


Hardware (/category/4/hardware)

/ Step-by-step procedure to connect the NRF24L01+ to the GPIO pins and use the Raspberry as a Serial Gateway (MySensors 1.x)  (/to...



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Note: This guide is only applicable to MySensors 1.x. For MySensors 2, use this guide (<https://www.mysensors.org/build/raspberry>).

I noticed that a step-by-step procedure to connect the NRF24L01 to the GPIO pins and use the Raspberry as a Serial Gateway was listed in the document (<https://docs.google.com/document/d/1NKq5uuNdnxF5jWnum7VT32mbKLjuvqlx2A5D1qQ-H3Q/edit#>) for MySensors 1.6.

Since I have three gateways configured this way, and I need to set up 3 more for covering different offices around the world, and I had already written the instructions in Swedish (<https://mikaelfalkvidd.com/elektronik/installera-mysensorsgateway-pa-raspberry-pi-2-med-domoticz/>) for Datormagazin, I thought I'd help out.

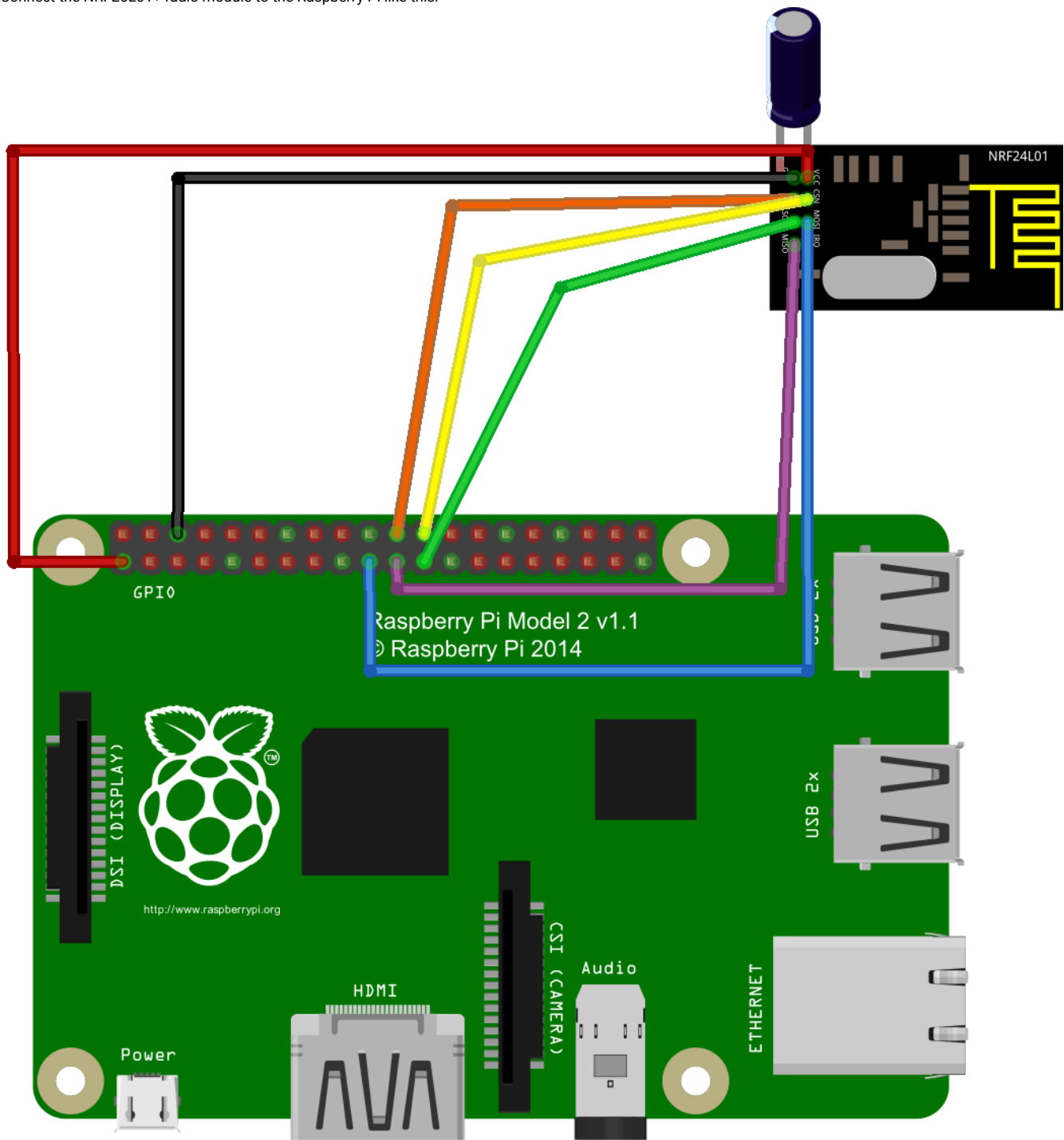
This is the first draft. Any feedback is welcome.

