adafruit learning system

USB Audio Cards with a Raspberry Pi

Created by lady ada

Last updated on 2016-05-23 04:09:29 PM EDT

Guide Contents

Instructions

The Raspberry Pi has an on-board audio jack, which is super handy for all kinds of sound effects and speech, just plug and go! However, for when you want better audio for music playback, a USB audio card can greatly improve the sound quality and volume, this tutorial will show you how...

> This tutorial is only for getting the audio output jack working. We don't have a tutorial for the microphone input (yet!)

Pre-requisites

First up, you will need a fully set up Raspberry Pi that is otherwise working and you can log into. We have tons of tutorials on that front (http://adafru.it/ckb), so get your SD card loaded with Raspbian (http://adafru.it/aWq) (that's what we're using in this tutorial), and either (http://adafru.it/aUB)**ssh (http://adafru.it/aUB)** in, log in with a monitor and keyboard, or a USB console cable (http://adafru.it/aUA)

Just a reminder, this tutorial is only known good for the USB audio card in the Adafruit shop. Audio cards all use different chipsets so if you have another card, it may not work here! You'll have to figure out what's different for your model.

Figure out your chipset

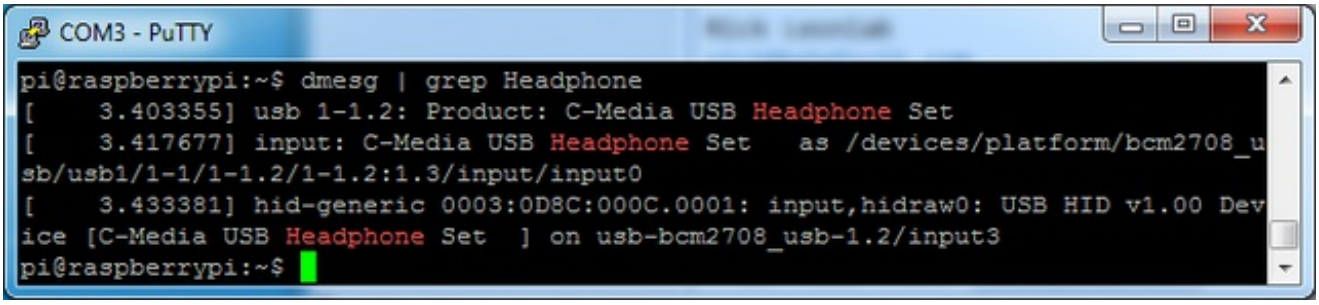
Figure out your chipset

Start by having your Raspi **turned off/shutdown** (perform a clean shutdown!) and then plugging in your USB audio card. Then boot the Pi as normal.

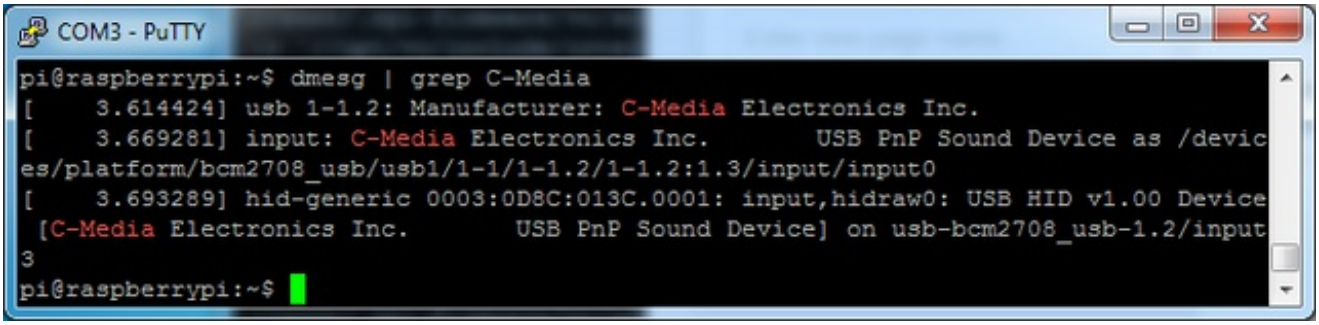
Once you log in, type **dmesg | grep cm109** to look at the boot messages. You should either see some lines about **cm109** if you have a **CM109** chipset
(http://adafru.it/dgh)

(http://adafru.it/kD1)

or if nothing comes up, try **dmesg | grep Headphone** you will see **the C-Media USB Headphone Set** driver. This means its a **CM-headphone**



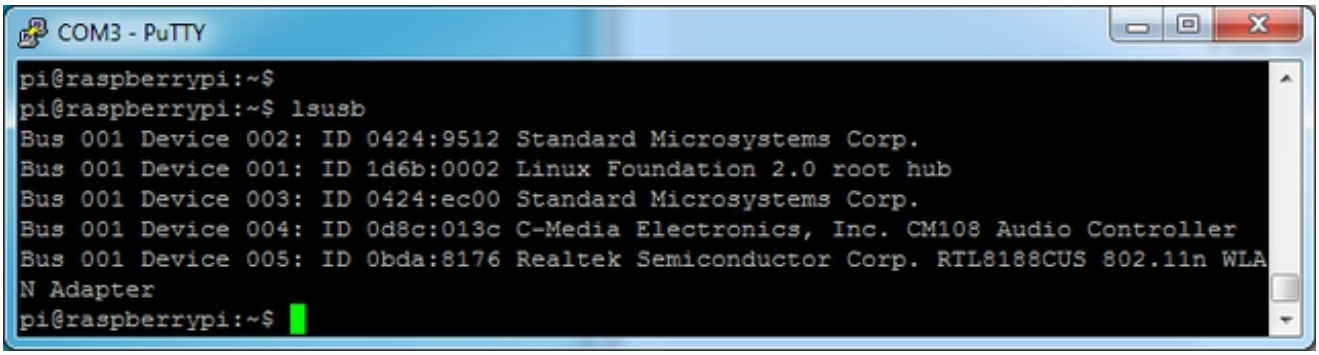
or if nothing comes up, try **dmesg | grep C-Media** you will see some C-Media notes but no mention of the cm109 driver. This means its a **CM108**



