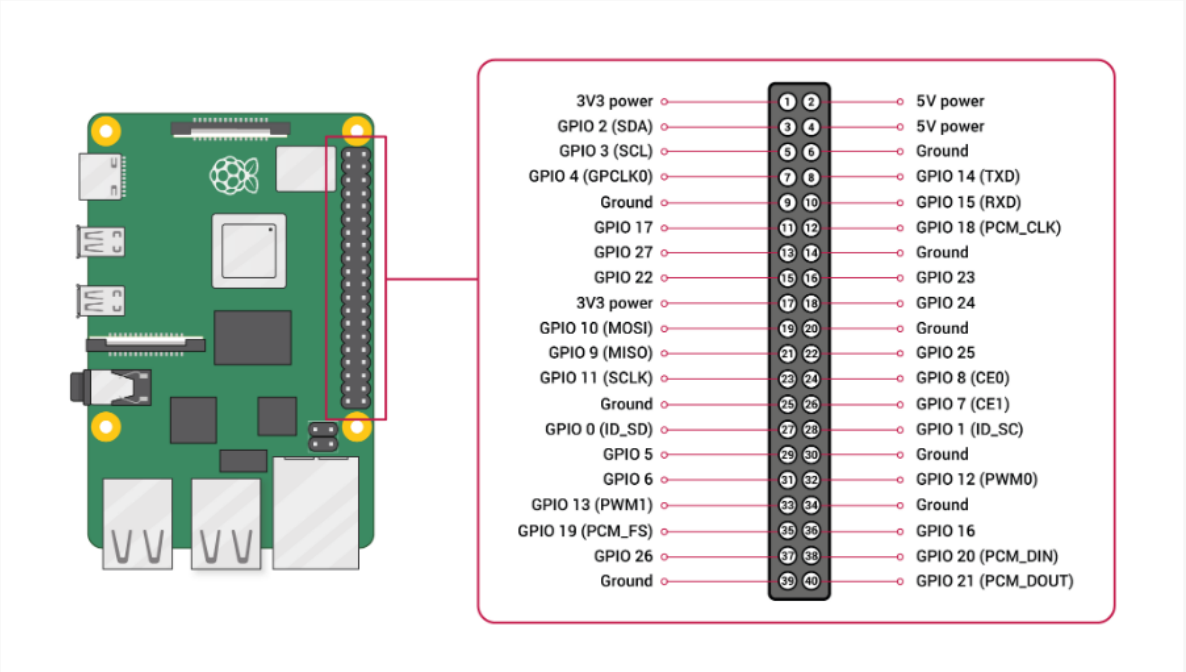
6.GPIO and 40-pin pins

6.1、Raspberry PI 5 pin diagram



6.2、GPIO pin action

- ### Voltages

  Two 5V pins and two 3.3V pins are present on the board, as well as a number of ground pins (0V), which are unconfigurable. The remaining pins are all general purpose 3.3V pins, meaning outputs are set to 3.3V and inputs are 3.3V-tolerant.

  #### Outputs

  A GPIO pin designated as an output pin can be set to high (3.3V) or low (0V).

  #### Inputs

  A GPIO pin designated as an input pin can be read as high (3.3V) or low (0V). This is made easier with the use of internal pull-up or pull-down resistors. Pins GPIO2 and GPIO3 have fixed pull-up resistors, but for other pins this can be configured in software.

  #### More

  As well as simple input and output devices, the GPIO pins can be used with a variety of alternative functions, some are available on all pins, others on specific pins.

  - PWM (pulse-width modulation)
    - Software PWM available on all pins
    - Hardware PWM available on GPIO12, GPIO13, GPIO18, GPIO19
  - SPI
    - SPI0: MOSI (GPIO10); MISO (GPIO9); SCLK (GPIO11); CE0 (GPIO8), CE1 (GPIO7)

