

## 4.2.1 Raspberry-Pi Architecture

**What is a Raspberry Pi?** Raspberry pi is the name of the “credit card-sized computer board” developed by the Raspberry pi foundation, based in the U.K. It gets plugged in a TV or monitor and provides a fully functional computer capability. It is aimed at imparting knowledge about computing to even younger students at the cheapest possible price. Although it is aimed at teaching computing to kids, but can be used by everyone willing to learn programming, the basics of computing, and building different projects by utilizing its versatility.

Raspberry Pi is developed by Raspberry Pi Foundation in the United Kingdom. The Raspberry Pi is a series of powerful, small single board computer

Raspberry Pi is launched in 2012 and there have been several iterations and variations released since then. Various versions of Raspberry Pi have been out till date. All versions consist of a Broadcom system on a chip (SoC) with an integrated ARM-compatible CPU and on-chip graphics processing unit (GPU).

The original device had a single-core Processor speed of device ranges from 700 MHz to 1.2 GHz and a memory range from 256 MB to 1 GB RAM. To store the operating system and program memory Secure Digital (SD) cards are used. Raspbian OS which is a Linux operating system is recommended OS by Raspberry Pi Foundation. Some other third party operating systems like RISC OS Pi, Diet Pi, Kali, Linux can also be run on Raspberry Pi.

### **Used:**

It also provides a set of general purpose input/output pins allowing you to control electronic components for physical computing and explore the Internet of Things (IOT).

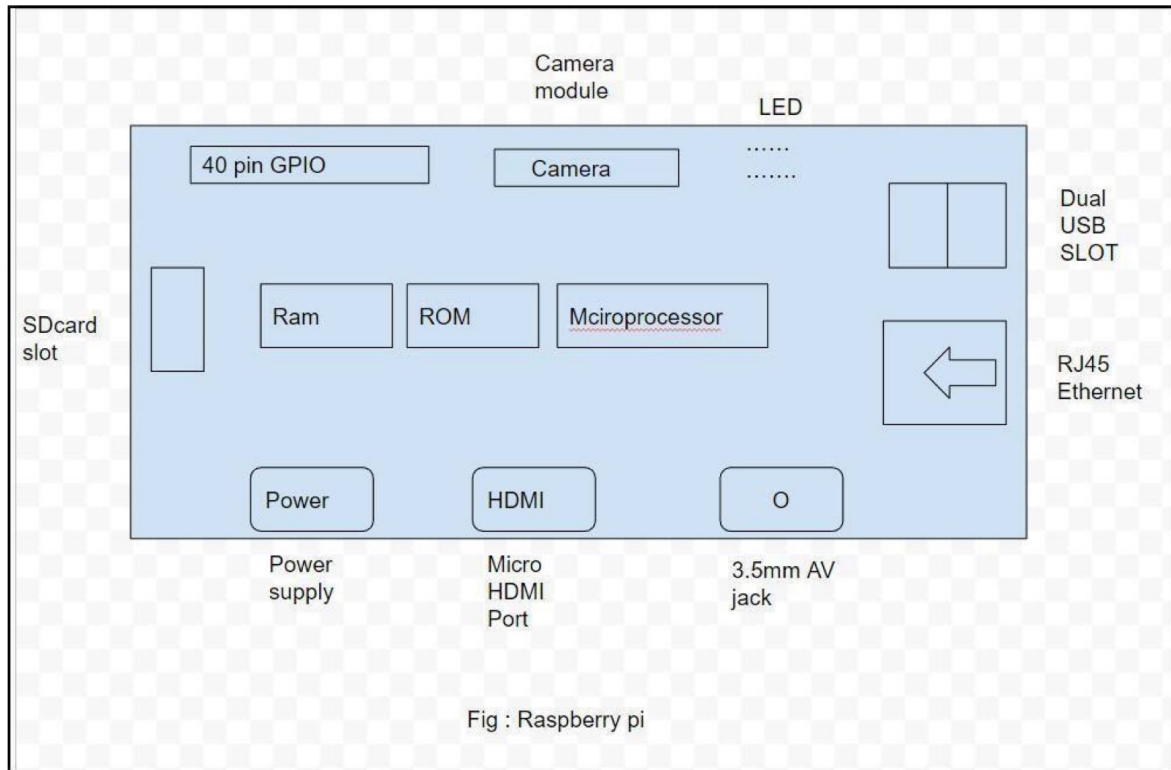
### **Raspberry pi Model**

There have been many generations of raspberry Pi from Pi 1 to Pi 4. There is generally a model A and model B. Model A is a less expensive variant and it tends to have reduced RAM and dual cores such as USB and Ethernet.