CM108 Type

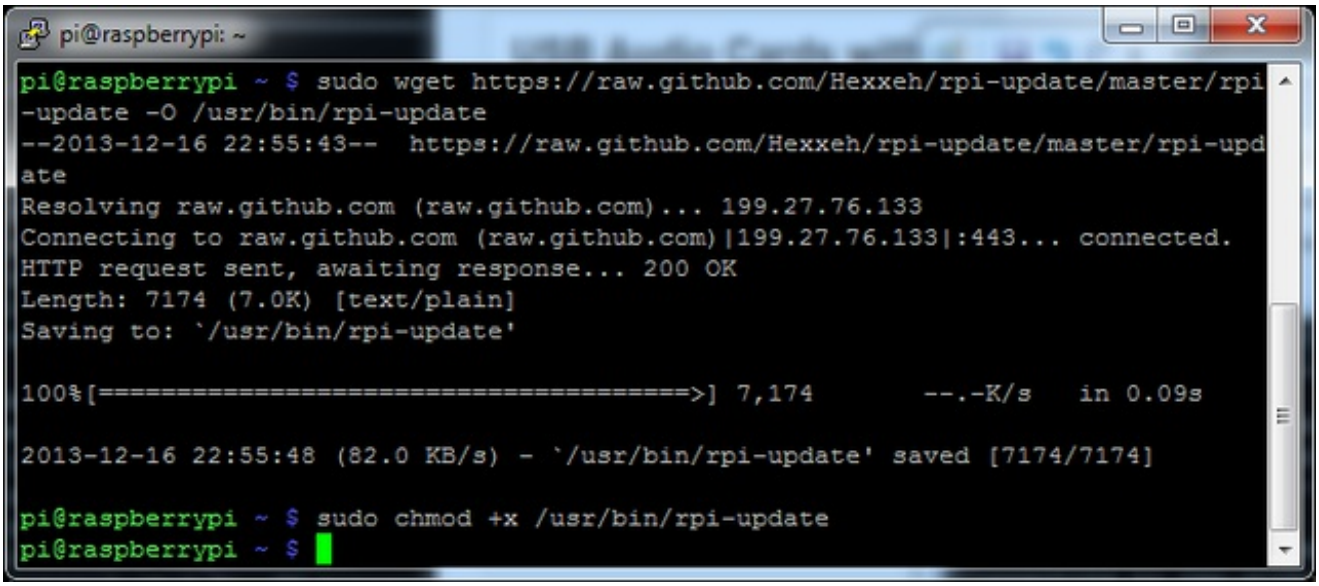
If you have CM108

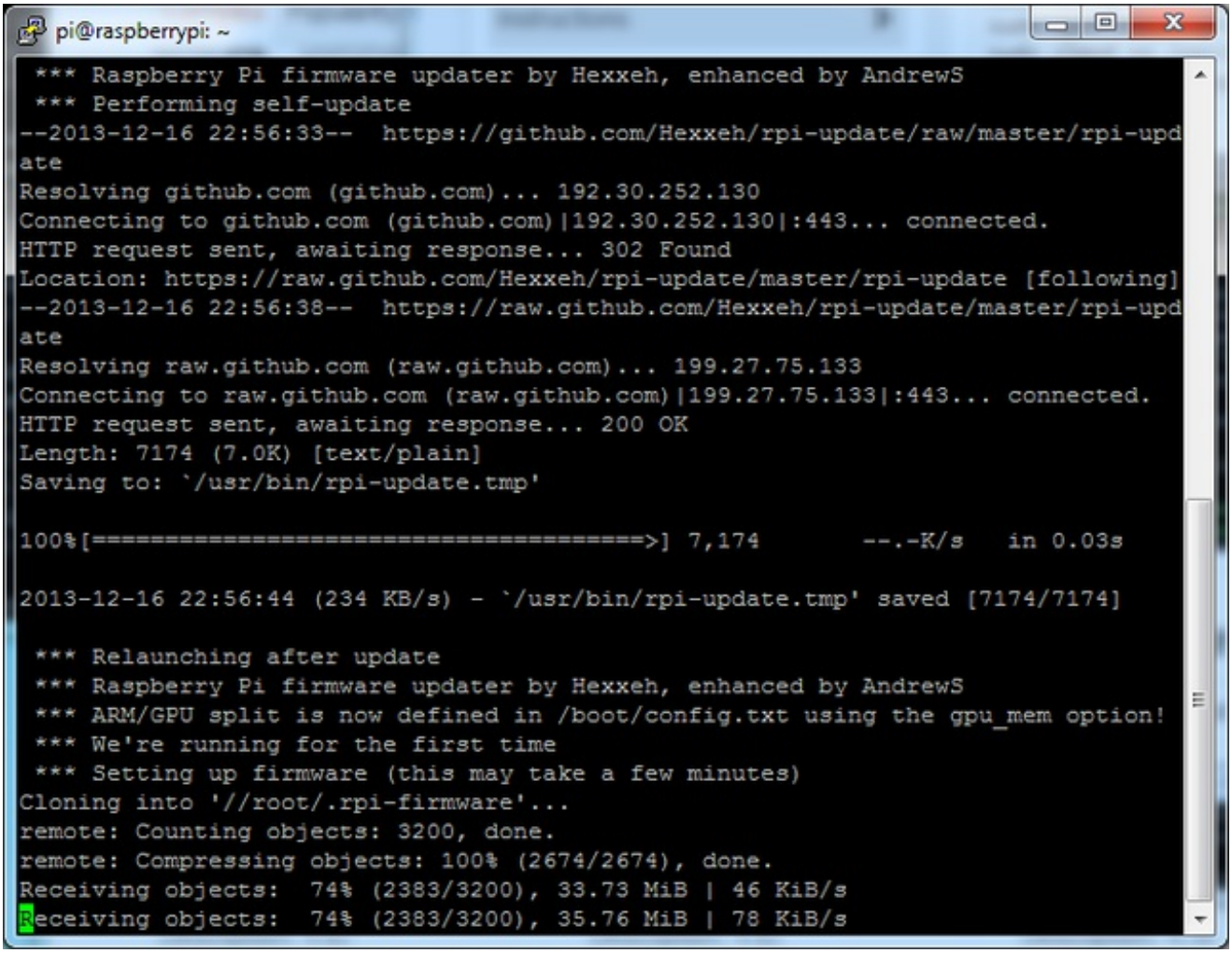
If you type in **lsusb** you should see a reference to **C-Media Electronics, Inc. CM108 Audio Adapter**

