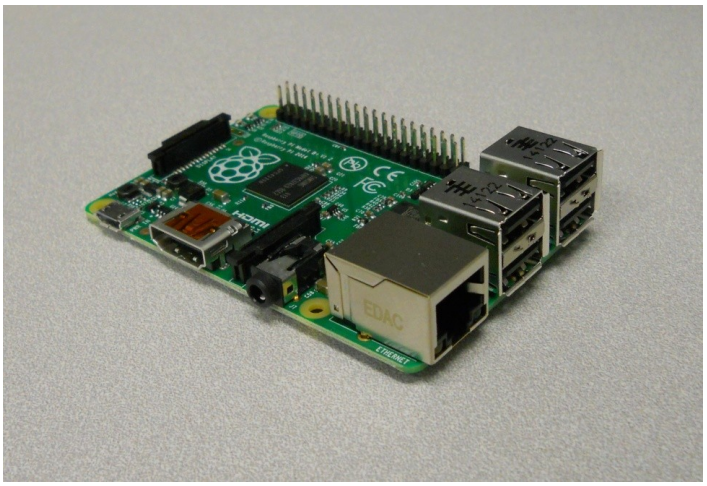
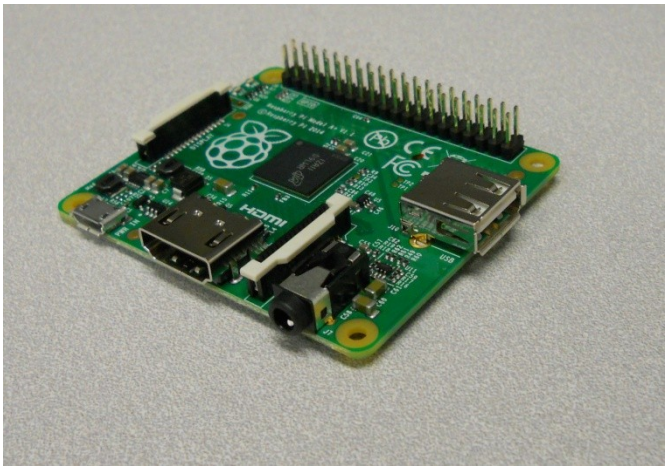
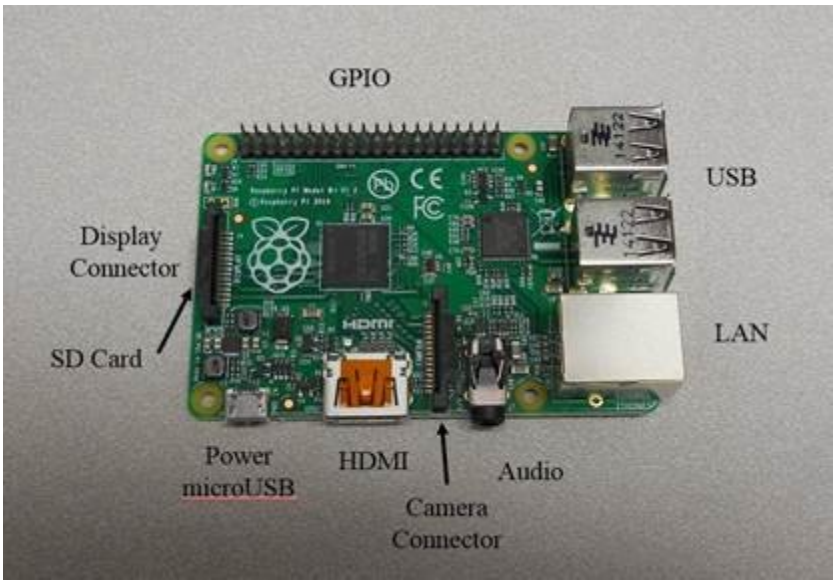
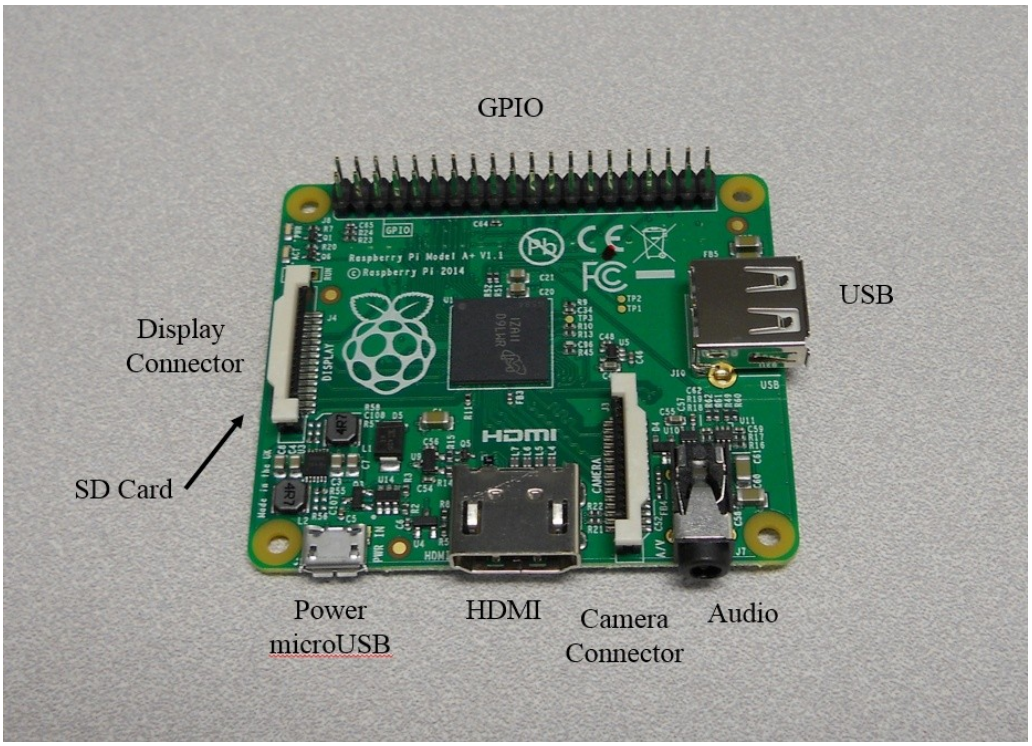
Chapter 1: Getting Started with Raspberry Pi






GPIO
USB
Display
Connector
SD Card
LAN
Power
microUSB
HDMI
Audio
Camera
Connector


GPIO
USB
Display
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Power
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Camera
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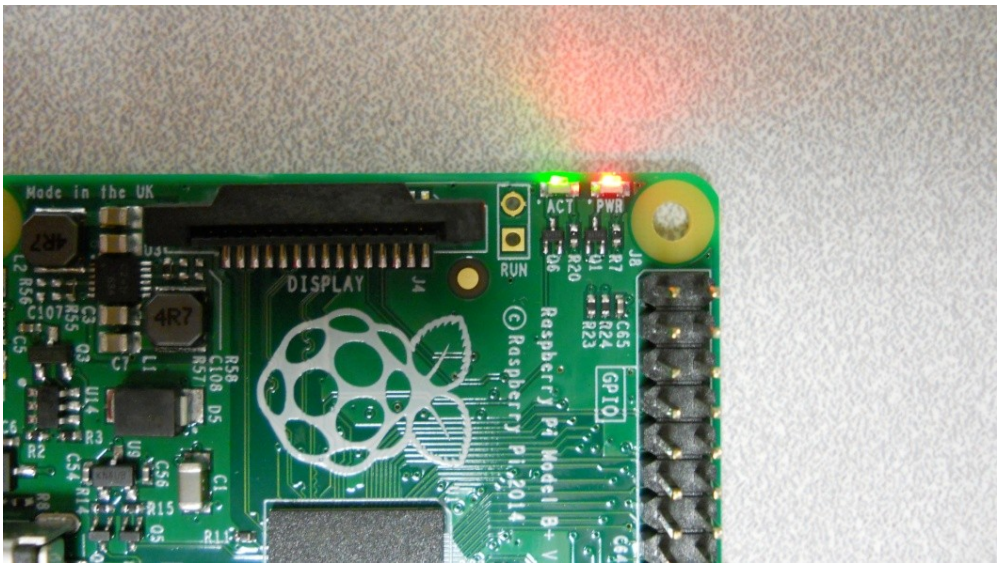
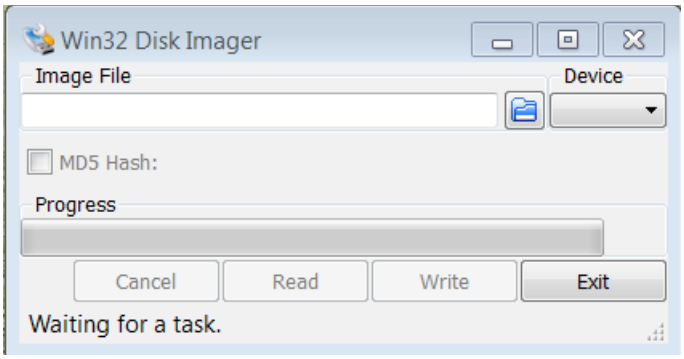
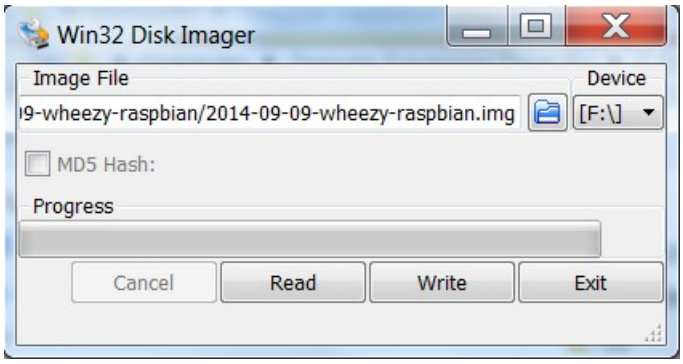
Audio

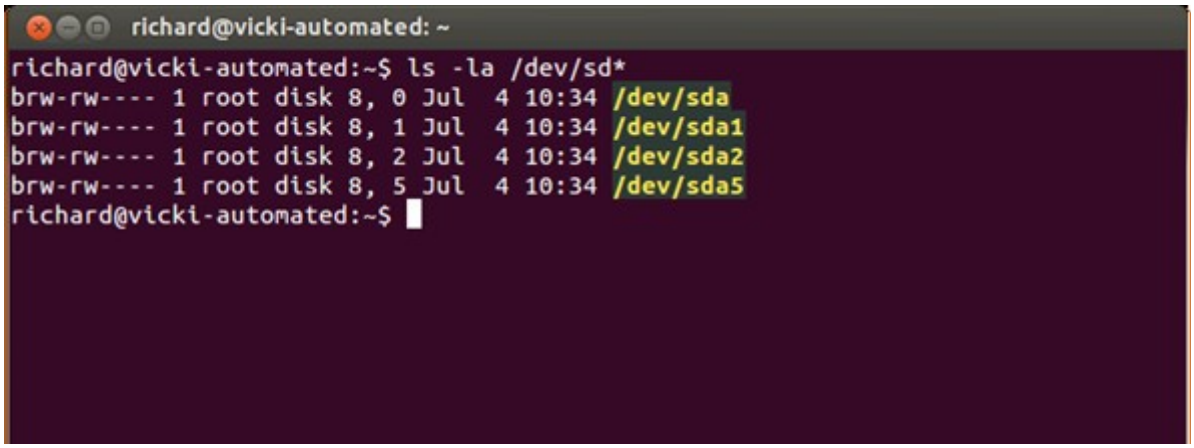

Made in the UK
DISPLAY
RUN
ACT
PWR
GPIO
Raspberry Pi Model B+

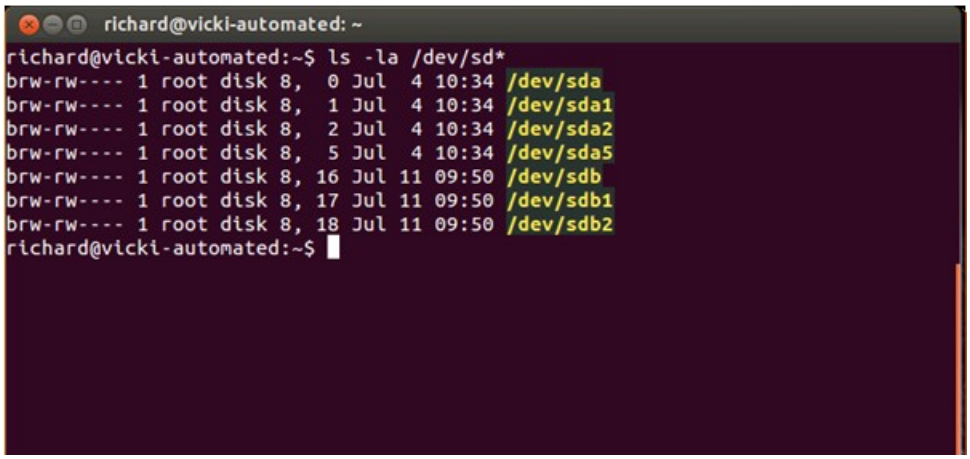
USB2.0 4Port HUB

SVideo
SVideo
(RCA Connector)
VGA
DVI
HDMI


Win32 Disk Imager
Image File
Device
MD5 Hash:
Progress
Cancel
Read
Write
Exit
Waiting for a task.


Win32 Disk Imager
Image File
Device
9-wheezy-raspbian/2014-09-09-wheezy-raspbian.img
[F:\]
MD5 Hash:
Progress
Cancel
Read
Write
Exit


richard@vicki-automated: ~
richard@vicki-automated:~$ ls -la /dev/sd*
brw-rw---- 1 root disk 8, 0 Jul 4 10:34 /dev/sda
brw-rw---- 1 root disk 8, 1 Jul 4 10:34 /dev/sda1
brw-rw---- 1 root disk 8, 2 Jul 4 10:34 /dev/sda2
brw-rw---- 1 root disk 8, 5 Jul 4 10:34 /dev/sda5
richard@vicki-automated:~$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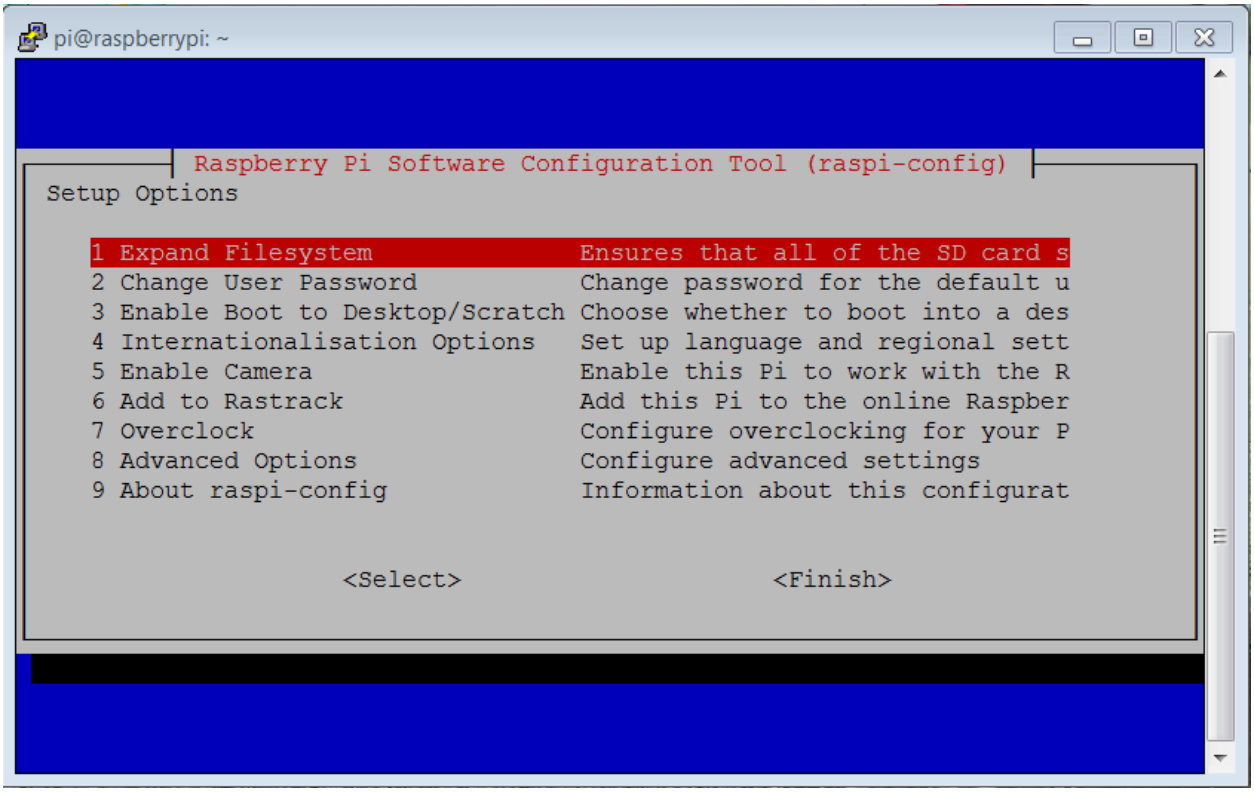
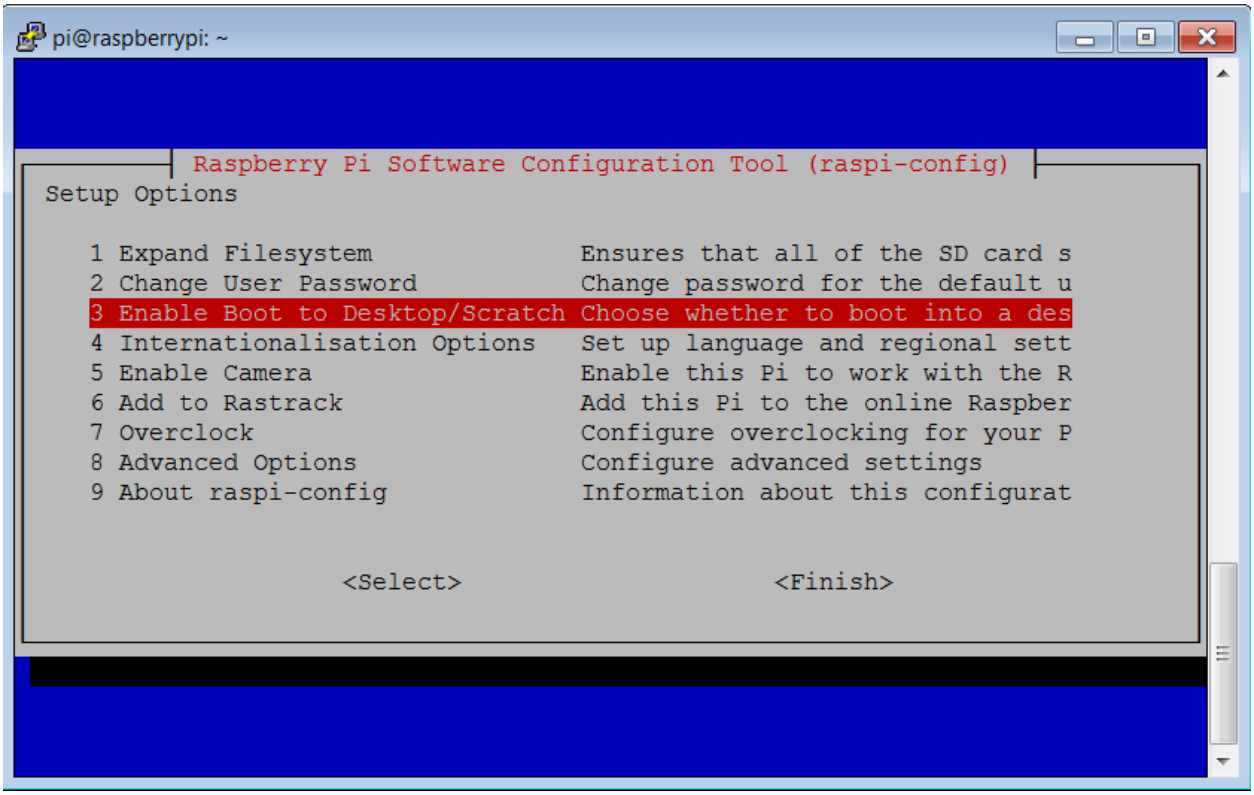
brw-rw---- 1 root disk 8, 0 Jul 4 10:34 /dev/sda
brw-rw---- 1 root disk 8, 1 Jul 4 10:34 /dev/sda1
brw-rw---- 1 root disk 8, 2 Jul 4 10:34 /dev/sda2
brw-rw---- 1 root disk 8, 5 Jul 4 10:34 /dev/sda5
brw-rw---- 1 root disk 8, 16 Jul 11 09:50 /dev/sdb
brw-rw---- 1 root disk 8, 17 Jul 11 09:50 /dev/sdb1
brw-rw---- 1 root disk 8, 18 Jul 11 09:50 /dev/sdb2
richard@vicki-automated:~$


