Configuring I2C

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I2C is a very commonly used standard designed to allow one chip to talk to another. So, since the Raspberry Pi can talk I2C we can connect it to a variety of I2C capable chips and modules.

Here are some of the Adafruit projects that make use of I2C devices and modules:

- http://learn.adafruit.com/mcp230xx-gpio-expander-on-the-raspberry-pi
- http://learn.adafruit.com/adafruit-16x2-character-lcd-plus-keypad-for-raspberry-pi
- http://learn.adafruit.com/adding-a-real-time-clock-to-raspberry-pi
- http://learn.adafruit.com/matrix-7-segment-led-backpack-with-the-raspberry-pi
- http://learn.adafruit.com/mcp4725-12-bit-dac-with-raspberry-pi
- http://learn.adafruit.com/adafruit-16-channel-servo-driver-with-raspberry-pi
- http://learn.adafruit.com/using-the-bmp085-with-raspberry-pi

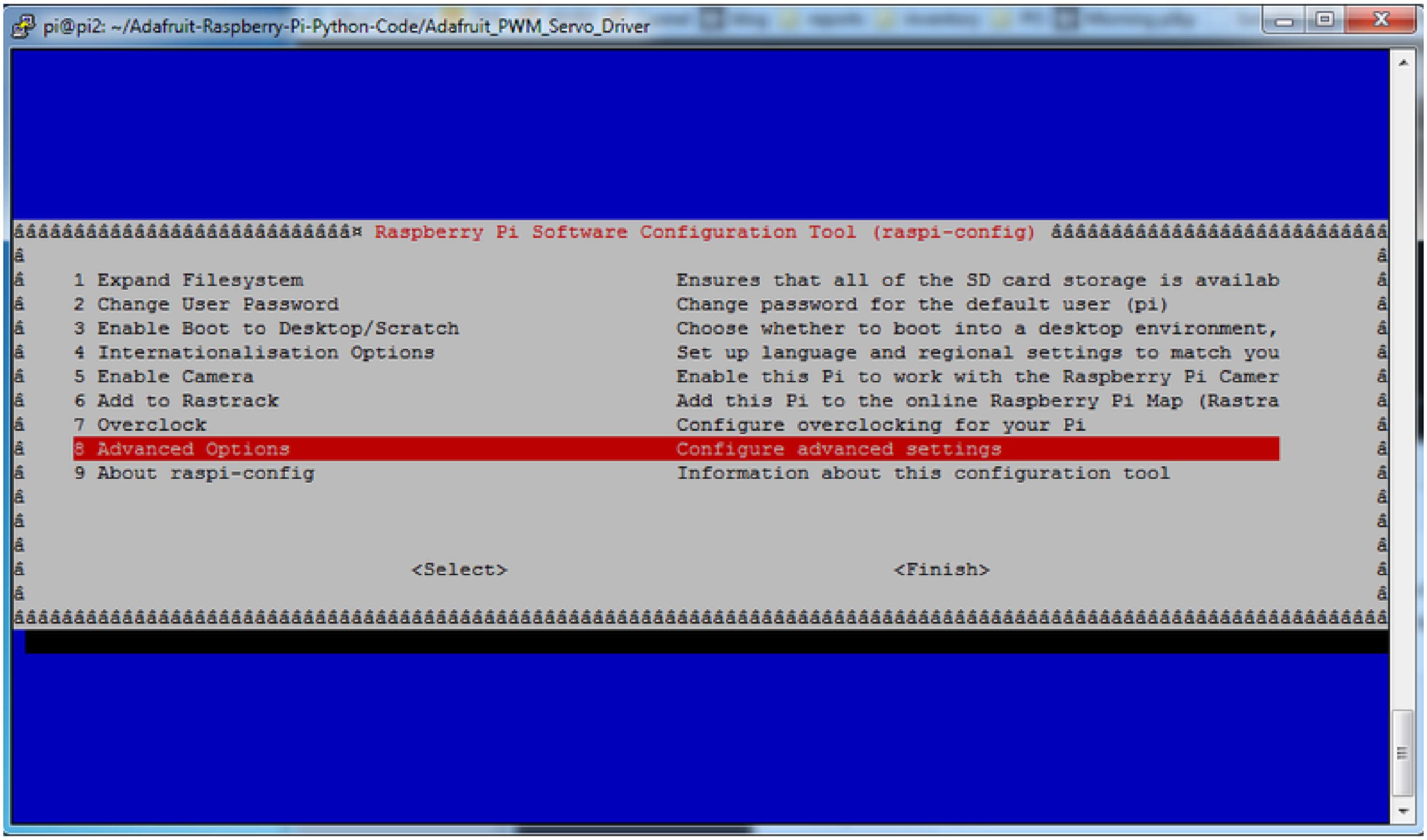
The I2C bus allows multiple devices to be connected to your Raspberry Pi, each with a unique address, that can often be set by changing jumper settings on the module. It is very useful to be able to see which devices are connected to your Pi as a way of making sure everything is working.

