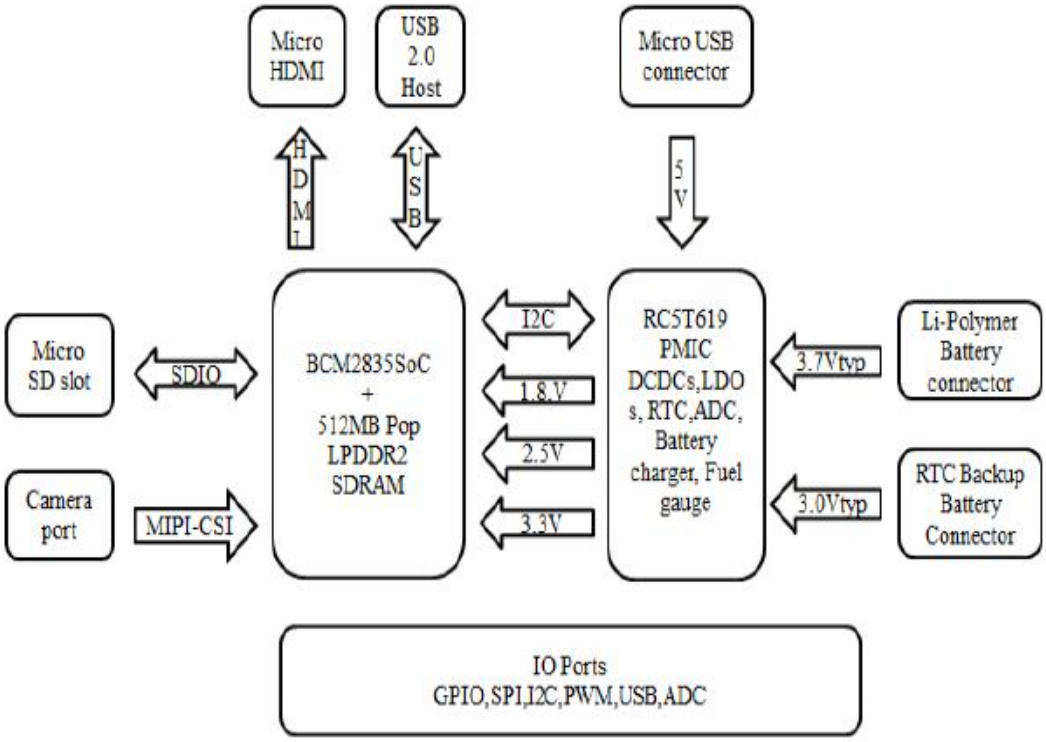
Introduction of Raspberry pi 3

It is a third generation of Raspberry pi 3 model. It is based on a Broad com BCM2837 chip.SD card is used for long term storage and booting. 40 pins are in this Raspberry pi 3 model pin diagram. SD card is the heart of the Raspberry pi 3. Quad core is used in the Raspberry pi 3. It has 64 bit and 1.2 GHz clock speed (Roughly 50% faster than pi 2). Raspberry pi 3 has 1GB RAM.

The Raspberry Pi 3 model is a small, powerful and lightweight ARM based computer which can do many of the things a desktop PC can do. It was developed in the UK by the Raspberry Pi Foundation with the hope of inspiring a generation of learners to be creative and to discover how computers are programmed and how they function. It is a standalone Linux, BSD, RISC OS, or Plan 9 system with a lot of I/O. The powerful graphics capabilities and HDMI video output make it ideal for multimedia applications such as media centers and narrow casting solutions. The Raspberry Pi is based on a Broadcom BCM2837 chip. It does not feature a built-in hard disk or solid-state drive, instead relying on an SD card for booting and long-term storage.