pi@raspberrypi: ~
Raspberry Pi Software Configuration Tool (raspi-config)
Setup Options
1 Expand Filesystem Ensures that all of the SD card s
2 Change User Password Change password for the default u
3 Enable Boot to Desktop/Scratch Choose whether to boot into a des
4 Internationalisation Options Set up language and regional sett
5 Enable Camera Enable this Pi to work with the R
6 Add to Rastrack Add this Pi to the online Raspber
7 Overclock Configure overclocking for your P
8 Advanced Options Configure advanced settings
9 About raspi-config Information about this configurat
<Select>
<Finish>

pi@raspberrypi: ~
Root partition has been resized.
The filesystem will be enlarged upon the next reboot
<Ok>


pi@raspberrypi: ~
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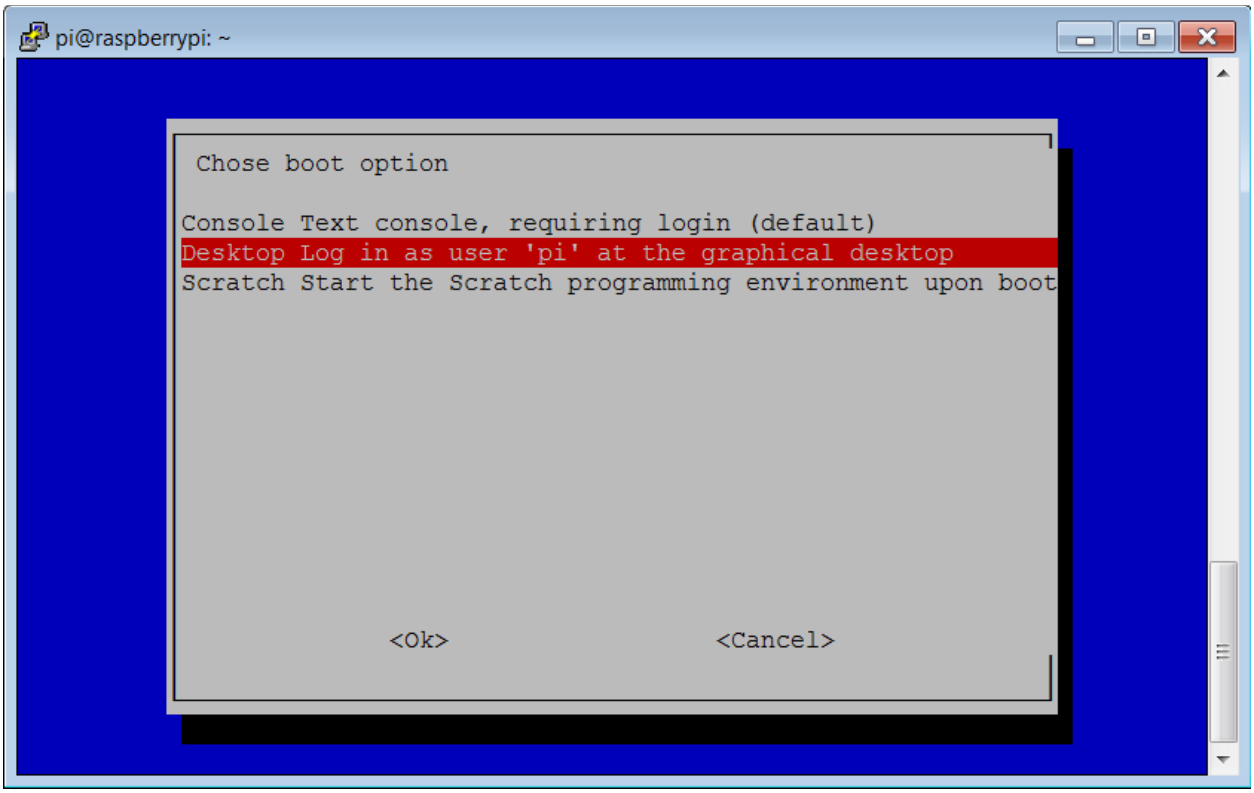
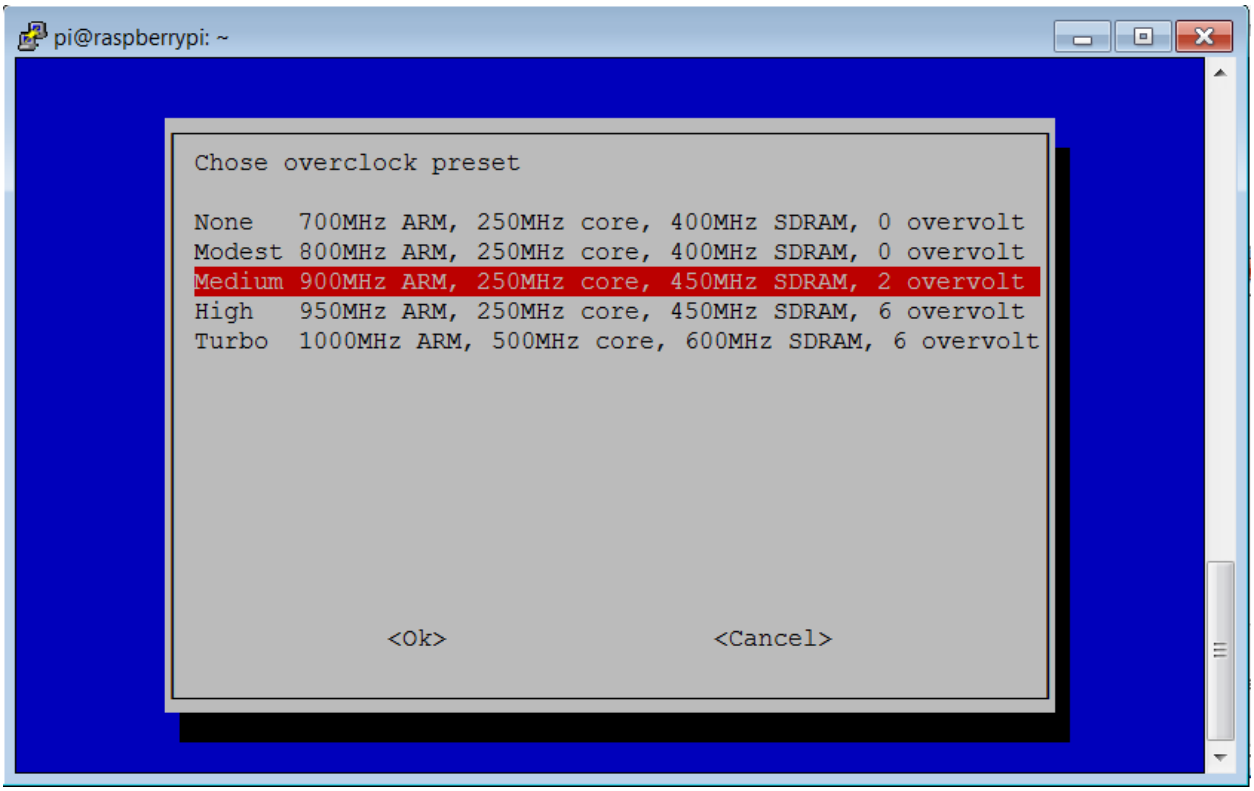
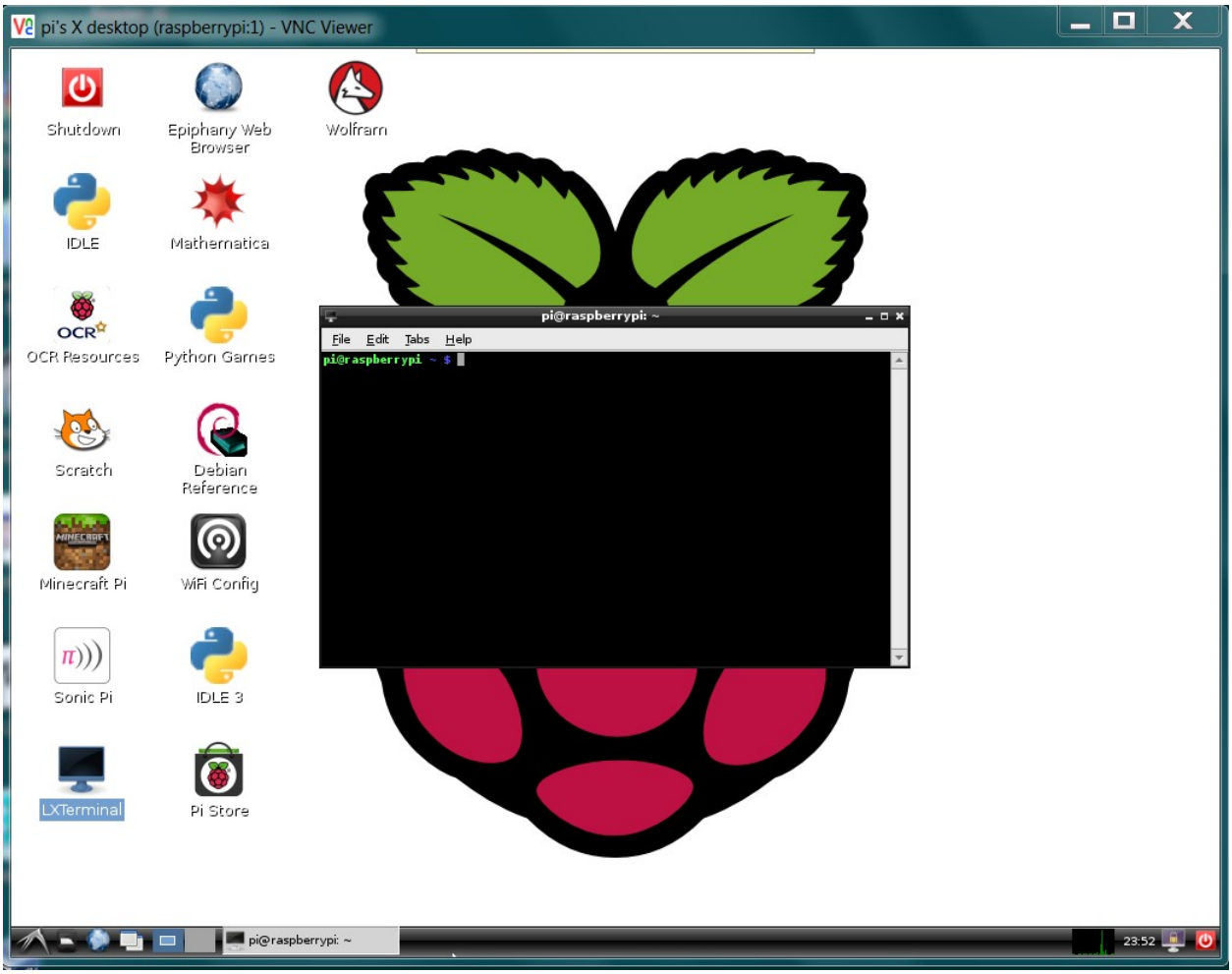
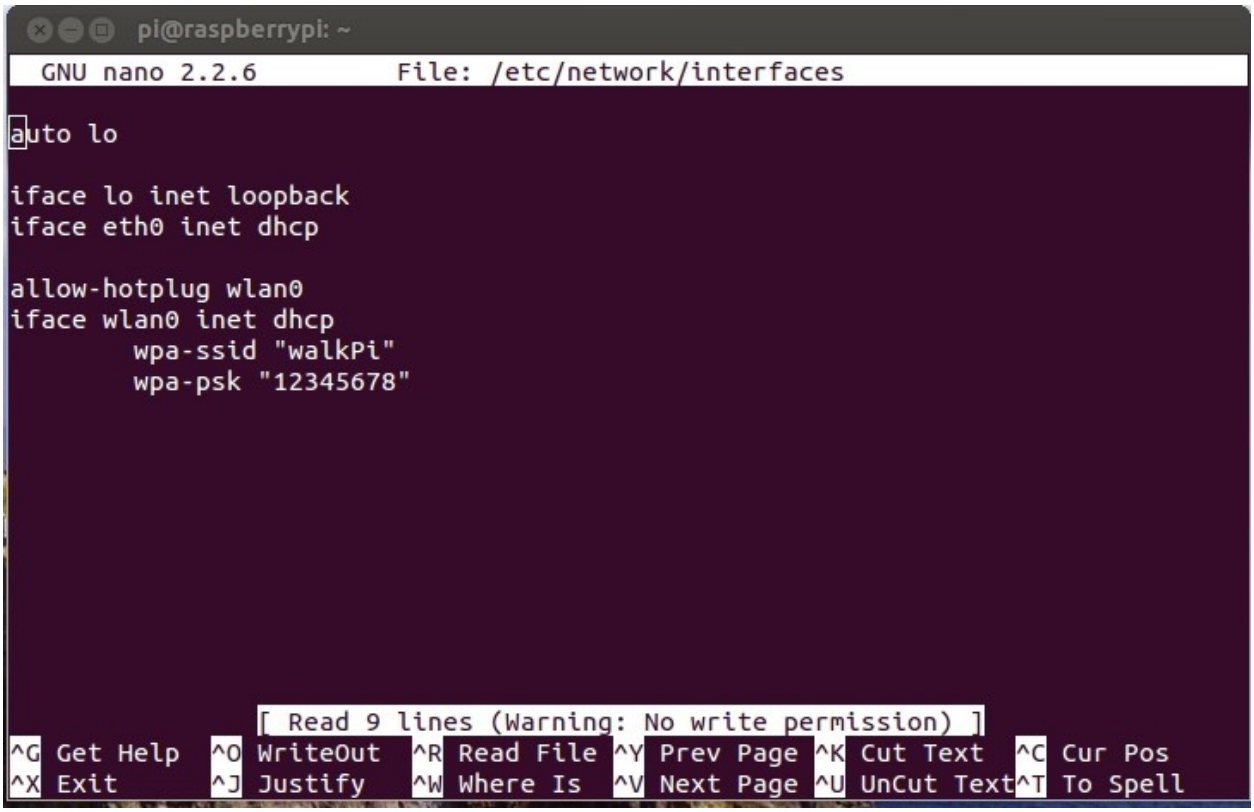
9 About raspi-config Information about this configurat
<Select>
<Finish>

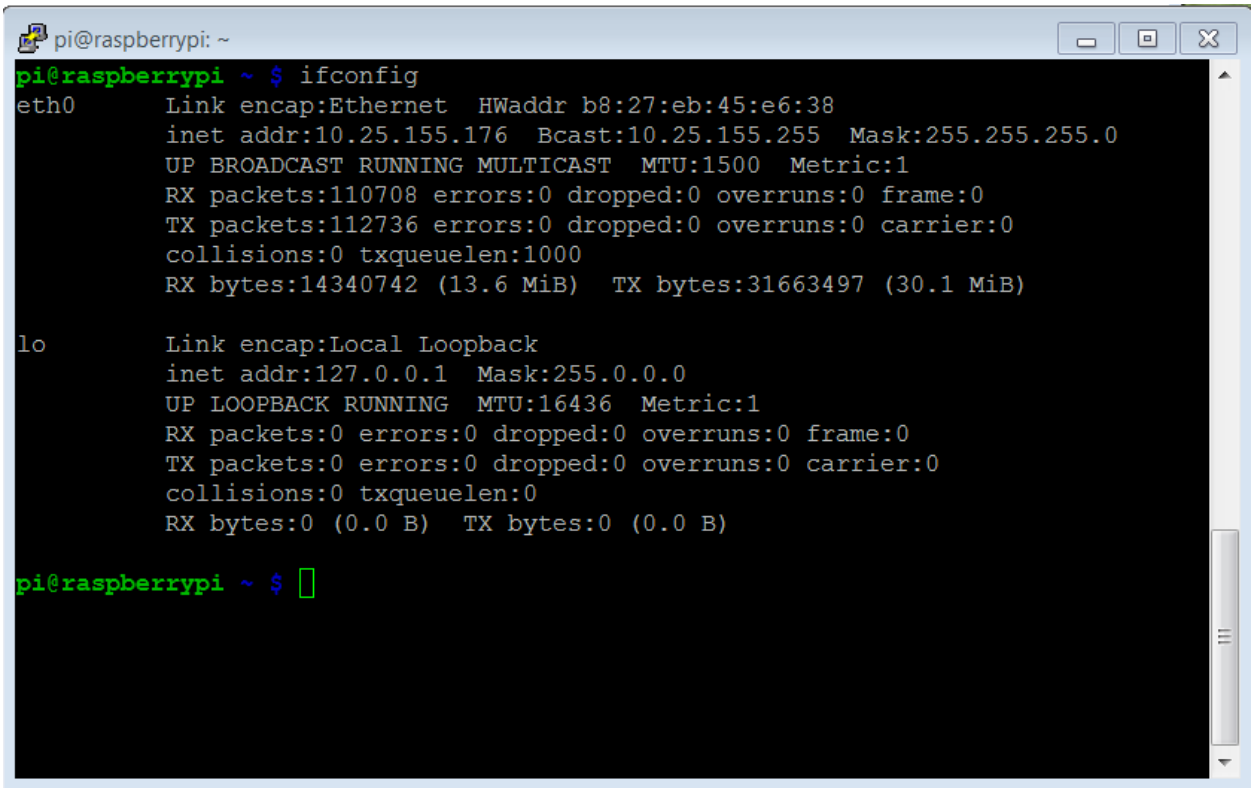

pi@raspberrypi: ~
Chose boot option
Console Text console, requiring login (default)
Desktop Log in as user 'pi' at the graphical desktop
Scratch Start the Scratch programming environment upon boot
<Ok>
<Cancel>