To do this, it is worth running the following commands in the Terminal to install the i2c-tools utility.

```
sudo apt-get install python-smbus
sudo apt-get install i2c-tools
```

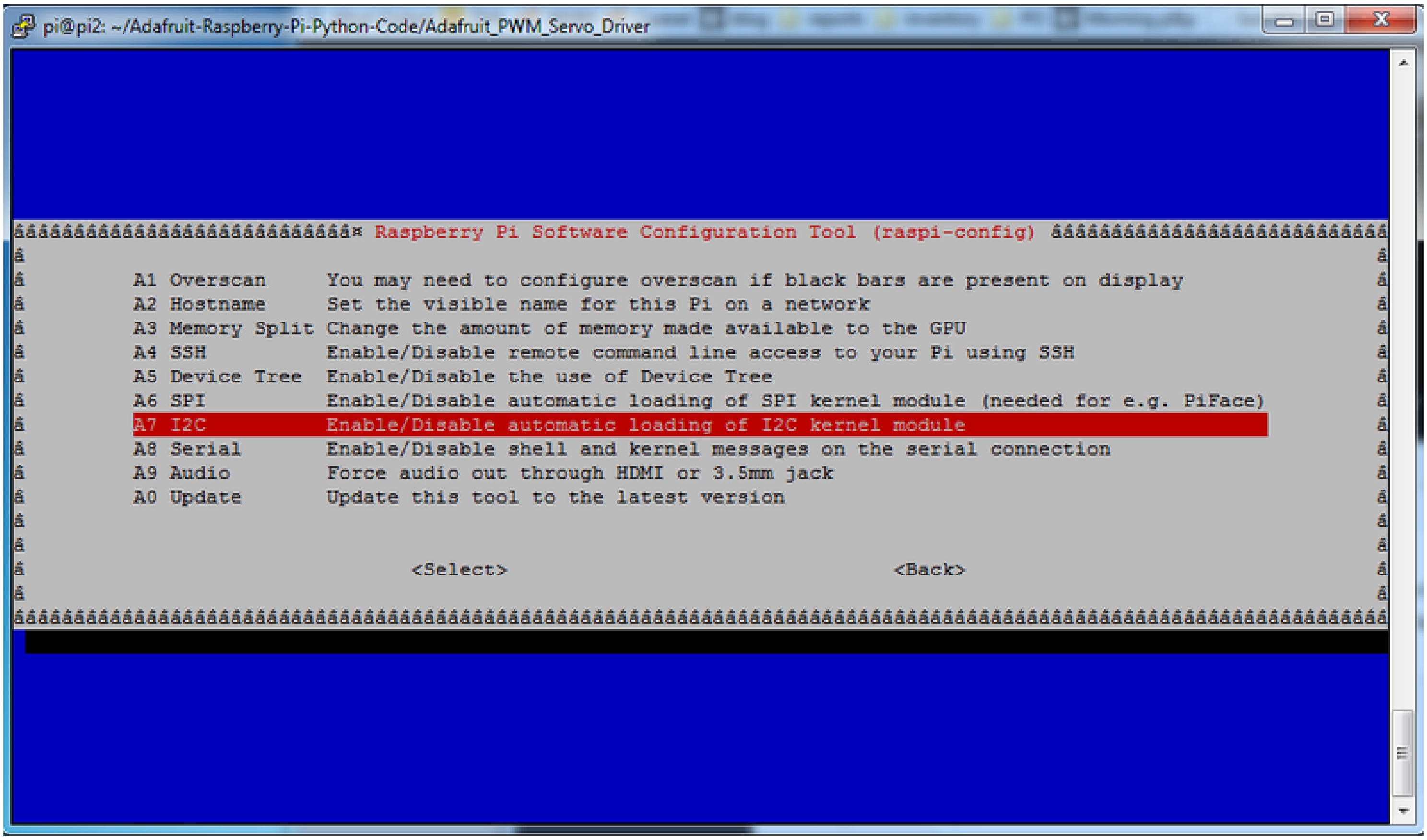
Installing Kernel Support (with Raspi-Config)