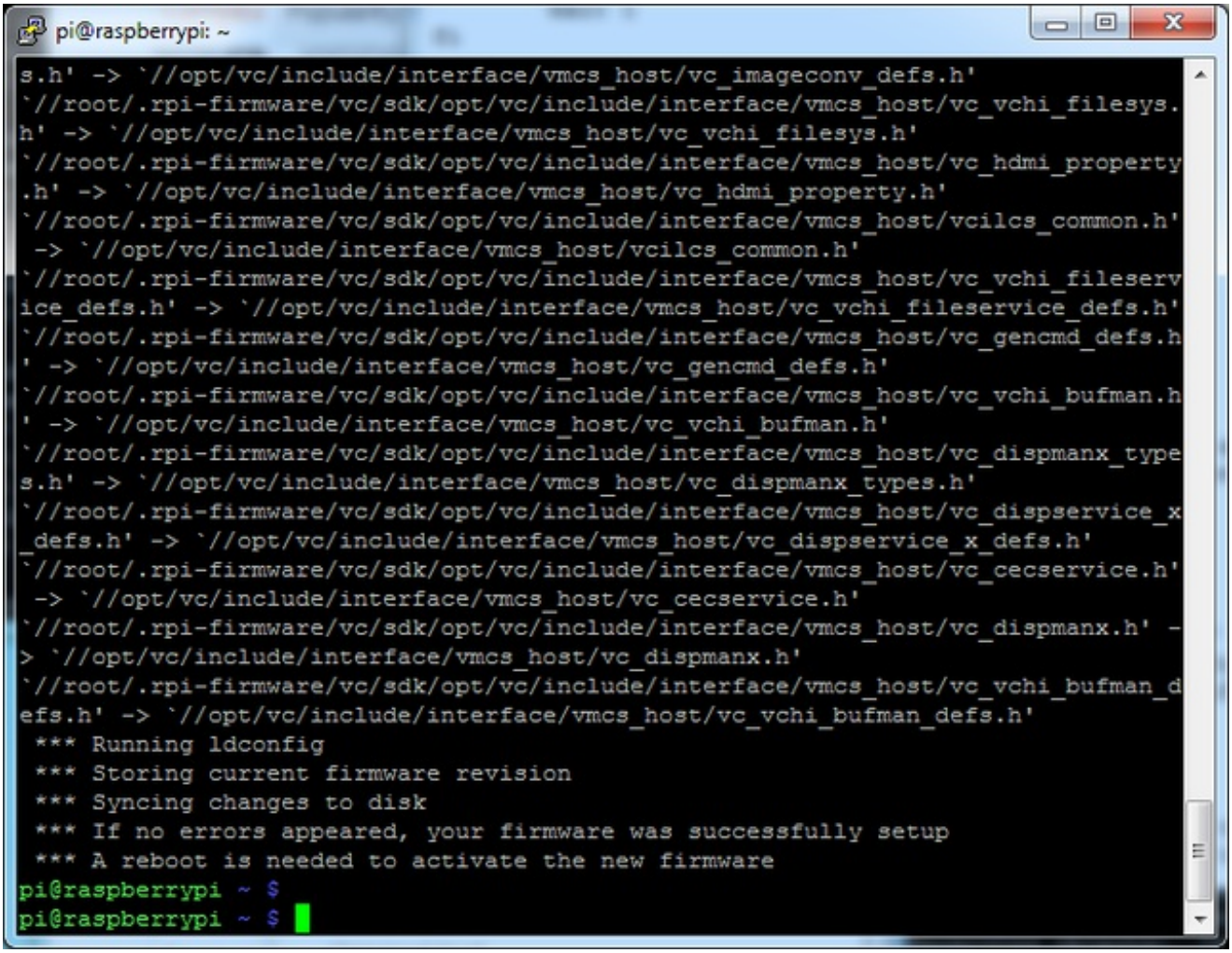


We'll need to update the firmware, this requires Internet access but only takes 15 minutes or so. You might want to run **sudo apt-get update** first if you haven't lately. Then run the following commands in order:

```
sudo apt-get install git-core
sudo wget https://raw.github.com/Hexxeh/rpi-update/master/rpi-update -O /usr/bin/rpi-update
sudo chmod +x /usr/bin/rpi-update
sudo BRANCH=next rpi-update
sudo reboot
```



