | ? | Micro USB |
| Gigabyte BRIX GB-BXBT-2807 | 56.1 × 107.6 × 114.4 | ? | 12 V | 30 W supply | DC jack |
| Gizmo Board | 102 × 102 | ? | 12 V | ? | DC jack |
| Gumstix Overo EarthSTORM + Summit | 80 × 39 | 20.8 g | 3.5-5 V | ? | DC jack |
| Hackberry A10 | 110 × 76 × 20 | ? | 5 V | 6 W supply | DC jack |
| Hiapad Hi-802 | ? | ? | 5 V | 10 W supply | Micro USB |
| Hummingboard | ? | ? | ? | ? | ? |
| Intel NUC | ? | ? | ? | ? | ? |
| MarsBoard | ? | ? | 5 V | 10 W supply | DC jack |
| MinnowBoard | 106.68 x 106.68 | ? | ? | ? | ? |
| MiraBox | 133 × 93 × 20 | ? | 5 V | 15 W | DC jack |
| MK808 | ? | ? | ? | ? | ? |
| MTB025 | ? | ? | ? | ? | ? |
| MYIR MYD-AM335X | 130 × 100 | ? | 5 V | 10 W supply | DC jack |
| Netduino Plus 2 | 71.1 × 53.3 | ? | 5 V (USB) or 7.5–9.0 V (DC jack) | ? | DC jack or micro USB |
| Nitrogen6x | 116 × 75 | ? | 5 V DC | 1.5 W | Separate plug or power over Ethernet |

| | | | | | |
|---|---|---|---|---|---|
| Nvidia Jetson TK1 | 127 × 127 | ? | 12 V | 60 W supply, <30 W typ. stress | DC jack |
| ODROID-U3 | 83 × 48 | 48 g | 5 V | ? | ? |
| ODROID-X2 | 94 × 90 | ? | 5 V | ? | ? |
| OLinuXino A10 LIME | 84 × 60 | ? | 5 V | 1.3 W | DC jack or USB OTG input or LiPo batteries |
| OLinuXino A13 base / WIFI | 120 × 120 | ? | 6–16 V | ? | DC jack or USB OTG input or LiPo batteries |
| OLinuXino A13 MICRO | 100 × 85 | ? | 6–16 V | ? | DC jack or USB OTG input |
| OLinuXino A20 LIME | 84 × 60 | ? | 6–16 V | ? | DC jack or LiPo batteries |
| OLinuXino A20 MICRO | 142.24 × 82.55 | ? | 6–16 V | ? | DC jack or LiPo batteries |
| Ouya | 75 × 75 × 75 | ? | ? | ? | ? |
| PandaBoard ES | 114.3 × 101.6 | 81.5 g | ? | ? | ? |
| pcDuino Lite | 125 × 52 | ? | 5 V | 10 W supply | Micro USB |
| pcDuino v2 | 125 × 52 | ? | 5 V | 10 W supply | Micro USB |
| pcDuino3 | 121 × 65 | ? | 5 V | 10 W supply | Micro USB |
| pcDuino3Nano | 92 × 54 | ? | 5 V | 10 W supply | Micro USB |
| PC Engines APU | 152.4 × 152.4 | 250 g | 12 V | 6–12 W | DC jack |
| Radxa Rock | 100 x 80 x 30 | ? | 5 V | ? | DC jack or USB OTG input |
| Raspberry Pi Model A | 85.6 × 54.0 × 19.5 | 45 g | 5 V | 1.5 W | ? |
| Raspberry Pi Model B | 85.6 × 54.0 × 19.5 | 45 g | 5 V | 3.5 W | ? |
| Rikomagic MK802 / MK802+ | 87 x 35 x 12 mm | ? | ? | ? | ? |
| Rikomagic MK802 II | 90 x 30 x 12 mm | ? | ? | ? | ? |
| RIoTboard | 120 x 75 | ? | 5 V | 5 W supply | DC jack |
| Snowball | ? | ? | 5 V | ? | ? |
| TBS 2910 Matrix | 135 x 90 x 45 | ? | 5 V | 15 W supply | DC jack |
| UDOO | 110 x 85 | ? | 6-15 V | ? | DC jack |
| Utilite | 135 x 100 x 21 | ? | 10-16 V | 3.6-8.4 W @ 12 V | DC Jack |
| VIA APC 8750 / Rock | 170 × 85 (Neo-ITX) | ? | 12 V | 3-13.5 W | DC jack or internal 4-pin power connector |
| VIA EPIA-P910-10 | 100 × 72 (Pico-ITX) | ? | ? | ? | ? |
| Wandboard | 95 × 95 | ? | 5 V | 10 W supply; Dual: 1.15-1.6 W typ. | DC jack |
| Zealz GK802 | 102 × 38 × 10 | 50 g | 5 V | 10 W supply, 3.1-7.6 W in Linux | micro USB |

# I/O interfaces and ports

| Name | Interfaces | PCIe | USB | | | Storage | | Networking | | Communication | | | | | Generic I/O | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 2.0 | 3.0 | Device | Flash | SATA | Ethernet | Wi-Fi | Bluetooth | CAN | CIR/IrDA | I²C | SPI | GPIO | Analog |
| Arduino Uno | Arduino 1.0 headers | No | No | No | No | No | No | No | No | No | No | No | No | Yes | 22 | 10-bit ADC, PWM |
| Arndale Board | JTAG | No | 2 | 1 | Yes | microSD | Optional | Yes | a/b/g/n (AR6003) | 4.0 BR/EDR + BLE | ? | No | ? | ? | Optional | ? |
| Banana Pi | CSI, UART | No | 2 | No | OTG | SD | Yes | 10/100/1000 | No | No | No | No | Yes | Yes | 80 | No |
| BeagleBoard | | No | Yes | No | OTG | SD | No | No | No | No | No | No | ? | ? | Yes | No |
| BeagleBoard-xM | ? | No | 4 | No | Yes | SD | No | 10/100 | No | No | No | No | ? | ? | ? | ? |
| BeagleBone | UART | No | Yes | No | Device, Host | microSD | No | 10/100 | No | No | Yes | No | Yes | Yes | 66 | 12-bit ADC |
| BeagleBone Black | UART | No | Yes | No | Device, Host | microSD | No | 10/100 | No | No | Yes | No | Yes | Yes | 66 | 12-bit ADC |
| Cotton Candy | | No | No | No | No | microSD | No | No | b/g/n | 2.1 + EDR | No | No | No | No | No | No |
| Cubieboard, Cubieboard 2 | UART | No | Yes | No | OTG | microSD | SATA 2.0 | 10/100 | No | No | No | No | Yes | Yes | Yes | No |
| Cubieboard 3 | UART | No | Yes | No | OTG | microSD | SATA 2.0 | 10/100/1000 | a/b/g/n (BCM4329) | 2.1 + EDR | No | IrDA | Yes | Yes | Yes | ? |
| Cubieboard 8 | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| CuBox-i2 | | No | 2 | No | No | microSD | No | 10/100 | Optional n | Optional | No | IR rx | No | No | ? | No |
| CuBox-i2eX | | No | 2 | No | No | microSD | eSATA 2.0 | 10/100/1000 | Optional n | Optional | No | IR rx/tx | No | No | ? | No |
| CuBox-i4Pro | | No | 2 | No | No | microSD | eSATA 2.0 | 10/100/1000 | b/g/n (BCM4329) | 2.1 + EDR | No | IR rx/tx | No | No | ? | No |
| DreamPlug | JTAG, UART, S/PDIF | No | 2 | No | No | microSD | eSATA 2.0 | 2x 10/100/1000 | b/g/n (88W8787) | 3.0 + HS | No | No | No | No | 7 | No |
| Embest SBC8600B | RS-232, RS-485 | No | 2 | No | OTG | microSD | No | 2x 10/100/1000 | No | No | CAN-2 | No | No | Yes | Yes | 12-bit ADC |
| Foxconn AT-5570 | | No | 4 | 2 | No | SD | SATA 2.0 | 10/100/1000 | No | No | No | No | No | No | No | No |
| GameStick | | No | No | No | No | microSD | No | No | b/g/n | 4.0 LE | No | No | No | No | ? | No |
| Gigabyte BRIX GB-BXBT-2807 | | 1x mini | 2 | 1 | No | No | SATA 2.0 | 10/100/1000 | n (mini PCIe) | 4.0 (mini PCIe) | No | No | No | No | ? | No |
| Gizmo Board | JTAG, extra connectors | No | 2 | No | No | No | Yes | 10/100 | No | No | No | No | No | Yes | ? | ADC, DAC |
| Gumstix Overo EarthSTORM + Summit | ? | No | 2 micro | No | OTG | microSD | No | No | No | No | No | No | No | No | Yes | ADC, PWM |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hackberry A10 | RS-232 header | No | 2 | No | No | SDHC | No | 10/100 | b/g/n (RTL8188CUS) | No | No | No | No | No | ? | No |
| Hiapad Hi-802 | UART pads | No | Yes | No | No | 2x microSD (int/ext) | No | No | b/g/n (RTL8192CE) | Yes | No | No | Pads | No | No | No |
| Hummingboard | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| Intel NUC | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| MarsBoard A10/A20 New | CIF, UART | No | 4 | No | OTG | microSD | Yes | 10/100 | b/g/n (RTL8188EU) | No | No | No | No | No | ? | No |
| MarsBoard RK3066 | CIF, UART | No | 4 | No | OTG | microSD | No | 10/100 | b/g/n (RTL8188EU) | No | No | No | No | No | ? | No |
| MinnowBoard | ? | ? | Yes | No | ? | ? | Yes | Yes | ? | ? | ? | ? | ? | ? | ? | ? |
| MiraBox | JTAG | 1x mini | 1 | 3 | No | microSD | No | 2x 10/100/1000 | b/g/n (88W8787) | 3.0 | No | No | No | No | 40 | No |
| MK808 | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| MTB025 | | No | 1 | No | No | ? | No | No | b/g/n | No | No | No | No | No | No | No |
| MYIR MYD-AM335X | 2x RS-232, RS-485 | No | 4 | No | OTG | SD | No | 2x 10/100/1000 | No | No | Yes | No | Yes | Yes | No | ADC, PWM |
| Netduino Plus 2 | Arduino 1.0 headers, 4x UART | No | No | No | No | microSD | No | 10 | No | No | No | No | Yes | Yes | 22 | 12-bit ADC, PWM |
| Nitrogen6x | JTAG, extra USB header | 1x header | 2 | No | 2 Host, 1 OTG | 2x microSD | SATA | 10/100/1000 | b/g/n (WL1271) | Optional | CAN-2 | No | Yes | No | ? | No |
| Nvidia Jetson TK1 | CSI-2, HSIC, JTAG, RS-232, UART | 1x mini | 1 microAB | 1 | OTG | SD | Yes | 10/100/1000 | No | No | No | No | Yes | Yes | 7 | No |
| ODROID-U3 | UART | No | 3 | No | 3 Host, 1 OTG | microSD | ? | 10/100 | No | No | No | No | Yes | No | Yes | No |
| ODROID-X2 | ? | No | 6 | No | Mass storage | SDHC | ? | 10/100 | No | No | No | No | ? | ? | ? | No |
| OLinuXino A10-LIME | 6x UART | No | 2 | No | OTG | microSD | Yes | 100 | No | No | No | No | Yes | Yes | 134 | PWM |
| OLinuXino A13 base | ? | No | 3 + 1 header | No | OTG | microSD | No | No | No | No | No | No | ? | ? | 142 | No |
| OLinuXino A13 MICRO | ? | No | 1 | No | OTG | microSD | No | No | No | No | No | No | ? | ? | 142 | No |
| OLinuXino A13 WIFI | ? | No | 3 | No | OTG | microSD | No | No | b/g/n (RTL8188CU) | No | No | No | ? | ? | 142 | No |
| OLinuXino A20 LIME | UART, UEXT | No | 2 | No | OTG | microSD | Yes | 100 | No | No | No | No | ? | ? | 160 | No |
| OLinuXino A20 MICRO | UART, UEXT | No | 2 | No | OTG | microSD, SD | Yes | 100 | No | No | No | No | ? | ? | 160 | No |
| Ouya | ? | No | 1 | No | ? | ? | ? | Yes | Yes | Yes | No | ? | ? | ? | ? | ? |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PandaBoard ES | ? | No | 2 | No | ? | SDHC | ? | 10/100 | b/g/n (WL1271) | 4.0 | ? | ? | ? | ? | ? | ? |
| pcDuino Lite | Arduino 1.0 headers | No | 2 | No | OTG | microSD | No | 10/100 | No | No | No | No | Yes | Yes | 22 | ADC, PWM |
| pcDuino v2 | Arduino 1.0 headers | No | 1 | No | OTG | microSD | No | 10/100 | b/g/n (RTL8188CUS) | No | No | No | Yes | Yes | 22 | ADC, PWM |
| pcDuino3 | Arduino 1.0 headers | No | 1 | No | OTG | microSD | Yes | 10/100 | b/g/n (RTL8188EUS) | No | No | No | Yes | Yes | 22 | ADC, PWM |
| pcDuino3Nano | Arduino 1.0 headers | No | 2 | No | OTG | microSD | Yes | 10/100/1000 | No | No | No | No | Yes | Yes | 22 | ADC, PWM |
| PC Engines APU | LPC, extra USB and RS-232 headers | 2x mini | 2 | No | No | SD | SATA, mSATA | 3x 10/100/1000 | Optional via mini-PCIe | Optional via mini-PCIe | No | No | Yes | No | 20 | No |
| Radxa Rock | UART | No | 2 | No | 2 Host, 1 OTG | microSD (SDXC) | ? | 10/100 | b/g/n (RTL8723) | 4.0 | No | No | Yes | Yes | 80 | ADC, PWM |
| Radxa Rock Lite | UART | No | 2 | No | 2 Host, 1 OTG | microSD (SDXC) | ? | 10/100 | b/g/n (RTL8188ETV) | No | No | No | Yes | Yes | 80 | ADC, PWM |
| Raspberry Pi Model A | UART | No | 1 | No | ? | SD | ? | No | No | No | No | No | Yes | Yes | 21 | No |
| Raspberry Pi Model B | UART | No | 2 | No | ? | SD | ? | 10/100 | No | No | No | No | Yes | Yes | 21 | No |
| Rikomagic MK802 / MK802+ | | No | 2 | No | ? | microSD | No | No | b/g/n | No | No | No | No | No | No | No |
| Rikomagic MK802 II | | No | 3 | No | ? | microSD | No | No | b/g/n | No | No | No | No | No | No | No |
| RIoTboard | CSI, UART | No | 4 | No | 4 Host, 1 OTG | microSD and SD | No | 10/100/1000 | No | No | No | No | Yes | Yes | 10 | PWM |
| Snowball | GPS, UART | No | 1 | No | ? | microSD | No | 100 | b/g/n (CW1200) | Optional 2.1 + EDR (CG2900) | No | No | Yes | Yes | Yes | No |
| TBS 2910 Matrix | UART | 1x mini | 3 | No | OTG | microSD and SD | SATA 3.0 | 10/100/1000 | b/g/n | No | No | No | Yes | No | No | Yes |
| UDOO Dual | Arduino 1.0 headers | No | 2 | No | OTG | microSD | No | 10/100/1000 | n (RT5370) | No | No | No | ? | ? | 76 | 10-bit ADC, PWM |
| UDOO Dual Basic | Arduino 1.0 headers | No | 2 | No | OTG | microSD | No | No | No | No | No | No | ? | ? | 76 | 10-bit ADC, PWM |
| UDOO Quad | Arduino 1.0 headers | No | 2 | No | OTG | microSD | SATA | 10/100/1000 | n (RT5370) | No | No | No | ? | ? | 76 | 10-bit ADC, PWM |