Run **sudo raspi-config** and follow the prompts to install i2c support for the ARM core and linux kernel



```
pi@pi2: ~/Adafruit-Raspberry-Pi-Python-Code/Adafruit_PWM_Servo_Driver

âââââââââââââââââââââââââââââ¤ Raspberry Pi Software Configuration Tool (raspi-config) âââââââââââââââââââââââââââââ
â                                                                                                                  â
â    1 Expand Filesystem                              Ensures that all of the SD card storage is availab          â
â    2 Change User Password                           Change password for the default user (pi)                   â
â    3 Enable Boot to Desktop/Scratch                 Choose whether to boot into a desktop environment,          â
â    4 Internationalisation Options                   Set up language and regional settings to match you          â
â    5 Enable Camera                                  Enable this Pi to work with the Raspberry Pi Camer          â
â    6 Add to Rastrack                                Add this Pi to the online Raspberry Pi Map (Rastra          â
â    7 Overclock                                      Configure overclocking for your Pi                          â
â    8 Advanced Options                               Configure advanced settings                                 â
â    9 About raspi-config                             Information about this configuration tool                   â
â                                                                                                                  â
â                                                                                                                  â
â                                                                                                                  â
â                             <Select>                                <Finish>                                     â
â                                                                                                                  â
ââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââ
```



```
pi@pi2: ~/Adafruit-Raspberry-Pi-Python-Code/Adafruit_PWM_Servo_Driver

âââââââââââââââââââââââââââââ¤ Raspberry Pi Software Configuration Tool (raspi-config) âââââââââââââââââââââââââââââ
â                                                                                                                  â
â         A1 Overscan     You may need to configure overscan if black bars are present on display                 â
â         A2 Hostname     Set the visible name for this Pi on a network                                            â
â         A3 Memory Split Change the amount of memory made available to the GPU                                    â
â         A4 SSH          Enable/Disable remote command line access to your Pi using SSH                           â
â         A5 Device Tree  Enable/Disable the use of Device Tree                                                    â
â         A6 SPI          Enable/Disable automatic loading of SPI kernel module (needed for e.g. PiFace)           â
â         A7 I2C          Enable/Disable automatic loading of I2C kernel module                                    â
â         A8 Serial       Enable/Disable shell and kernel messages on the serial connection                        â
â         A9 Audio        Force audio out through HDMI or 3.5mm jack                                               â
â         A0 Update       Update this tool to the latest version                                                   â
â                                                                                                                  â
â                                                                                                                  â
â                             <Select>                                <Back>                                       â
â                                                                                                                  â
ââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââ
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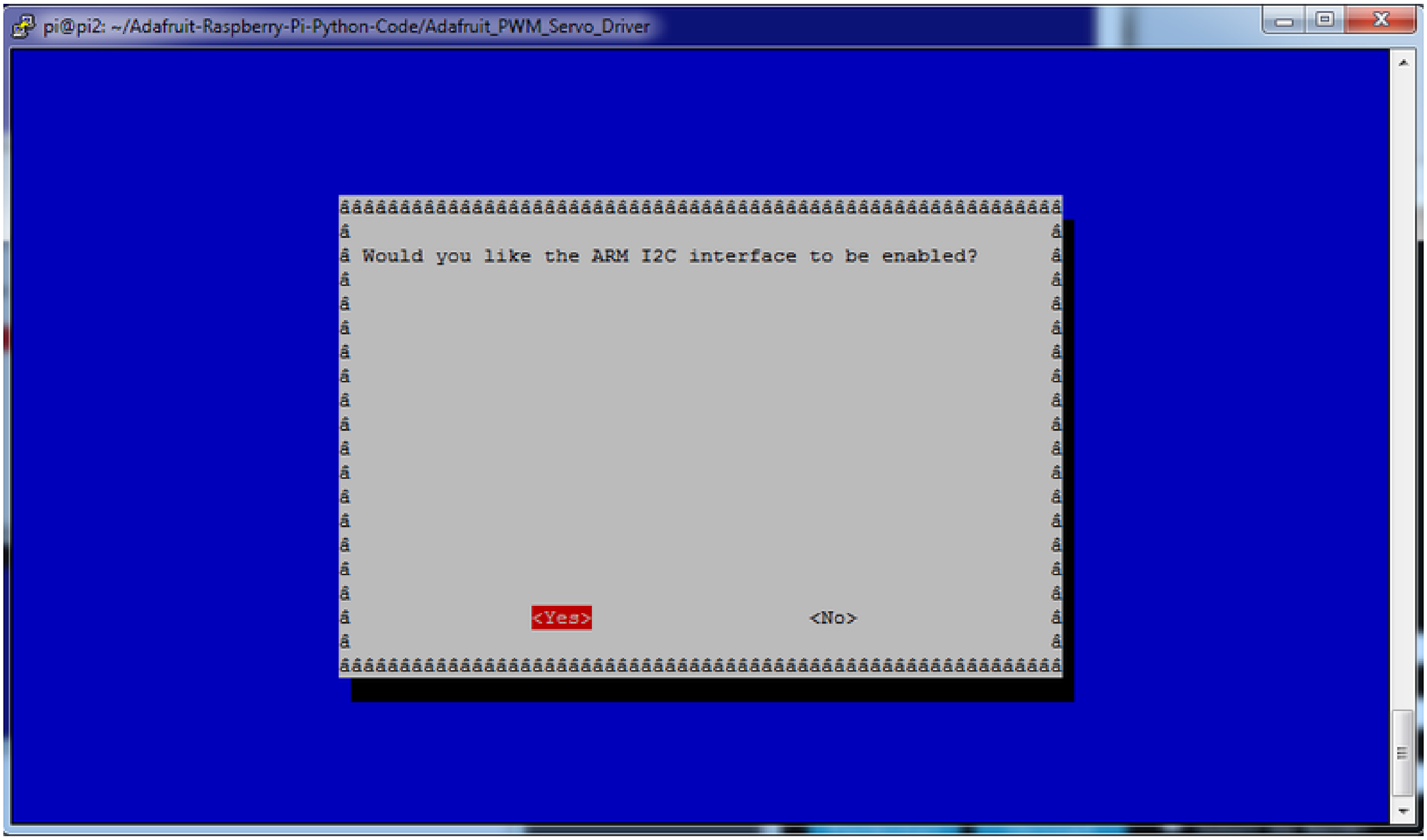

pi@pi2: ~/Adafruit-Raspberry-Pi-Python-Code/Adafruit_PWM_Servo_Driver