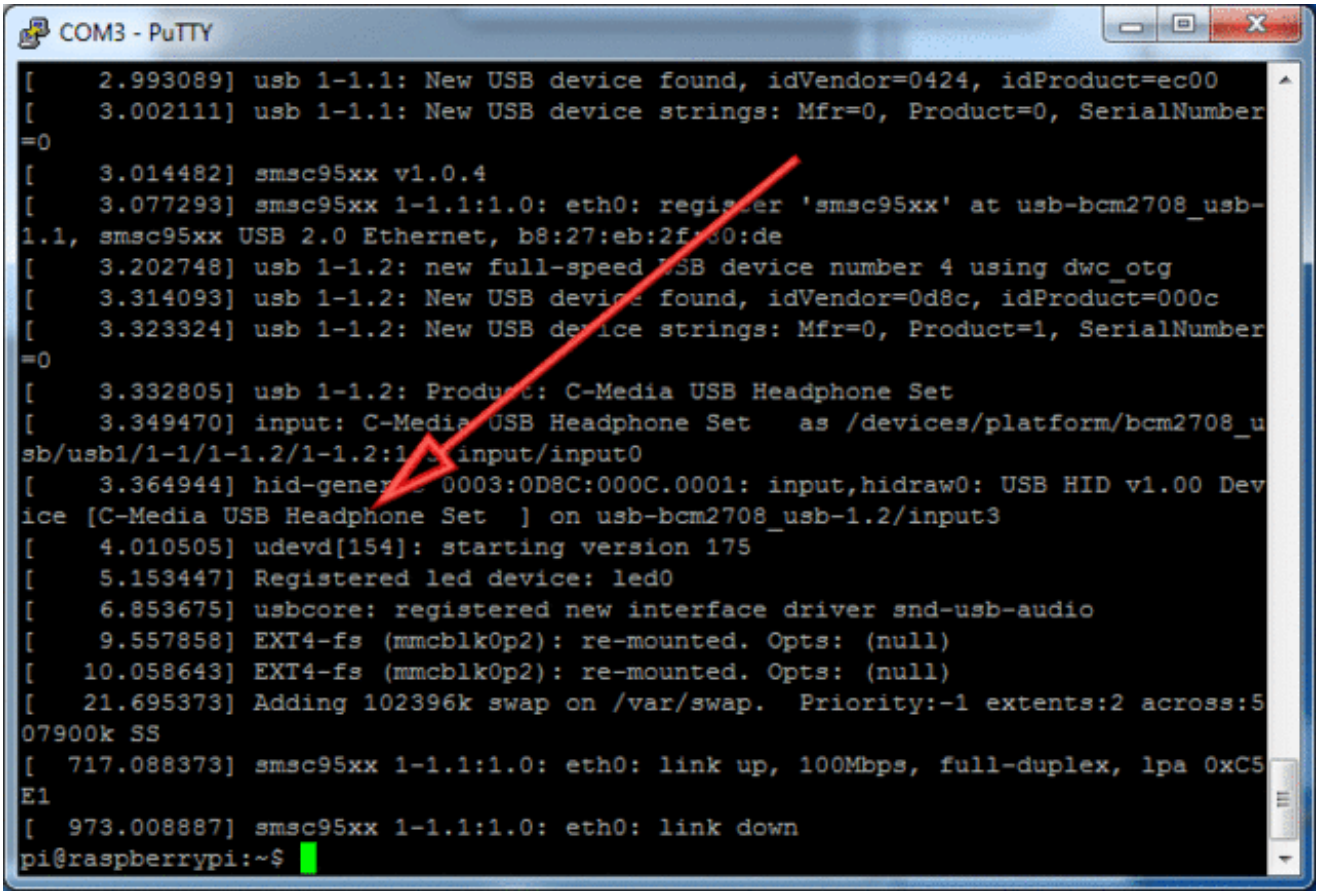

pi@raspberrypi: ~
*** Raspberry Pi firmware updater by Hexxeh, enhanced by AndrewS
*** Performing self-update
--2013-12-16 22:56:33-- https://github.com/Hexxeh/rpi-update/raw/master/rpi-update
Resolving github.com (github.com)... 192.30.252.130
Connecting to github.com (github.com)|192.30.252.130|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://raw.github.com/Hexxeh/rpi-update/master/rpi-update [following]
--2013-12-16 22:56:38-- https://raw.github.com/Hexxeh/rpi-update/master/rpi-update
Resolving raw.github.com (raw.github.com)... 199.27.75.133
Connecting to raw.github.com (raw.github.com)|199.27.75.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 7174 (7.0K) [text/plain]
Saving to: `/usr/bin/rpi-update.tmp'
100%[======================================>] 7,174 --.-K/s in 0.03s
2013-12-16 22:56:44 (234 KB/s) - `/usr/bin/rpi-update.tmp' saved [7174/7174]
*** Relaunching after update
*** Raspberry Pi firmware updater by Hexxeh, enhanced by AndrewS
*** ARM/GPU split is now defined in /boot/config.txt using the gpu_mem option!
*** We're running for the first time
*** Setting up firmware (this may take a few minutes)
Cloning into '//root/.rpi-firmware'...
remote: Counting objects: 3200, done.
remote: Compressing objects: 100% (2674/2674), done.
Receiving objects: 74% (2383/3200), 33.73 MiB | 46 KiB/s
Receiving objects: 74% (2383/3200), 35.76 MiB | 78 KiB/s