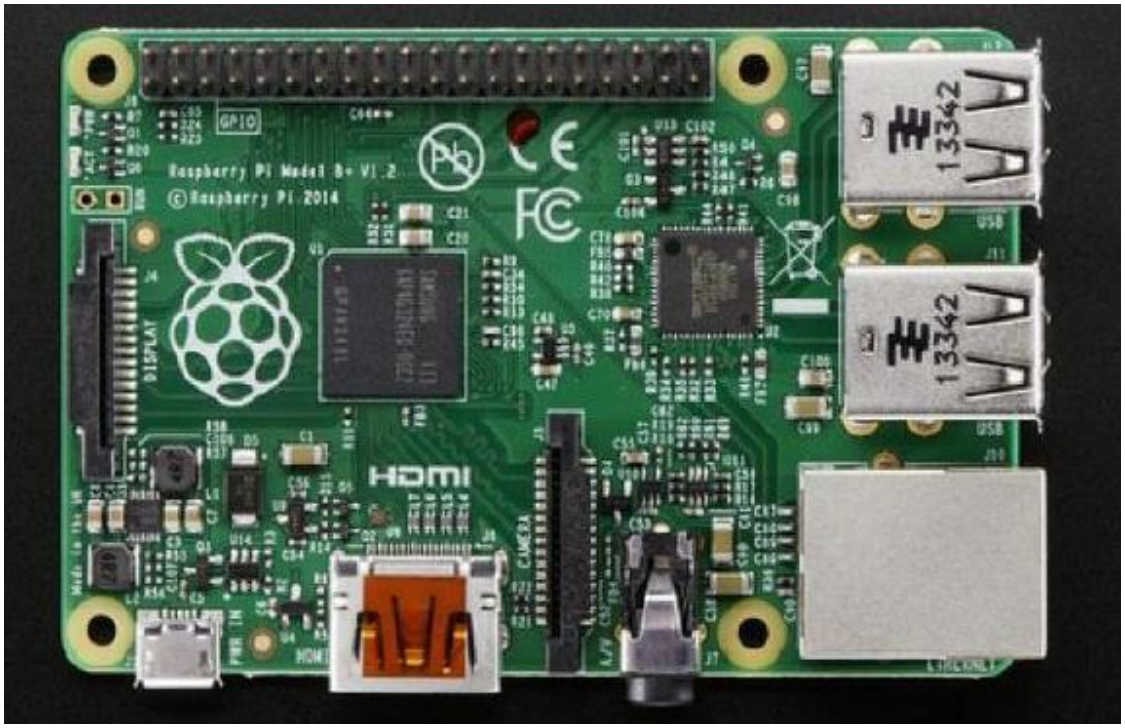


Block diagram of Raspberry Pi 3 model

The Raspberry pi does not feature with a built-in hard disk or solid-state drive like traditional computers instead it relies on the SD card for the starting up and storing of information. For the Raspberry Pi the SD card does the same job as a hard drive does in a traditional computer. The SD card must contain the operating system, programs and the data needed to run the Raspberry Pi. The operating system tells the Raspberry Pi how to function, how to handle any input from the user and how to manage programs when they are running