INTRODUCTION

The radio module NRF24L01+ is cheap and power efficient, but it is unable to communicate with regular wifi. The bridge between NRF24L01+ nodes and the "computer world" is called a Gateway. You can use other types of gateways (http://www.mysensors.org/build/select_gateway), but connecting the NRF24L01+ module directly to the Raspberry Pi is a simple and cheap alternative.

Wiring Things Up

Connect the NRF20L01+ radio module to the Raspberry Pi like this:



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(/uploads/files/1448223387663-raspi_mysensors-1.png)

Raspberry Pi	NRF24L01+	Color
6 / GND	GND	Black
1 / 3.3V DC	VCC	Red
22 / GPIO25	CE	Orange
24 / GPIO 8	CSN/CS	Yellow
23 / GPIO11 / SPI_CLK	SCK	Green
19 / GPIO10 / SPI_MOSI	MOSI	Blue

Raspberry Pi	NRF24L01+	Color
21 / GPIO9 / SPI_MISO	MISO	Violet

The IRQ pin on NRF24L01 is not currently used.

For a comprehensive view of the Raspberry Pi pins, see <http://pinout.xyz/> (<http://pinout.xyz/>)

You should also connect a decoupling capacitor to the radio. See this (http://www.mysensors.org/build/connect_radio#connecting-a-decoupling-capacitor) guide.

COMPILING THE GATEWAY

Login to your Raspberry Pi (using SSH or open a terminal on the graphical console) and run these commands:

```
git clone https://github.com/TMRh20/RF24.git
cd RF24
make all && sudo make install
cd ..

git clone https://github.com/mysensors/Raspberry.git
cd Raspberry
make all && sudo make install
```

If you get the following error:

```
pi@raspberrypi ~/RF24 $ make all && sudo make install
g++ -Wall -fPIC -Ofast -mfpu=vfp -mfloat-abi=hard -mtune=arm1176jzf-s -march=armv7-a -D BCM2835_
gcc -Wall -fPIC -Ofast -mfpu=vfp -mfloat-abi=hard -mtune=arm1176jzf-s -march=armv7-a -D BCM2835_
bcm2835.c: In function 'bcm2835_init':
bcm2835.c:1207:28: error: invalid suffix "x" on integer constant
```



You've probably run into the problem discussed in this (<http://forum.mysensors.org/topic/2305/nrf24l01-rpi2-direct-connection-problem>) thread. People have had luck with different solutions. The simplest is to make the following change to `~/Raspberry/librf24-bcm/Makefile`

```
#IOBASE := $(shell cat /proc/iomem | grep bcm2708_vcio | cut -f 1 -d "-")
IOBASE := 3F000000
```

VERIFY THE GATEWAY

Run `sudo /usr/local/sbin/PiGatewaySerial`. The output should look like this:

```
pi@raspberrypi ~/Raspberry $ sudo /usr/local/sbin/PiGatewaySerial
Starting PiGatewaySerial...
Protocol version - 1.4
Created PTY '/dev/pts/1'
Gateway tty: /dev/ttyMySensorsGateway
===== SPI Configuration =====
CSN Pin      = CE0 (PI Hardware Driven)
CE Pin       = Custom GPIO25
Clock Speed  = 8 Mhz
===== NRF Configuration =====
STATUS       = 0x0e RX_DR=0 TX_DS=0 MAX_RT=0 RX_P_NO=7 TX_FULL=0
RX_ADDR_P0-1 = 0xe7e7e7e7e7 0xc2c2c2c2c2
RX_ADDR_P2-5 = 0xff 0xc4 0xc5 0xc6
```