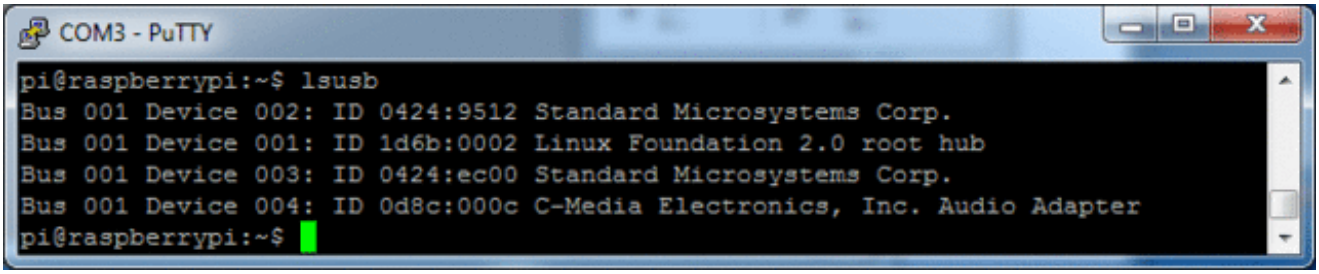
Now you can go down to the **update alsa module options** section

CM-Headphone Type

Type **dmesg** to look at the boot messages. You should see a bunch of lines that talk about **C-Media USB Headphone Set**



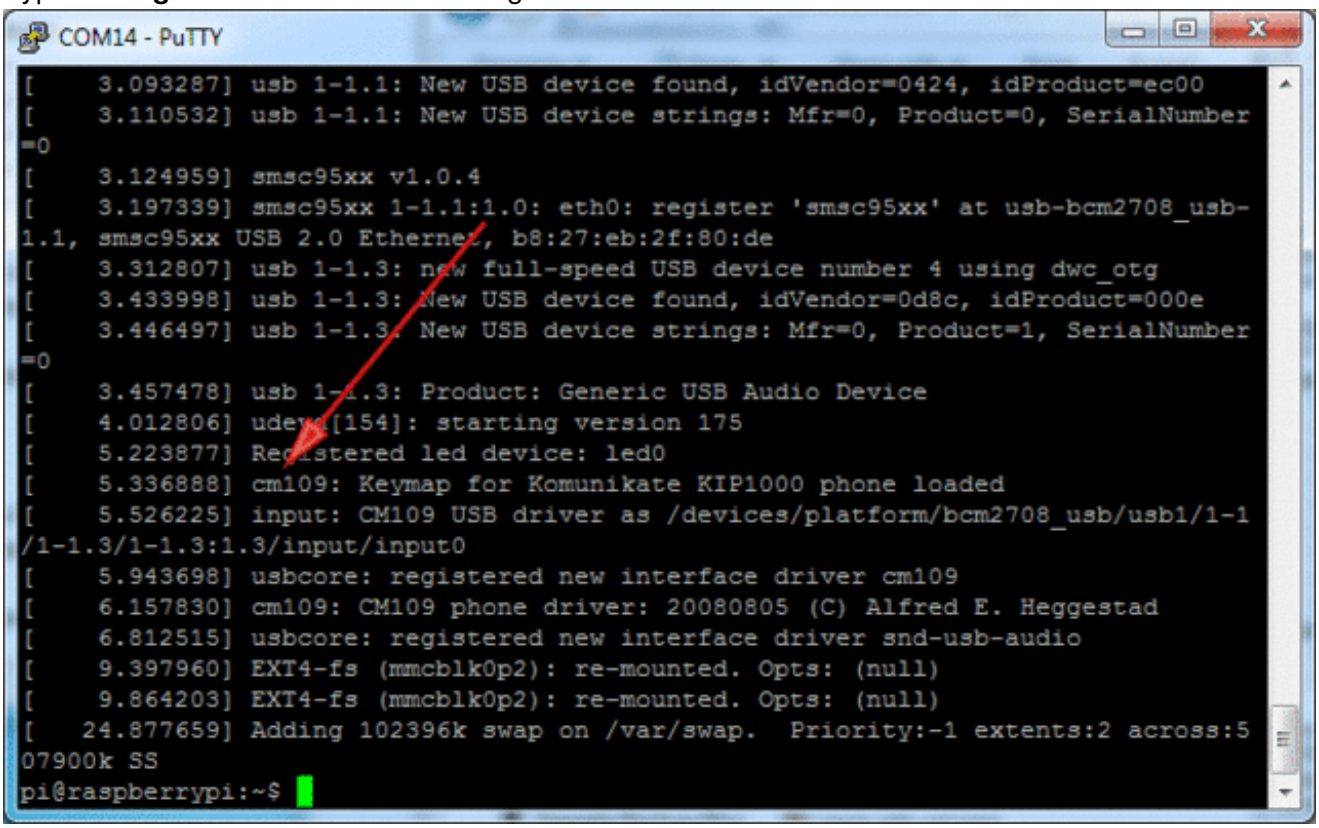
And if you type in **lsusb** you should see a reference to **C-Media Electronics Audio Adapter** but no mention of **CM108** and the VID/PID is 0x0d8c:0x00c