RASPBERRY PI 3 MODEL KIT

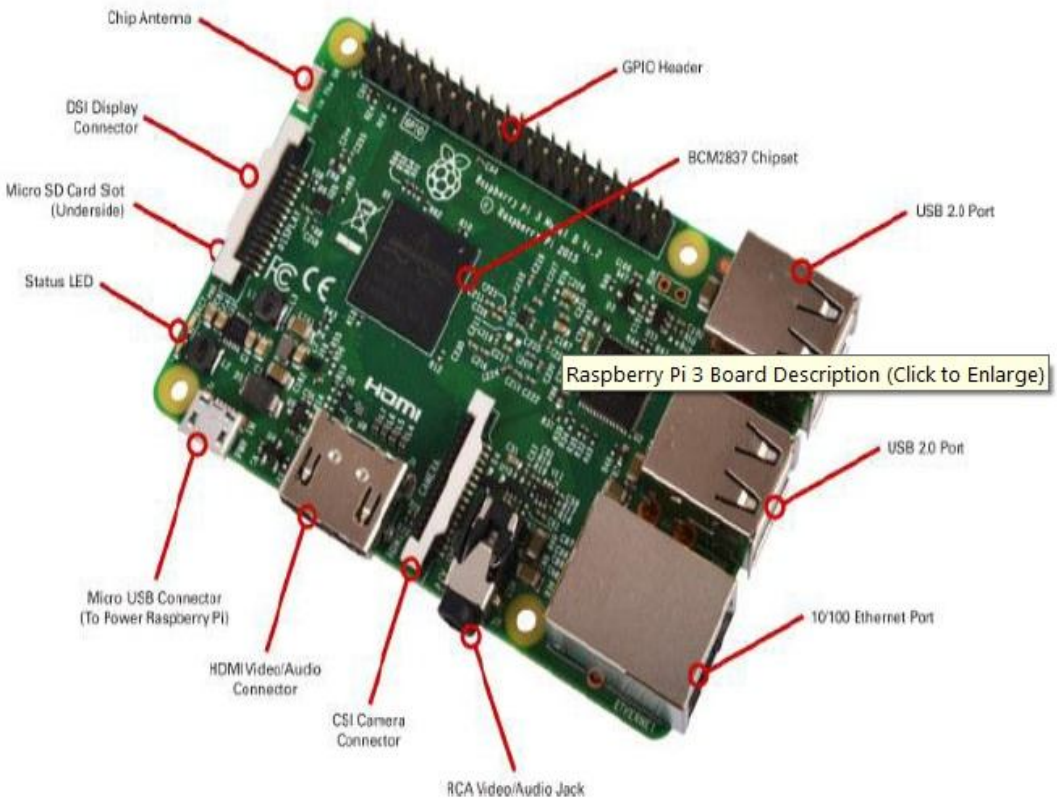




Raspberry Pi 3 model kit

RASPBERRY PI 3 MODEL KIT DESCRIPTION

Raspberry Pi 3 board was first found on the FCC website, and thanks to various other leaks we had a pretty good idea of the board specifications **17** including a Broadcom 64-bit ARM processor coupled with 1GB RAM, Wi-Fi and Bluetooth, as well as basically the same features and ports as Raspberry Pi 2 Model B. But with the fourth anniversary of the Raspberry Pi Model 1 board, Raspberry Pi 3 has now officially been launched, and you can now purchase the board for $35.



Raspberry Pi 3 Model Kit Description

RASPBERRY PI 3 MODEL SPECIFICATIONS

1. SoC – Broadcom BCM2837 64bit ARMv8 quad core Cortex A53 processor @ 1.2GHz with dual core Video Core IV GPU @ 400 MHz supporting OpenGL ES 2.0, hardware-accelerated Open VG, and 1080p30 H.264 high-profile decode. Capable of 1Gpixel/s, 1.5Gtexel/s or 24GFLOPs with texture filtering and DMA infrastructure.
2. System Memory – 1GB LPDDR2.
3. Storage – micro SD slot.
4. Video & Audio Output – HDMI 1.4 and 4-pole stereo audio and composite video port.
5. Connectivity – 10/100M Ethernet, Wi-Fi 802.11 b/g/n up to 150Mbps and Bluetooth 4.1 LE (BCM43438 module).
6. USB – 4x USB 2.0 host ports (with better power management, allowing higher power peripherals), 1x micro USB port for power.
7. Expansion

    1. 40-pin GPIO header.
    2. MIPI DSI for Raspberry Pi touch screen display.
    3. MIPI CSI for Raspberry Pi camera.

8. Power Supply – 5V up to 2.4A via micro USB port.
9. Dimensions – 85 x 56 x 17 mm.

RASPBERRY PI 3 MODEL FEATURES

1. CPU-700 MHz Low Power ARM1176JZ-F Applications Processor
2. GPU-Dual Core Video Core IV Multimedia Co-Processor
3. Memory-512MB SDRAM

4. Ethernet on board 10/100 Ethernet RJ45 jack
5. Four USB Connectors (USB 2.0).
6. Video Output- HDMI (rev 1.3 & 1.4) Composite RCA (PAL and NTSC)
7. Audio Output-3.5mm jack, HDMI
8. On board Storage- SD, MMC, SDIO card slot

ADVANTAGES OF RASPBERRY PI

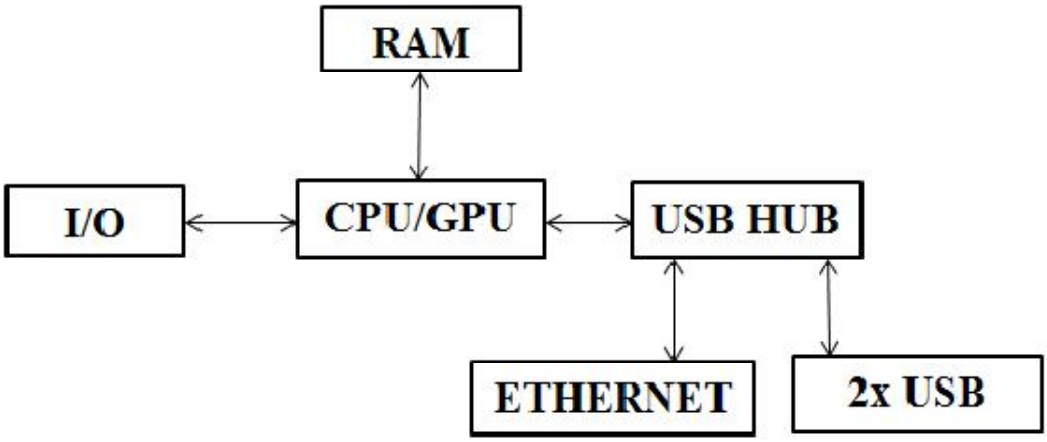
1. Raspberry Pi is as small as the size of a credit card, it works as if a normal Computer at a relatively low price.
2. It is possible to work as a low-cost server to handle light internal or web traffic.
3. Grouping a set of Raspberry Pi to work as a server is more cost-effective than a Normal server. If all light traffic servers are changed into Raspberry Pi, it can Certainly minimize an enterprise's budget.