| Utilite | 2 ultra-mini RS-232 | No | 4x 1 A ports (1 hub) | No | OTG | microSD | mSATA | 1x or 2x 10/100/1000 | Optional b/g/n (mwifiex) | Optional 3.0 | No | No | No | No | No | No |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VIA APC 8750 | | No | 4 | No | No | microSD | No | 10/100 | No | No | No | No | No | No | No | No |
| VIA APC Rock | JTAG | No | 2 | No | OTG | microSD | No | 10/100 | No | No | No | No | Yes | Yes | Yes | No |
| VIA EPIA-P910-10 | ? | ? | 6 | 2 | ? | ? | ? | Yes | No | No | ? | ? | No | No | ? | No |
| Wandboard Dual | UART | No | 1 | No | 1 OTG | 2x microSD | No | 10/100/1000 | n (BCM4329) | Yes | No | No | Yes | Yes | 10 | No |
| Wandboard Quad | UART | No | 1 | No | 1 OTG | 2x microSD | Yes | 10/100/1000 | n (BCM4329) | Yes | No | No | Yes | Yes | 10 | No |
| Wandboard Solo | UART | No | 1 | No | 1 OTG | 2x microSD | No | 10/100/1000 | No | No | No | No | Yes | Yes | 10 | No |
| Zealz GK802 | | No | 1 | No | ? | microSD | No | No | b/g/n | Yes | No | No | No | No | No | No |
| **Name** | **Interfaces** | **PCI/PCIe** | **2.0** | **3.0** | **Device** | **Flash** | **SATA** | **Ethernet** | **Wi-Fi** | **Bluetooth** | **CAN** | **CIR/IrDA** | **I²C** | **SPI** | **GPIO** | **Analog** |
| | | **USB** | | | **Storage** | | **Networking** | | **Expansion buses** | | | | | **Generic I/O** | | |

## Audiovisual interfaces

| Name | Mic In | Audio Out | HDMI | LVDS | Other Video Out |
|---|---|---|---|---|---|
| Arduino Uno | No | No | No | No | No |
| Arndale Board | ? | ? | 1.4 | Yes | ? |
| Banana Pi | Pads | Yes | Yes | Yes | Composite |
| BeagleBoard | Yes | Yes | Yes[DVI compatible] | No | No |
| BeagleBoard-xM | Yes | Yes | Yes | No | DVI-D, S-Video |
| BeagleBone | No | No | No | No | No |
| BeagleBone Black | No | HDMI | Yes | No | No |
| Cotton Candy | No | No | 1.3a | ? | ? |
| Cubieboard, Cubieboard 2 | No | 3.5 mm jack, HDMI | Yes | Headers | Headers |
| Cubieboard 3 | Header | 3.5 mm, HDMI, S/PDIF | 1.4 | No | VGA |
| Cubieboard 8 | ? | ? | ? | ? | ? |
| CuBox-i | No | Optical SPDI/F | 1.4 | No | No |
| DreamPlug | Yes | 3.5 mm, Optical S/PDIF | No | No | No |
| Embest SBC8600B | Yes | Yes | No | Yes | Optional VGA module |
| Foxconn AT-5570 | ? | ? | ? | ? | ? |
| GameStick | No | No | Yes | No | No |
| Gigabyte BRIX GB-BXBT-2807 | Yes | Yes | Yes | No | VGA |
| Gizmo Board | Yes | Yes | No | Part of “High Speed Connector” | VGA |

| | | | | | |
|---|---|---|---|---|---|
| Gumstix Overo EarthSTORM + Summit | Yes | Yes | Yes[DVI compatible] | No | No |
| Hackberry A10 | Yes | ? | Partial[DVI incompatible] | ? | ? |
| Hiapad Hi-802 | No | No | Yes | No | No |
| Hummingboard | ? | ? | ? | ? | ? |
| Intel NUC | ? | ? | ? | ? | ? |
| MarsBoard A10/A20 New | Yes | Yes | Yes | RGB, LVDS pads | Composite in/out, VGA |
| MarsBoard RK3066 | Yes | Yes | Yes | RGB | No |
| MinnowBoard | ? | ? | ? | ? | ? |
| MiraBox | No | No | No | No | No |
| MK808 | ? | ? | ? | ? | ? |
| MTB025 | ? | ? | ? | ? | ? |
| MYIR MYD-AM335X | Yes | Yes | Yes | LCD header | No |
| Netduino Plus 2 | No | No | No | No | No |
| Nitrogen6x | Header | 3.5 mm, HDMI | Yes[DVI compatible] | 3 screen options | Parallel RGB |
| Nvidia Jetson TK1 | Yes | Yes | Yes | LCD header | No |
| ODROID-U3 | No | 3.5 mm, HDMI | micro HDMI | No | No |
| ODROID-X2 | Yes | 3.5 mm, HDMI | Yes | ? | ? |
| OLinuXino A10 LIME | No | No | Yes | LCD header | No |
| OLinuXino A13 base / WIFI | Yes | Yes | No | LCD header | VGA |
| OLinuXino A13 MICRO | Pads | Yes | No | LCD header | VGA |
| OLinuXino A20 LIME | No | No | Yes | LCD header | No |
| OLinuXino A20 MICRO | Yes | Yes | Yes | LCD header | VGA 6-pin 1.25 mm step connector |
| Ouya | ? | ? | Yes | ? | ? |
| PandaBoard ES | Yes | 3.5 mm jack, HDMI | Yes | LCD header | DSI, DVI-D (non-standard plug) |
| pcDuino Lite | No | No | Yes | No | No |
| pcDuino v2 | No | No | Yes | No | No |
| pcDuino3 | No | Yes | Yes | LCD header | No |
| pcDuino3Nano | No | No | Yes | No | No |
| PC Engines APU | No | No | No | No | No |
| Radxa Rock | ? | 3.5 mm, HDMI, S/PDIF | 1.4 | ? | AV output |
| Raspberry Pi | No | Yes | Yes[DVI compatible] | ? | Composite video |
| Rikomagic MK802 / MK802+ / MK802 II | No | HDMI | Partial[DVI incompatible] | No | No |
| RIoTboard | Yes | 3.5 mm, HDMI | Yes | Yes | ? |
| Snowball | ? | Yes | Yes | ? | ? |

| TBS 2910 Matrix | No | Yes | Yes | No | No |
|---|---|---|---|---|---|
| UDOO | Yes | Yes | Yes | LCD header | No |
| Ulite | 3.5 mm | 3.5 mm | HDMI 1.4 | ? | Optional DVI-D |
| VIA APC 8750 | Yes | Yes | Yes | No | VGA |
| VIA APC Rock | Yes | Yes | Yes | No | VGA |
| VIA EPIA-P910-10 | Yes | Yes | Mini-HDMI | ? | VGA |
| Wandboard | Yes | 3.5 mm, S/PDIF | Yes | expansion board | No |
| Zealz GK802 | No | No | Yes | No | No |
| **Name** | **Mic In** | **Audio Out** | **HDMI** | **LVDS** | **Other Video Out** |

Notes

**^DVI compatible** HDMI signal can be converted to DVI by passive adapter.

**^DVI incompatible** HDMI signal not convertible to DVI by passive adapter. Watch out for HDMI screens that require DVI signalling.