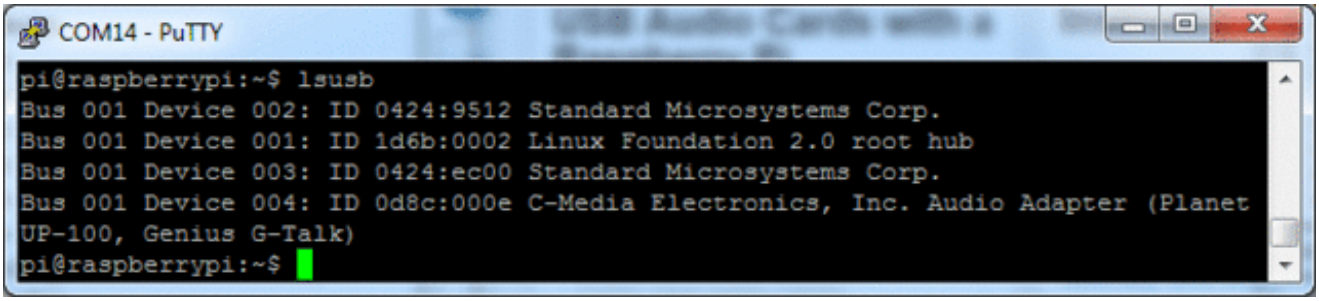
Nothing special needs to be done! Hurray! Continue on to the **Updating ALSA Config section**

CM109 Type

Type **dmesg** to look at the boot messages. You should see a bunch of lines that talk about **cm109**



And if you type in **lsusb** you should see a reference to **C-Media Electronics Audio Adapter** but no mention of **CM108**



(http://adafru.it/dgj)

Nothing special needs to be done! Hurray! Continue on to the next section

Updating ALSA Config

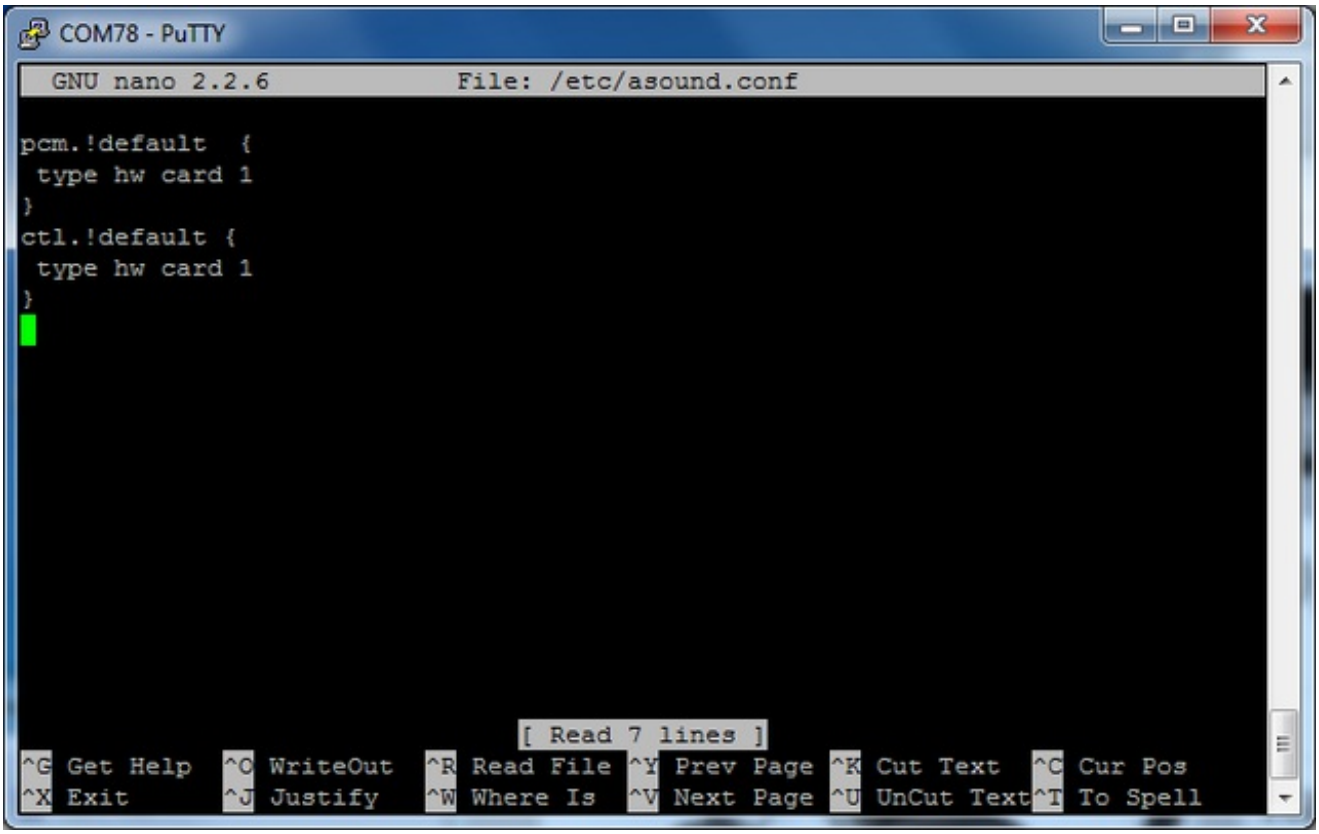
Raspbian Jessie - Updating alsa options

All we have to do is tell Raspbian to look at "card #1" for the default audio. Card #0 is the built in audio, so this is fairly straightforward.

run **sudo nano /etc/asound.conf** and put the following in the file and save

```
pcm.!default {
 type hw card 1
}
ctl.!default {
 type hw card 1
}
```

This will make the default PCM (audio) output card #1 and the default control also card #1



