Read and Write From Serial Port With Raspberry Pi

By emmeshop (/member/emmeshop/) in Circuits (/circuits/) > Raspberry Pi (/circuits/raspberry-pi/projects/) 531,175 266 38 Featured

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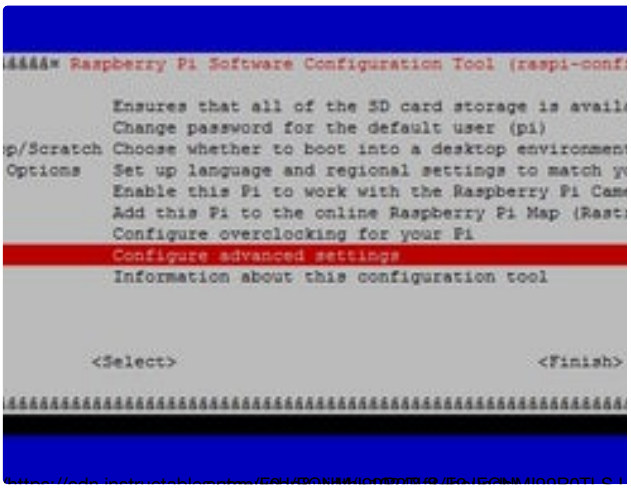

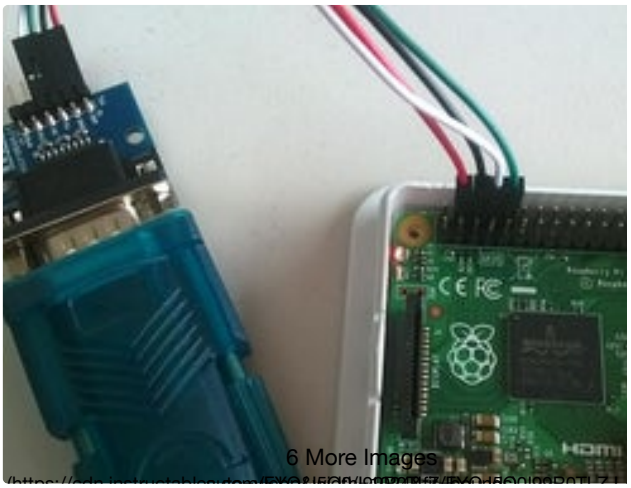

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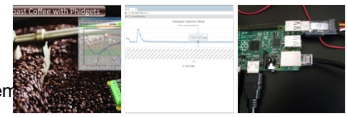

In this tutorial we will see how to use the serial port on Raspberry Pi (http://www.emmeshop.eu/shop/raspberry-pi/boards/raspberry-pi-2-model-b-armv7-with-1g-ram.html). We will use the serial port available on Raspberry with a RS232/TTL 3-5,5V adapter (http://www.emmeshop.eu/shop/components/cables-and-connectors/serial/serial-adapter-rs232-ttl-3-5-5v.html) and a USB-serial adapter (http://www.emmeshop.eu/shop/components/cables-and-connectors/serial/3400-0-usb-to-serial-converter.html). By default the Raspberry Pi's serial port is configured to be used for console input/output. This can help to fix problems during boot, or to log in to the Pi if the video and network are not available.

To be able to use the serial port to connect and talk to other devices (e.g. a modem a printer..), the serial port console login needs to be disabled.

Here we use Raspberry Pi 2, and we connect a RS232/TTL 3-5,5V adapter to pins 4 (5V), 6 (GND) ,8 (TX),10 (RX) of Raspberry, obviously connect tx with rx and vice versa.

(http://www.emmeshop.eu/blog/sites/files/image/u1/emmeshop-raspberry-serial-1.jpg)

To search for available serial ports we use the command

```
dmesg | grep tty
```

The output is something like this

```
pi@raspberrypi ~ $ dmesg | grep tty
  [    0.000000] Kernel command line: dma.dmachans=0x7f35 bcm2708_fb.fbwidth=656 bcm2708_fb.fbheigh
t=416 bcm2709.boardrev=0xa01041 bcm2709.serial=0x93f9c7f9 smsc95xx.macaddr=B8:27:EB:F9:C7:F9 bcm270
8_fb.fbswap=1 bcm2709.disk_led_gpio=47 bcm2709.disk_led_active_low=0 sdhci-bcm2708.emmc_clock_freq=
250000000 vc_mem.mem_base=0x3dc00000 vc_mem.mem_size=0x3f000000  dwc_otg.lpm_enable=0 console=tty1
console=ttyAMA0,115200 root=/dev/mmcblk0p2 rootfstype=ext4 elevator=deadline rootwait
  [    0.001774] console [tty1] enabled
  [    0.749509] dev:f1: ttyAMA0 at MMIO 0x3f201000 (irq = 83, base_baud = 0) is a PL011 rev3
  [    1.268971] console [ttyAMA0] enabled
  pi@raspberrypi ~ $
```

Last line indicates that the console is enabled on the serial port ttyAMA0, so we disable it