APPLICATIONS

1. Home automation
2. Media streamer
3. Arcade machine
4. Tablet computer
5. Controlling robots

RASPBERRY PI 3 HARDWARE

The Raspberry Pi hardware has evolved through several versions that feature variations in memory capacity and peripheral-device support.



This block diagram depicts Models A, B, A+, and B+. Model A, A+, and the Pi Zero lack the Ethernet and USB hub components. The Ethernet adapter is internally connected to an additional USB port. In Model A, A+, and the PI Zero, the USB port is connected directly to the system on a chip (SoC). On the Pi 1 Model B+ and later models the USB/Ethernet chip contains a five-point USB hub, of which four ports are available, while the Pi 1 Model B only provides two. On the Pi Zero, the USB port is also connected directly to the SoC, but it uses a micro USB (OTG) port.

BROADCOM BCM2837 CPU

ARM11 Cortex-53

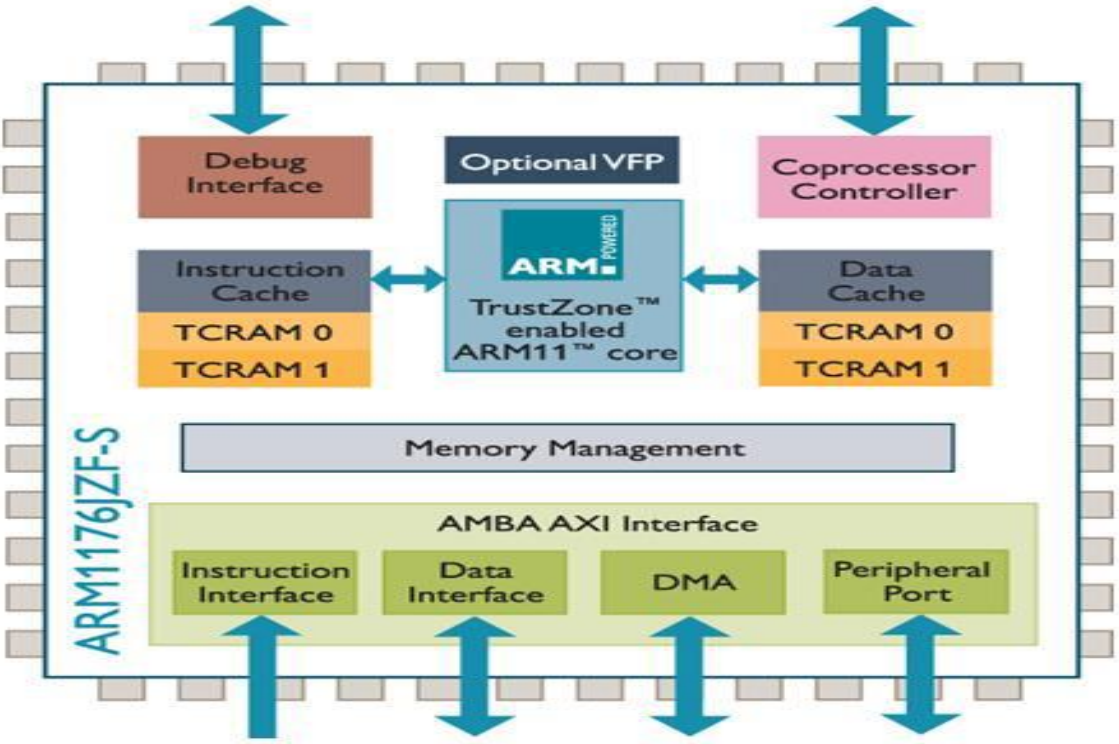
The ARM11 cortex-53 processor incorporates an integer core that implements the ARM11 ARM architecture v6. It supports the ARM and Thumb™ instruction sets, Jazzle technology to enable direct execution of Java byte codes, and a range of SIMD DSP instructions that operate on 16-bit or 8-bit data values in 32-bit registers.