If the NRF24L01+ isn't correctly wired, the following error will be shown

```
pi@raspberrypi ~ $ sudo /usr/local/sbin/PiGatewaySerial
Starting PiGatewaySerial...
Protocol version - 1.4
Created PTY '/dev/pts/2'
Gateway tty: /dev/ttyMySensorsGateway
check wires
```

If this happens, double-check your wiring and correct any problems. Press Ctrl+Z and type

```
sudo killall PiGatewaySerial
```

to get rid of the non-functioning Gateway. Then run `sudo /usr/local/sbin/PiGatewaySerial` again

If all is well, exit `PiGatewaySerial` by pressing Ctrl+C. Then run

```
sudo /etc/init.d/PiGatewaySerial start
```

to start the gateway as a background process. Verify that it started correctly by running

```
sudo cat /dev/ttyMySensorsGateway
```

You should see the message "Gateway startup complete". Exit by typing Ctrl+C.

MAKE THE GATEWAY AUTOSTART

To make sure the Gateway is started when your Raspberry Pi boots up, run the following command:

```
sudo make enable-gwserial
```

Enable the gateway for use with Domoticz

Domoticz (and maybe other home automation systems) has trouble reading from the default path created by PiGatewaySerial. You might need to run the following command:

```
sudo ln -s /dev/ttyMySensorsGateway /dev/ttyUSB20
```

And change /etc/rc.local from this

```
exit 0
```

to this

```
ln -s /dev/ttyMySensorsGateway /dev/ttyUSB20
exit 0
```

OTHER NOTES

- The 3.3V power on the Raspberry Pi is rated for a maximum of 50mA. A regular NRF24L01+ only needs 15mA, but if you are using a power amplified version you might exceed what the Raspberry Pi can output. In that case, an external power supply might be required. If you use an external power source gnd must be connected to the Raspberry Pi's gnd.
- Connecting the NRF24L01+ directly to your Raspberry Pi will prevent you from using the Raspberry Pi's gpio ports for other things, like a Z-wave board.
- A user experienced slow data transfer compared to USB-to-Serial(ttl)<-->MySensors Gateway connection, especially on OTA firmware update. If you think this will cause a problem for you, an ethernet gateway might be a better alternative.

As always, I stand on the shoulders of giants. Related posts:

- <http://forum.mysensors.org/topic/1151/tutorial-raspberry-pi-nrf24l01-direct-connection> (<http://forum.mysensors.org/topic/1151/tutorial-raspberry-pi-nrf24l01-direct-connection>)
- <http://forum.mysensors.org/topic/1974/domoticz-as-controller-and-a-gateway-for-mysensor-nodes-running-on-a-raspberry-pi-2> (<http://forum.mysensors.org/topic/1974/domoticz-as-controller-and-a-gateway-for-mysensor-nodes-running-on-a-raspberry-pi-2>)

TROUBLESHOOTING

If you get this error

```
pi@Domoticz3:~/Raspberry$ sudo /etc/init.d/PiGatewaySerial start
[....] Starting PiGatewaySerial (via systemctl): PiGatewaySerial.serviceFailed to start PiGatewaySerial:
failed!
```

or this error

```
pi@raspberrypi ~ $ sudo /usr/local/sbin/PiGatewaySerial
sudo: /usr/local/sbin/PiGatewaySerial: command not found
```

you have probably forgotten to run `sudo make install`. Read the instructions again, and follow them this time 😊 User @sineverba (<https://forum.mysensors.org/uid/6275>) reported that a reboot of the Pi after running `make install` helped.

 4 Replies ▶

▲ 13 ⋮

GATEWAY 66 (/tags/gateway) RASPBERRY PI 20 (/tags/raspberry pi) RASPBERRY 20 (/tags/raspberry) NRF24 11 (/tags/nrf24) RASPBERRY NRF24L01 GPIO 4 (/tags/raspberry nrf24l01 gpio)