### **List of Raspberry pi models and releases year:**

1. pi 1 model B – 2012
2. pi 1 model A – 2013
3. pi 1 model B+ -2014
4. pi 1 model A+ – 2014
5. Pi 2 Model B – 2015
6. Pi 3 Model B- 2016
7. Pi 3 Model B+ -2018
8. Pi 3 Model A+ -2019
9. Pi 4 Model A – 2019

## Raspberry pi Diagram:



**Specs of the Computer:** – The computer has a quad-core ARM processor that doesn't support the same instruction as an X86 desktop CPU. It has 1GB of RAM, One HDMI port, four USB ports, one Ethernet connection, Micro SD slot for storage, one combined 3.5mm audio/videoport, and a Bluetooth connection. It has got a series of input and output pins that are used for making projects like – home security camera, encrypted door lock, etc.

**Versatility of Raspberry Pi:** – It is indeed a versatile computer and can be utilized by people from all age groups, it can be used for watching videos on YouTube, watching movies, and programming in languages like Python, Scratch, and many more. As mentioned above it has a series of I/O pins that give this board the ability to interact with its environment and hence can be utilized to build really cool and interactive projects.

**Examples of projects:** – It can be turned into a weather station by connecting some instruments to it for check the temperature, wind speed, humidity etc... It can be turned into a home surveillance system due to its small size; by adding some cameras to it the security network will be ready. If you love reading books it can also become a storage device for storing thousands of eBooks and also you can access them through the internet by using this device.

## Build Physical Projects With Python on the Raspberry Pi

The Raspberry Pi is one of the leading physical computing boards on the market. From hobbyists

building DIY projects to students learning to program for the first time, people use the RaspberryPi every day to interact with the world around them. Python comes built in on the Raspberry Pi, so you can take your skills and start building your own Raspberry Pi projects today.