```
ââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââ
â                                                          â
â Would you like the ARM I2C interface to be enabled?      â
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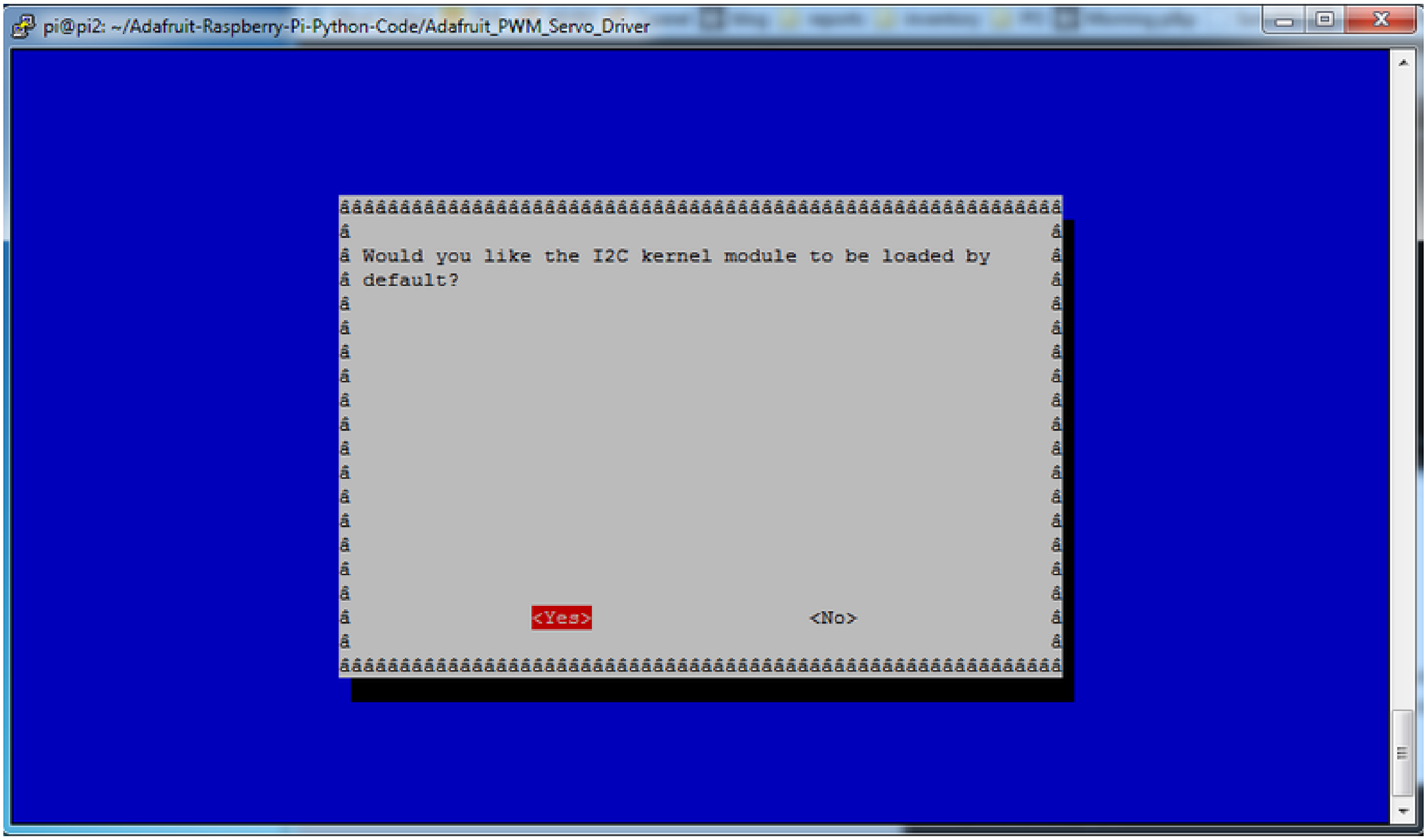
â                                                          â
â                                                          â
â               <Yes>                  <No>                â
â                                                          â
ââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââ
```



pi@pi2: ~/Adafruit-Raspberry-Pi-Python-Code/Adafruit_PWM_Servo_Driver