Run the configuration command and follow the instructions below

```
sudo raspi-config
```

(http://www.emmeshop.eu/blog/sites/files/image/u1/emmeshop-raspberry-serial-2.png)

(http://www.emmeshop.eu/blog/sites/files/image/u1/emmeshop-raspberry-serial-3.png)

(http://www.emmeshop.eu/blog/sites/files/image/u1/emmeshop-raspberry-serial-4.png)

(http://www.emmeshop.eu/blog/sites/files/image/u1/emmeshop-raspberry-serial-5.png)

(http://www.emmeshop.eu/blog/sites/files/image/u1/emmeshop-raspberry-serial-6.png)

Reboot and try with

```
dmesg | grep tty
```

output now is

```
pi@raspberrypi ~ $ dmesg | grep tty
  [    0.000000] Kernel command line: dma.dmachans=0x7f35 bcm2708_fb.fbwidth=656 bcm2708_fb.fbheigh
t=416 bcm2709.boardrev=0xa01041 bcm2709.serial=0x93f9c7f9 smsc95xx.macaddr=B8:27:EB:F9:C7:F9 bcm270
8_fb.fbswap=1 bcm2709.disk_led_gpio=47 bcm2709.disk_led_active_low=0 sdhci-bcm2708.emmc_clock_freq=
250000000 vc_mem.mem_base=0x3dc00000 vc_mem.mem_size=0x3f000000  dwc_otg.lpm_enable=0 console=tty1
root=/dev/mmcblk0p2 rootfstype=ext4 elevator=deadline rootwait
  [    0.001769] console [tty1] enabled
  [    0.749438] dev:f1: ttyAMA0 at MMIO 0x3f201000 (irq = 83, base_baud = 0) is a PL011 rev3
  pi@raspberrypi ~ $
```


Now we can use the serial ttyAMA0. We connect an adapter usb / serial, then we will try to establish a communication between the two serial ports; obviously in a practical application to every serial we could connect a device, for example a modem, a printer a RFID reader etc.

(http://www.emmeshop.eu/blog/sites/files/image/u1/emmeshop-raspberry-serial-7.jpg)

After connecting the second serial port we launch the command to find the name that Raspberry gives him

```
dmesg | grep tty
```

The output is something like this

```
pi@raspberrypi ~ $ dmesg | grep tty
  [    0.000000] Kernel command line: dma.dmachans=0x7f35 bcm2708_fb.fbwidth=656 bcm2708_fb.fbheigh
t=416 bcm2709.boardrev=0xa01041 bcm2709.serial=0x93f9c7f9 smsc95xx.macaddr=B8:27:EB:F9:C7:F9 bcm270
8_fb.fbswap=1 bcm2709.disk_led_gpio=47 bcm2709.disk_led_active_low=0 sdhci-bcm2708.emmc_clock_freq=
250000000 vc_mem.mem_base=0x3dc00000 vc_mem.mem_size=0x3f000000  dwc_otg.lpm_enable=0 console=tty1
root=/dev/mmcblk0p2 rootfstype=ext4 elevator=deadline rootwait
  [    0.001769] console [tty1] enabled
  [    0.749438] dev:f1: ttyAMA0 at MMIO 0x3f201000 (irq = 83, base_baud = 0) is a PL011 rev3
  [  971.919417] usb 1-1.2: pl2303 converter now attached to ttyUSB0
  pi@raspberrypi ~ $
```

Ok, now we create two files, one who writes something on the ttyAMA0 port and the other that reads on the ttyUSB0 port.

serial_write.py

```
#!/usr/bin/env python


        import time
        import serial


        ser = serial.Serial(

            port='/dev/ttyAMA0',
            baudrate = 9600,
            parity=serial.PARITY_NONE,
            stopbits=serial.STOPBITS_ONE,
            bytesize=serial.EIGHTBITS,
            timeout=1
        )
        counter=0


        while 1:
            ser.write('Write counter: %d \n'%(counter))
            time.sleep(1)
            counter += 1
```

serial_read.py

```
#!/usr/bin/env python


        import time
        import serial


        ser = serial.Serial(

            port='/dev/ttyUSB0',
            baudrate = 9600,
            parity=serial.PARITY_NONE,
            stopbits=serial.STOPBITS_ONE,
            bytesize=serial.EIGHTBITS,
            timeout=1
        )
        counter=0


        while 1:
            x=ser.readline()
            print x
```

If we run both files, serial_read.py will read what serial_write.py writes

(http://www.emmeshop.eu/blog/sites/files/im

age/u1/emmeshop-raspberry-serial-9.png)

This is just a small example but it can serve as a starting point to send a print to an old printer or read data from a router or a gps.