## References

[1] http://www.pcengines.ch/apu.htm
[2] http://www.pcengines.ch/apu1c.htm
[3] http://www.pcengines.ch/apu1c4.htm
[4] https://github.com/laanwj/etna_viv

## External links

- iqjar.com: An overview and comparison of single board micro computers (http://iqjar.com/jar/an-overview-and-comparison-of-todays-single-board-micro-computers/)

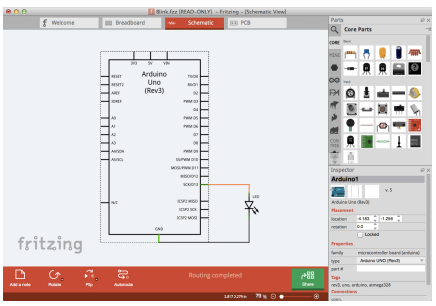
# Fritzing

**Fritzing Software**

| | |
|---|---|
| **Developer(s)** | Interaction Design Lab Potsdam |
| **Stable release** | 0.9.0b / July 14, 2014 |
| **Operating system** | Mac OS X, Linux, Windows |
| **Type** | EDA |
| **License** | GNU GPL v3 (software)<br>CC-BY-SA (component images)[1] |
| **Website** | http://www.fritzing.org/ |

**Fritzing** is an open source software initiative to support designers and artists ready to move from physical prototyping to actual product. It was developed at the University of Applied Sciences of Potsdam.

## Goals

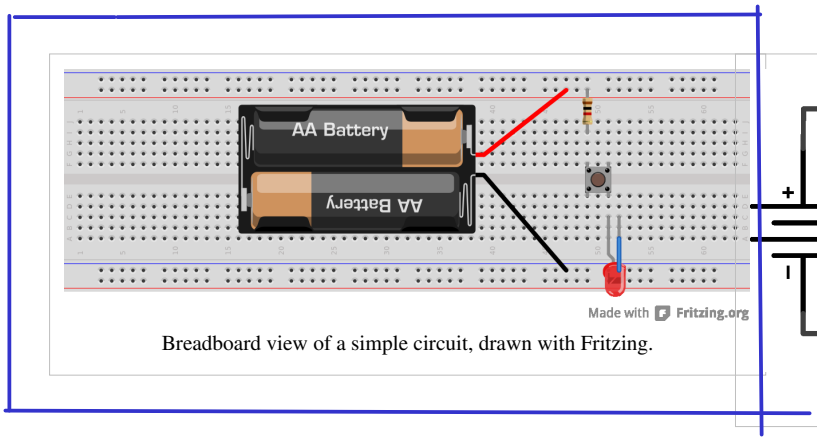


Fritzing's schematic view

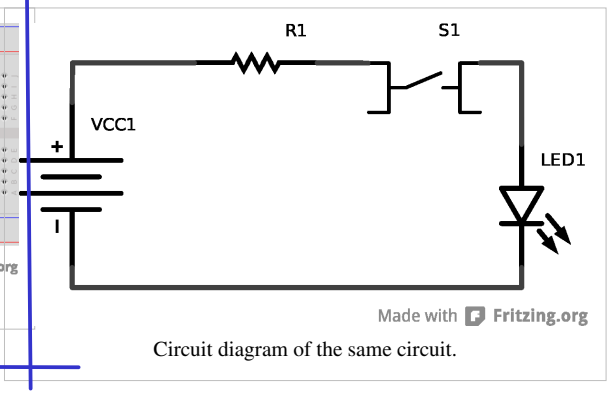
The software is created in the spirit of Processing and Arduino and allows a designer, artist, researcher, or hobbyist to document their Arduino-based prototype and create a PCB layout for manufacturing. The complementary website helps to share and discuss drafts and experiences as well as to reduce manufacturing costs. In other words, they make electronic items from your design.

Fritzing can be seen as an electronic design automation (EDA) tool for non-engineers: the input metaphor is inspired by the environment of designers (the breadboard-based prototype), the output is offering nearly no options and is focused on accessible means of production.

Component images are distributed under CC-BY-SA, which will also be the license for any generated breadboard views.



Breadboard view of a simple circuit, drawn with Fritzing.



Circuit diagram of the same circuit.

## References

[1] What license is Fritzing released under? (http://fritzing.org/faq/#documentContent) FAQ

## External links

Wikimedia Commons has media related to ***Fritzing***.

- Official website (http://www.fritzing.org)

# List of Arduino boards and compatible systems

This is a non-exhaustive **list of Arduino boards and compatible systems**. It lists boards in these categories:

- Released under the official Arduino name
- Arduino "shield" compatible
- Development-environment compatible
- Based on non-Atmel processors

Where different from the Arduino base feature set, compatibility, features, and licensing details are included.

## Official Arduino versions

Many versions of the official Arduino hardware have been commercially produced to date:

| Name | Processor | | Format | | Host interface | | | | | | I/O | | | Release date | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Processor | Frequency | | Dimensions | | | Voltage | Flash (kB) | EEPROM (kB) | SRAM (kB) | Digital I/O (pins) | Digital I/O with PWM (pins) | Analog input (pins) | | |
| Arduino Zero[1] | ATSAMD21G18 | 48 MHz | Arduino | | USB | | 3.3 V | 256 kB | up to 16 kB by emulation | 32 kB | 14 | 6 | 6 | May 15, 2014 | |
| Arduino Yùn[2] | Atmega32u4, Atheros AR9331 | 16 MHz, 400 MHz | Arduino | 2.7 in × 2.1 in [ 68.6 mm × 53.3 mm ] | USB | | 5 V | 32 kB, 16 MB | 1 kB, 0 kB | 2.5 kB, 64 MB | 14 | 6 | 12 | September 10, 2013[3] | Arduino Yún is the combination of a classic Arduino Leonardo (based on the Atmega32U4 processor) with a Wifi system on a chip (SoC) running Linino, a MIPS GNU/Linux based on OpenWrt. |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arduino Leonardo | Atmega32u4 | 16 MHz | Arduino | 2.7 in × 2.1 in [ 68.6 mm × 53.3 mm ] | USB | 32u4 | 5 V | 32 | 1 | 2.5 | 14 | 6 | 12 | July 23, 2012 | The Leonardo uses the Atmega32U4 processor, which has a USB controller built-in, eliminating one chip as compared to previous Arduinos. |
| Arduino Uno | ATmega328P | 16 MHz | Arduino | 2.7 in × 2.1 in [ 68.6 mm × 53.3 mm ] | USB | 8U2 (Rev1&2)/ 16U2 (Rev3) | 5 V | 32 | 1 | 2 | 14 | 6 | 6 | September 24, 2010 | This uses the same ATmega328 as late-model Duemilanove, but whereas the Duemilanove used an FTDI chipset for USB, the Uno uses an ATmega16U2 (ATmega8U2 before rev3) programmed as a serial converter. |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arduino Due | AT91SAM3X8E (ARM Cortex-M3) | 84 MHz | Mega | 4 in × 2.1 in [ 101.6 mm × 53.3 mm ] | USB | 16U2 + native host | 3.3 V | 512 | 0 | 96 | 54 | 12 | 12 | October 22, 2012 | The first Arduino board based on an ARM Processor. Features 2 channel 12-bit DAC, 84Mhz clock frequency, 32-bit architecture, 512KB Flash and 96KB SRAM. Unlike most arduino boards, it operates on 3.3 V and is not 5 V tolerant. |
| Arduino Mega2560 | ATmega2560 | 16 MHz | Mega | 4 in × 2.1 in [ 101.6 mm × 53.3 mm ] | USB | 8U2 (Rev1&2)/ 16U2 (Rev3) | 5 V | 256 | 4 | 8 | 54 | 15 | 16 | September 24, 2010 | Total memory of 256 kB. Uses the ATmega16U2 (ATmega8U2 before Rev3) USB chipset. Most shields that were designed for the Duemilanove, Diecimila, or Uno will fit, but a few shields will not fit because of interference with the extra pins. |