```
ââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââ
â                                                          â
â Would you like the I2C kernel module to be loaded by     â
â default?                                                 â
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â                                                          â
â                                                          â
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â                                                          â
â                                                          â
â                                                          â
â               <Yes>                  <No>                â
â                                                          â
ââââââââââââââââââââââââââââââââââââââââââââââââââââââââââââ
```

Then reboot!

We also recommend going through the steps below to manually check everything was added by raspi-config!

Installing Kernel Support (Manually)

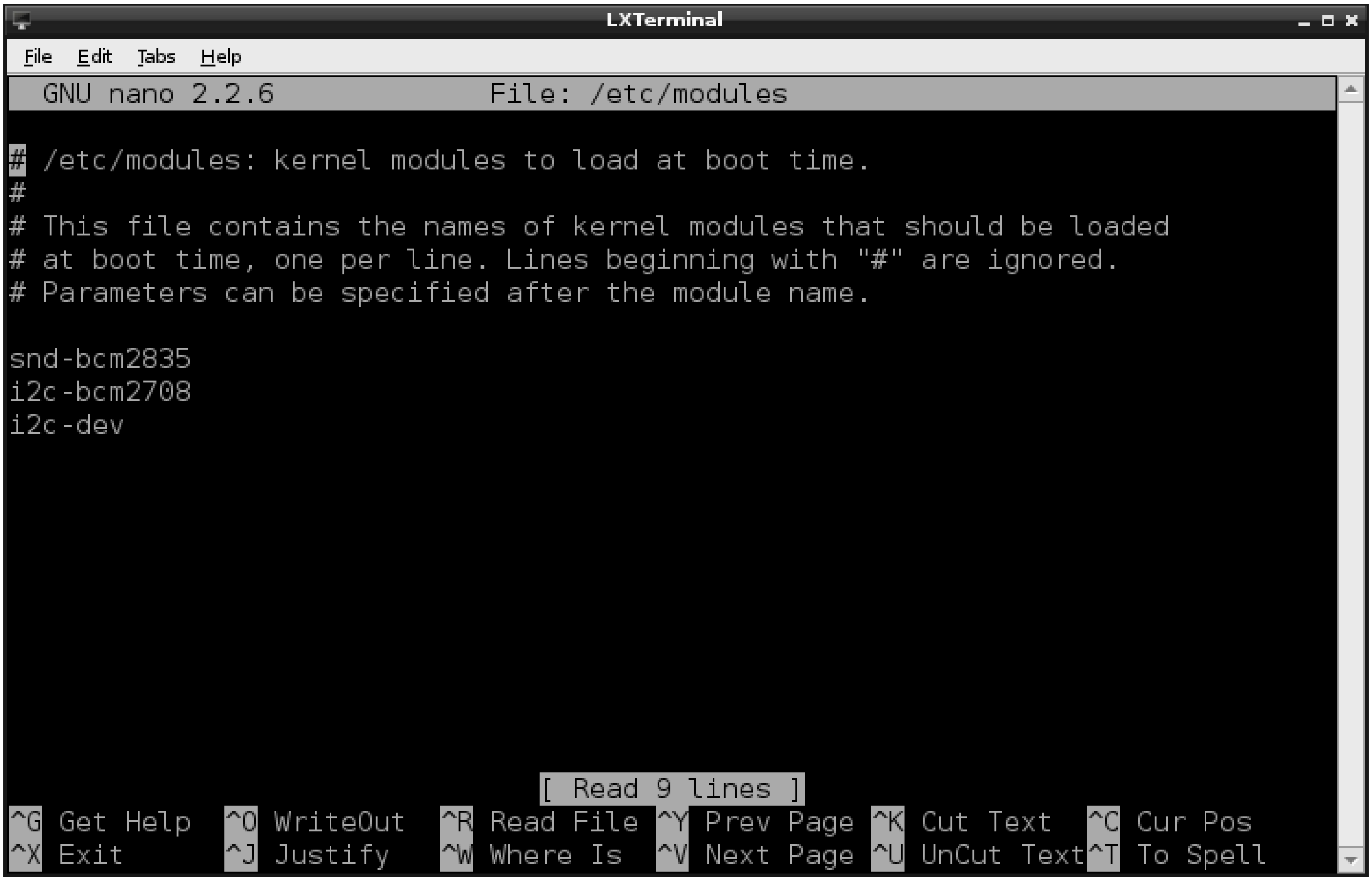
If you are using Occidentalis, then your Pi is ready to go with I2C as far as enabling the hardware goes. However, if you are using Raspbian, you will need to open LXTerminal or console or ssh and enter the following command:

```
sudo nano /etc/modules
```

and add these two lines to the end of the file:

```
i2c-bcm2708
i2c-dev
```

like so:



```
  GNU nano 2.2.6             File: /etc/modules

# /etc/modules: kernel modules to load at boot time.
#
# This file contains the names of kernel modules that should be loaded
# at boot time, one per line. Lines beginning with "#" are ignored.
# Parameters can be specified after the module name.