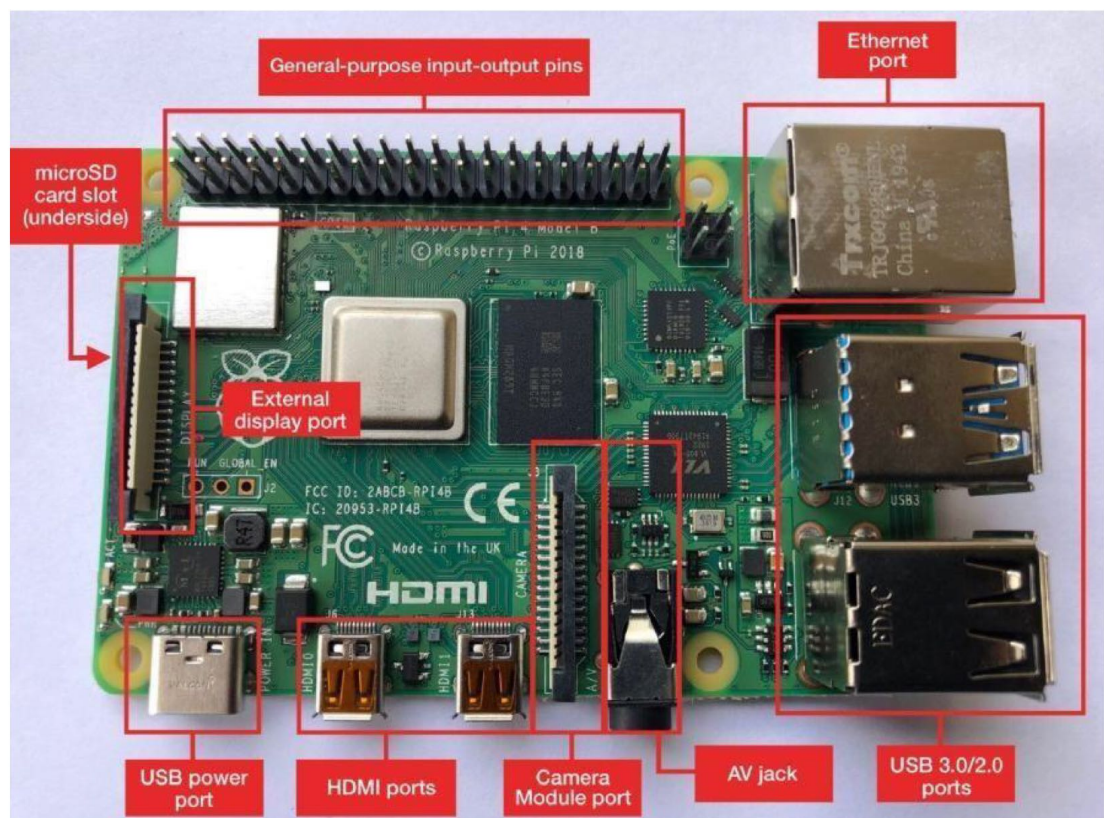
## Getting to Know the Raspberry Pi

The Raspberry Pi is a single-board computer developed by the Raspberry Pi Foundation, a UK- based charity organization. Originally designed to provide young people with an affordable computing option to learn how to program, it has developed a massive following in the maker and DIY communities because of its compact size, full Linux environment, and general-purpose input–output (**GPIO**) pins.

With all the features and capabilities that are packed into this small board, there's no shortage of projects and use cases for the Raspberry Pi. If you can think of a project that would benefit from having a credit card–sized computer attached to it, then someone has probably used a Raspberry Pi to do it. The Raspberry Pi is a fantastic way to bring your Python project ideas to life.

### Raspberry Pi Board Overview

Below is the board layout of the Raspberry Pi 4. While this layout is slightly different from previous models of the Raspberry Pi, most of the connections are the same. The setup described in the next section should be the same for both a Raspberry Pi 3 and a Raspberry Pi 4:



The Raspberry Pi 4 board contains the following components:

- **General-purpose input–output pins:** These pins are used to connect the Raspberry Pi to electronic components.
- **Ethernet port:** This port connects the Raspberry Pi to a wired network. The Raspberry Pi also has Wi-Fi and Bluetooth built in for wireless connections.
- **Two USB 3.0 and two USB 2.0 ports:** These USB ports are used to connect peripherals like a keyboard or mouse. The two black ports are USB 2.0 and the two blue ports are USB 3.0.
- **AV jack:** This AV jack allows you to connect speakers or headphones to the Raspberry Pi.
- **Camera Module port:** This port is used to connect the official Raspberry Pi Camera Module, which enables the Raspberry Pi to capture images.
- **HDMI ports:** These HDMI ports connect the Raspberry Pi to external monitors. The Raspberry Pi 4 features two micro HDMI ports, allowing it to drive two separate monitors at the same time.
- **USB power port:** This USB port powers the Raspberry Pi. The Raspberry Pi 4 has a **USB Type-C** port, while older versions of the Pi have a **micro-USB** port.
- **External display port:** This port is used to connect the official seven-inch Raspberry Pi touch display for touch-based input on the Raspberry Pi.
- **microSD card slot (underside of the board):** This card slot is for the microSD card that contains the Raspberry Pi operating system and files.

People often wonder what the difference is between a Raspberry Pi and an Arduino. The Arduino is another device that is widely used in physical computing. While there is some overlap in the capabilities of the Arduino and the Raspberry Pi, there are some distinct differences.

The Arduino platform provides a hardware and software interface for programming microcontrollers. A microcontroller is an integrated circuit that allows you to read input from and send output to electronic components. Arduino boards generally have limited memory, so they're often used to repeatedly run a single program that interacts with electronics.

The Raspberry Pi is a general-purpose, Linux-based computer. It has a full operating system with a GUI interface that is capable of running many different programs at the same time.

The Raspberry Pi comes with a variety of software preinstalled, including a web browser, an office suite, a terminal, and even Minecraft. The Raspberry Pi also has built-in Wi-Fi and Bluetooth to connect to the Internet and external peripherals.

For running Python, the Raspberry Pi is often the better choice, as you get a full-fledged Python installation out of the box without any configuration.