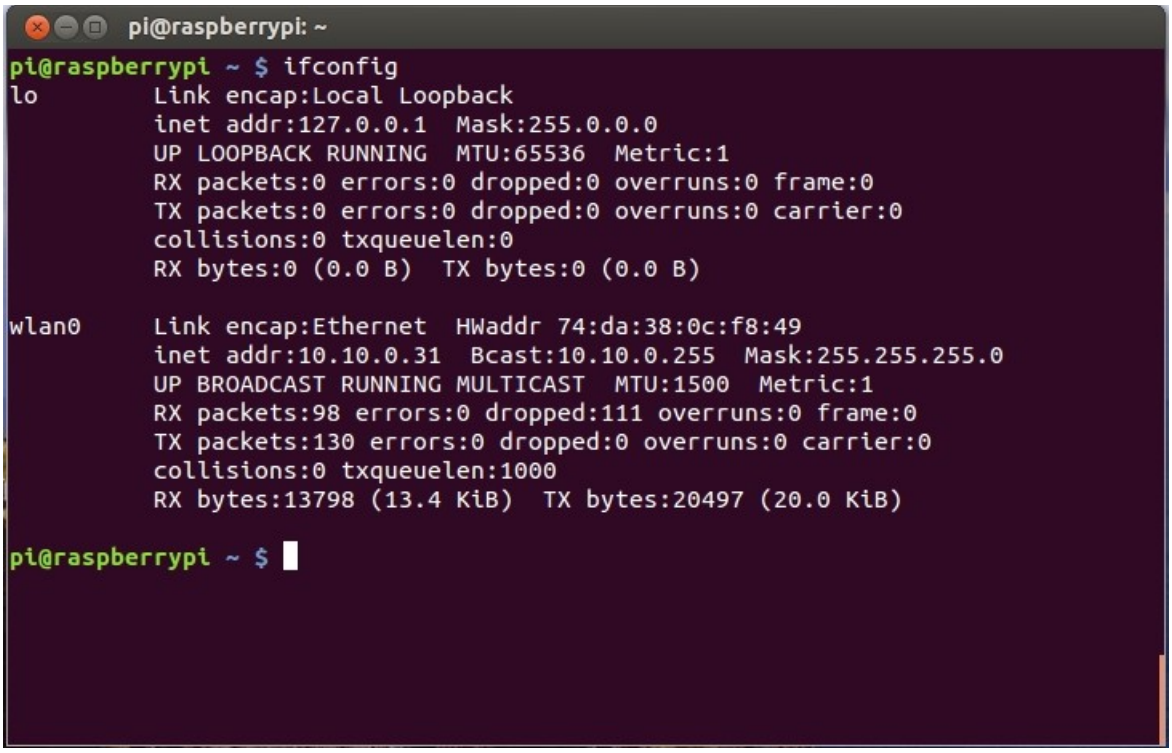

pi@raspberrypi: ~
Chose overclock preset
None 700MHz ARM, 250MHz core, 400MHz SDRAM, 0 overvolt
Modest 800MHz ARM, 250MHz core, 400MHz SDRAM, 0 overvolt
Medium 900MHz ARM, 250MHz core, 450MHz SDRAM, 2 overvolt
High 950MHz ARM, 250MHz core, 450MHz SDRAM, 6 overvolt
Turbo 1000MHz ARM, 500MHz core, 600MHz SDRAM, 6 overvolt
<Ok>
<Cancel>

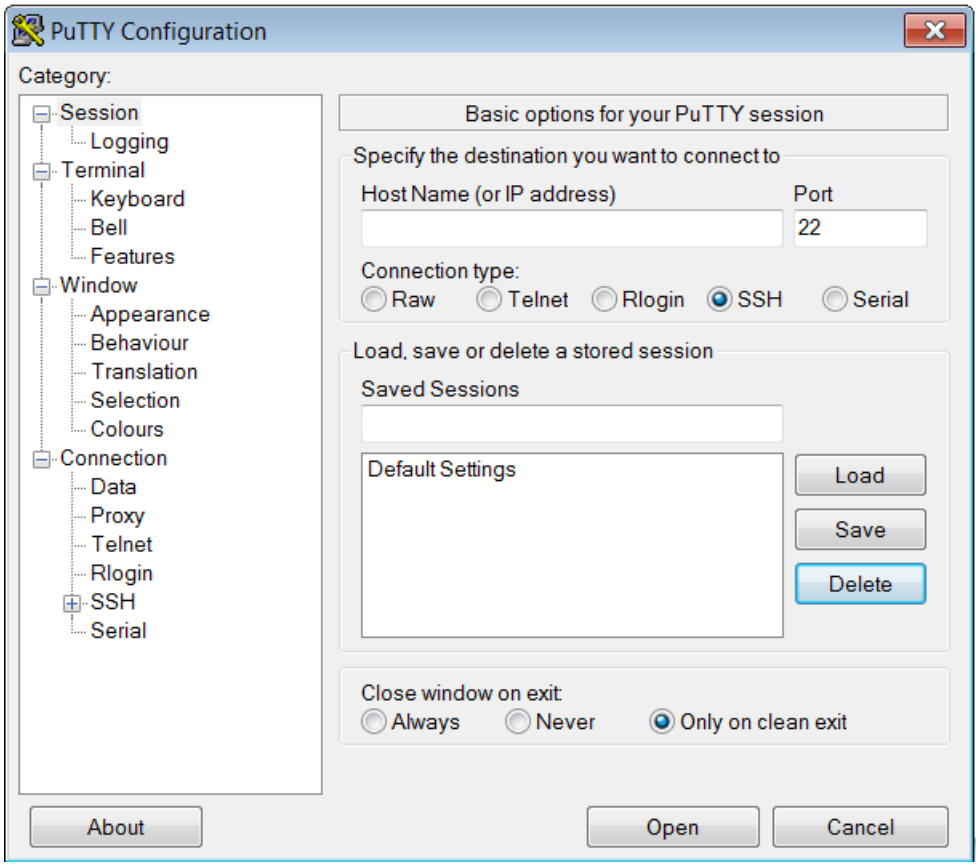

pi's X desktop (raspberrypi:1) - VNC Viewer
Shutdown
Epiphany Web Browser
Wolfram
IDLE
Mathematica
OCR Resources
Python Games
Scratch
Debian Reference
Minecraft Pi
WiFi Config
Sonic Pi
IDLE 3
LXTerminal
Pi Store
pi@raspberrypi: ~
File Edit Tabs Help
pi@raspberrypi ~ $
pi@raspberrypi: ~
23:52

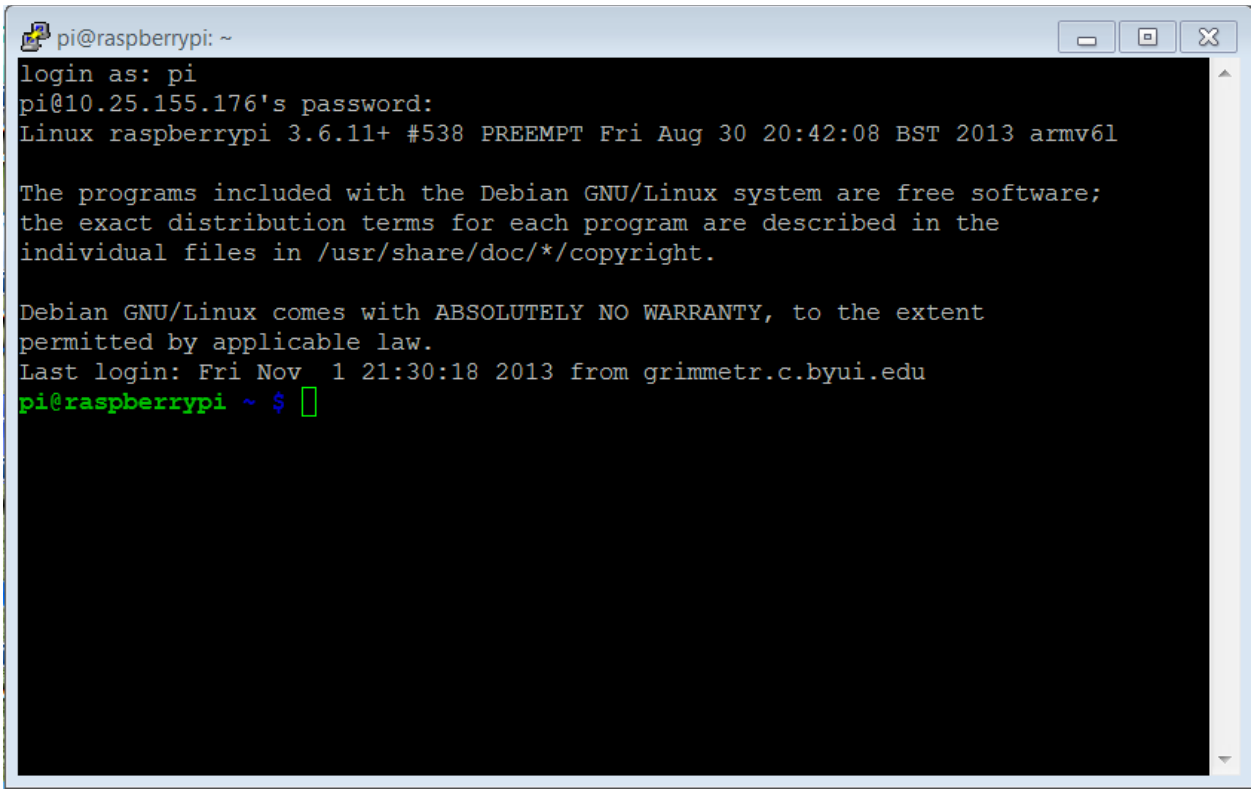
EDIMAX

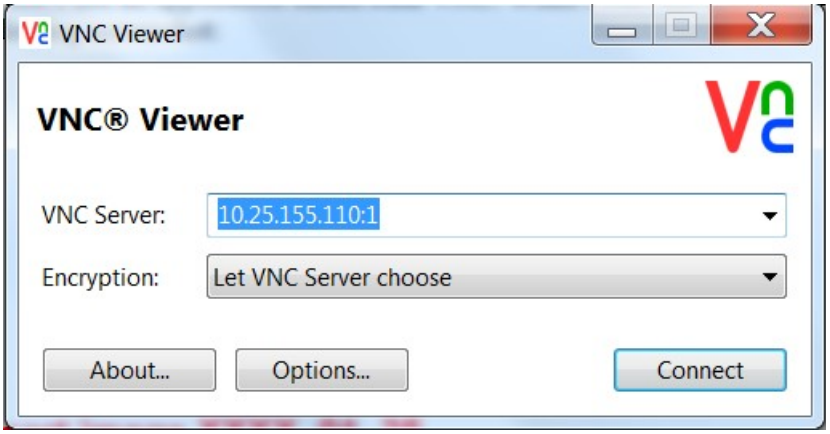

pi@raspberrypi: ~
GNU nano 2.2.6 File: /etc/network/interfaces
auto lo
iface lo inet loopback
iface eth0 inet dhcp
allow-hotplug wlan0
iface wlan0 inet dhcp
wpa-ssid "walkPi"
wpa-psk "12345678"
[Read 9 lines (Warning: No write permission)]
^G Get Help ^O WriteOut ^R Read File ^Y Prev Page ^K Cut Text ^C Cur Pos
^X Exit ^J Justify ^W Where Is ^V Next Page ^U UnCut Text ^T To Spell

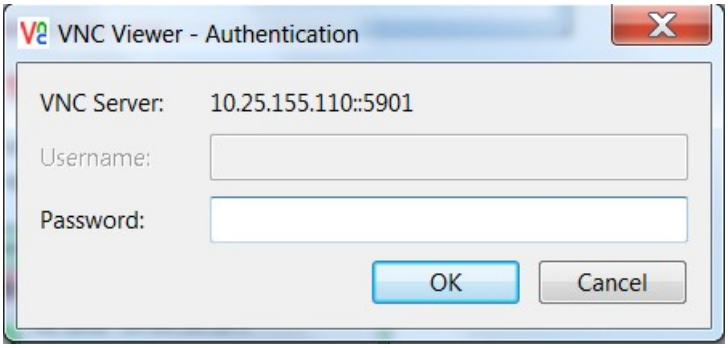

pi@raspberrypi: ~
pi@raspberrypi ~ $ ifconfig
eth0 Link encap:Ethernet HWaddr b8:27:eb:45:e6:38
inet addr:10.25.155.176 Bcast:10.25.155.255 Mask:255.255.255.0
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:110708 errors:0 dropped:0 overruns:0 frame:0
TX packets:112736 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:14340742 (13.6 MiB) TX bytes:31663497 (30.1 MiB)
lo Link encap:Local Loopback
inet addr:127.0.0.1 Mask:255.0.0.0
UP LOOPBACK RUNNING MTU:16436 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)
pi@raspberrypi ~ $

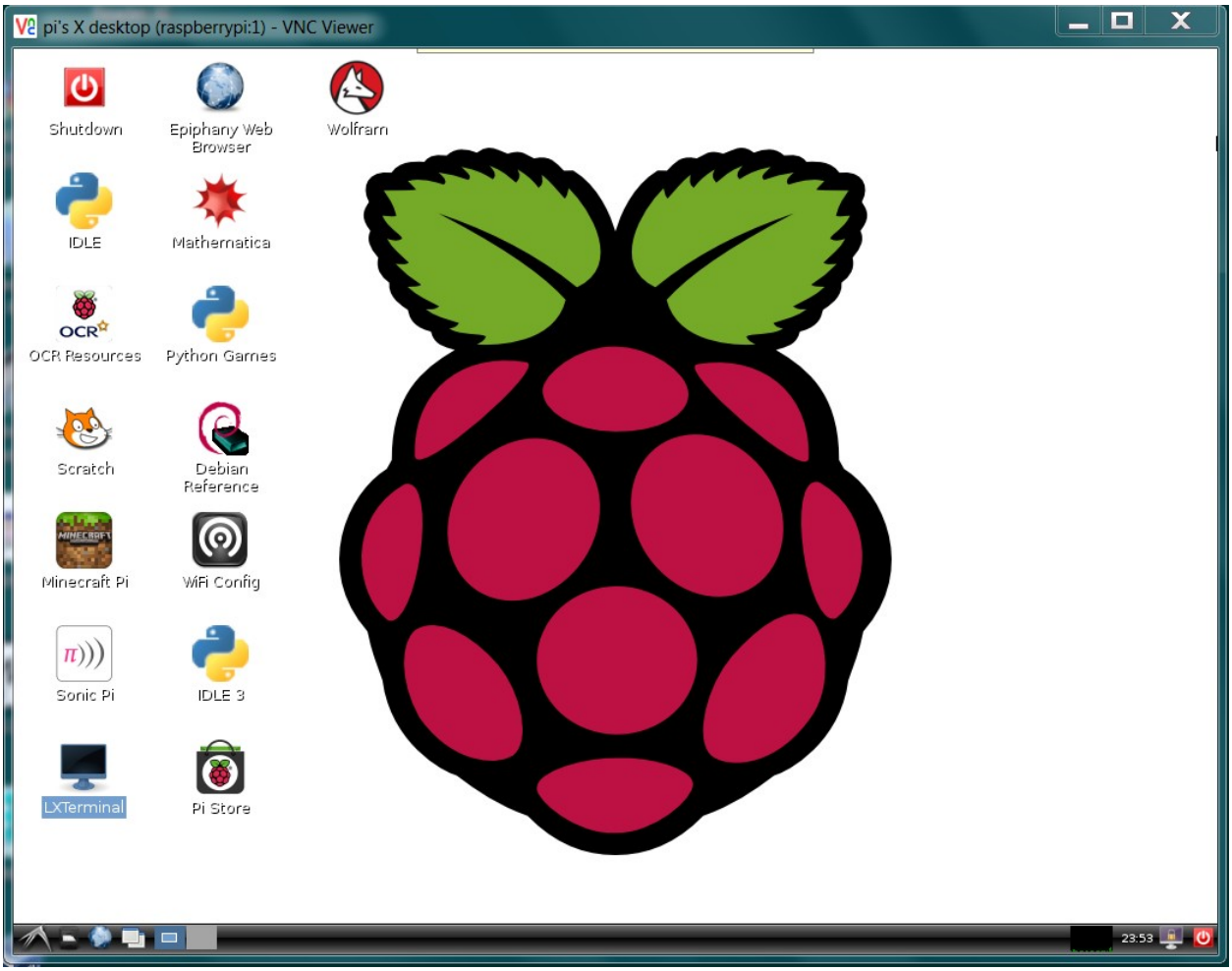

pi@raspberrypi: ~
pi@raspberrypi ~ $ ifconfig
lo Link encap:Local Loopback
inet addr:127.0.0.1 Mask:255.0.0.0
UP LOOPBACK RUNNING MTU:65536 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)
wlan0 Link encap:Ethernet HWaddr 74:da:38:0c:f8:49
inet addr:10.10.0.31 Bcast:10.10.0.255 Mask:255.255.255.0
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:98 errors:0 dropped:111 overruns:0 frame:0
TX packets:130 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:13798 (13.4 KiB) TX bytes:20497 (20.0 KiB)
pi@raspberrypi ~ $