snd-bcm2835
i2c-bcm2708
i2c-dev











                                [ Read 9 lines ]
^G Get Help   ^O WriteOut   ^R Read File ^Y Prev Page ^K Cut Text   ^C Cur Pos
^X Exit       ^J Justify    ^W Where Is  ^V Next Page ^U UnCut Text^T To Spell
```

Then save the file with **Control-X Y** <return>

Depending on your distribution, you may also have a file called**/etc/modprobe.d/raspi-blacklist.conf**

If you do not have this file then there is nothing to do, however, if you do have this file, you need to edit it and comment out the lines below:

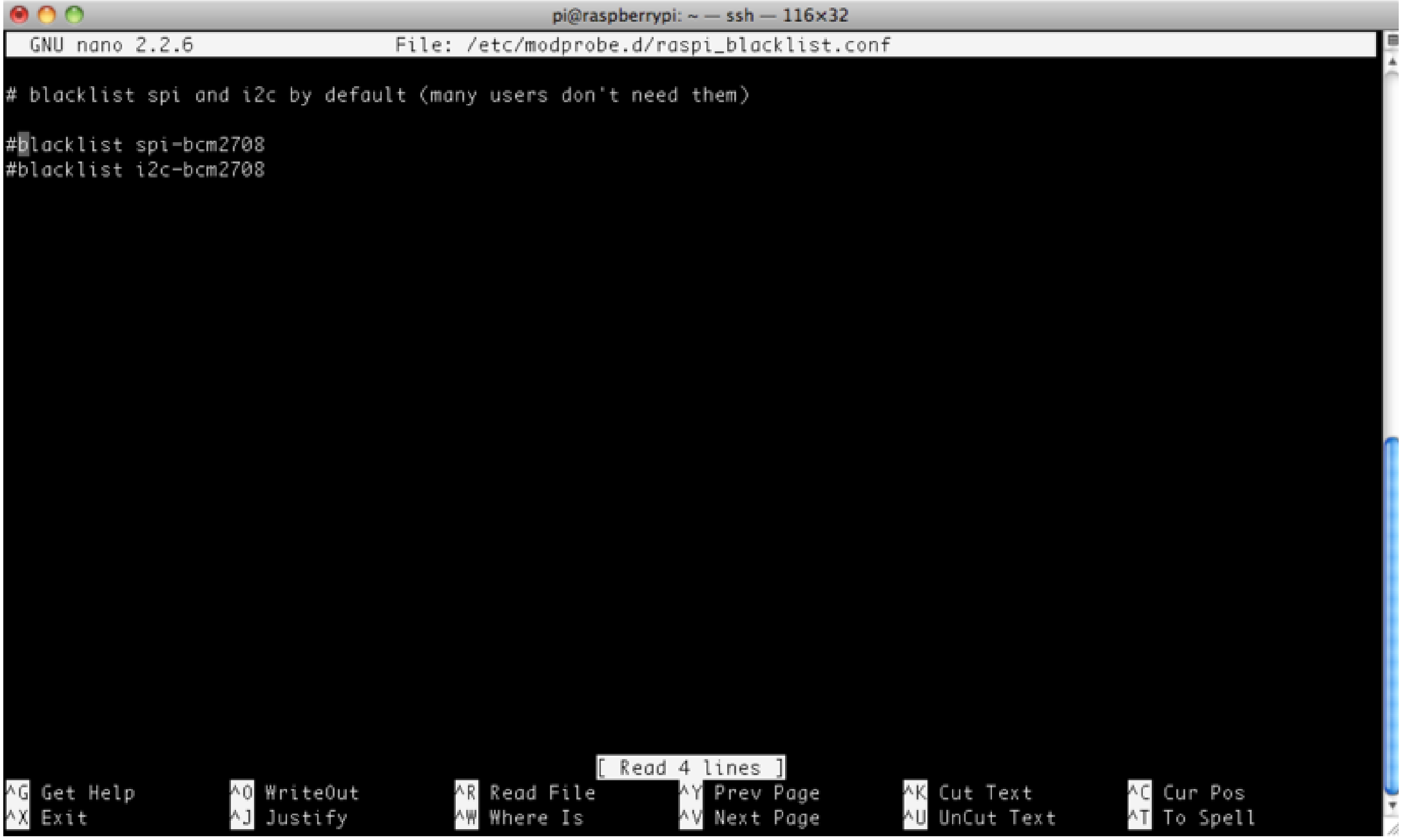
```
blacklist spi-bcm2708
blacklist i2c-bcm2708
```

.. by putting a # in front of them.

Open an editor on the file by typing:

```
sudo nano /etc/modprobe.d/raspi-blacklist.conf
```

.. then edit the file so that it appears as below, and then save and exit the file using CTRL-x and Y.