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http://www.emmeshop.eu (http://www.emmeshop.eu)

(http://www.emmeshop.eu/blog/sites/files/image/u1/emmeshop-raspberry-serial-8.jpg)

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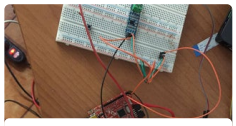

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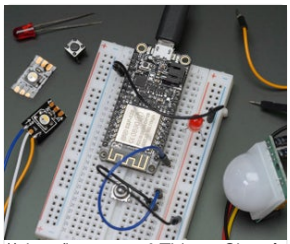

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(/member/bunglesmate/) bunglesmate (/member/bunglesmate/) Question 5 months ago on Introduction

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There appear to be bits missing? After the command sudo raspi-config is there supposed to be a picture explaining what to do in the config?

(/member/LucasT70/) LucasT70 (/member/LucasT70/) 2 years ago

Reply | Upvote

i work directly on a raspberry pi zero, and when i try to run the program and test the serial communication the time library is missing ans the program wont execute. Do you have any idea how to solve that?
thanks

1 reply


(/member/NielsB34/) NielsB34 (/member/NielsB34/) Question 9 months ago on Introduction

Answer | Upvote

Hi, is there a way to speed this up? i have a sensor hooked up that can spit out 10 hits per second, but for some reason i can't read more than 1 reading every 3.3 seconds.

(/member/GunjalA1/) GunjalA1 (/member/GunjalA1/) 1 year ago

Reply | Upvote

Hi , I am trying to interface fingerprint sensor R307 with raspberry pi. but I got error in serial communication as follow:
Exception : Unknown error 0x21
I don't understand why this come? please help me.

(/member/SilvanoN/) SilvanoN (/member/SilvanoN/) Tip 1 year ago

Reply | Upvote

There is an error, you can't "write" a data if you don't add .encode()
ser.write(str(10).encode())

 (/member/parovelb/) parovelb (/member/parovelb/) 2 years ago

Reply Upvote

Set it up communicating but the output is garbled. The language of the rpi2 is english, character enconde utf8, baud rate 9600, stop bits one, eight bits data. Any hints?

2 replies

 (/member/MirkoT8/) MirkoT8 (/member/MirkoT8/) Question 1 year ago on Introduction

Answer Upvote

So I run both programs at once, but serial_read.py does not give me the Write counter like it should. Any thoughts on why that is? Help would be appreciated. Also if its really simple, I'm a noob XD

1 answer

 (/member/AmitP103/) AmitP103 (/member/AmitP103/) Question 1 year ago

Answer Upvote

Hello. Firstly let me thank you for this great tutorial. I have followed the exact same procedure as given above. I have used an FTDI chip to connect between raspberry pi. On the sender side the port name id /dev/ttyAMA0 and on the receiving side it is ttyUSB0. However when i run the code of serial_write the code gets stuck at ser.write() line and on the receiving side only space and newline are getting printed. What does this mean? Why am I getting such error? Help plzzzz. Thanks in advance

 (/member/barotroma/) barotroma (/member/barotroma/) Question 1 year ago

Answer Upvote

hello guys i m trying to connect arduino and raspberry pi3 via HC-05 bluetooth communication .
i had done the pairing with pi. but when i am executing serial code to send data to pi its print ? on pi terminal. please help me out .
thanks

 (/member/russ_hensel/) russ_hensel (/member/russ_hensel/) 1 year ago

Reply Upvote

For a more advanced Python setup - for those of you who know the language, you might also enjoy:
https://www.instructables.com/id/Python-Terminal-for-Cheap-Pi-Arduino-Connection/
(https://www.instructables.com/id/Python-Terminal-for-Cheap-Pi-Arduino-Connection/)

 (/member/mtorquato/) mtorquato (/member/mtorquato/) 1 year ago

Reply Upvote

Thank you for your help.
I used serial communication for a industrial thermal printer.

 (/member/JurgenN1/) JurgenN1 (/member/JurgenN1/) 1 year ago

Reply Upvote

I am a noob sorry,
Where to make the files on raspberry pi 3 ?
Ok, now we create two files, one who writes something on the ttyAMA0 port and the other that reads on the ttyUSB0 port

 (/member/hcgrant/) hcgrant (/member/hcgrant/) 1 year ago

Reply Upvote

Many thanks for this ... Ive upgraded my Raspberry Pi and it must have set /dev/ttyAMA0 for console use .. Now its all working again! ;-)))

(/member/MandavaC/) MandavaC (/member/MandavaC/) 2 years ago

Reply Upvote

I'm using HC-05 Bluetooth module with RPi3 through UART to receive data from other bluetooth module.
What I have to replace ttyUSB0 in port='/dev/ttyUSB0' in order to read serial data.

(/member/zuyao1988/) zuyao1988 (/member/zuyao1988/) 2 years ago

Reply Upvote

I using the raspi 3. and the writing seems not working initially.
Base on this disccussion http://raspberrypi.stackexchange.com/questions/455... (http://raspberrypi.stackexchange.com/questions/45570/how-do-i-make-serial-work-on-the-raspberry-pi3/45571#45571)
change 'ttyAMA0' to 'ttyS0' in serial_write.py and it's
working fine!
***Thanks for sharing!

(/member/TheElectromania/) TheElectromania (/member/TheElectromania/) 2 years ago

Reply Upvote

nice work

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