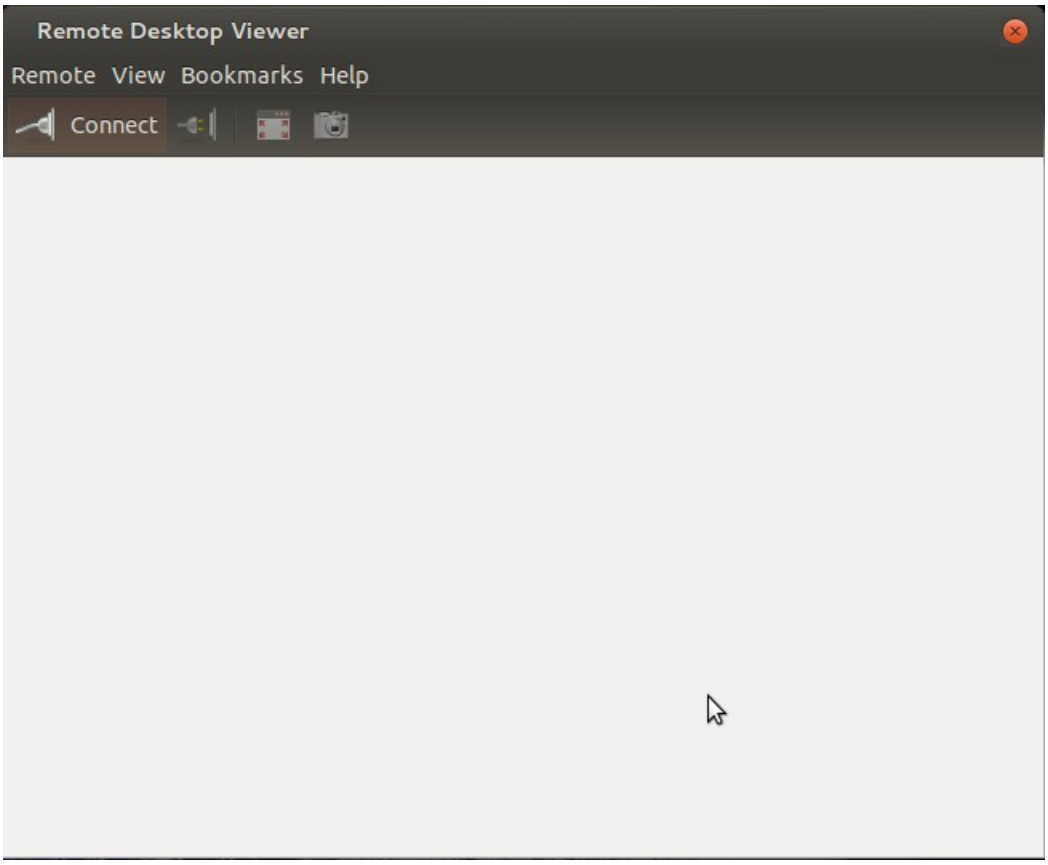

PuTTY Configuration
Category:
Session
Logging
Terminal
Keyboard
Bell
Features
Window
Appearance
Behaviour
Translation
Selection
Colours
Connection
Data
Proxy
Telnet
Rlogin
SSH
Serial
Basic options for your PuTTY session
Specify the destination you want to connect to
Host Name (or IP address)
Port
22
Connection type:
Raw
Telnet
Rlogin
SSH
Serial
Load, save or delete a stored session
Saved Sessions
Default Settings
Load
Save
Delete
Close window on exit:
Always
Never
Only on clean exit
About
Open
Cancel

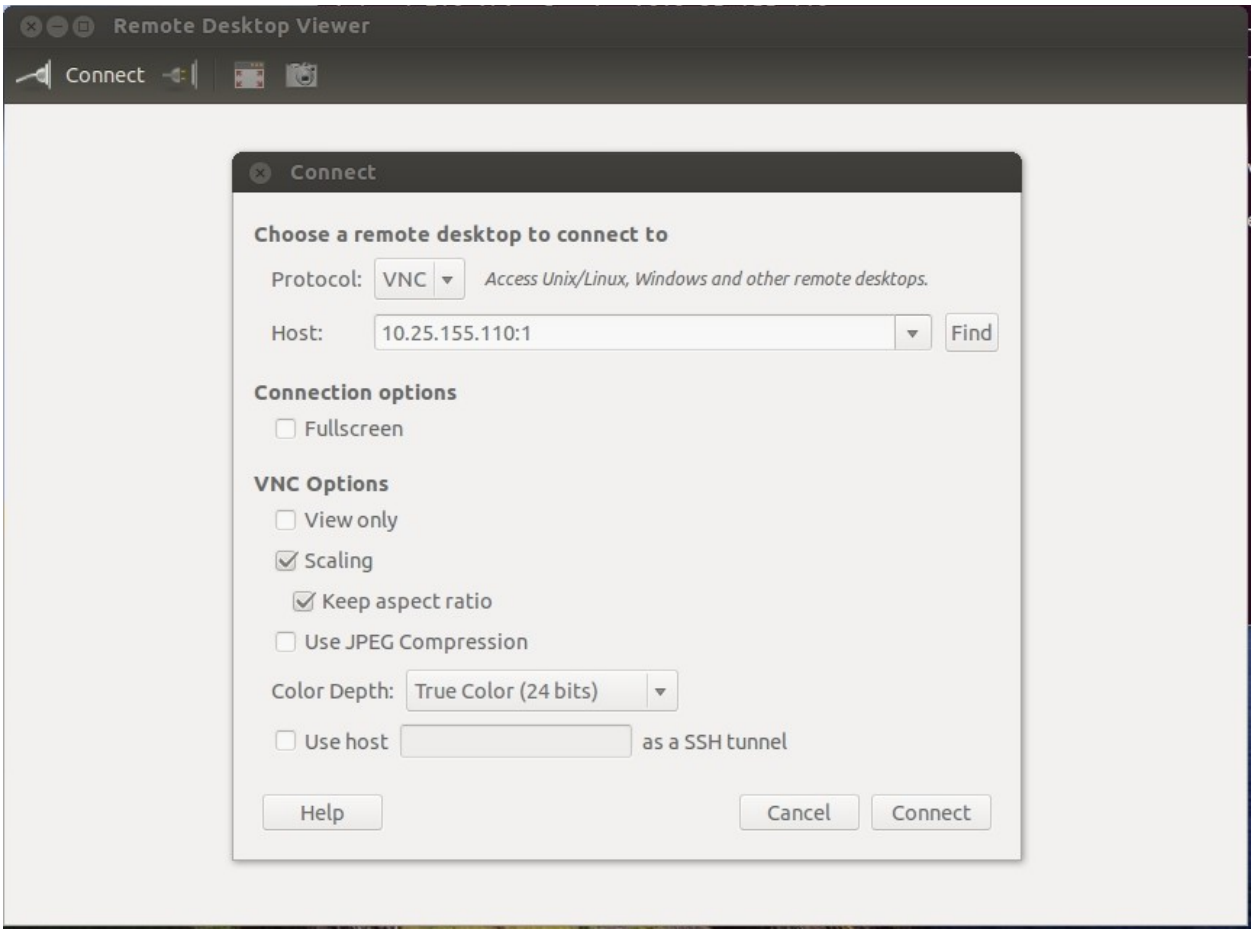

pi@raspberrypi: ~
login as: pi
pi@10.25.155.176's password:
Linux raspberrypi 3.6.11+ #538 PREEMPT Fri Aug 30 20:42:08 BST 2013 armv6l
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Fri Nov 1 21:30:18 2013 from grimmetr.c.byui.edu
pi@raspberrypi ~ $

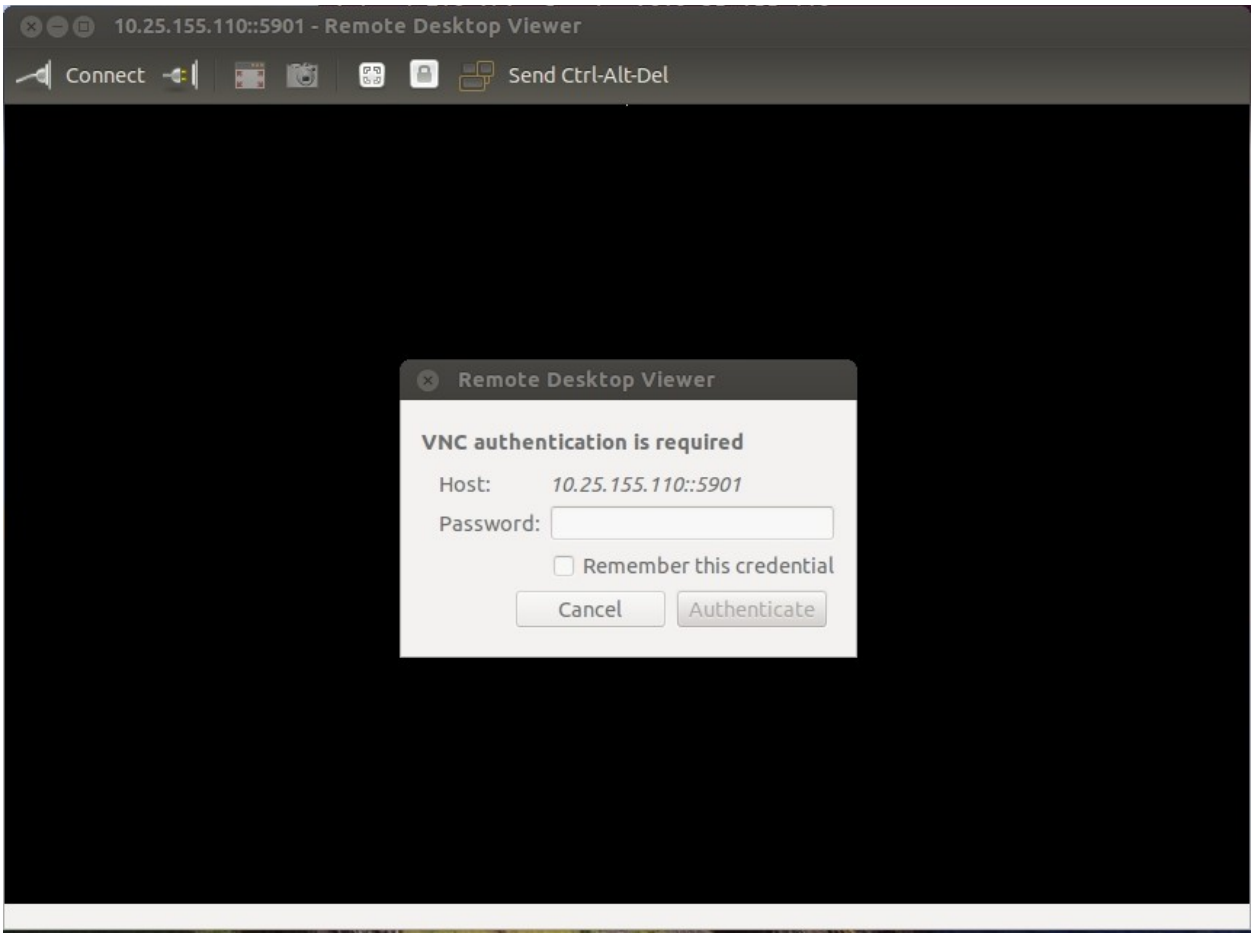

VNC Viewer
VNC® Viewer
VNC Server:
10.25.155.110:1
Encryption:
Let VNC Server choose
About...
Options...
Connect

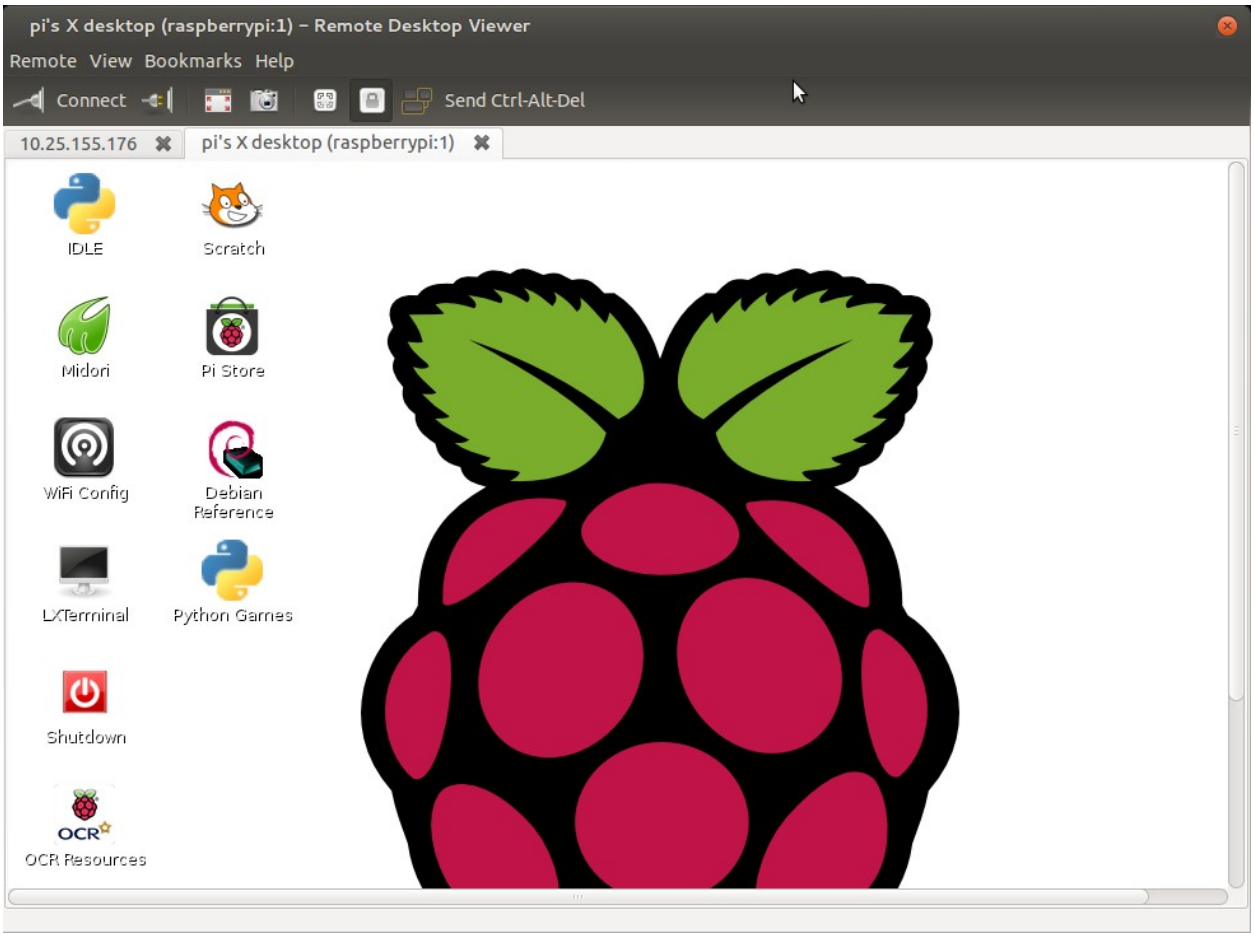

VNC Viewer - Authentication
VNC Server:
10.25.155.110::5901
Username:
Password:
OK
Cancel

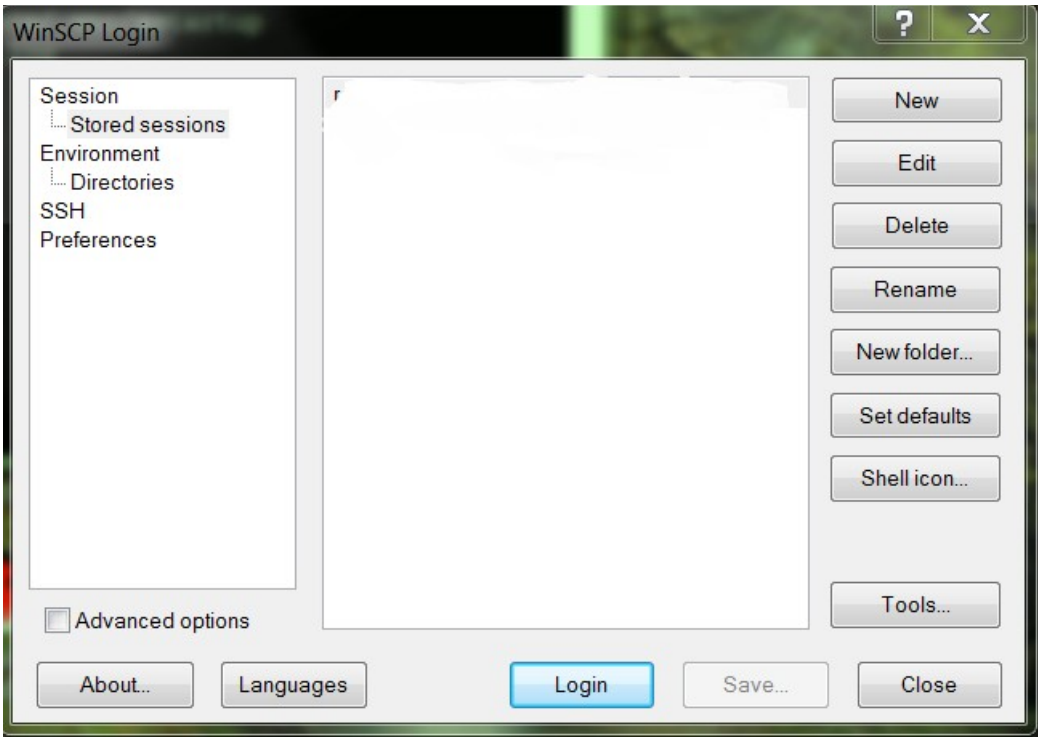

pi's X desktop (raspberrypi:1) - VNC Viewer
Shutdown
Epiphany Web Browser
Wolfram
IDLE
Mathematica
OCR Resources
Python Games
Scratch
Debian Reference
Minecraft Pi
WiFi Config
Sonic Pi
IDLE 3
LXTerminal
Pi Store
23:53