```
  GNU nano 2.2.6                File: /etc/modprobe.d/raspi_blacklist.conf

# blacklist spi and i2c by default (many users don't need them)

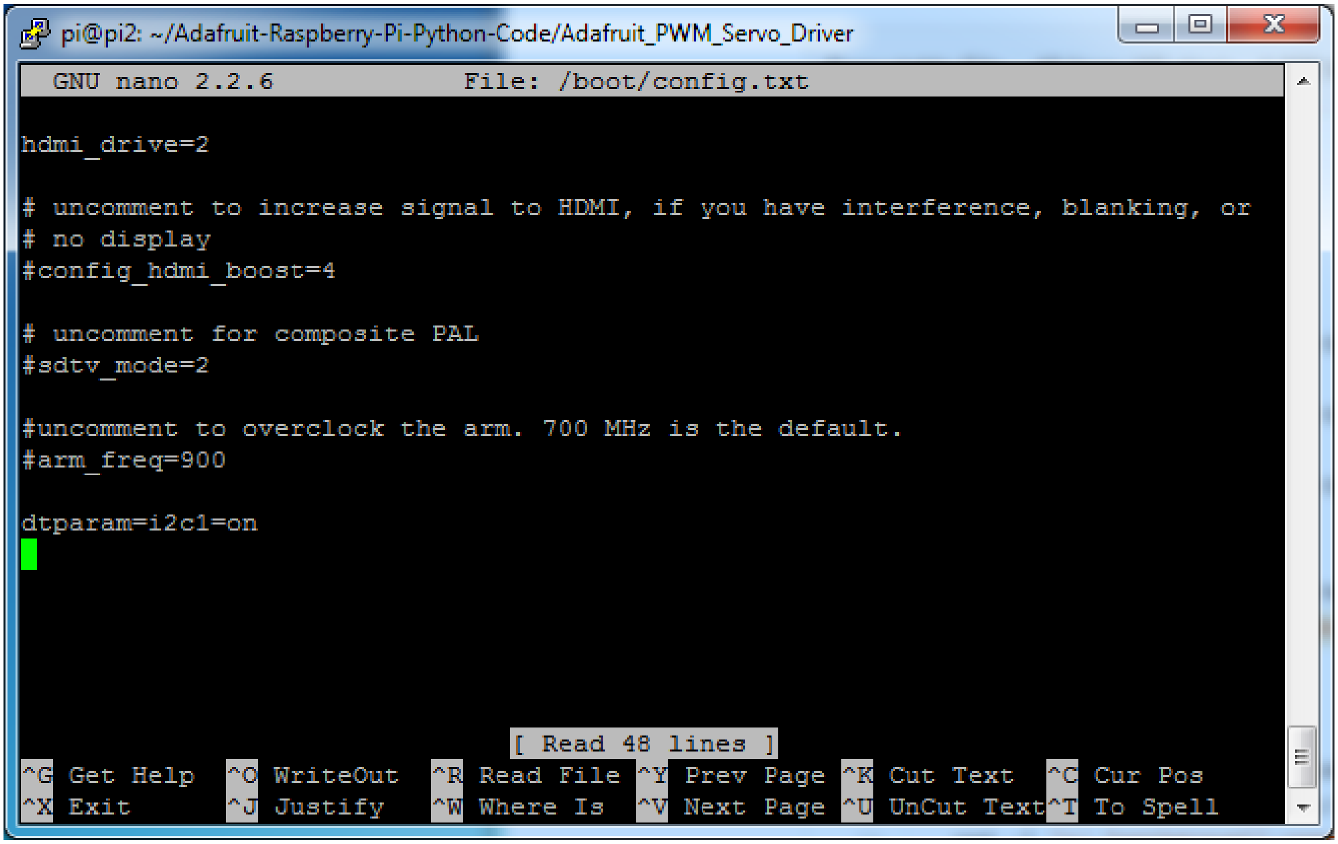
#blacklist spi-bcm2708
#blacklist i2c-bcm2708
```

```
                                      [ Read 4 lines ]
^G Get Help     ^O WriteOut     ^R Read File    ^Y Prev Page    ^K Cut Text     ^C Cur Pos
^X Exit         ^J Justify      ^W Where Is     ^V Next Page    ^U UnCut Text   ^T To Spell
```

If you are running a recent Raspberry Pi (3.18 kernel or higher) you will also need to update the **/boot/config.txt** file. Edit it with **sudo nano /boot/config.txt** and add the text

dtparam=i2c1=on
dtparam=i2c_arm=on

at the bottom. note that the "1" in "i2c1" is a one not an L!



pi@pi2: ~/Adafruit-Raspberry-Pi-Python-Code/Adafruit_PWM_Servo_Driver