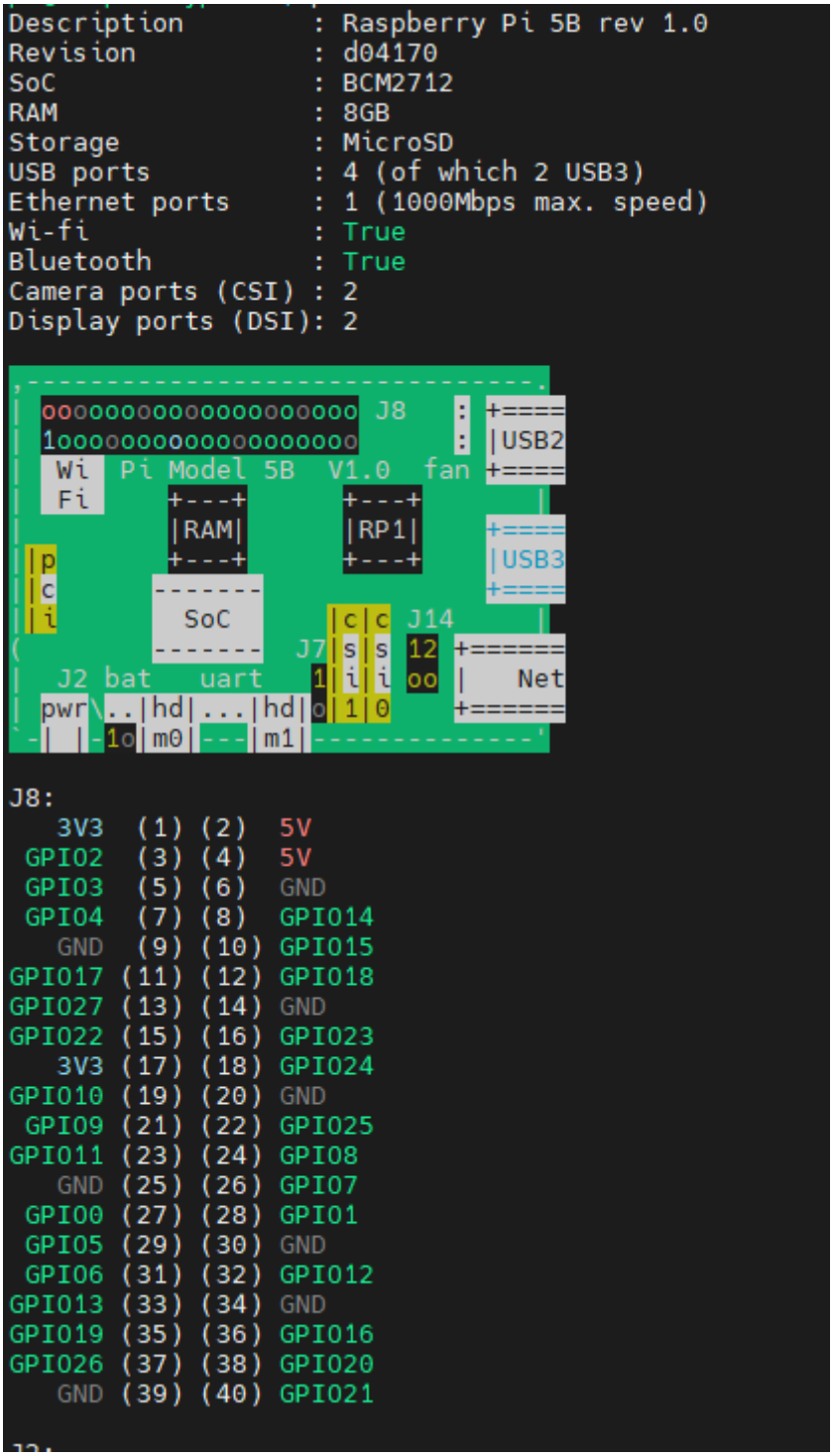
        - SPI1: MOSI (GPIO20); MISO (GPIO19); SCLK (GPIO21); CE0 (GPIO18); CE1 (GPIO17); CE2 (GPIO16)
    - I2C
        - Data: (GPIO2); Clock (GPIO3)
        - EEPROM Data: (GPIO0); EEPROM Clock (GPIO1)
    - Serial
        - TX (GPIO14); RX (GPIO15)

6.3、 GPIO pinout

Open a terminal window and run the following command:

```
pinout
```

A handy reference can be accessed on the Raspberry Pi by opening a terminal window and running the command `pinout`. This tool is provided by the GPIO Zero Python library, which is installed by default in Raspberry Pi OS.



For more details on the advanced capabilities of the GPIO pins see gadgetoid's interactive pinout diagram.

Warning:

> While connecting up simple components to the GPIO pins is perfectly safe, it's important to be careful how you wire things up. LEDs should have resistors to limit the current passing through them. Do not use 5V for 3.3V components. Do not connect motors directly to the GPIO pins, instead use an H-bridge circuit or a motor controller board.