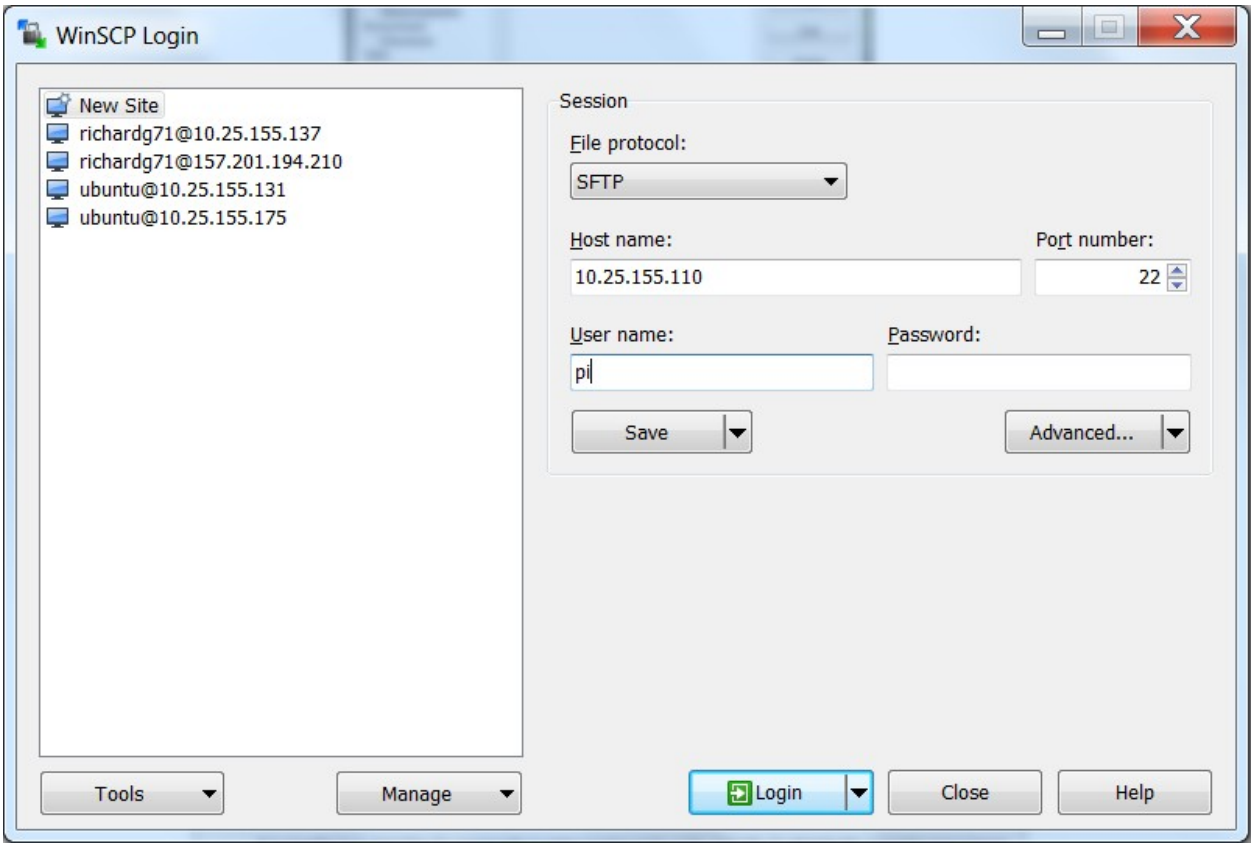

Remote Desktop Viewer
Remote View Bookmarks Help
Connect

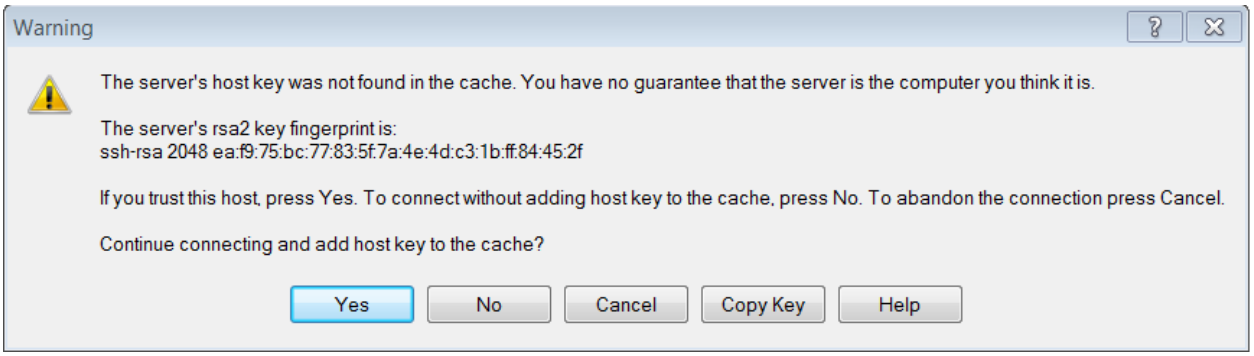

Remote Desktop Viewer
Connect
Connect
Choose a remote desktop to connect to
Protocol:
VNC
Access Unix/Linux, Windows and other remote desktops.
Host:
10.25.155.110:1
Find
Connection options
Fullscreen
VNC Options
View only
Scaling
Keep aspect ratio
Use JPEG Compression
Color Depth:
True Color (24 bits)
Use host
as a SSH tunnel
Help
Cancel
Connect

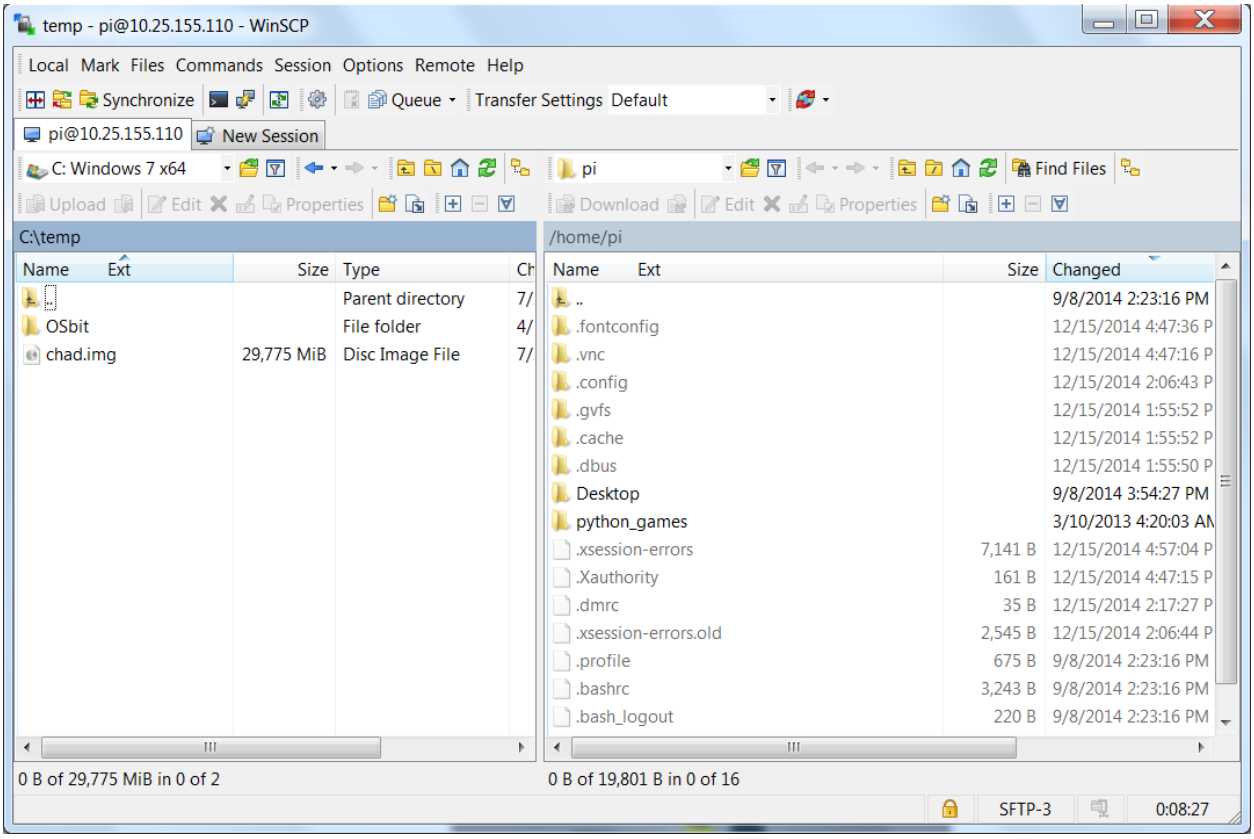

10.25.155.110::5901 - Remote Desktop Viewer
Connect
Send Ctrl-Alt-Del
Remote Desktop Viewer
VNC authentication is required
Host:
10.25.155.110::5901
Password:
Remember this credential
Cancel
Authenticate

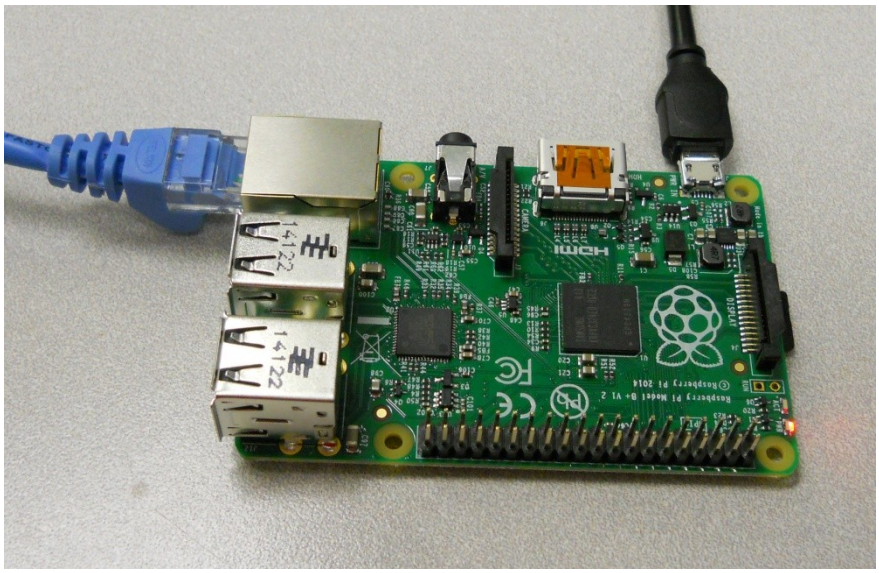

pi's X desktop (raspberrypi:1) – Remote Desktop Viewer
Remote View Bookmarks Help
Connect
Send Ctrl-Alt-Del
10.25.155.176
pi's X desktop (raspberrypi:1)
IDLE
Scratch
Midori
Pi Store
WiFi Config
Debian Reference
LXTerminal
Python Games
Shutdown
OCR Resources

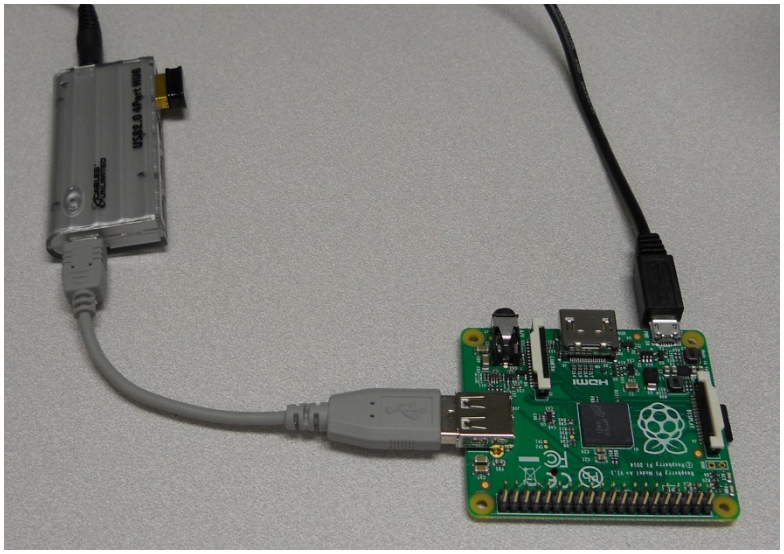

WinSCP Login
Session
Stored sessions
Environment
Directories
SSH
Preferences
r
New
Edit
Delete
Rename
New folder...
Set defaults
Shell icon...
Tools...
Advanced options
About...
Languages
Login
Save...
Close

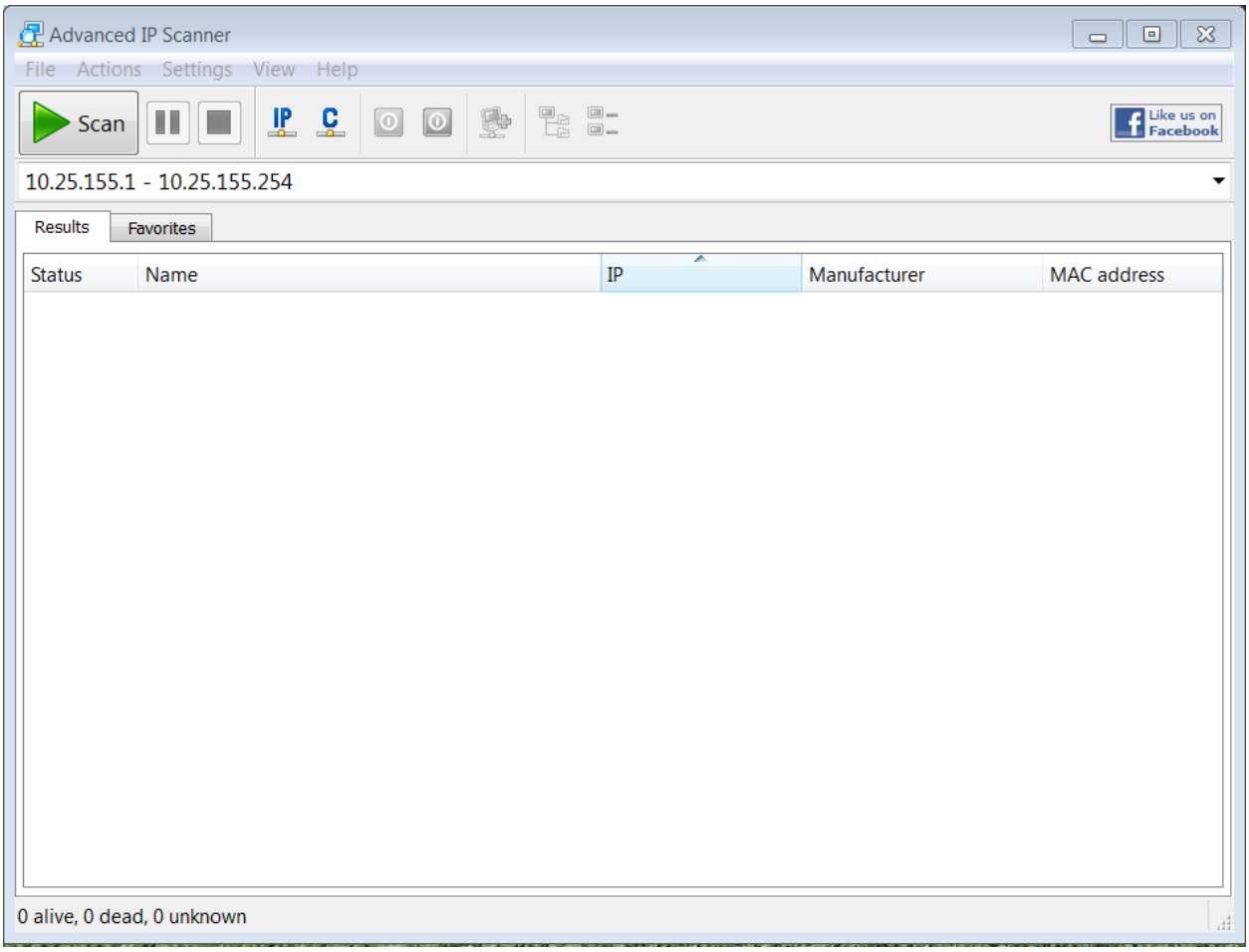

WinSCP Login
New Site
richardg71@10.25.155.137
richardg71@157.201.194.210
ubuntu@10.25.155.131
ubuntu@10.25.155.175
Session
File protocol:
SFTP
Host name:
Port number:
10.25.155.110
22
User name:
Password:
pi
Save
Advanced...
Tools
Manage
Login
Close
Help


Warning
The server's host key was not found in the cache. You have no guarantee that the server is the computer you think it is.
The server's rsa2 key fingerprint is:
ssh-rsa 2048 ea:f9:75:bc:77:83:5f:7a:4e:4d:c3:1b:ff:84:45:2f
If you trust this host, press Yes. To connect without adding host key to the cache, press No. To abandon the connection press Cancel.
Continue connecting and add host key to the cache?
Yes
No
Cancel
Copy Key
Help