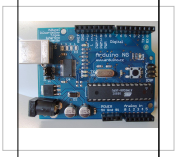
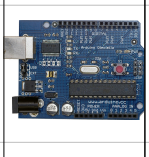
| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arduino Ethernet | ATmega328 | 16 MHz | Arduino | 2.7 in × 2.1 in [ 68.6 mm × 53.3 mm ] | Ethernet Serial interface | Wiznet Ethernet | 5 V | 32 | 1 | 2 | 14 | 4 | 6 | July 13, 2011 | Based on the same WIZnet W5100 chipset as the Arduino Ethernet Shield. A serial interface is provided for programming, but no USB interface. Late versions of this board support Power over Ethernet (PoE). |
| Arduino Fio | ATmega328P | 8 MHz | minimal | 2.6 in × 1.1 in [ 66.0 mm × 27.9 mm ] | XBee Serial | | 3.3 V | 32 | 1 | 2 | 14 | 6 | 8 | March 18, 2010 | Includes XBee socket on bottom of board. |
| Arduino Nano | ATmega328 (ATmega168 before version 3.0) | 16 MHz | minimal | 1.70 in × 0.73 in [ 43.18 mm × 18.54 mm ] | USB | FTDI | 5 V | 16/32 | 0.5/1 | 1/2 | 14 | 6 | 8 | May 15, 2008 | This small USB-powered version of the Arduino uses a surface-mounted processor. |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LilyPad Arduino | ATmega168V or ATmega328V | 8 MHz | wearable | 2 in ∅51 mm ∅ | | | 2.7-5.5 V | 16 | 0.5 | 1 | 14 | 6 | 6 | October 17, 2007 | This minimalist design is for wearable applications. |
| Arduino Pro [4] | ATmega168 or ATmega328 | 16 MHz | Arduino | 2.05 in × 2.1 in [ 52.1 mm × 53.3 mm ] | UART Serial, I2C(TWI), SPI | FTDI | 5 V or 3.3 V | 16/32 | 0.5/1 | 1/2 | 14 | 6 | 6 | | Designed and manufactured by SparkFun Electronics for use in semi-permanent installations. |
| Arduino Mega ADK | ATmega2560 | 16 MHz | Mega | 4 in × 2.1 in [ 101.6 mm × 53.3 mm ] | | 8U2 MAX3421E USB Host | 5 V | 256 | 4 | 8 | 54 | 14 | 16 | July 13, 2011 | |
| Arduino Esplora | Atmega32u4 | 16 MHz | | 6.5 in × 2.4 in [ 165.1 mm × 61.0 mm ] | | 32u4 | 5 V | 32 | 1 | 2.5 | | | | December 10, 2012 | Analog joystick, four buttons, several sensors, 2 TinkerKit inputs and 2 outputs, LCD connector |
| Arduino Micro | ATmega32u4 | 16 MHz | | 0.7 in × 1.9 in [ 17.8 mm × 48.3 mm ] | | | 5 V | 32 | 1 | 2.5 | 20 | 7 | 12 | November 8, 2012 | This Arduino was co-designed by Adafruit. |
| Arduino (Pro) Mini | ATmega168 (Pro uses ATMega328) | 8 MHz (3.3 V model) or 16 MHz (5 V model) | | 0.7 in × 1.3 in [ 17.8 mm × 33.0 mm ] | | | 5 V or 3.3 V | 16 | 0.5 | 1 | 14 | 6 | 6 | August 23, 2008 | This miniature version of the Arduino uses a surface-mounted processor. |

## Superseded versions

The following have been superseded by later and more capable versions from Arduino, but some, particularly the Duemilanove, are still in widespread use.

| Name | Processor | | Format | | Host interface | | | | | | I/O | | | Release date | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Processor | Frequency | | Dimensions | | | Voltage | Flash (kB) | EEPROM (kB) | SRAM (kB) | Digital I/O (pins) | Digital I/O with PWM (pins) | Analog input (pins) | | |
| Serial Arduino | ATmega8 | 16 MHz | Arduino | 3.2 in × 2.1 in [ 81.3 mm × 53.3 mm ] | DE-9 serial connection | native | | | | | | | | | The first board labelled "Arduino". |
| Arduino USB | ATmega8 | 16 MHz | Arduino | 3.2 in × 2.1 in [ 81.3 mm × 53.3 mm ] | USB | FTDI FT232BM | | | | | | | | | Changed: USB replaces RS-232 interface, Improved: Arduino can be powered from host |
| Arduino Extreme | ATmega8 | 16 MHz | Arduino | 3.2 in × 2.1 in [ 81.3 mm × 53.3 mm ] | USB | | | | | | | | | | The Arduino Extreme uses many more surface mount components than previous USB Arduino boards and comes with female pin headers. |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arduino NG (*Nuova Generazione*) | ATmega8 | 16 MHz | Arduino | 3.2 in × 2.1 in [ 81.3 mm × 53.3 mm ] | USB | FTDI FT232RL | | | | | | | | |  Improved: FT232BM has been replaced by FT232RL to require fewer external components, LED on pin 13 added |
| Arduino NG plus | ATmega168 | 16 MHz | Arduino | 3.2 in × 2.1 in [ 81.3 mm × 53.3 mm ] | USB | | | | | | | | | | |
| Arduino BT (Bluetooth) | ATmega168 ATmega328 | 16 MHz | Arduino | 3.2 in × 2.1 in [ 81.3 mm × 53.3 mm ] | Bluetooth | Bluegiga WT11 Bluetooth | 5 V | 32 | 1 | 2 | 14 | 4 | 6 | October 22, 2007 | Similar to the Arduino NG, this has a Bluetooth module rather than a serial interface. Programming is carried out via Bluetooth. |
| Arduino Diecimila | ATmega168 in a DIL28 package | 16 MHz | Arduino | 2.7 in × 2.1 in [ 68.6 mm × 53.3 mm ] | USB | FTDI | 5 V | 16 | 0.5 | 1 | 14 | 6 | 6 | October 22, 2007 |  Improved: Host is able to reset the Arduino, pin headers for reset and 3.3 V, low dropout voltage regulator allows lower voltage on external power source |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Arduino Duemilanove (*2009*) | ATmega168/328P (ATmega328 for newer version) | 16 MHz | Arduino | 2.7 in × 2.1 in [ 68.6 mm × 53.3 mm ] | USB | FTDI | 5 V | 16/32 | 0.5/1 | 1/2 | 14 | 6 | 6 | October 19, 2008 | Improved: automatically switching between USB and external power, eliminating jumper |
| Arduino Mega | ATmega1280 | 16 MHz | Mega | 4 in × 2.1 in [ 101.6 mm × 53.3 mm ] | USB | FTDI | 5 V | 128 | 4 | 8 | 54 | 14 | 16 | March 26, 2009 | Uses a surface-mounted ATmega1280 for additional I/O and memory. |

## Arduino-compatible boards

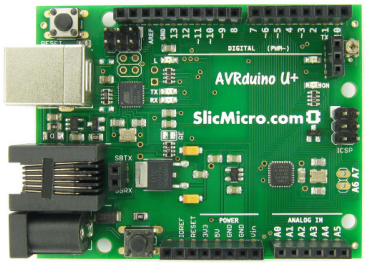
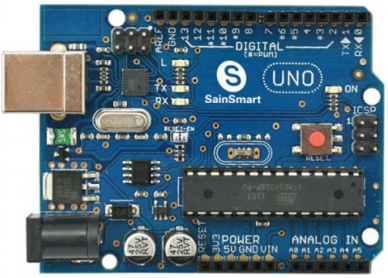
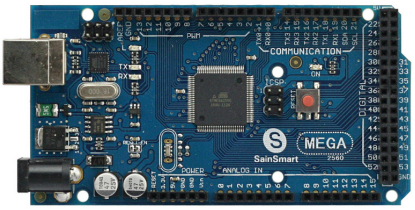
Although the hardware and software designs are freely available under copyleft licenses, the developers have requested that the name "Arduino" be exclusive to the official product and not be used for derivative works without permission. The official policy document on the use of the Arduino name emphasizes that the project is open to incorporating work by others into the official product.

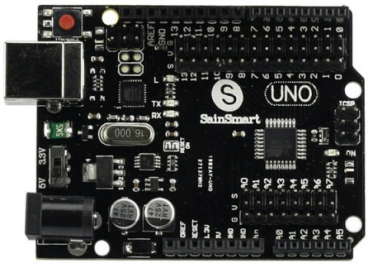
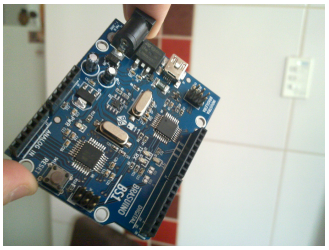
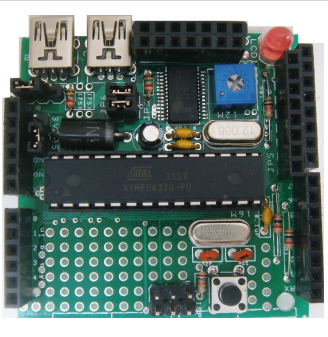
As a result of the protected naming conventions of the Arduino, a group of Arduino users forked the Arduino Diecimila, releasing an equivalent board called Freeduino. The name "Freeduino" is not trademarked and is free to use for any purpose.

Several Arduino-compatible products commercially released have avoided the "Arduino" name by using "-duino" name variants.

### Arduino footprint-compatible boards

The following boards are fully or almost fully compatible with both the Arduino hardware and software, including being able to accept "shield" daughterboards.

| Name | Processor | Maker | Notes |
|---|---|---|---|
| AVR.duino U+ | ATmega328 | SlicMicro.com |  Compatible With Arduino Uno Rev3<br>Added Features:<br>• SlicBus Port (Serial + Power)<br>• Crystal Oscillator (Real Time Accuracy)<br>• On board test with Button/LED/Trimmer<br>• A6 and A7 available |
| SainSmart UNO | ATmega328 | SainSmart |  Compatible With Arduino |
| SainSmart Mega 2560 | ATmega2560 | SainSmart |  Compatible with Arduino |

| | | | |
|---|---|---|---|
| SainSmart UNO R3 | ATmega328-AU | SainSmart |  <br>Development board compatible with Arduino UNO R3<br>Controller: SMD MEGA328P-AU; A6/A7 port added; 3.3 V/5 V supply voltage and I/O voltage switch. |
| AVR-Duino | | TavIR | Another Arduino/Mega compatible board. |
| Brasuíno | | Holoscópio |  <br>Based on the Uno with rearranged LEDs and reset button, mini-USB connector, and altered pin 13 circuitry so that the LED and resistor do not interfere with pin function when acting as an input. The Brasuíno was designed using KiCad, and is licensed as GPLv2. |
| ChibiDuino2 | ATmega328 | TiisaiDipJp |  <br>Japanese Arduino compatible kit using Uno board setting. Includes two mini-B USB sockets, 1602 LCD socket, 5 V or 3.3 V power selection, breadboard area. |
| Cosmo Black Star | ATmega328 | JT5 | Arduino layout-compatible board. Based on the Arduino Duemilanove. |
| CraftDuino | | Manufactured and sold by RoboCraft Team. | |

