Book 2

Home Automation & Security Projects for Raspberry Pi

Tim Rustige

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Introduction

In our first Home Security Projects book for Raspberry Pi we showed you how to connect PIR motion sensors and magnetic door/window sensors to your Pi, and have your Pi email photos to your mobile phone when activity was detected.

In this second book we build on that by showing you how to connect a cheap wireless doorbell to the internet, and get photos of callers emailed to your phone. We also show you how to create your own home automation system, using inexpensive wireless mains sockets, light switches & relays, and control them from your tablet or mobile phone's web browser - you can also have the Pi turn the appliances on and off at pre-set times.

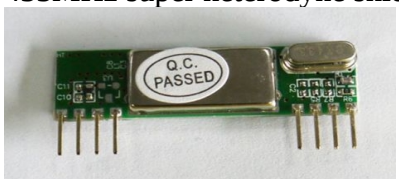
In later chapters we show you how to make a motorised cctv security camera that you can pan & tilt from a web browser on your phone, and also control from a graphical panel on your Pi's desktop.

If you've ever wondered how to stream CCTV audio from one Pi to another over a network or the internet, we also show you the best USB Audio capture and microphone hardware to use and the simplest way to stream it from the command line.

All our wireless projects use the licence-free 315MHz equipment in North America and 433.92MHz in the UK/Europe. The typical equipment that operates at these frequencies is very inexpensive.

Here are some examples of typical costs on eBay:

433MHz super heterodyne shielded wireless receiver module 30 metre range £4/$5



433MHz transmitter & receiver boards for Arduino/Raspberry Pi £2/$3

3 Pack of Status Remote Control Mains sockets 433MHz £15/$19

Remote control light switches 1,2 or 3 gang £12/$15

433MHz 12 volt relays – use to control 5 or 12 volt DC or 240/120V AC mains 10A £3/$4

433MHz Lloytron MIP wireless Doorbell push available in White or Black £5/$6

433MHz Lloytron MIP wireless PIR motion sensor £11/$14

433MHz Lloytron MIP wireless door sensor £6/$8

Using the standard 433MHz receiver and transmitter boards, it's possible to “talk & listen” to a wide range of equipment using any model of Raspberry Pi – you're not locked into a single manufacturer, like you would be if you'd bought Energenie power sockets and installed their wireless GPIO hat.

The scripts in subsequent chapters show you how to receive codes and timing values from your 433MHz or 315MHz wireless devices, and then be able to replay those codes from simple Python scripts running on your Pi.

```
pi@raspberrypi3:~/PIGPIO $ python replay2.py
code=9775839 bits=24 (gap=9580 t0=299 t1=885)
replay received code y/n OR c to change the code OR input r for Range: c
enter new code to send: 9775838
exiting back to receiver mode
code=9775839 bits=24 (gap=9615 t0=303 t1=881)
replay received code y/n OR c to change the code OR input r for Range:
exiting back to receiver mode
code=9775839 bits=24 (gap=9595 t0=301 t1=883)
replay received code y/n OR c to change the code OR input r for Range:
exiting back to receiver mode

code=9775838 bits=24 (gap=9580 t0=301 t1=883)
replay received code y/n OR c to change the code OR input r for Range: e
code=9775838 bits=24 (gap=9595 t0=300 t1=883)
replay received code y/n OR c to change the code OR input r for Range:
exiting back to receiver mode
code=9775838 bits=24 (gap=9630 t0=302 t1=881)
replay received code y/n OR c to change the code OR input r for Range:
exiting back to receiver mode
```

We show you how to transmit codes to turn mains sockets, relays & light switches on and off at certain times of day. We also show you how to create a web browser interface that lets you control mains sockets, relays and light switches from your phone or tablet over WiFi or the internet.

Say goodbye to manually trying to reverse-engineer 433MHz and 315MHz OOK AM signals using Audacity, Baudline, GNUradio, Inspectrum etc.

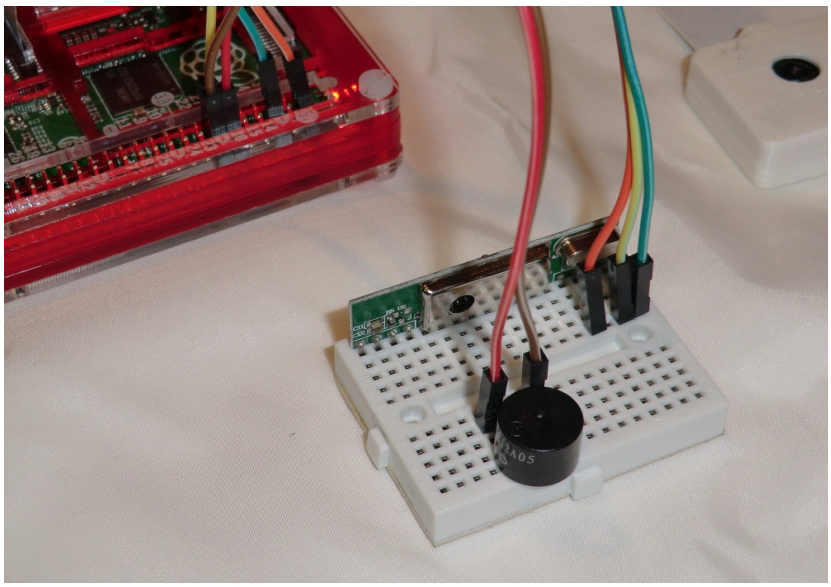
Connect a Wireless Doorbell to your Pi.