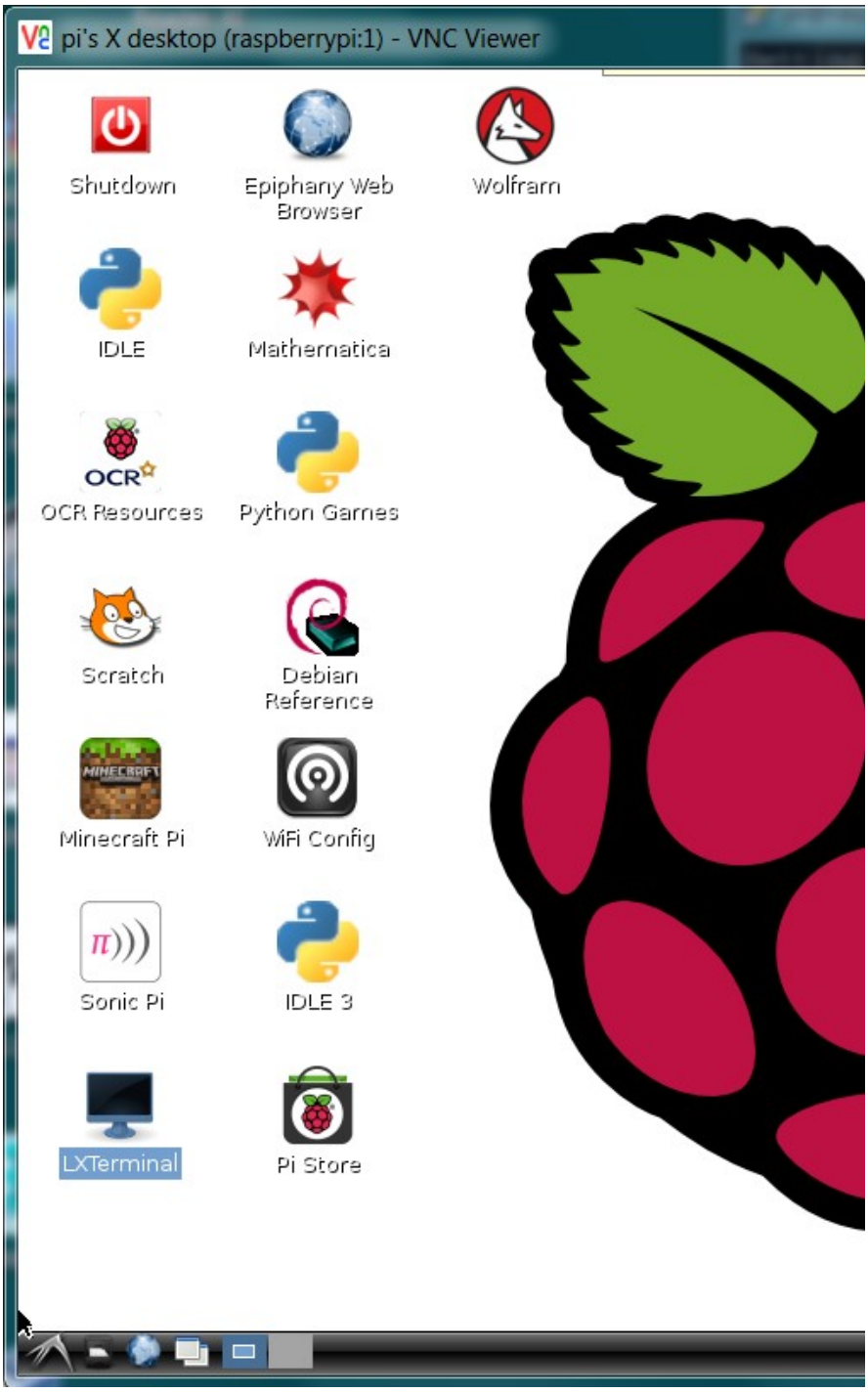

temp - pi@10.25.155.110 - WinSCP
Local Mark Files Commands Session Options Remote Help
Synchronize
Queue
Transfer Settings Default
pi@10.25.155.110
New Session
C: Windows 7 x64
pi
Find Files
Upload
Edit
Properties
Download
Edit
Properties
C:\temp
/home/pi
Name Ext Size Type Ch
Parent directory 7/
OSbit File folder 4/
chad.img 29,775 MiB Disc Image File 7/
Name Ext Size Changed
.. 9/8/2014 2:23:16 PM
.fontconfig 12/15/2014 4:47:36 P
.vnc 12/15/2014 4:47:16 P
.config 12/15/2014 2:06:43 P
.gvfs 12/15/2014 1:55:52 P
.cache 12/15/2014 1:55:52 P
.dbus 12/15/2014 1:55:50 P
Desktop 9/8/2014 3:54:27 PM
python_games 3/10/2013 4:20:03 AM
.xsession-errors 7,141 B 12/15/2014 4:57:04 P
.Xauthority 161 B 12/15/2014 4:47:15 P
.dmrc 35 B 12/15/2014 2:17:27 P
.xsession-errors.old 2,545 B 12/15/2014 2:06:44 P
.profile 675 B 9/8/2014 2:23:16 PM
.bashrc 3,243 B 9/8/2014 2:23:16 PM
.bash_logout 220 B 9/8/2014 2:23:16 PM
0 B of 29,775 MiB in 0 of 2
0 B of 19,801 B in 0 of 16
SFTP-3
0:08:27

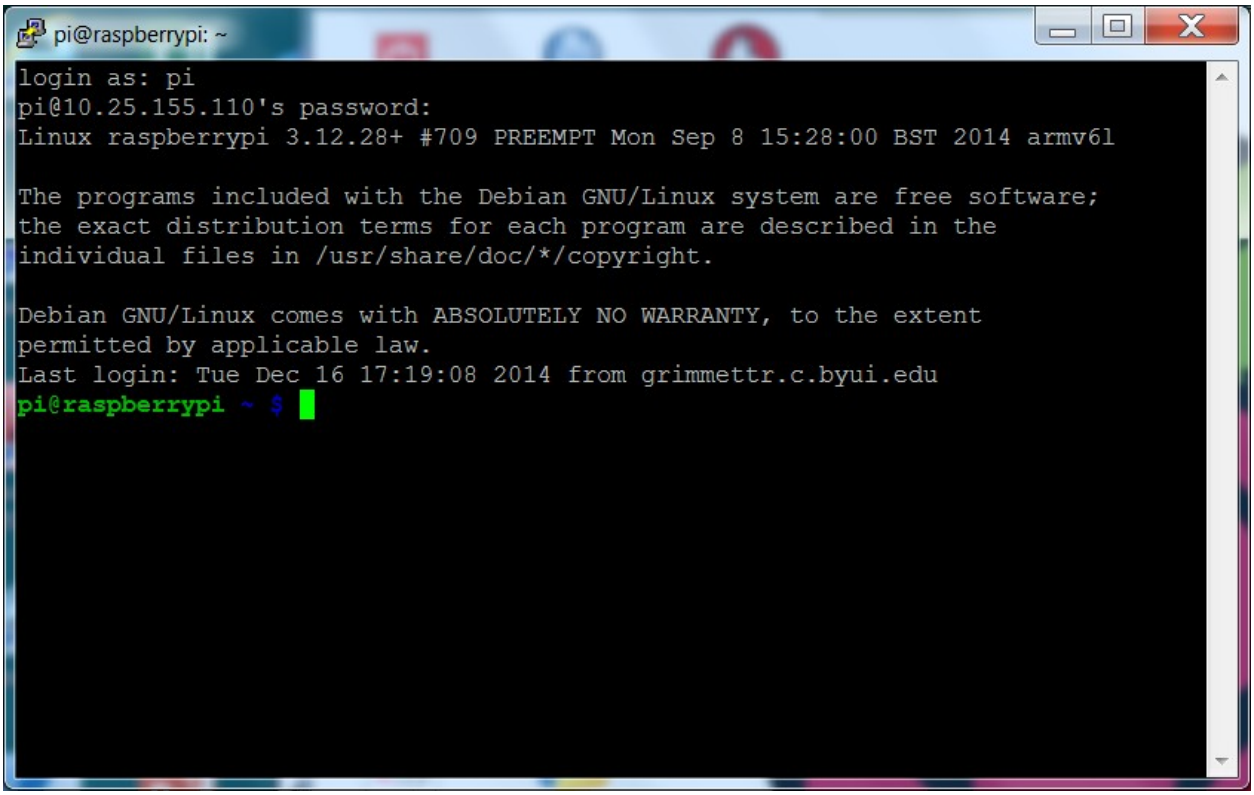


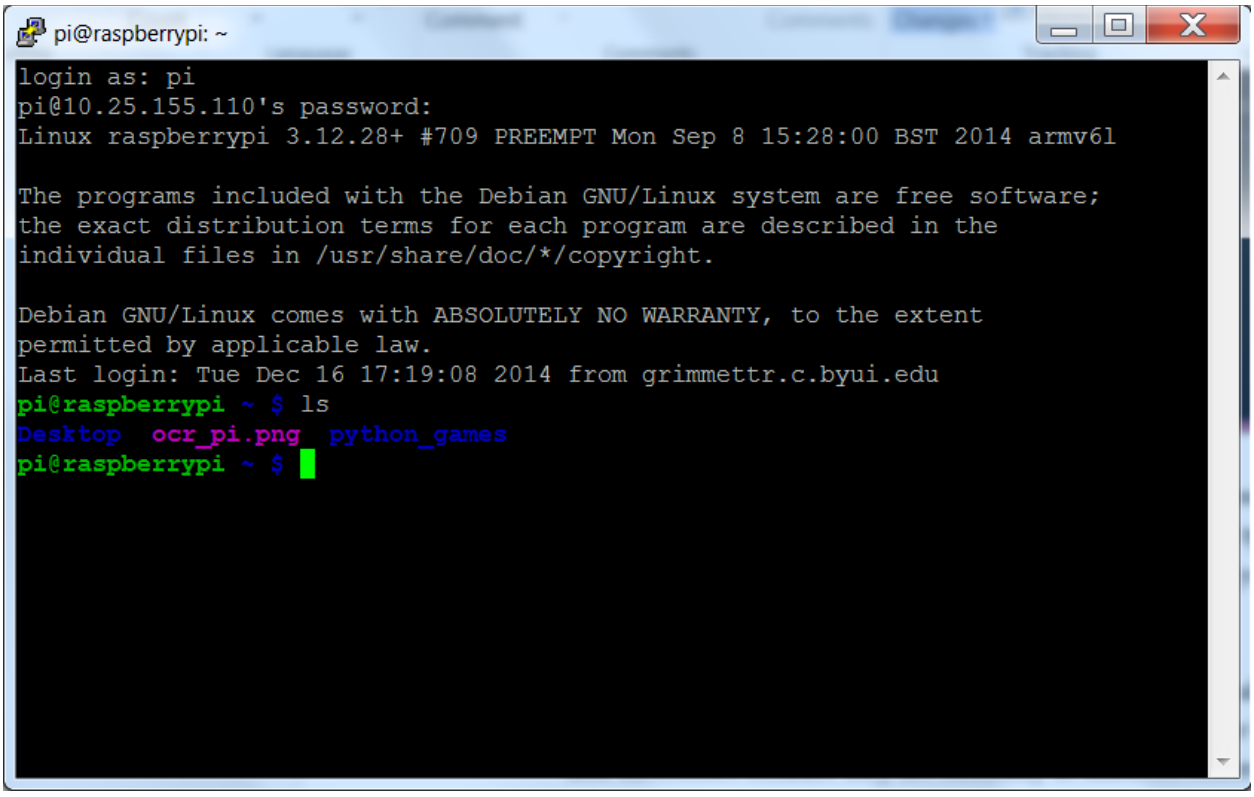



Advanced IP Scanner
File
Actions
Settings
View
Help
Scan
IP
C
Like us on Facebook
10.25.155.1 - 10.25.155.254
Results
Favorites
Status
Name
IP
Manufacturer
MAC address
0 alive, 0 dead, 0 unknown

Chapter 2: Programming Raspberry Pi




pi@raspberrypi: ~
login as: pi
pi@10.25.155.110's password:
Linux raspberrypi 3.12.28+ #709 PREEMPT Mon Sep 8 15:28:00 BST 2014 armv6l
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Tue Dec 16 17:19:08 2014 from grimmettr.c.byui.edu
pi@raspberrypi ~ $


pi@raspberrypi: ~
login as: pi
pi@10.25.155.110's password:
Linux raspberrypi 3.12.28+ #709 PREEMPT Mon Sep 8 15:28:00 BST 2014 armv6l
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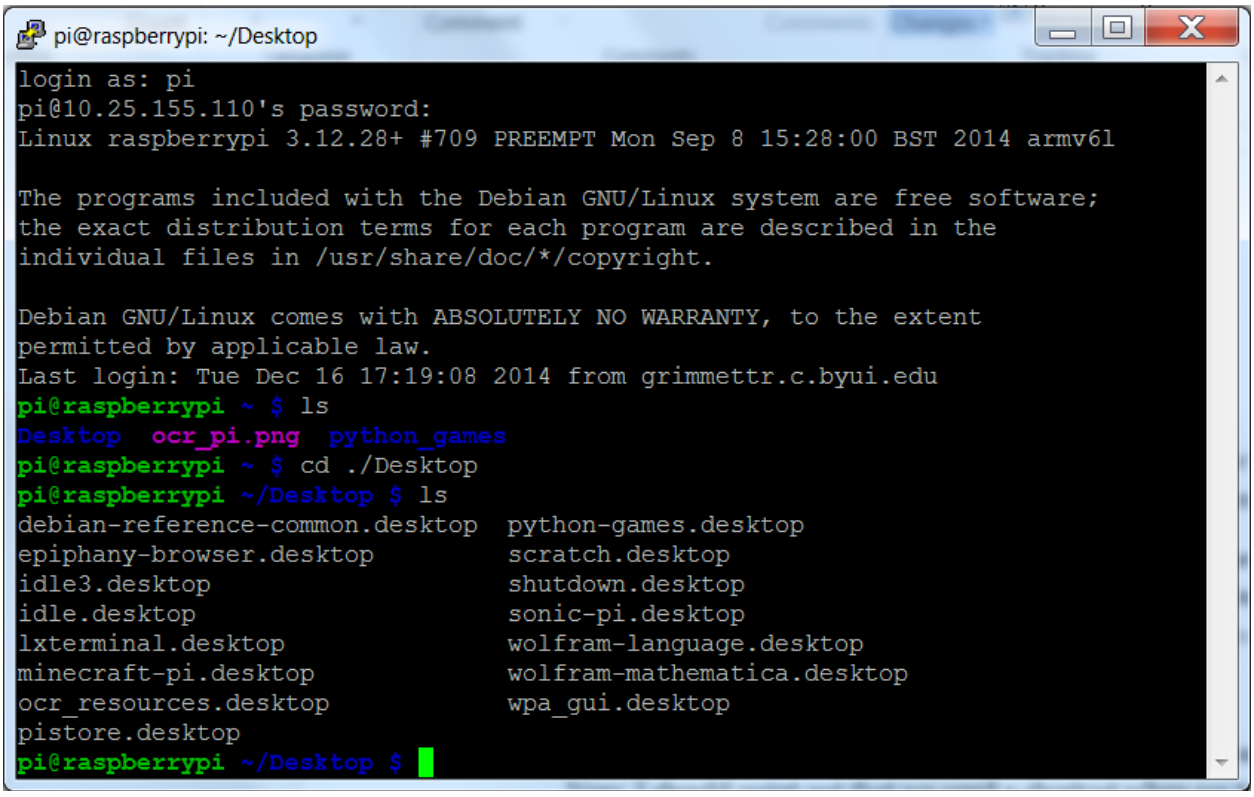
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Tue Dec 16 17:19:08 2014 from grimmettr.c.byui.edu
pi@raspberrypi ~ $ ls
Desktop ocr_pi.png python_games
pi@raspberrypi ~ $


pi@raspberrypi: ~/Desktop
login as: pi
pi@10.25.155.110's password:
Linux raspberrypi 3.12.28+ #709 PREEMPT Mon Sep 8 15:28:00 BST 2014 armv6l
The programs included with the Debian GNU/Linux system are free software;
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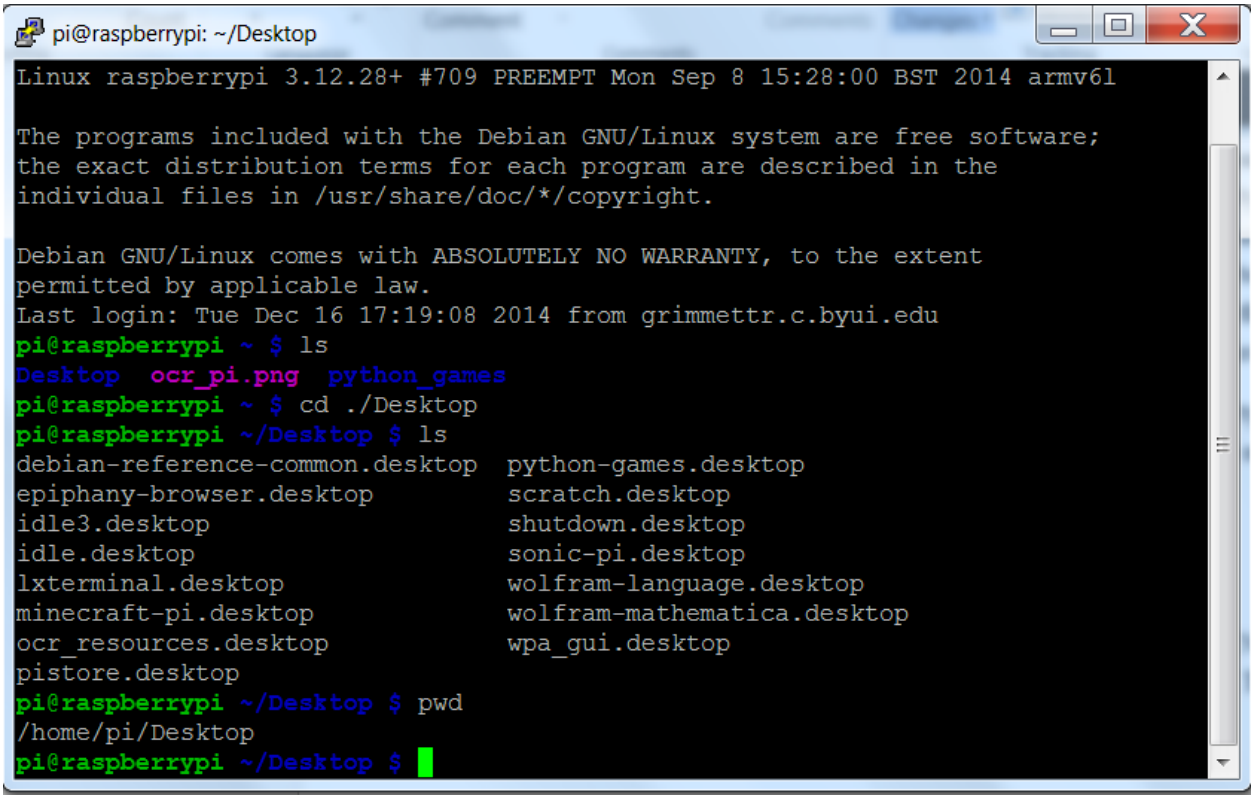
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.
Last login: Tue Dec 16 17:19:08 2014 from grimmettr.c.byui.edu
pi@raspberrypi ~ $ ls
Desktop ocr_pi.png python_games
pi@raspberrypi ~ $ cd ./Desktop
pi@raspberrypi ~/Desktop $ ls
debian-reference-common.desktop python-games.desktop
epiphany-browser.desktop scratch.desktop
idle3.desktop shutdown.desktop
idle.desktop sonic-pi.desktop
lxterminal.desktop wolfram-language.desktop
minecraft-pi.desktop wolfram-mathematica.desktop
ocr_resources.desktop wpa_gui.desktop
pistore.desktop
pi@raspberrypi ~/Desktop $