Raspbian Wheezy - Updating alsa

options

We'll edit the audio system configuration file with

```
sudo nano /etc/modprobe.d/alsa-base.conf
```

For all but the most recent Raspbian Wheezy releases, look for the line that reads:

```
#options snd-usb-audio index=0
```

Change this to:

```
options snd-usb-audio index=0
```

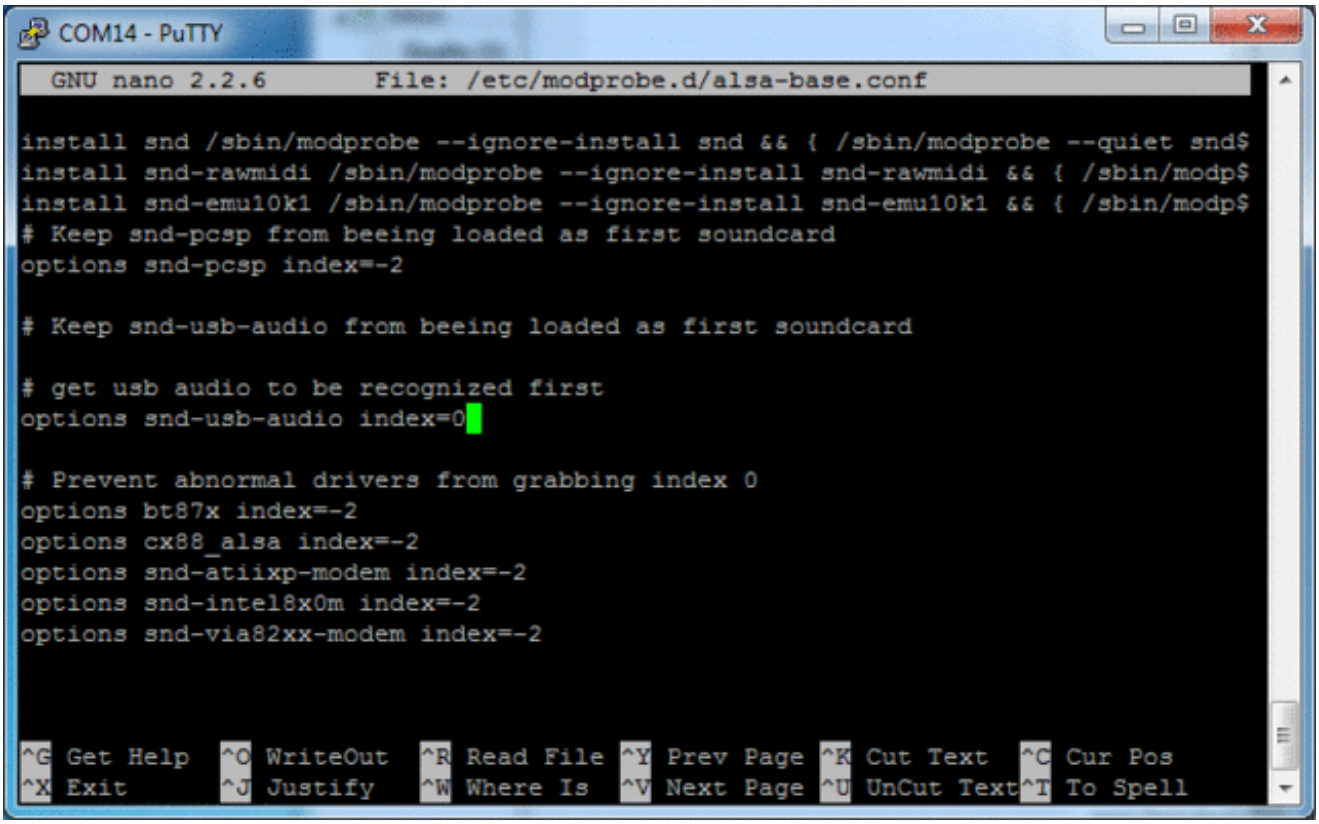
Note we removed the # at the start of the line.

For the latest Raspbian Wheezy versions, look for this line instead:

```
options snd-usb-audio index=-2
```

There's no # to remove in this case, just change the index from -2 to 0:

```
options snd-usb-audio index=0
```



That's it! Now reboot with **sudo reboot** and log in again, you can test with **speaker-test** by running

```
speaker-test -c2
```

Which will play white noise through the left and right 'speakers' on the audio card. Once you've got something coming out, try to play an audio file with **speaker-test** (for WAV files, not MP3)

```
speaker-test -c2 --test=wav -w /usr/share/sounds/alsa/Front_Center.wav
```