```
  GNU nano 2.2.6            File: /boot/config.txt

hdmi_drive=2

# uncomment to increase signal to HDMI, if you have interference, blanking, or
# no display
#config_hdmi_boost=4

# uncomment for composite PAL
#sdtv_mode=2

#uncomment to overclock the arm. 700 MHz is the default.
#arm_freq=900

dtparam=i2c1=on



                                [ Read 48 lines ]
^G Get Help   ^O WriteOut   ^R Read File  ^Y Prev Page  ^K Cut Text   ^C Cur Pos
^X Exit       ^J Justify    ^W Where Is   ^V Next Page  ^U UnCut Text^T To Spell
```

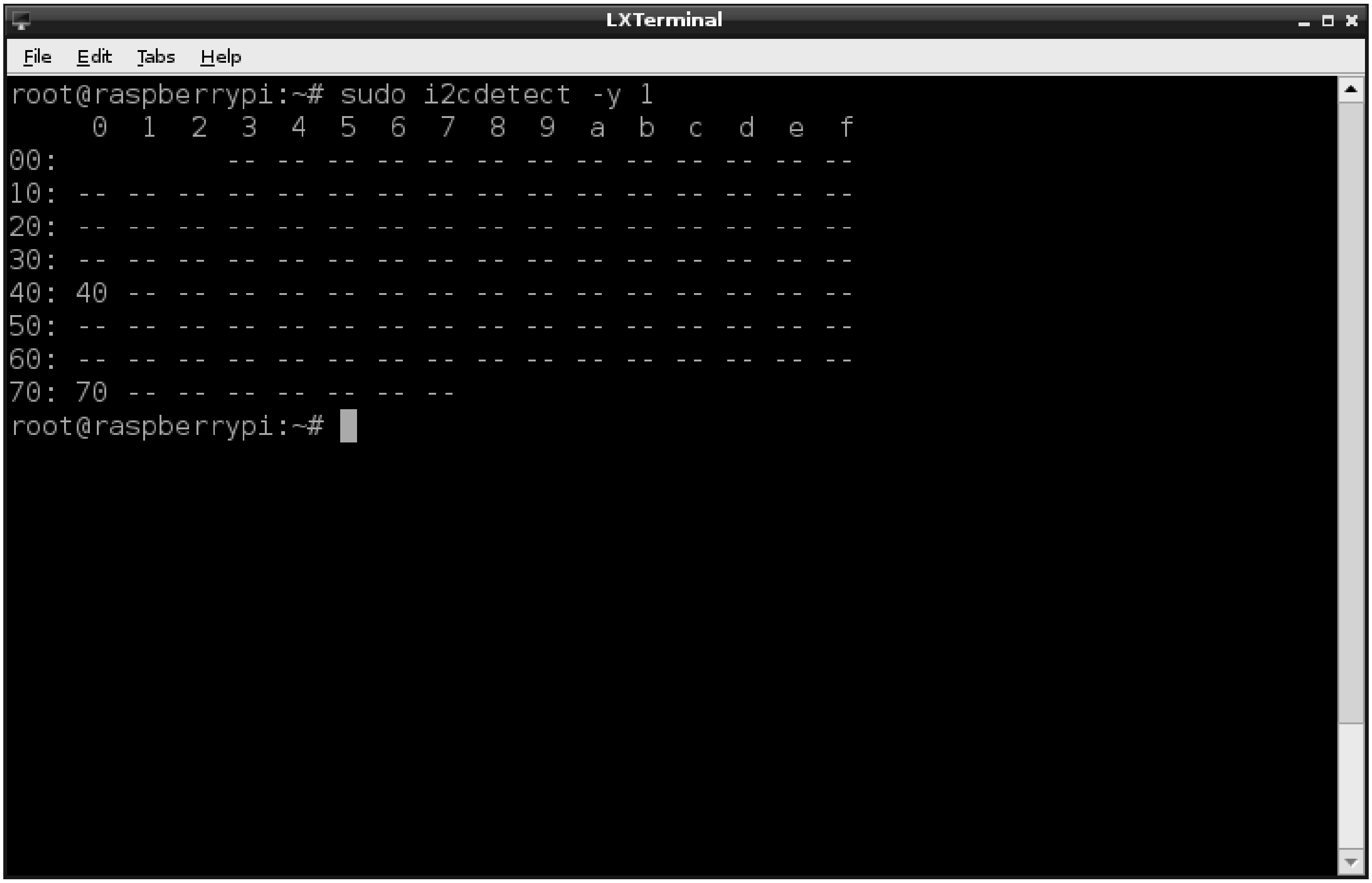
Once this is all done, reboot!

> **sudo reboot**

Testing I2C

Now when you log in you can type the following command to see all the connected devices (if you are running a 512MB Raspberry Pi Model B)

```
sudo i2cdetect -y 1
```



```
root@raspberrypi:~# sudo i2cdetect -y 1
     0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:          -- -- -- -- -- -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
20: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: 40 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
50: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
60: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
70: 70 -- -- -- -- -- -- --
root@raspberrypi:~#
```

This shows that two I2C addresses are in use – 0x40 and 0x70.

Note that if you are using one of the very first Raspberry Pis (a 256MB Raspberry Pi Model B) then you will need to change the command to:

```
sudo i2cdetect -y 0
```

The Raspberry Pi designers swapped over I2C ports between board releases. Just remember: 512M Pi's use i2c port 1, 256M ones use i2c port 0!