pi@raspberrypi: ~/Desktop
Linux raspberrypi 3.12.28+ #709 PREEMPT Mon Sep 8 15:28:00 BST 2014 armv6l
The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
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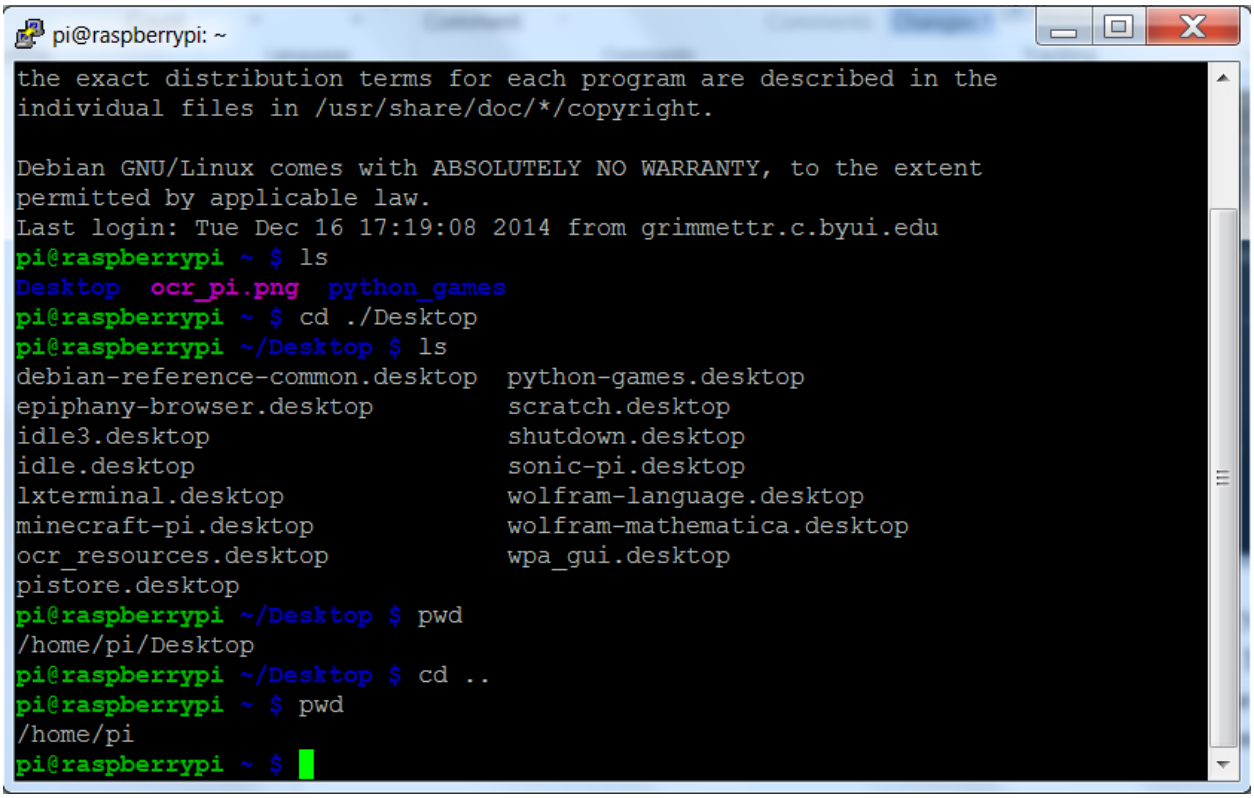
pi@raspberrypi ~ $ ls
Desktop ocr_pi.png python_games
pi@raspberrypi ~ $ cd ./Desktop
pi@raspberrypi ~/Desktop $ ls
debian-reference-common.desktop python-games.desktop
epiphany-browser.desktop scratch.desktop
idle3.desktop shutdown.desktop
idle.desktop sonic-pi.desktop
lxterminal.desktop wolfram-language.desktop
minecraft-pi.desktop wolfram-mathematica.desktop
ocr_resources.desktop wpa_gui.desktop
pistore.desktop
pi@raspberrypi ~/Desktop $ pwd
/home/pi/Desktop
pi@raspberrypi ~/Desktop $


pi@raspberrypi: ~
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.
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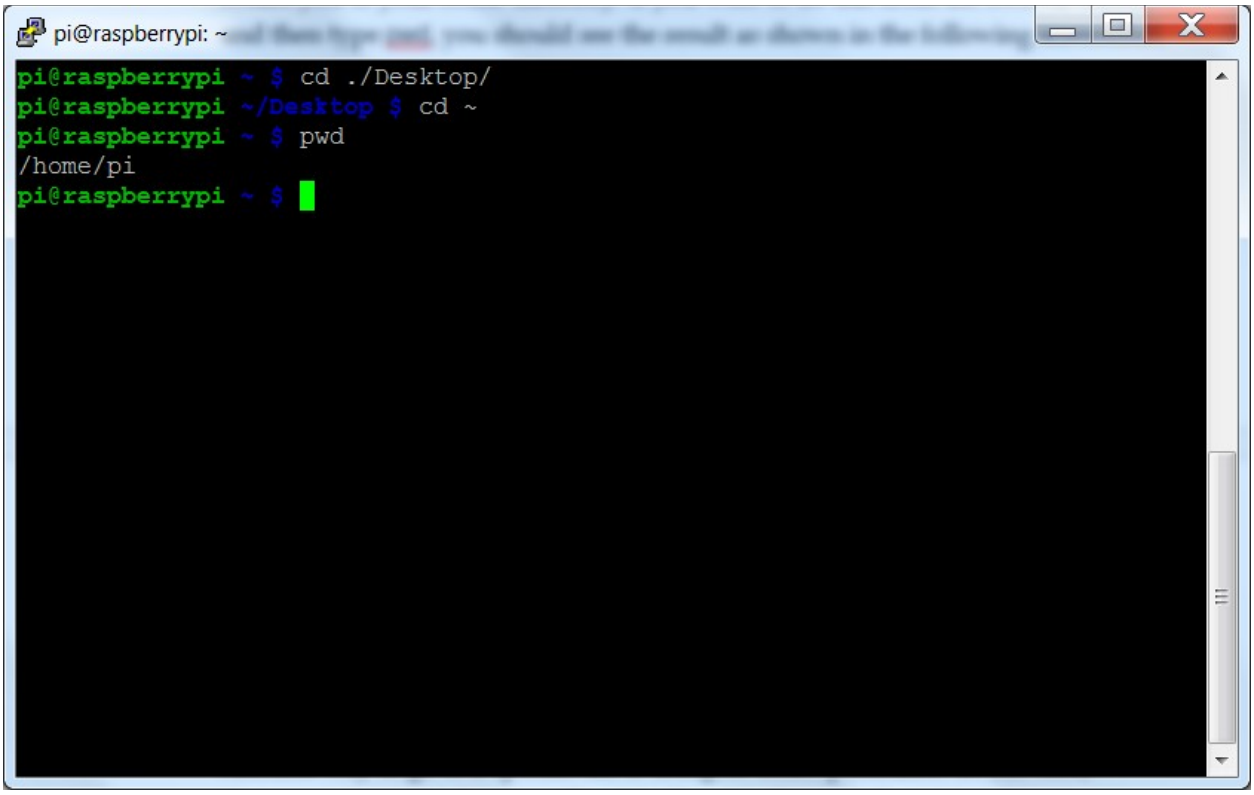
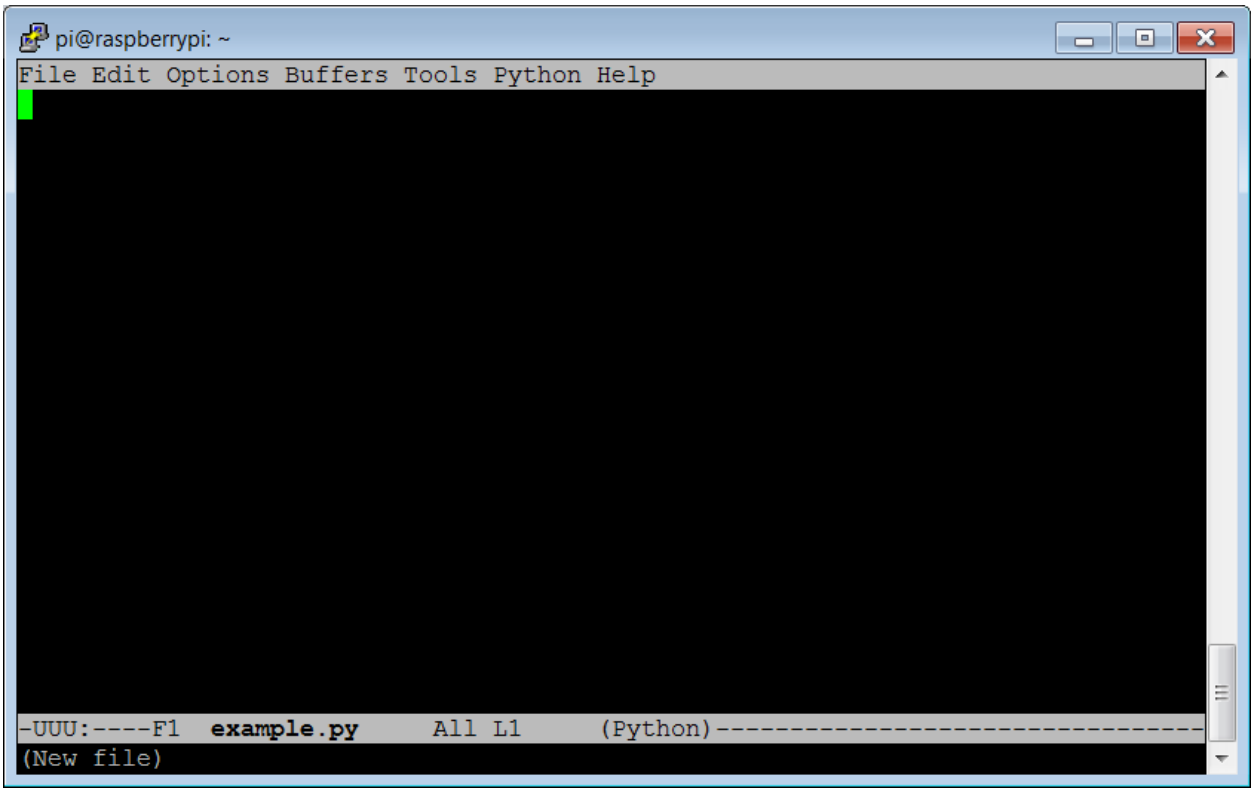
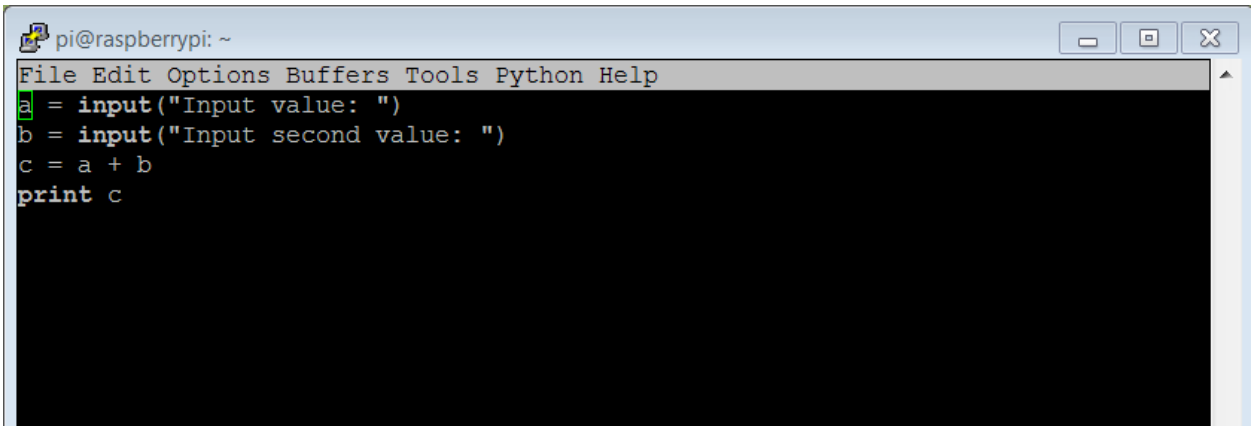
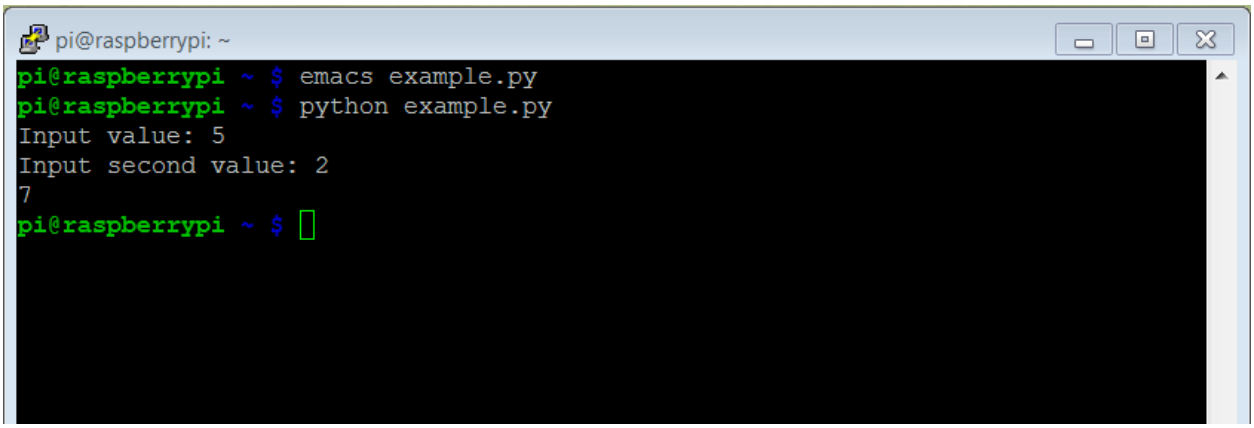
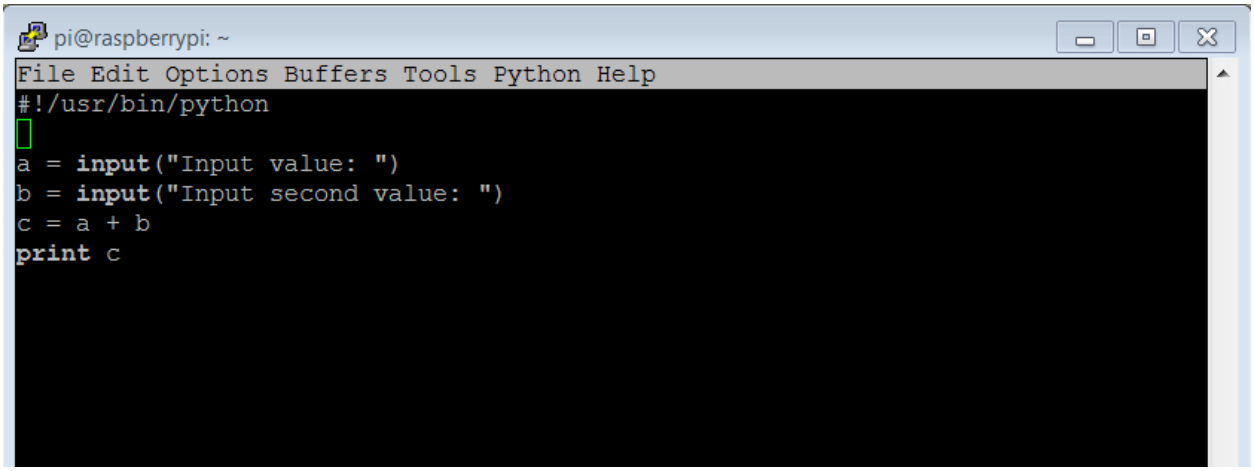
permitted by applicable law.
Last login: Tue Dec 16 17:19:08 2014 from grimmettr.c.byui.edu
pi@raspberrypi ~ $ ls
Desktop ocr_pi.png python_games
pi@raspberrypi ~ $ cd ./Desktop
pi@raspberrypi ~/Desktop $ ls
debian-reference-common.desktop python-games.desktop
epiphany-browser.desktop scratch.desktop
idle3.desktop shutdown.desktop
idle.desktop sonic-pi.desktop
lxterminal.desktop wolfram-language.desktop
minecraft-pi.desktop wolfram-mathematica.desktop
ocr_resources.desktop wpa_gui.desktop
pistore.desktop
pi@raspberrypi ~/Desktop $ pwd
/home/pi/Desktop
pi@raspberrypi ~/Desktop $ cd ..
pi@raspberrypi ~ $ pwd
/home/pi
pi@raspberrypi ~ $

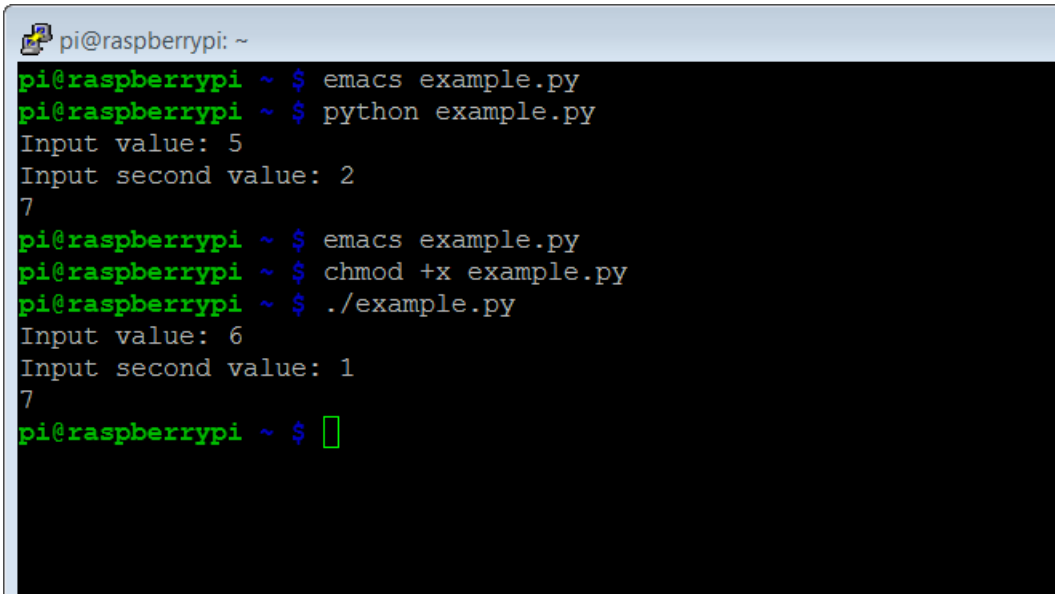

pi@raspberrypi: ~
pi@raspberrypi ~ $ cd ./Desktop/
pi@raspberrypi ~/Desktop $ cd ~
pi@raspberrypi ~ $ pwd
/home/pi
pi@raspberrypi ~ $