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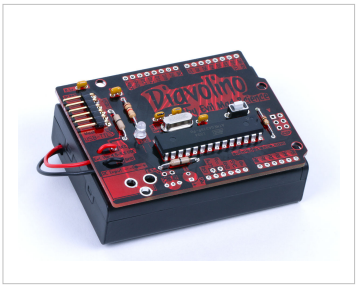
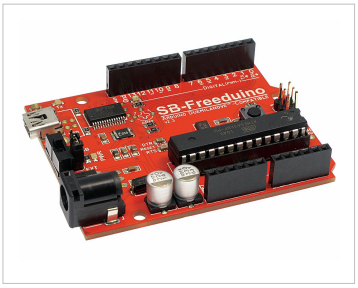
| Diavolino | | Evil Mad Scientist Laboratories |  Arduino layout-compatible board, designed for use with a USB-TTL serial cable. |
| DuinoBot v1.x | ATmega32U4 | RobotGroup Argentina | Arduino fully compatible board, with integrated power supply and controllers designed for robotics. Compatible as well with the system "Multiplo" |
| eJackino | | Kit by CQ publisher in Japan. | Similar to Seeeduino, eJackino can use Universal boards as Shields. On back side, there is a "Akihabara station" silk, just like Italia on Arduino. |
| Freeduino MaxSerial | | Manufactured and sold assembled or as a kit by Fundamental Logic until May 2010. | A board with a standard DE-9 serial port. |
| Freeduino SB | ATmega328 | Solarbotics Ltd. |  Compatible with the Duemilanove. |
| Freeduino Through-Hole | | Manufactured and sold as a kit by NKC Electronics. | The design avoids surface-mount soldering. |
| Illuminato Genesis | ATmega644 | | Provides 64 kB of flash, 4 kB of RAM and 42 general I/O pins. Hardware and firmware are open source. |
| InduinoX | ATmega168/ATmega 328/ATmega 8 | Simple Labs | A low cost Arduino clone using the ATmega168/ATmega 328/ATmega 8 and designed for prototyping, it includes onboard peripherals such as an RGB LED, switches, IR Tx/Rx and DS1307(RTC). |
| Japanino | ATmega168 | A kit by Otonano Kagaku publisher in Japan. | The board and a POV kit were included in Vol. 27 of the eponymous series. It is unique in having a regular size USB A connector. |
| 1000Pads Luigino | | | Minimalistic version of Arduino: small, without serial converter. Available as a kit, board only or assembled. Smaller than Arduino, with different footprint. |
| Luigino328 | ATmega328 | | It has an improved automatic voltage selector, resolves problems during programming caused by shields that use the serial port, with an automatic serial port selector, and has the LM1117 voltage regulator. |

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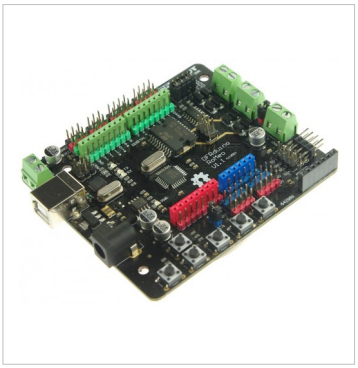
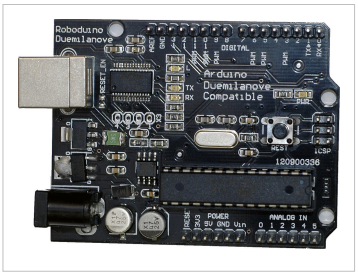
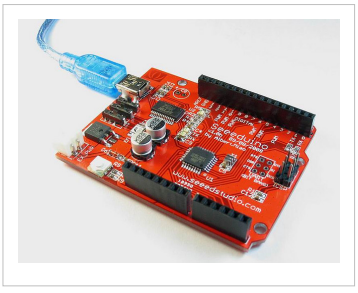
| metaboard | | Developed by Metalab, a hackerspace in Vienna. | Designed to have a very low complexity and price. Hardware and firmware are open source. |
| Rascal | AT91SAM9G20 (ARM9 family) | Rascal Micro | It is compatible with Arduino shields, but it is programmed in Python rather than C++. It has an embedded webserver. |
| Raspduino | ATmega328 | Bitwizard | Fully Arduino compatible board, that fits perfectly on a Raspberry Pi, and can be programmed through the Raspberry Pi's serial interface. It also breaks out the Raspberry Pi's SPI and I²C interfaces, or can be used as a stand-alone Arduino when powered with the external power header. |
| Romeo 2012 | ATmega328 | DFRobot | An all-in-one Arduino with motor controller. Compatible with the Arduino Uno.  |
| Roboduino | | |   Designed for robotics. All connections have neighboring power buses (not pictured) for servos and sensors. Additional headers for power and serial communication are provided. It was developed by Curious Inventor, LLC. |
| Seeeduino | v2.21 (Atmega168 or Atmega328)<br>v3.0 (Atmega328) | SeeedStudio |  Derived from the Diecimila. This photo is v1.0b. |
| SunDuino | ATmega8/88/168/328/16/32/324/644 and PIC18F2550/4550 PIC32MX320F128 and ButterFLY, STM32Discovery | Lothar Team Arduino PRO Compatible boards. (Poland) | Another Arduino compatible board, software- and hardware-compatible. |

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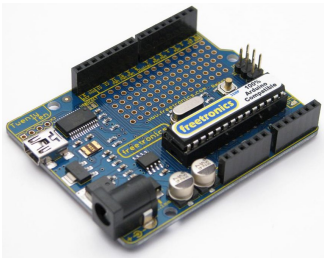
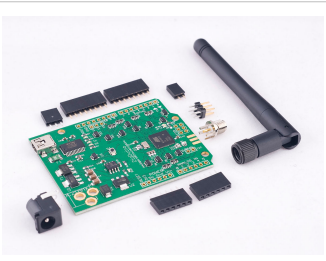
| TwentyTen | | Freetronics |  <br>Based on the Duemilanove, with a prototyping area, rearranged LEDs, mini-USB connector, and altered pin 13 circuitry so LED and resistor do not interfere with pin function when acting as an input. |
| Volksduino | | Applied Platonics | A low cost, high power, shield-compatible, complete Arduino-compatible board kit. Based on the Duemilanove, it comes with a 5 V / 1 A voltage regulator (optional 3.3 V regulator). Designed for low component count and for ease of assembly. |
| Wiseduino | | | Includes a DS1307 real-time clock (RTC) with backup battery, a 24LC256 EEPROM and a connector for XBee adapter for wireless communication. |
| Xaduino | ATXmega128A3U | http://www.obdiiworld.com/ (parts in Chinese?) | 8/16 bit Xmega core @ 32 MHz. 8 KB SRAM. 37 Digital I/O. 3.3 V. 2 DAC. Output 3.3 V pin: 500 mA, 5 V 500 mA. |
| YourDuinoRobo1 | Atmel 328 | Yourdunio | Includes 6 color-coded 3-pin connectors for direct cable connection of servos, electronic bricks, etc., and 6 3-pin connectors to Analog inputs for electronic bricks, etc. Provides improved 3.3 V regulator supplying 500 mA, and optional 3.3 V operation. |
| ZArdino | | | A South African Arduino-compatible board derived from the Duemilanove, it features mostly through-hole construction except for the SMD FT232RL IC, power selection switches, option for a Phoenix power connector instead of DC jack, extra I/O pads for using Veroboard as shields. Designed for easy assembly in countries where exotic components are hard to find. |
| Zigduino | ATmega128RFA1 | Logos Electromechanical |  <br>Integrates ZigBee (IEEE 802.15.4). It can be used with other 802.15.4 network standards as well as ZigBee. It is the same shape as the Duemilanove, includes an external RPSMA jack on the side of the board opposite the power jack, and is compatible with shields that work with other 3.3 V boards. |

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| EtherTen[5] | ATmega328P | Freetronics | Fixed SPI behaviour on Ethernet chipset, D13 pin isolated with a MOSFET of which can also be used as an input. |
| EtherMega[6] | ATmega2560 | Freetronics | Fixed SPI behaviour on Ethernet chipset, Micro SD card slot, D13 pin isolated with a MOSFET of which can also be used as an input. |
| USBDroid[7] | ATmega328P | Freetronics | Can act as a host for an Android device and is compatible with the Android Open Accessory Development Kit, Micro SD card slot, D13 pin isolated with a MOSFET of which can also be used as an input. |
| Eleven[8] | ATmega328P | Freetronics | Arduino Uno compatible, D13 pin isolated with a MOSFET of which can also be used as an input. |
| KitTen[9] | ATmega328P | Freetronics | Includes both 3.3V and 5V regulators for shields, D13 pin isolated with a MOSFET of which can also be used as an input. |
| EtherDue[10] | ATmega328P (AT89SAM3X8E (ARM Cortex-M3)) | Freetronics | Arduino Due with onboard Ethernet, D13 pin isolated with a MOSFET of which can also be used as an input. |

## Special purpose Arduino-compatible boards

Special purpose Arduino-compatible boards add additional hardware optimised for a specific application. It is kind of like having an Arduino and a shield on a single board. Some are Shield compatible, others are not.

| Name | Processor | Shield-compatible? | Host interface | Maker | Additions |
|---|---|---|---|---|---|
| Io:duino | AT90CAN128 | yes | USB with FTDI serial chip | Railstars | Adds built-in CAN support through the AT90CAN128 micro processor, dual RJ45 jacks, and optional bus termination. Designed specifically for model railroading applications using the OpenLCB networking protocol, the hardware is sufficiently generic for use with other low-speed CAN networks. |
| DFRobotShop Rover | ATmega328 | | | | The is a minimalist tracked platform based on the Arduino Duemilanove. Has an ATmega328 with Arduino bootloader, a dual H-bridge and additional prototyping space and headers. It is compatible with many shields, though four digital pins are used when operating the motor controller. Has an onboard voltage regulator, additional LEDs, a temperature sensor, and a light sensor. Part of the DFRobotShop Rover kit. |

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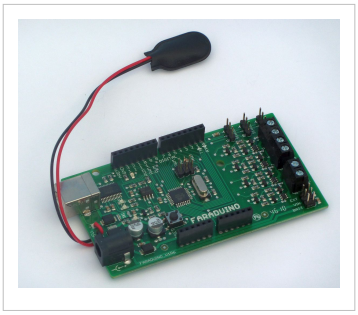
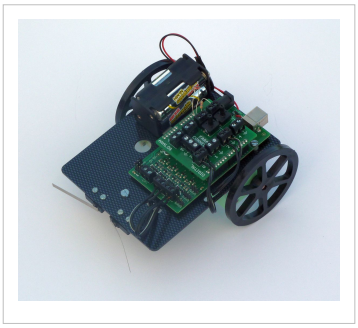
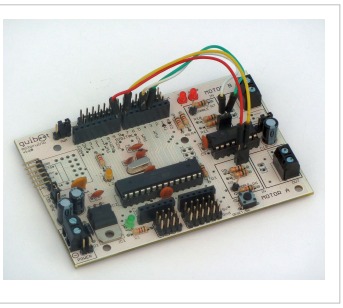
| Faraduino | ATmega328 | Yes | USB with FTDI serial chip | Developed by Middlesex University Teaching Resources. |  <br>Simple shield-compatible board, with onboard discrete transistor H-bridges and screw terminals to drive two small DC motors from pins 4-7. Has headers for three servos on pins 9-11.<br>  <br>Also sold with the Faraduino buggy kit and Faraconnect shield as a simple school-level teaching robot. |
| Lightuino | ATmega328p | | | | Produced as a stand-alone '328 Arduino-compatible board and as a shield. It directly drives LEDs (70 constant-current channels) or LED matrices (1100 LEDs), and has an adjustable LED voltage regulator, an ambient light sensor, and an IR receiver. |
| Motoruino | ATmega328 | Yes | Serial only, 6 pin header | Guibot |  <br>Has L293D twin H-bridge. |
| ArduPilot | | | | | An Arduino-compatible board designed for auto-piloting and autonomous navigation of aircraft, cars, and boats. It uses GPS for navigation and thermopile sensors or an IMU for stabilization. |
| ArduIMU | | | | | An Arduino-compatible board designed for Inertial Measurement and Inertial Navigation navigation of aircraft, cars, and boats. It uses the ATMEGA128RFA1 and a variety of sensors IMU for various applications. |
| FlyDuino Mega | ATmega 2560 | | Serial only, 6 pin header | Paul Bake | An Arduino Mega 2560 compatible board designed for auto-piloting and autonomous navigation of multirotor aircraft. Designed to be stacked with sensor bobs and boards with several breakout boards available. |