Wireless doorbell & PIR receiver project.

This project will allow your Raspberry Pi to listen out for the 433MHz radio signal transmitted by a variety of Lloytron MIP wireless doorbells, PIR sensors & Magnetic door sensors. It will also detect signals from Driveway Patrol & Digiteck driveway alarms.

The Pi can differentiate between the unique codes from each device & send you an email stating which has been triggered. If you have a Raspberry Pi camera or USB webcam pointing at the doorway, you can get a photo of the visitor emailed to your mobile phone.

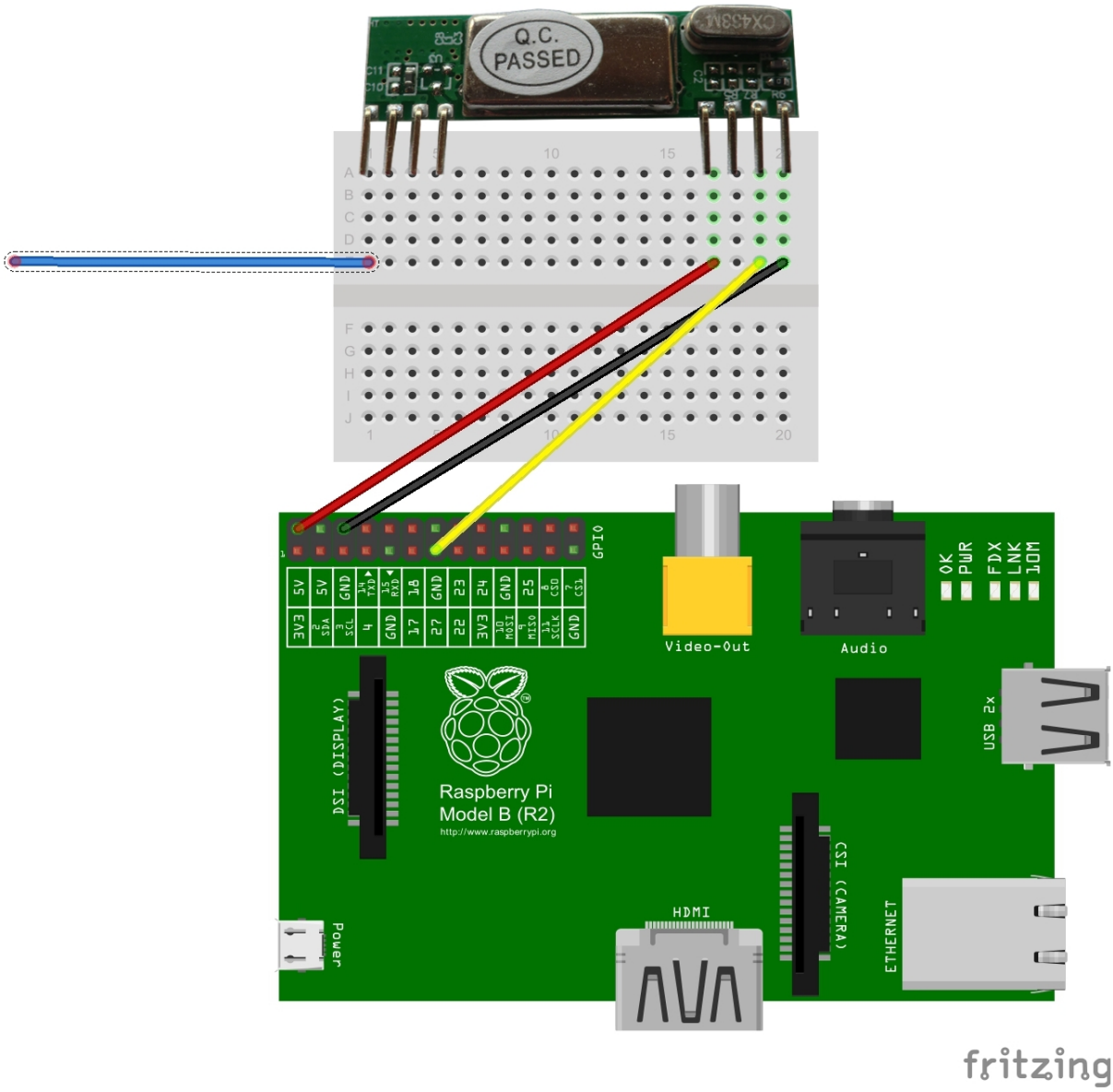
You'll need: 433MHz receiver board , mini breadboard, three IDC connection wires (all pictured), 5 volt buzzer & 2 connection wires.