If you want to play a stream of music, you can try

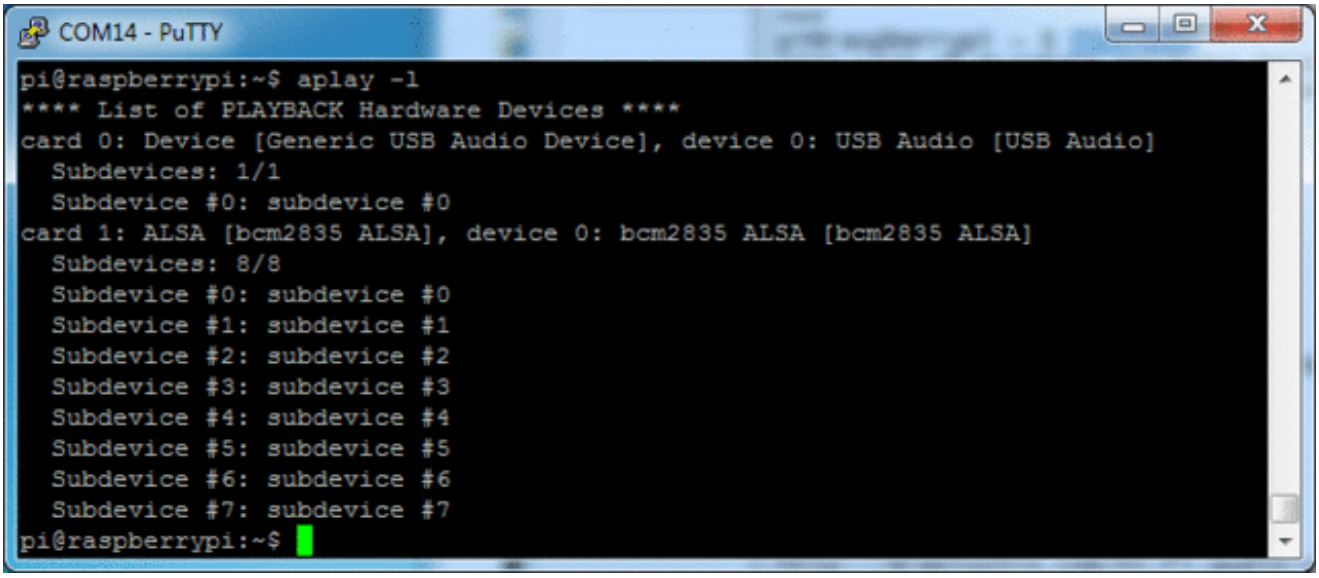
```
sudo apt-get install mpg123
mpg123 http://ice1.somafm.com/u80s-128-mp3 (http://adafru.it/d26)
```

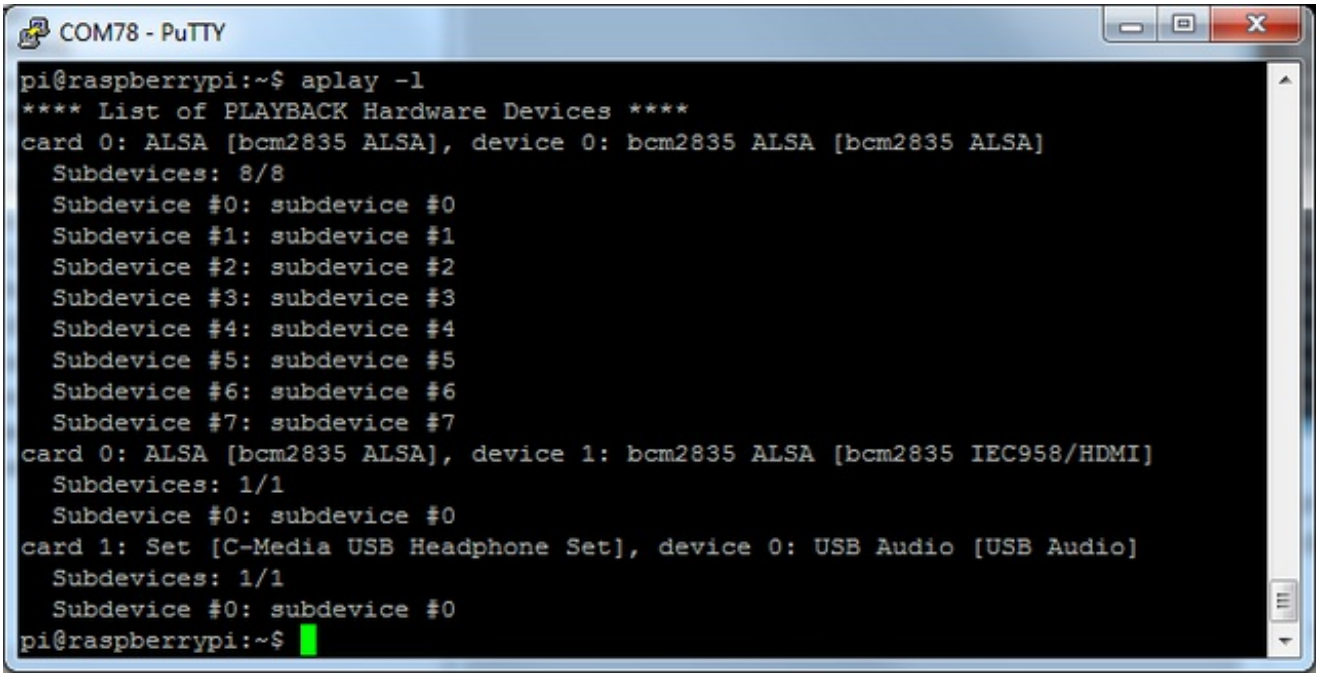
If you want to play MP3's on command, check out this tutorial which covers how to set that up (http://adafru.it/aTD)

Headphone vs Audio card

Don't forget, you still have the built in headphone jack on the Pi, if you edited alsa confit might be called **card 1** now (not the default **card 0**)

You can run **aplay -l** to **l**ist the devices





If you want to **aplay** through a specific card, specify **card 1** with **-D hw:1,0** or card 0 **-D hw:0,0** etc

```
speaker-test -c2 -D hw:1,0
```

Troubleshooting!

If you're using a Raspberry Pi and notice the output isnt totally clean, some USB Audio adapters don't like USB-1.2 and produce crackling in the output. You can work around the problem by adding `dwc_otg.speed=1` to **/boot/cmdline.txt** and setting the USB ports to USB-1.1 mode.