ARM11 Cortex-53 PROCESSOR FEATURES

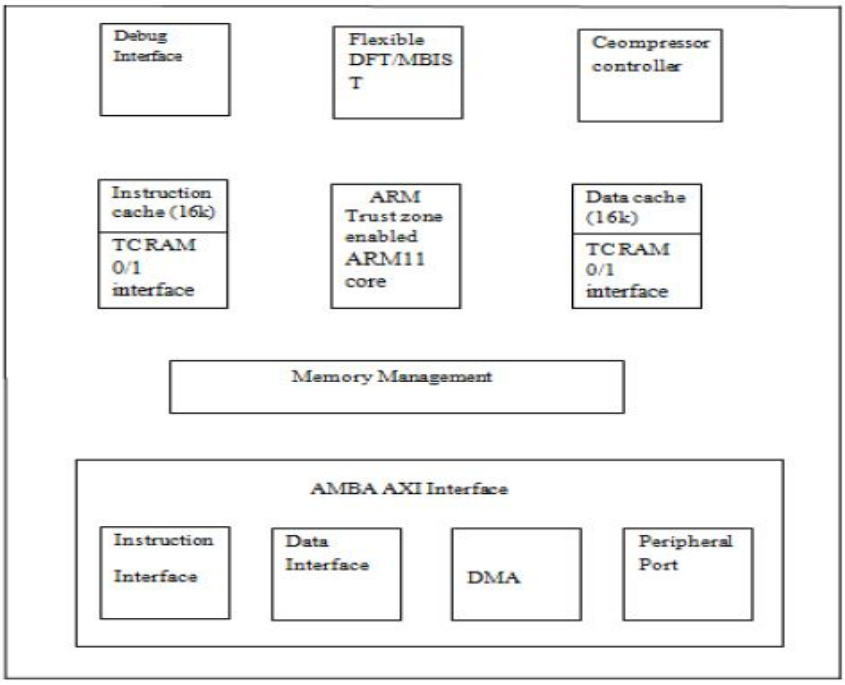
1. High-speed Advanced Microprocessor Bus Architecture (AMBA)
2. Advanced Extensible Interface (AXI) level two interfaces supporting Prioritized multiprocessor implementations.
3. An eight-stage pipeline.
4. ARMv6 Architecture.
5. Low interrupt latency configuration.
6. Internal coprocessors CP14 and CP15.
7. Vector Floating-Point (VFP) coprocessor support.
8. External coprocessor interface.
9. Instruction and Data Memory Management Units (MMUs)
10. Virtually indexed and physically addressed caches
11. 64-bit interface to both caches
12. Level one Tightly-Coupled Memory (TCM) that you can use as a local RAM with DMA.
13. JTAG-based debug.

It supports the ARM and Thumb™ instruction sets, Jazelle technology to enable direct execution of Java byte codes, and a range of SIMD DSP instructions that operate on 16-bit or 8-bit data values in 32-bit registers. It supports the ARM and Thumb™ instruction sets and is in the direct execution of the codes.

It has eight-stage pipeline, ARMv6 Architecture, Low interrupt latency configuration, Internal coprocessors CP14 and CP15, Vector Floating-Point (VFP) coprocessor support, External coprocessor interface.



ARM11 Processor Block Diagram



Architecture of ARM11

PORT DESCRIPTION

MEMORY CARD SLOT

As the RASPBERRY Pi has no internal mass storage or built-in operating System it requires an SD card preloaded with a version of the Linux Operating System using any suitable SD card (4GBytes or above).

USB CONNECTOR

There are four USB port available for raspberry pi b+ model. These USB ports Are used to interface keyboards, mouse and other peripherals which having USB connectivity. Wireless keyboard/mice should also function, and only Require a single USB port for an RF dongle

GPIO CONNECTOR

Raspberry Pi have 40 GPIO (General Purpose input output) with 2.54 mm(100 mil) expansion header. These pins are used for general input output control. Among those 40 GPIO pins 5 pins can use as ground and 2 pins can use For supply.

