

Difference between Arduino and Raspberry Pi

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There are a wide variety of controller boards that we can use for our hardware projects. The two most popular among them are: **Arduino** and **Raspberry Pi**. [Arduino](#) is based on the ATmega family and has a relatively simple design and software structure. Raspberry Pi, basically is a single-board computer. Both of them have a CPU which executes the instructions, timers, memory and I/O pins. The key distinction between the two is that Arduino tends to have a strong I/O capability which drives external hardware directly. Whereas Raspberry Pi has a weak I/O which requires transistors to drive the hardware.

What is Arduino?

[Arduino](#) is an open-source, cross-platform, very simple hardware and software environment intended for interactive projects. It could be an electronic board having a [microcontroller](#)—a computer in one chip—besides a development environment within which one writes, compiles, and ultimately downloads code onto the microcontroller. The Arduino boards were designed to make simple engagements with an electronic system easy for both supporters and audiences: beginners, enthusiasts, and learners.

Advantages of Arduino

- **User Friendly:** [Arduino IDE](#) is so user-friendly that even a complete beginner finds it very easy to learn.
- **Above all:** Open-source, Arduino has an enormous community providing a huge number of tutorials, libraries, and other resources.
- **variety of shields:** There exist a variety of shields that can give extended capabilities to an Arduino for wireless, motor control, and even Internet connectivity.
- **Economical:** Arduino boards are much cheaper in price than most other microcontrollers or development boards.
- **Platform Independent:** The Arduino Software runs on Windows, Mac OS X and Linux.

Disadvantages of Arduino

- **Limited Computational Power:** The processing and memory resources of the Arduino boards are actually quite limited, so they cannot be used for higher operations, such as an operating system workable through intensive computation.
- **Absence of Multitasking:** Arduino boards are fundamentally designed for single-task execution, signifying their inability to manage several tasks concurrently.
- **Connectivity is limited:** While shields can absolutely extend the connective selection, the basic model of an Arduino does have its features lacking, such as Wi-Fi and Ethernet.

What is Raspberry Pi?

The Raspberry Pi is a low-cost, small-sized, single-board computer developed by the Raspberry Pi Foundation. On the contrary, Raspberry Pi is a complete computer with an installed [operating system](#)—a form of Linux on most versions. It does all tasks that would normally be performed on a regular desktop; it browses the internet, it plays videos, and it runs software programs.

Advantages of Raspberry Pi

- **Full-Fledged Computer:** Raspberry Pi is running on a full-fledged operating system, which can perform tasks like running a desktop computer, including multitasking.
- **Versatile:** Means that the Raspberry Pi is useful for a wide range of uses — from simple projects like home automation to complex applications in artificial intelligence and machine learning.
- **Extensive Connectivity:** Raspberry Pi has numerous options for connectivity, such as HDMI, USB, [Ethernet](#), Wi-Fi, and Bluetooth, making the system ideal for networked projects.
- **Strong Community Support:** Besides Arduino, the Raspberry Pi is also developed on a Dynamite-sized community that boasts very active forums, tutorials, and resources.
- **GPIO Pins:** The Raspberry Pi makes it possible to interface with electronic components by the use of General Purpose Input/Output GPIO Pins, this is by far

sophisticated compared to Arduino inputs.

Disadvantages of Raspberry Pi

- **Complexity:** Setting up and using the Raspberry Pi is a bit more complicated compared to Arduino, because it requires some knowledge of operating systems and possibly command-line interfaces.
- **High Power Consumption:** The Raspberry Pi has high power consumption compared to an Arduino, which could become a problem for battery-powered projects.
- **Cost:** Raspberry Pi is pretty cheap, though becomes rather expensive with the designing of the SD cards, power supplies, and cases in comparison to Arduino boards. Overkill for Simple Projects: For simple electronics projects, Raspberry Pi might be overpowered and unnecessary, making Arduino a considerably better option.

Difference between Arduino and Raspberry Pi

S No.	Arduino	Raspberry Pi
1.	In the year 2005, the classrooms of the Interactive Design Institute in Ivrea, Italy, first introduced the Arduino board.	In the year 2012, Eben Upton first introduced the Raspberry Pi device in February.
2.	Control unit of the Arduino is from the At mega family.	The control unit of Raspberry Pi is from the ARM family.
3.	Arduino is based on a microcontroller.	While Raspberry Pi is based on a microprocessor.
4.	It is designed to control the electrical components connected to	While Raspberry Pi computes data and produces valuable outputs, and controls

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	the circuit board in a system.	components in a system based on the outcome of its computation.
5.	Arduino boards have a simple hardware and software structure.	While Raspberry Pi boards have a complex architecture of hardware and software.
6.	CPU architecture: 8 bit.	CPU architecture: 64 bit.
7.	It uses very little RAM, 2 kB.	While Raspberry Pi requires more RAM, 1 GB.
8.	It clocks a processing speed of 16 MHz.	While Raspberry Pi clocks a processing speed of 1.4 GHz.
9.	It is cheaper in cost.	While Raspberry Pi is expensive.
10.	It has a higher I/O current drive strength.	While Raspberry Pi has a lower I/O current drive strength.
11.	It consumes about 200 MW of power.	While it consumes about 700 MW of power.
12.	Its logic level is 5V.	Its logic level is 3V.
13.	It does not have internet support.	It has inbuilt Ethernet port and WiFi support.
14.	It has higher current drive strength.	It has lower current drive strength.

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15.	Some of the applications of Arduino are traffic light countdown timer , Weighing machines , etc.	Some of the applications of Raspberry Pi are Stop motion cameras , Robot Controllers , Game Servers.
16.	Operating systems are required in Arduino.	Operating System is required in Raspberry Pi.
17.	Two tiny cores Arduino with 32 MHz	Single core and 700 MHz

Conclusion

The other was to serve needs where the purposes and projects in consideration are different. Arduino is perfect for simple and single-function things, and it works great when one is starting into the world of electronics. Contrarily, the Raspberry Pi offers a lot more computational muscle and capabilities that make it well-suited for complex multi-tasking projects that need a full-fledged OS. The best will come down to which between the two options serves the peculiar needs of your project: either just a microcontroller for very basic functions or overall a single-board computer.

Frequently Asked Questions on Difference between Arduino and Raspberry Pi- FAQs

Can I use Arduino and Raspberry Pi together?

Yes, they both can work together on one project. The Raspberry Pi performs high-level operations, while Arduino handles the low-level hardware control. Communication between them is possible using different protocols, from UART, I2C, up to SPI.

Which is better for beginners, Arduino or Raspberry Pi?

Arduino is seen to be more helpful for beginners who are just getting into electronics and/or programming because it's that easy. On the other side, Raspberry Pi is recommended for learners with slight experience wishing to undertake high-computing projects.

Can Raspberry Pi replace Arduino?

Obviously, there are. Raspberry Pi is the alternative for Arduino when it's about any project requiring a full operating system, multitasking, or much computational power. For simple tasks, however, Arduino tends to be much more efficient and simpler to solutionize.