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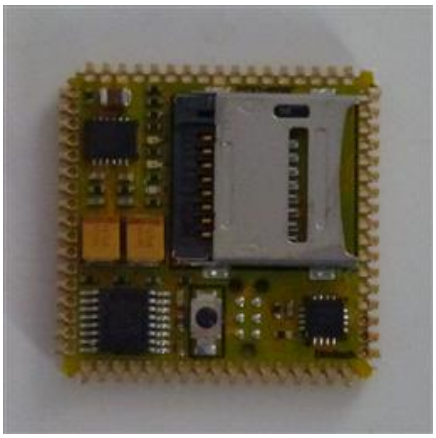
| Colibri | ATmega168 | No | Serial only | JT5 | Universal Platform for Wireless Data Transmission in the Frequency Band 868 MHz. The Board Combines Features Arduino Mini and the Radio EZRadioPRO for Receiving and Transmitting Data. With dataFlash. |
| JeeNode | ATmega328 | | 6 pin header | Jeelabs | Includes a wireless radio module, called the RFM12B by HopeRF |
| ArduPhone[11] | ATmega1284P | yes | USB | Freetronics | Cellular phone kit, ADH8066 GSM module, Micro SD slot, 16 key matrix keyboard, LiPo charger and microphone/speaker connectors. |

## Software-compatibility only

These boards are compatible with the Arduino software, but they do not accept standard shields. They have different connectors for power and I/O, such as a series of pins on the underside of the board for use with breadboards for prototyping, or more specific connectors. One of the important choices made by Arduino-compatible board designers is whether or not to include USB circuitry in the board. That circuitry can be placed in the cable between development PC and board, thus making each instance of the board less expensive. For many Arduino tasks, the USB circuitry is redundant once the device has been programmed.

| Name | Processor | Maker | Notes |
|---|---|---|---|
| Ardweeny | | Solarbotics | An inexpensive, even more compact breadboardable device. |
| Banguino | ATmega328 | Dimitech [12] |  Enhanced Arduino-Uno-compatible in standard PLCC68 socket |
| Bare Bones Board (BBB) and Really Bare Bones Board (RBBB) | | Modern Device | Compact inexpensive Arduino-compatible board suitable for breadboarding. |
| BlockDuino | ATmega8 ATmega328 | Blockduino | An Arduino-Diecimila-compatible board with serial connection to Blocks (shields). |

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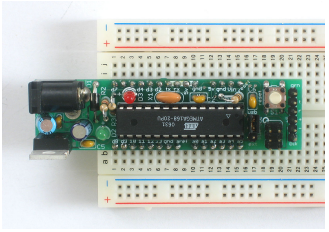
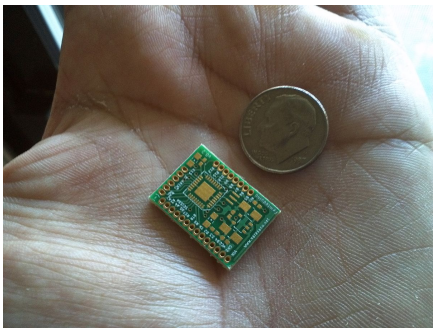
| Boarduino | ATmega168 ATmega328 | Adafruit |  An inexpensive Arduino-Diecimila-compatible board made for breadboarding. |
| Breaduino | | Applied Platonics | A complete, very low cost Arduino-compatible kit that can be assembled entirely on a breadboard. |
| Croduino Basic | ATmega328 | e-radionica.com | Inexpensive fully compatible Arduino board for schools and DIY individuals in Croatia. |
| Cardboarduino | ATmega168 | | Inspired by the Paperduino, an ultra low-cost Arduino compatible, built on printed posterboard, rather than a PCB. |
| Crumbuino-Nano | ATmega328 | chip45.com/ | The Crumbuino-Nano is a low-cost module comparable to the Arduino-Nano and can be used as Arduino-Nano in the Arduino-IDE. The Arduino bootloader is preloaded, hence the module is ready-to-use. The documentation shows the pin mapping of Arduino-naming to module pinout. |
| Crumbuino-Mega | ATmega2560 | chip45.com/ | The Crumbuino-Mega is a low-cost module comparable to the Arduino-Mega 2560 and can be used as Arduino-Mega 2560 in the Arduino-IDE. The Arduino bootloader is preloaded, hence the module is ready-to-use. The documentation shows the pin mapping of Arduino-naming to module pinout. |
| Digispark | ATTiny85 | Digistump | Requires special version of the Arduino IDE. |
| DragonFly | ATmega1280 | | A compact board with Molex connectors, aimed at environments where vibration could be an issue. DragonFly features the ATmega1280 and have all 86 I/O lines pinned out to connectors. |
| FemtoduinoWikipedia:Link rot | ATmega328P-MU | Femtoduino |  Femtoduino PCB vs Dime An ultra-small (20.7x15.2 mm) Arduino compatible board designed by Fabio Varesano. Femtoduino is currently the smallest Arduino compatible board available.Wikipedia:Citation needed |

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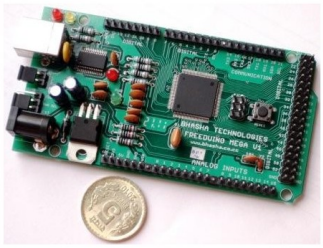
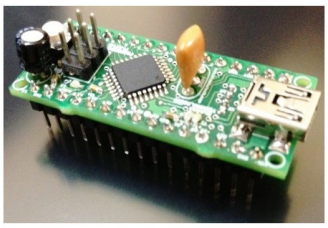
| Freeduino USB Mega 2560 | ATmega2560 | Bhasha Technologies |  <br>Freeduino USB Mega 2560, designed in India with Male headers (coming soon with Female Headers). Suitable for use in project, R&D, device and applications<br>Freeduino USB Mega 2560 is a cost effective and 100% pin and software compatible to the popular Arduino Mega 2560. Uses through hole components and has male headers. |
| Freeduino Lite v2 | ATmega8/168/328 | Bhasha Technologies | Freeduino Lite v2 is a low cost, Freeduino with no USB and Serial port. Needs FTDI USB Cable or FTDI Breakout board for programming. Uses through hole components and has male headers. |
| Freeduino Serial | ATmega8/168/328 | Bhasha Technologies | Freeduino Serial is a low cost Freeduino board with serial DB9 connector. Uses MAX232 Chip for Serial connectivty. |
| Freeduino NANO | ATmega328 | Bhasha Technologies |  <br>Freeduino nano designed in India, completely breadboard friendly, elegant and compact design.<br>Freeduino Nano is a low cost Arduino Nano compatible board with mini USB connector using SMD components Freeduino Nano [13]. |
| iDuinoWikipedia:Link rot | | | A USB board for breadboarding, manufactured and sold as a kit by Fundamental Logic. |

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| JeeNode | ATmega328P | JeeLabs | Low-cost, low-size, radio-enabled Arduino-compatible board running at 3.3 V. Inspired by the Modern Device RBBB (above) with a HopeRF RFM12B wireless module and a modular I/O design supporting a wide range of interfaces. |
| LCDuino[14] | ATmega328P | Geppetto Electronics | A combination of an ATMega328P and an i2c based RGB backlit LCD interface (software compatible with the Adafruit RGB LCD shield), along with a USB serial programming interface done as a "backpack" module for the LCD. |
| LEDuino | | | A board with enhanced I²C, DCC decoder and CAN-bus interfaces. Manufactured using surface mount and sold assembled by Siliconrailway. |
| Moteino[15] | ATmega328P | LowPowerLab[16] | An SD-card size wireless-enabled breadboard friendly Arduino compatible board running at 16 MHz/3.3 V. It can mate with either an RFM12B or RFM69W/HW/CW transceiver from HopeRF, allowing very low cost wireless communication (also available without a transceiver). Programmable from the Arduino IDE through an FTDI cable/adapter, or directly through the USB interface (Moteino-USB revision). Moteino runs DualOptiboot,[17] a custom version of Optiboot that allows wireless programming when external FLASH memory is present. |
| NavSpark | Venus822 (Leon3 SPARC V8 compatible, 100 MHz 32-bit RISC) | SkyTraq | The modified Arduino IDE allows the compiled user sketch to be uploaded onto the processor either with or without the proprietary GNSS software. NavSpark has 17 GPIO pins, which include two UARTs, 1 I²C, 1 SPI, 1 PWM, and a trigger. The first UART is usually used by the GNSS software to output NMEA 0183 data, although this can be disabled. This UART communicates over USB through a PL2303 serial converter and the transmit output is also made available on a pin. A 1 pulse per second signal is produced on a dedicated pin when a valid fix has been made. There is a GPS-only version, a combined GPS/GLONASS version, and a GPS/Beidou version. An adaptor board adds a JST connector for a lithium-ion battery, a charger for the battery, and a microSD card slot connected to the SPI pins. |
| NB1A | | | An Arduino-compatible board that includes a battery backed up real-time clock and a four channel DAC. Most Arduino-compatible boards require an additional shield for these resources. |

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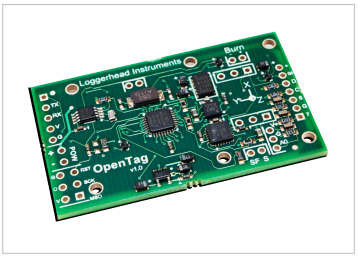
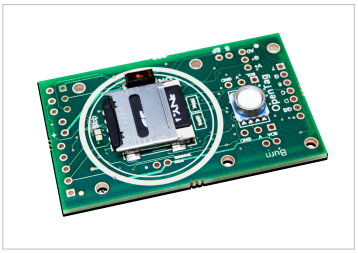
| NB2A | | | Sanguino-compatible board that includes a battery backed up real-time clock and a two channel DAC. Sanguino's feature the ATmega644P, which has additional memory, I/O lines and a second UART. |
| Nymph | ATmega328P | | A compact board with Molex connectors, aimed at environments where vibration could be an issue. |
| Oak Micros om328p | | | An Arduino Duemilanove compacted down to a breadboardable device (36 mm x 18 mm) that can be inserted into a standard 600 mil 28-pin socket, with USB capability, ATmega328P, and 6 onboard LEDs. |
| OpenTag | ATmega328p | Loggerhead Instruments |  <br>  <br>Arduino-compatible microSD motion datalogging board with accelerometer, magnetometer, gyroscope, pressure, temperature and real-time clock. |
| Paperduino | ATmega168 | | An ultra low-cost Arduino compatible, built on a printed paper and cardboard substrate, rather than a PCB. |