Connecting to an older Raspberry Pi model A or B

The blue wire in the picture is an optional antenna wire, which should be 17.3cm long & can be coiled around a biro so it takes up less space. We didn't need to use an external antenna wire in any of our tests.

The colour of the wires isn't important, just make sure connect the correct points together.

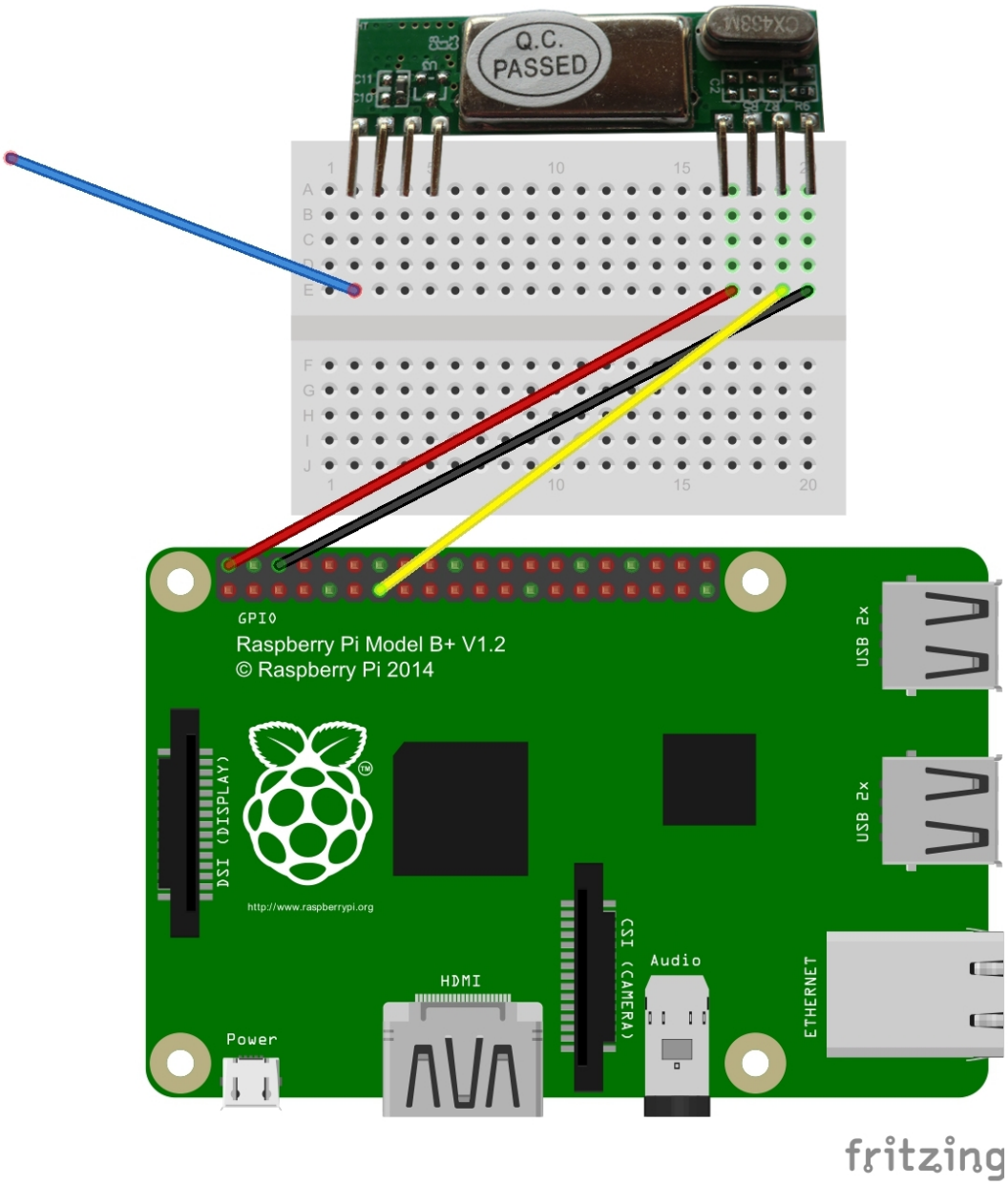


Connecting to a Raspberry Pi B+, A+, Pi Zero, Pi 2 or Pi 3.

The blue wire in the picture is an optional antenna wire, which should be 17.3cm long & can be coiled around a biro so it takes up less space. We didn't need to use the external antenna wire in any of our tests.

You can use different coloured wires, just make sure you connect the correct points together.

The red wire connects to 5 volt + on the Pi, the black wire connects to GND & the yellow wire connects to GPIO 27 (which in WiringPi-speak is confusingly referred to as GPIO 2)



Install WiringPi library

Before we go any further we need to install WiringPi, a set of utilities that make talking to the GPIO pins easy. Enter these commands at the $ terminal prompt:

```
sudo apt-get update
sudo apt-get upgrade
sudo apt-get install git-core
git clone git://git.drogon.net/wiringPi
```

```
cd wiringPi
git pull origin
```

```
./build
gpio -v
gpio readall
cd ..
```

You'll now see a list of all the GPIO assignments for Wiring Pi. I've highlighted our GPIO pin 27.