P5: Secondary GPIO connector (Rev. 2 Pi only)							
WiringPi Pin	BCM GPIO	Name	Header		Name	BCM GPIO	WiringPi Pin
		5v	1	2	3.3v		
17	28	GPIO8	3	4	GPIO9	29	18
19	30	GPIO10	5	6	GPIO11	31	20
		0v	7	8	0v		
WiringPi Pin	BCM GPIO	Name	Header		Name	BCM GPIO	WiringPi Pin

Main GPIO Connector pin



GPIO connectors

POWER SUPPLY

Power Supply is the device that transfers electric power from a source to a load using electronic circuits. Power supplies are used in many industrial and aerospace applications and also in consumer products. Some of the requirements of power supplies are small size, lightweight, low cost, and high power conversion efficiency. The unit is powered via the micro-USB connector (only the power pins are connected, so it will not transfer data over this connection). A standard modern phone charger with a micro-USB connector will do, providing it can supply at least 700mA at +5Vdc.

Experiments

LED BLINKING

Aim :

Blinking LED using C program

Components Required :

Raspberry pi board , LED , 1 - 50 ohm resistor ,Some small-gauge solid core wire ,Breadboard and/or alligator clips to hold connections

Procedure :

- To install wiring Pi library
- Connect the LED & Resistor as shown in the Fig.1
- Write & execute the below code

Program :

```
#include <stdio.h>

#include <wiringPi.h>


// LED Pin - wiringPi pin 0 is BCM_GPIO 17.

#define LED     0

int main (void)

{

  printf ("Raspberry Pi blink\n") ;

  wiringPiSetup () ;

  pinMode (LED, OUTPUT) ;

for(;;)

{
```

```
   digitalWrite (LED, LOW) ;   // On
  delay (500) ;               // mS
  digitalWrite (LED, LOW) ;    // Off
  delay (500) ;
}
 return 0 ;
}
```

Configuration :

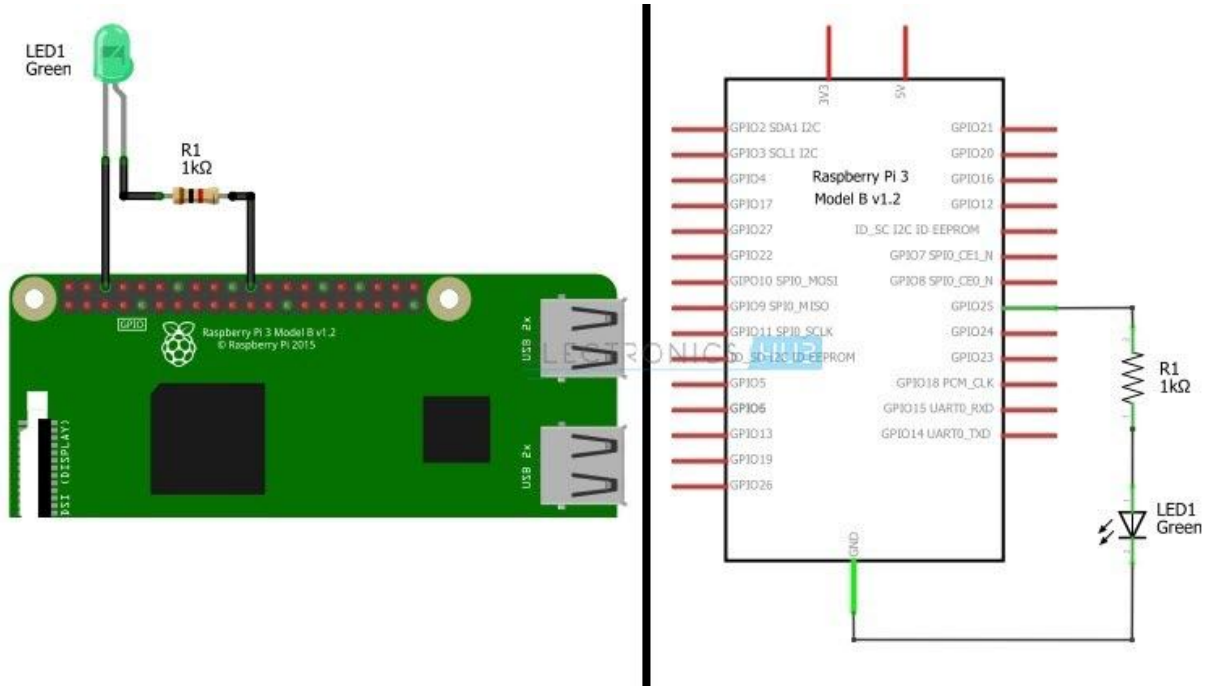


Fig. 1