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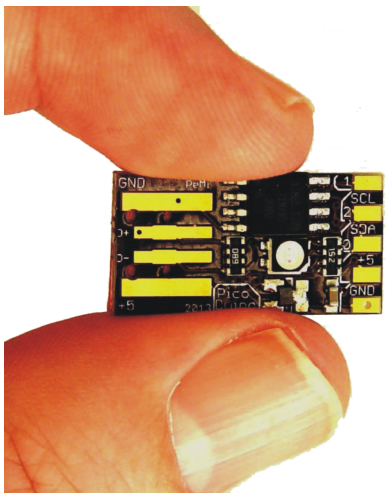
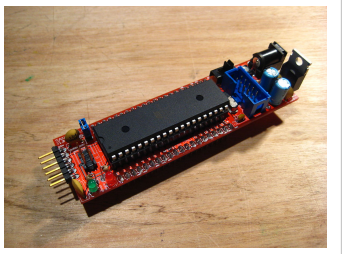
| PicoDuino | ATTiny85 | Peter Misenko |  <br>PicoDuino size demonstration.<br>• Requires special version of the Arduino IDE (Digispark IDE recommended)<br>• Digispark compatible SW/HW<br>• Trinket compatible HW (due to bootloader USB vid restriction)<br>• Ultra small board 22mm x 12mm<br>• RGB led<br>• Relay/motor driver<br>• Reset button. |
| Rainbowduino | | | An Arduino-compatible board designed specifically for driving LEDs. It is generally used to drive an 8x8 RGB LED matrix using row scanning, but it can be used for other things. |
| Sanguino | ATmega644 | |  <br>An open source enhanced Arduino-compatible board that uses an ATMega644P instead of an ATmega168. This provides 64 kB of flash, 4 kB of RAM and 32 general I/O pins in a 40 pin DIP device. It was developed with the RepRap Project in mind. |
| Seeeduino Mega | ATmega2560 | SeeedStudio | Arduino Mega compatible board with 16 extra I/O pins and the same a board size as the Arduino Uno. As with the Arduino Mega, most shields that were designed for the Duemilanove, Diecimila, or Uno will fit, but a few shields will not fit because of interference with the extra pins. |

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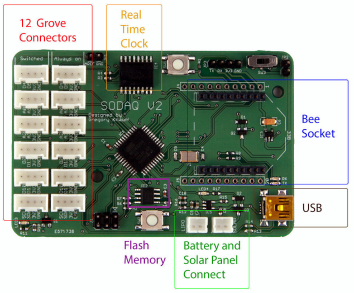
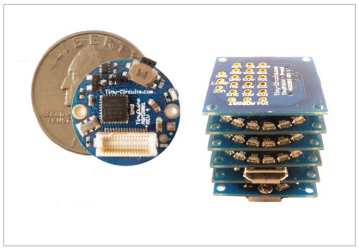
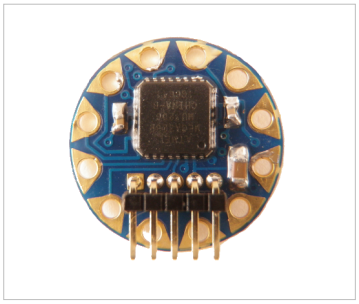
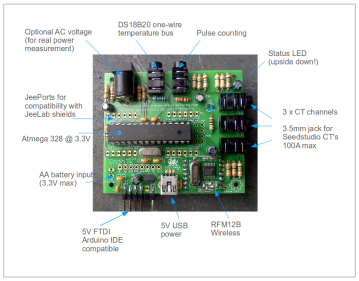
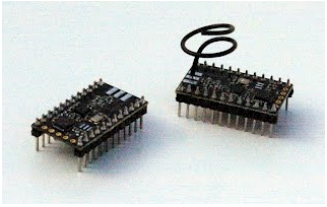
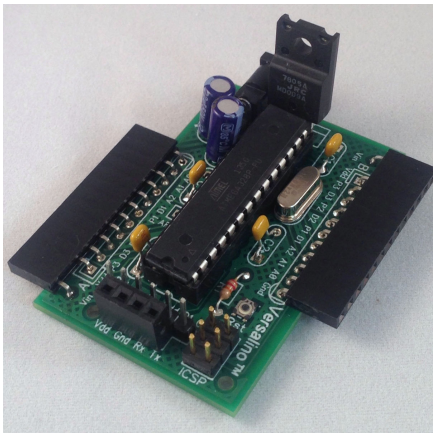
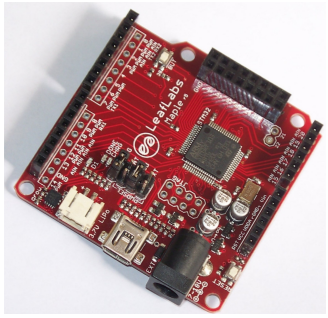
|---|---|---|---|
| SODAQ | ATmega328P | SODAQ |  <br>SODAQ, an Arduino Compatible Solar Powered sensor board<br><br>The Raspberry Pi-sized SODAQ board is built for Solar Powered Data Acquisition. It is fitted with a Lipo charge controller and 12 Grove sockets for plug and play prototyping. It runs at 3.3 V and 8 MHz. It also comes with a DS3231 Real Time Clock and 16 Mbit serial flash for data logging. Its "bee" socket can use a range of different modules, like Xbee, RFbee, Bluetoothbee and GPRSbee to make the board communicate. Specifications:<br>• Power supply by LiPo battery (3.7 V) or via Micro USB connector<br>• Solar charge controller with JST connector for Solar Panel up to 2.5W<br>• Battery Monitor<br>• DS3231 Real Time Clock and Temperature sensor, clock backup powered by LiPo battery<br>• On/Off switch. With the switch in Off position the solar charge circuit is still active and the RTC clock is still powered.<br>• ICSP programming header |
| Sparrow | ATMega328P | Open Home Automation | Arduino compatible board designed specifically for RF mesh network experiments. It features 10 IOs, an 10 pin ISP programming connector, a connector for a standard LCD display (in 4 bit mode) and a connector for an 2.4Ghz RF module. |
| Spider Controller | | | Arduino Mega compatible board designed specifically for robots requiring large numbers of servos. A built in 3 A switchmode power supply allows servos to plug directly into the board. Pin spacing allows making custom shields from standard prototype board. |
| Stickduino | | | Similar to a USB key. |
| Teensy and Teensy++ | | | A pair of boards from PJRC.com that run most Arduino sketches using the Teensyduino software add-on to the Arduino IDE. |
| Teensy 3.0 | | | A very small board from PJRC.com based on the Freescale MK20DX128VLH5 32-bit ARM Cortex-M4 48 MHz CPU. It has 34 I/O pins; 128 kB of flash; 16-bit ADC; UARTs, SPI, I²C, Touch and other I/O capability. |

| | | | |
|---|---|---|---|
| TinyDuino | ATmega328p | TinyCircuits |  A fully capable Arduino platform smaller than a quarter, yet with all the power and functionality of the Arduino Uno board, including stackable shield support. The TinyDuino also support an option coin cell holder and has many expansion shields available. |
| TinyLily | ATmega328p | TinyCircuits |  A fully capable Arduino platform smaller than a dime, designed for e-textiles. Includes large sewtabs and a header for a USB adapter for communication and programming. |
| Trinket[18] | ATTiny85 | Adafruit[19] | Requires updates to Arduino IDE (or download special version) and driver under Windows. Includes regulator for battery power away from PC. Very low cost. |
| Wireless Widget | | | A compact (35 mm x 70 mm), low voltage, battery powered Arduino-compatible board with onboard wireless capable of ranges up to 120 m. The Wireless Widget was designed for both portable and low cost Wireless sensor network applications. |
| ZB1 | | | An Arduino-compatible board that includes a Zigbee radio (XBee). The ZB1 can be powered by USB, a wall adapter or an external battery source. It is designed for low-cost Wireless sensor network applications. |
| SunDuino2 | ATmega16/32/324/644 | | An open source enhanced Arduino-compatible board that uses an ATmega16/32/324/644 instead of an ATmega168. This provides 16/32/64 kB of flash, and 32 general I/O pins in a 40 pin DIP device. |
| OpenEnergyMonitor emonTx | ATmega328 | |   An open-source low power wireless (RFM12B) energy monitoring node based on ATmega328 and JeeNode design and uses the Nanode (another Arduino compatible) design for their receiver. |

| | | | |
|---|---|---|---|
| panStamp | ATmega328 | panStamp |  <br>Small low-power wireless motes and base boards. Communication library, configuration tools and automation applications are available for panStamps. These wireless miniatures can easily be hooked to different cloud data services via Lagarto, an open automation platform developed for panStamps. |
| Microduino | ATmega168/328/644/1284 | Microduino Studio | 1" x 1.1" small, stackable, low-cost Arduino-compatible board with a uniformed U-shape 27-pin standard interface. |
| Versalino Uno[20] | ATmega328p | Virtuabotix |  <br>Versalino Uno 1.1<br>Compact board with pins in two similar layouts "Bus A" and "Bus B". 6 volt input 3.5 mm plug power. Programmed with FTDI. |
| LeoStick[21] | ATmega32U4 | Freetronics | Compact version of the Arduino Leonardo (which can be plugged straight into a USB port without a cable) and has a buzzer and a 3-in-1 RGB LED. |

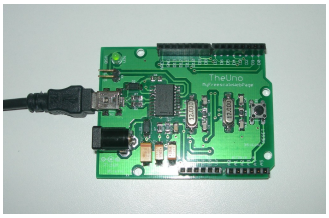
## Non-ATmega boards

The following non-ATmega boards accept Arduino shield daughter boards. The microcontrollers are not compatible with the official Arduino IDE, but they do provide a version of the Arduino IDE and compatible software libraries.

| Name | Processor | Host interface | Maker | Notes |
|---|---|---|---|---|
| PIC.duino Net | PIC18F67J60 | Ethernet or Serial | SlicMicro | Pin compatible with Arduino but uses the ethernet enabled PIC microcontroller to connect to the Internet. Allows sending of email, display of javascript enabled webpages, and remote web based access and control from around the world. |
| Leaflabs Maple | ARM STM32 | USB | LeafLabs |  A 72 MHz 32-bit ARM Cortex-M3-based microcontroller (ST Microelectronics] STM32F103) with USB support, compatibility with Arduino shields, and 39 GP I/O pins. Programmable with the Open Source Maple IDE, which is a branch of the Arduino IDE. The Maple IDE includes both an implementation of the Arduino Language, and lower-level native libraries (with support from the libmaple C library). |
| Microchip chipKIT Uno32 and chipKIT Max32 | PIC32 | USB | Digilent | 32-bit MIPS-M4K PIC32 processor boards. The Arduino libraries have been implemented natively for the PIC32 and these kits run in a fork of the standard Arduino IDE, chipKIT32-MAX and are compatible to most shields. |
| Freescale Freedom | Kinetis-L ARM Cortex-M0+ | USB | Freescale | A 48 MHz 32-bit ARM Cortex-M0+-based microcontroller (Freescale MKL25Z128VLK4) with USB support, compatibility with Arduino shields and 64 GP I/O pins. Board embeds the new ARM OpenSDA debug and programming interface through USB and is compatible with the majority of the ARM IDE suppliers. |
| PRO Family | ARM Cortex LPC1114 LPC1751 LPC1756 | USB | Coridium | up to 100 MHz ARM Cortex-M3 and ARM7TDMI-based shield-compatible boards, programmable in BASIC or C with Sketch support with open source MakeItC utilities. All boards have 5 V tolerant IOs. |
| Energia | MSP430 | USB | Texas Instruments | The Energia project integrates this with the Arduino IDE. |
| Sakura board | Renesas RX63N | USB | Renesas/Wakamatsu Tsusho Co.,Ltd | Web compiler with Sketch support, ethernet interface |

## Non-Arduino boards

The following boards accept Arduino shield daughter boards. They do not use ATmega microcontrollers and so are not compatible with the Arduino IDE, nor do they provide an alternative implementation of the Arduino IDE and software libraries.

| Name | Processor | Maker | Notes |
|---|---|---|---|
| Bambino 210 [22] | NXP LPC4330 | Microint USA | Dual core ARM Cortex-M4/M0, 264 KB SRAM, 4 MB Flash, mbed HDK, Arduino-compatible headers. The Bambino 210E has the same features as the 210, but adds a 10/100 Ethernet port, 8MB Flash, microSD socket, and Xbee Socket |
| Cypress PSoC 4 Pioneer Kit (CY8CKIT-042) | PSoC 4 CY8C4245AXI-483 | Cypress | The PSoC 4 Pioneer Kit is a development platform enabling users to design with the ARM Cortex-M0 PSoC®4 device family. The kit features the PSoC 4200 device family as the main processor and includes a PSoC 5LP (ARM Cortex-M3 processor) to perform programming and debugging. The kit is supported using PSoC Creator, which is a free IDE for embedded development targeting the PSoC 3/4/5LP device families. In the summer of 2013 Cypress supported the kit with a 100 projects in 100 days [23] campaign on the community forums at Element14. |
| Arduino Shield Compatible Propeller Board | Parallax Propeller | Parallax | Based on the Parallax Propeller; interfaces with standard Arduino shields. The Propeller comes with a free IDE called "propeller tool", and an alternative IDE tool is available. |
| Amicus18 | PIC | | Amicus18 is an embedded system platform based on PIC architecture (18F25K20). Can be programmed with any programming language, though the Amicus IDE is free and complete. |
| Cortino | ARM STM32 | | Development system for a 32-bit ARM Cortex-M3-based microcontroller. |
| Pinguino | PIC | | Board based on a PIC microcontroller, with native USB support and compatibility with the Arduino programing language plus an IDE built with Python and sdcc as compiler. |
| Unduino | PIC | | A board based on the dsPIC33FJ128MC202 microcontroller, with integrated motor control peripherals. |
| Netduino | ARM AT91SAM7X | | 48 MHz 32-bit ARM7 microcontroller board with support for the .NET Micro Framework. Pin compatible with Arduino shields although drivers are required for some shields. |
| Vinculo | Vinculum II | | FTDI USB development board for the FTDI Vinculum II microcontroller. |
| FEZ Domino, FEZ Panda, and FEZ Panda II | ARM | | 72 MHz 32-bit ARM (GHI Electronics USBizi chips) micro-controller boards with support for the .NET Micro Framework. Pin compatible with Arduino shields, although drivers are required for some shields. |
| TheUno | Freescale S08DZ60 | MyFreescaleWebPage |  Freescale 8-bit S08DZ60 based Arduino Shield Compatible development board. Programmable in C or assembly language using the free CodeWarrior development environment from Freescale, based on Eclipse. Integrated open-source debugging cable for fast prototyping. |

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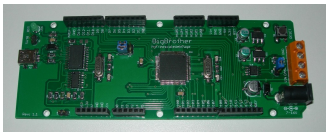
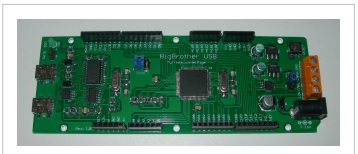
| BigBrother | Freescale MCF51AC256 | MyFreescaleWebPage |  Freescale 32-bit Coldfire MCF51AC256 based Arduino Shield Compatible development board. Programmable in C or assembly language using the free CodeWarrior development environment from Freescale, based on Eclipse and in C++ with CodeSourcery. Integrated open-source debugging cable for fast prototyping. The first Arduino Shield Compatible board with two Arduino slots to add more and more shields. |
| BigBrother-USB | Freescale MCF51JM128 | MyFreescaleWebPage |  Freescale 32-bit Coldfire MCF51JM128 based Arduino Shield Compatible development board. Programmable in C or assembly language using the free CodeWarrior development environment from Freescale, based on Eclipse and in C++ with CodeSourcery. Integrated open-source debugging cable for fast prototyping. The first Arduino Shield Compatible board with two Arduino slots to add more and more shields. |
| Firebird32 | Coldfire | | Freescale 32-bit Coldfire MCF51JM128 based Arduino Shield Compatible development board. Programmable in StickOS BASIC, and C or assembly language using Flexisframework or CodeWarrior with a step-by-step debugger. The Firebird32 is also available in a special model based on the 8-bit MC9S08JM60. |
| Stampduino[24] | PIC or Parallax SX | Parallax | Arduino Shield compatible BASIC Stamp 2 board, interfaces with most standard Arduino shields. The BS comes with a free IDE. |
| STM32 Nucleo | STM32 Family | STMicroelectronics | Arduino connectors and ST Morpho headers |
| SunDuinoPIC | PIC18F2550 or PIC18F4550 | | Microchip PIC Arduino hardware compatible board. Based PINGUINO Project. USB HID Bootloader. |
| Breeze[25][26] | PIC | | Breeze boards are prototyping platforms for 28-pin PIC microcontrollers. They come with a PIC18F25K22 (USB-UART interface) or PIC18F25J50 (direct USB interface), however almost any 28-pin PIC can be used with the platform. |

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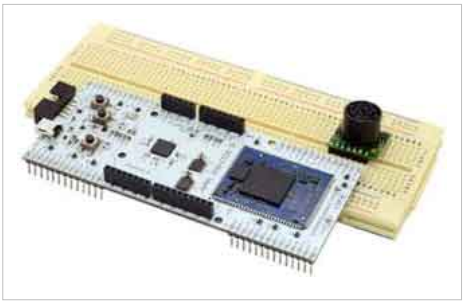
|---|---|---|---|
| Goldilocks[27] | FPGA | Thin Layer Embedded [28] | Goldilocks has three Arduino UNO Shield compatible sockets and a 'helix_4' FPGA Module with Altera Cyclone IV FPGA, DDR2 DRAM, fast SRAM, serial Flash, a MEMs oscillator, power supplies and an Atmel ATSHA204 Authentication IC/EEPROM. The 'helix_4' module is notable for castellated edge connectors; it's designed to be 'soldered-down' to a subsequent PCB development. |
| Breadstick[29] | FPGA | Thin Layer Embedded [28] |  Breadstick has one Arduino UNO Shield compatible socket, 43 GPIO to pin HDRs for breadboarding, and a lower power 'helix_4' FPGA Module with Altera Cyclone IV FPGA, fast SRAM, serial Flash, a MEMs oscillator, power supplies and an Atmel ATSHA204 Authentication IC/EEPROM. The 'helix_4' module is notable for castellated edge connectors; it's designed to be 'soldered-down' to a subsequent PCB development. |

# References


[1] http://arduino.cc/en/Main/ArduinoBoardZero
[2] http://arduino.cc/en/Main/ArduinoBoardYun
[3] http://blog.arduino.cc/2013/08/21/updating-about-arduino-yun-and-arduino-robot/
[4] arduino.cc (http://arduino.cc/en/Main/ArduinoBoardPro)
[5] http://www.freetronics.com/collections/arduino/products/etherten
[6] http://www.freetronics.com/collections/arduino/products/ethermega-arduino-mega-2560-compatible-with-onboard-ethernet
[7] http://www.freetronics.com/collections/arduino/products/usbdroid
[8] http://www.freetronics.com/collections/arduino/products/eleven
[9] http://www.freetronics.com/collections/arduino/products/kitten
[10] http://www.freetronics.com/collections/arduino/products/etherdue-arduino-due-compatible-with-onboard-ethernet
[11] http://www.freetronics.com/collections/arduino/products/arduphone-arduino-compatible-cellphone
[12] http://dimitech.com
[13] http://www.bhashatech.com/boards/128-freeduino-nano.html
[14] (http://www.geppettoelectronics.com/search/label/LCDuino), LCDuino blog
[15] lowpowerlab.com (http://lowpowerlab.com/moteino), All about Moteino
[16] lowpowerlab.com (http://www.lowpowerlab.com/)
[17] (https://github.com/LowPowerLab/DualOptiboot) DualOptiboot
[18] https://learn.adafruit.com/introducing-trinket
[19] https://www.adafruit.com

[20] Versalino-Uno (https://www.virtuabotix.com/versalino-uno-technical-specs-pinout-guide/)
[21] http://www.freetronics.com/collections/arduino/products/leostick
[22] http://www.micromint.com/index.php?option=com_content&view=article&id=199:bambino210&catid=53:products
[23] http://www.element14.com/psoc4
[24] parallax.com (http://www.parallax.com/StoreSearchResults/tabid/768/txtSearch/stampduino/List/0/SortField/4/ProductID/842/Default.aspx)
[25] Breeze Boards (http://www.dizzy.co.za/store.asp?category=89) Dizzy Enterprises website
[26] Arduino clone with mikroBUS socket (http://www.mikroe.com/news/view/530/arduino-clone-with-mikrobus-socket/) mikroElektronika news article
[27] Goldilocks Dev Board (http://www.thin-layer-embedded.com/Module+-+helix_4#ms_dev) Thin Layer website
[28] http://www.thin-layer-embedded.com
[29] Goldilocks Dev Board (http://www.thin-layer-embedded.com/Module+-+helix_4#breadstick) Thin Layer website

# Further reading

| Library resources about<br>**List of Arduino boards and compatible systems** |
|---|
| • Resources in your library (http://tools.wmflabs.org/ftl/cgi-bin/ftl?st=&su=Arduino+(Microcontroller))<br>• Resources in other libraries (http://tools.wmflabs.org/ftl/cgi-bin/ftl?st=&su=Arduino+(Microcontroller)&library=0CHOOSE0) |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