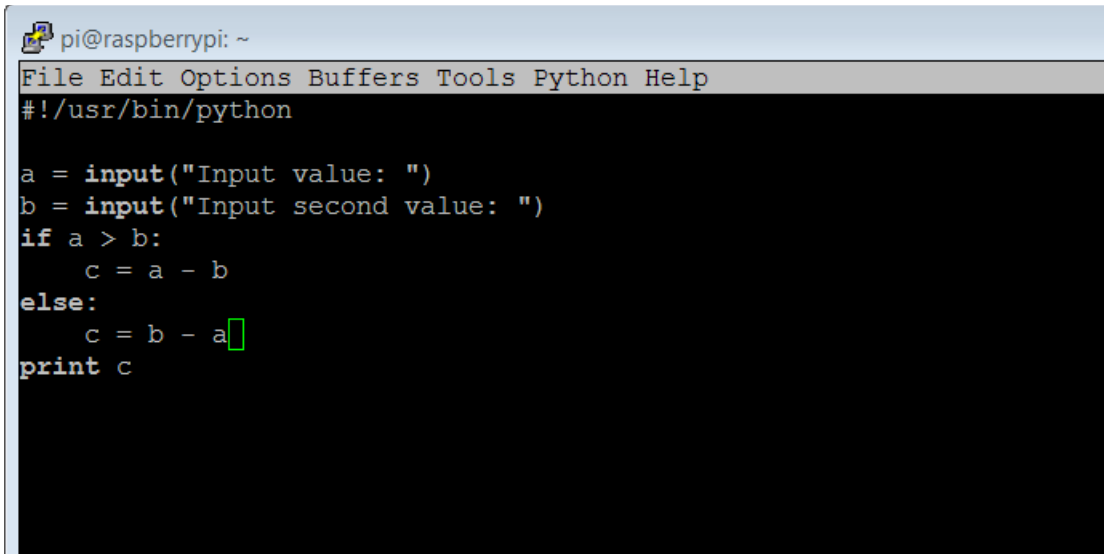

pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
-UUU:----F1 example.py All L1 (Python)----------
(New file)

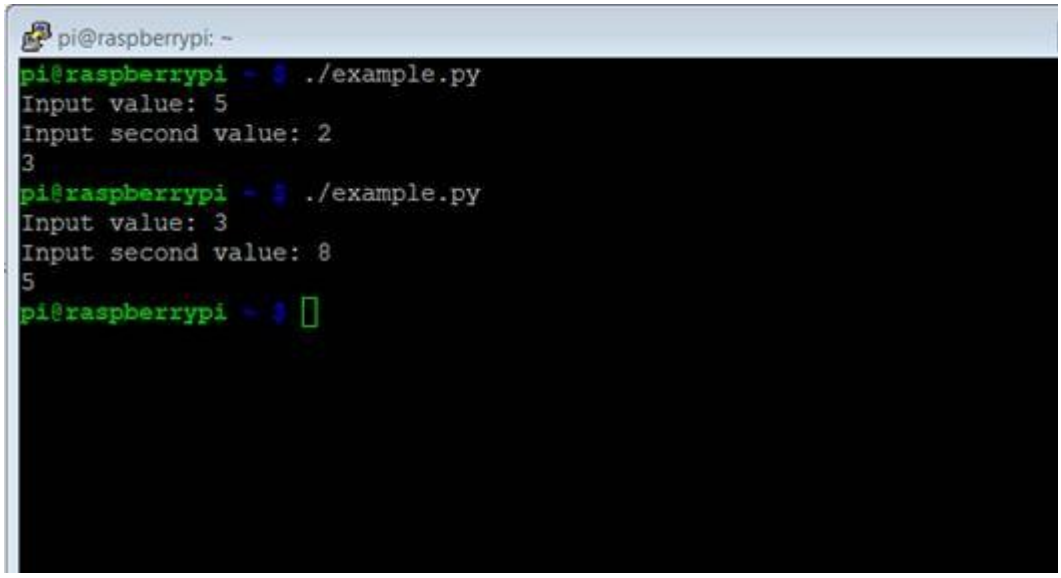

pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
a = input("Input value: ")
b = input("Input second value: ")
c = a + b
print c

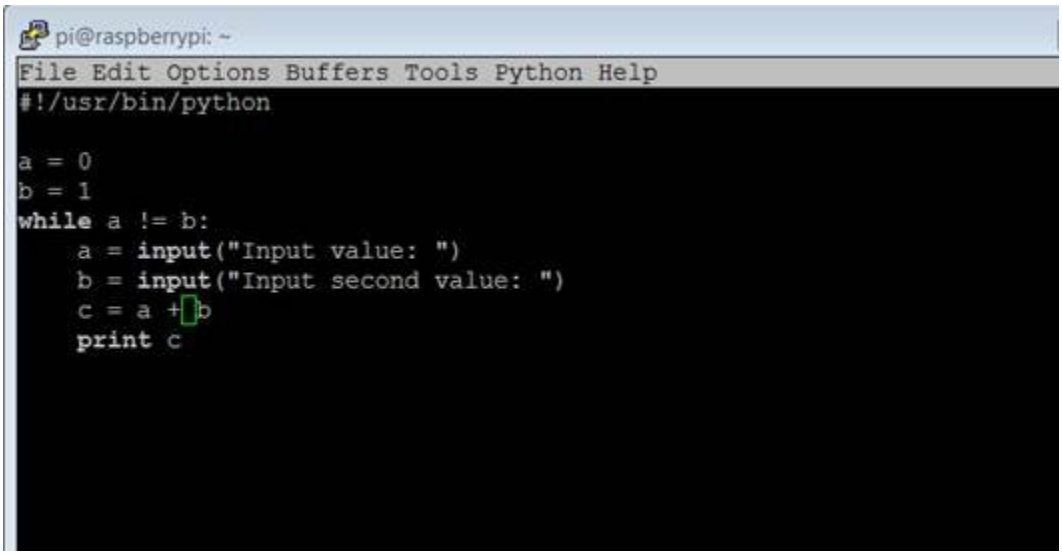

pi@raspberrypi: ~
pi@raspberrypi ~ $ emacs example.py
pi@raspberrypi ~ $ python example.py
Input value: 5
Input second value: 2
7
pi@raspberrypi ~ $

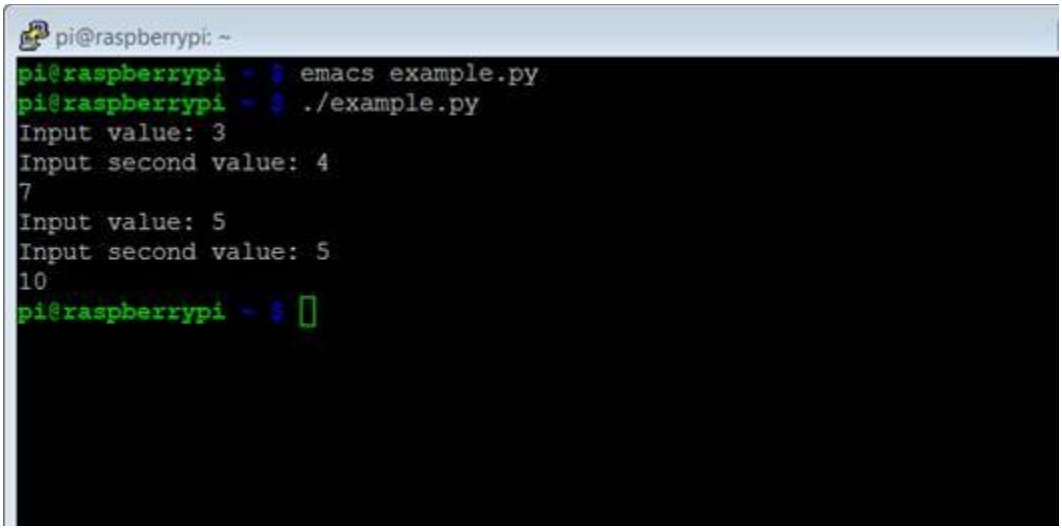

pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
a = input("Input value: ")
b = input("Input second value: ")
c = a + b
print c

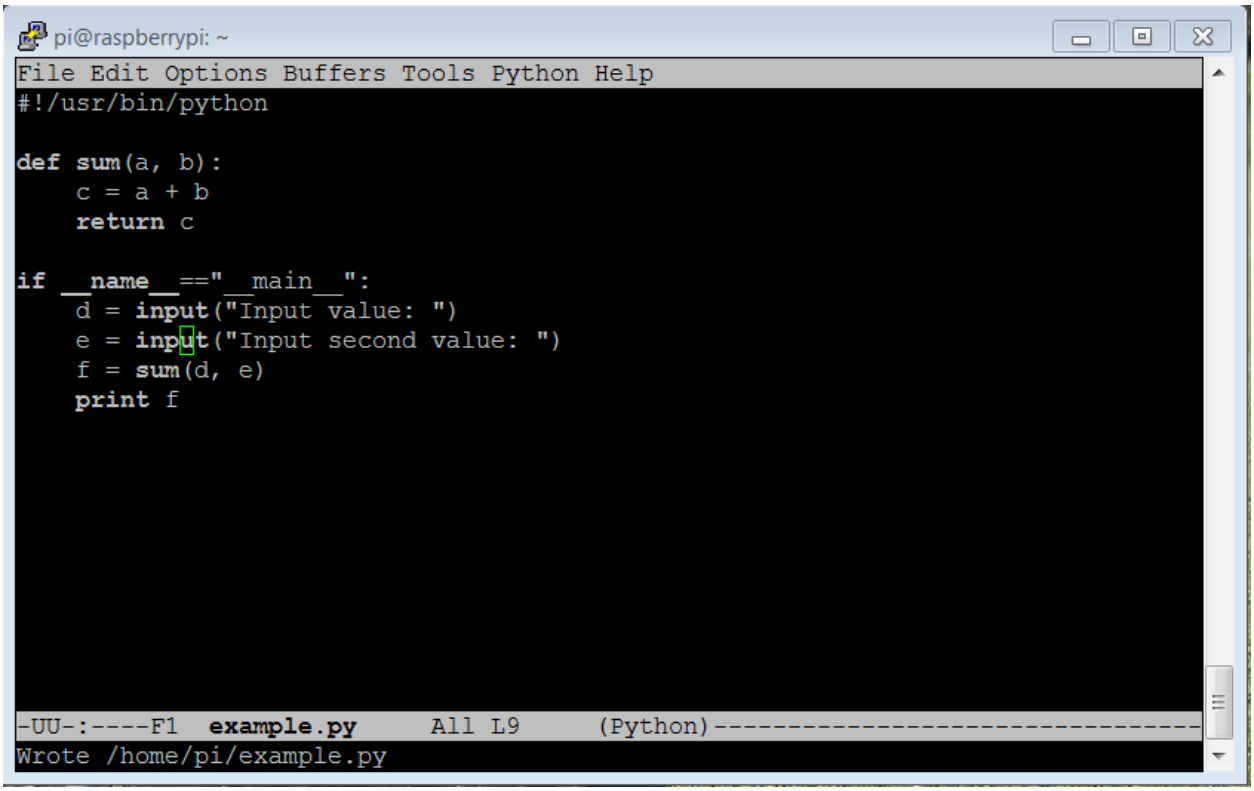

pi@raspberrypi: ~
pi@raspberrypi ~ $ emacs example.py
pi@raspberrypi ~ $ python example.py
Input value: 5
Input second value: 2
7
pi@raspberrypi ~ $ emacs example.py
pi@raspberrypi ~ $ chmod +x example.py
pi@raspberrypi ~ $ ./example.py
Input value: 6
Input second value: 1
7
pi@raspberrypi ~ $

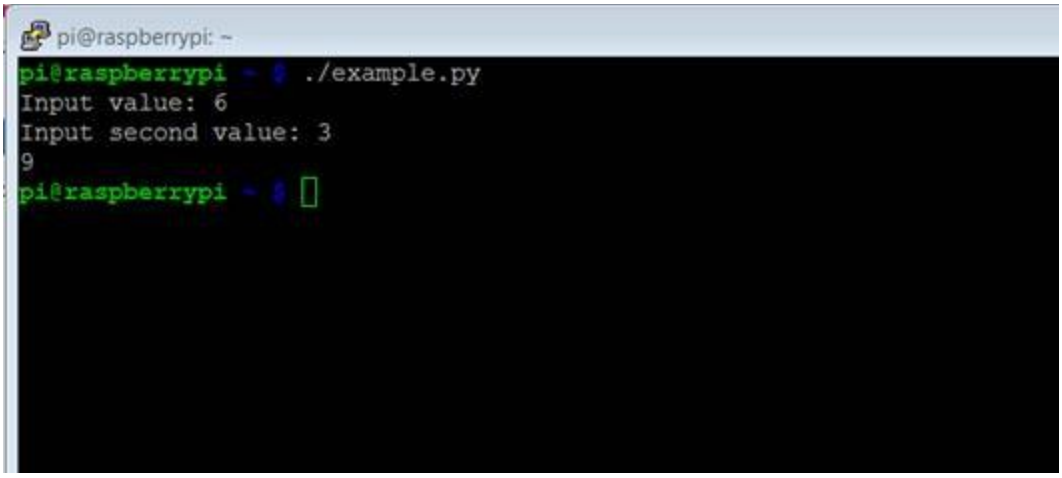

pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
a = input("Input value: ")
b = input("Input second value: ")
if a > b:
c = a - b
else:
c = b - a
print c

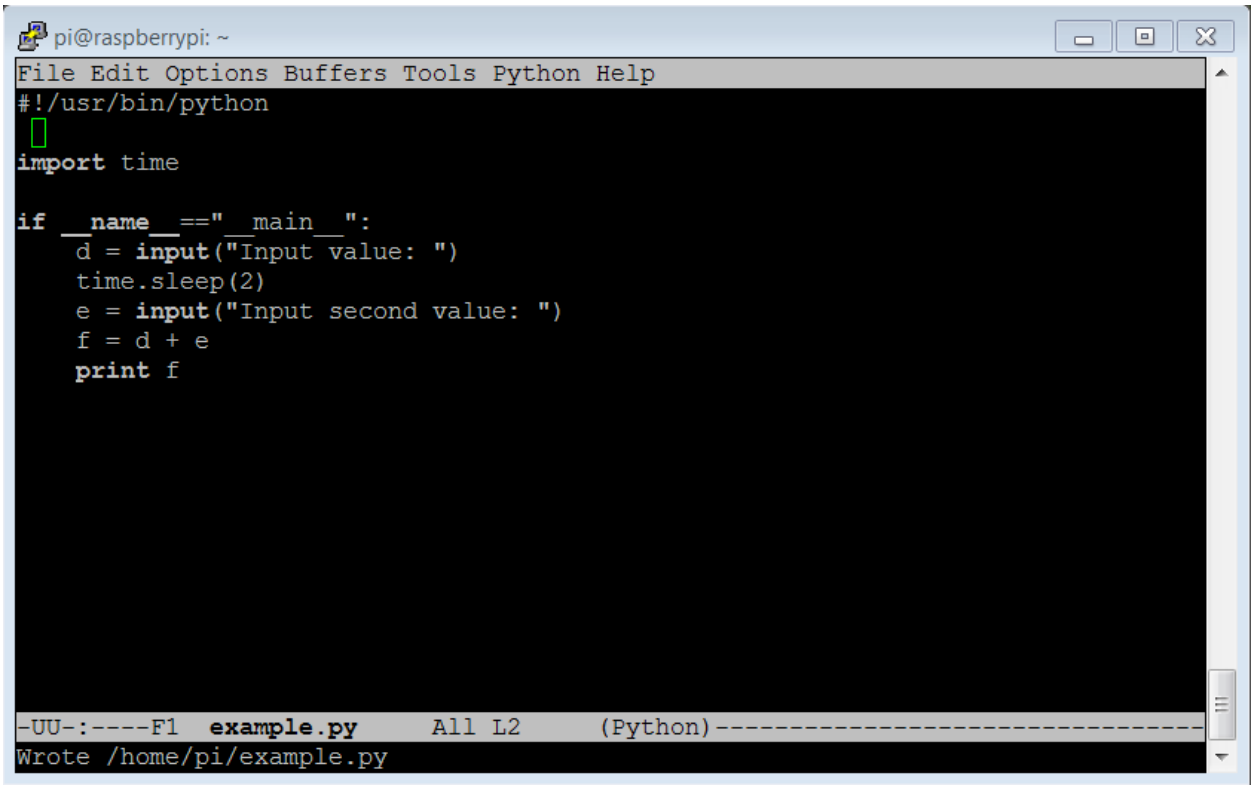

pi@raspberrypi: ~
pi@raspberrypi ~ $ ./example.py
Input value: 5
Input second value: 2
3
pi@raspberrypi ~ $ ./example.py
Input value: 3
Input second value: 8
5
pi@raspberrypi ~ $

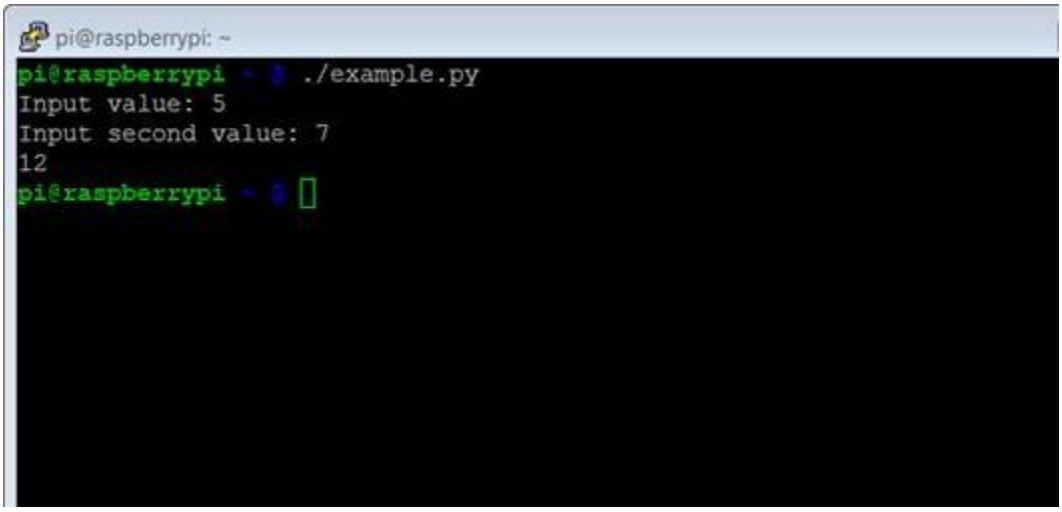

pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
a = 0
b = 1
while a != b:
a = input("Input value: ")
b = input("Input second value: ")
c = a + b
print c

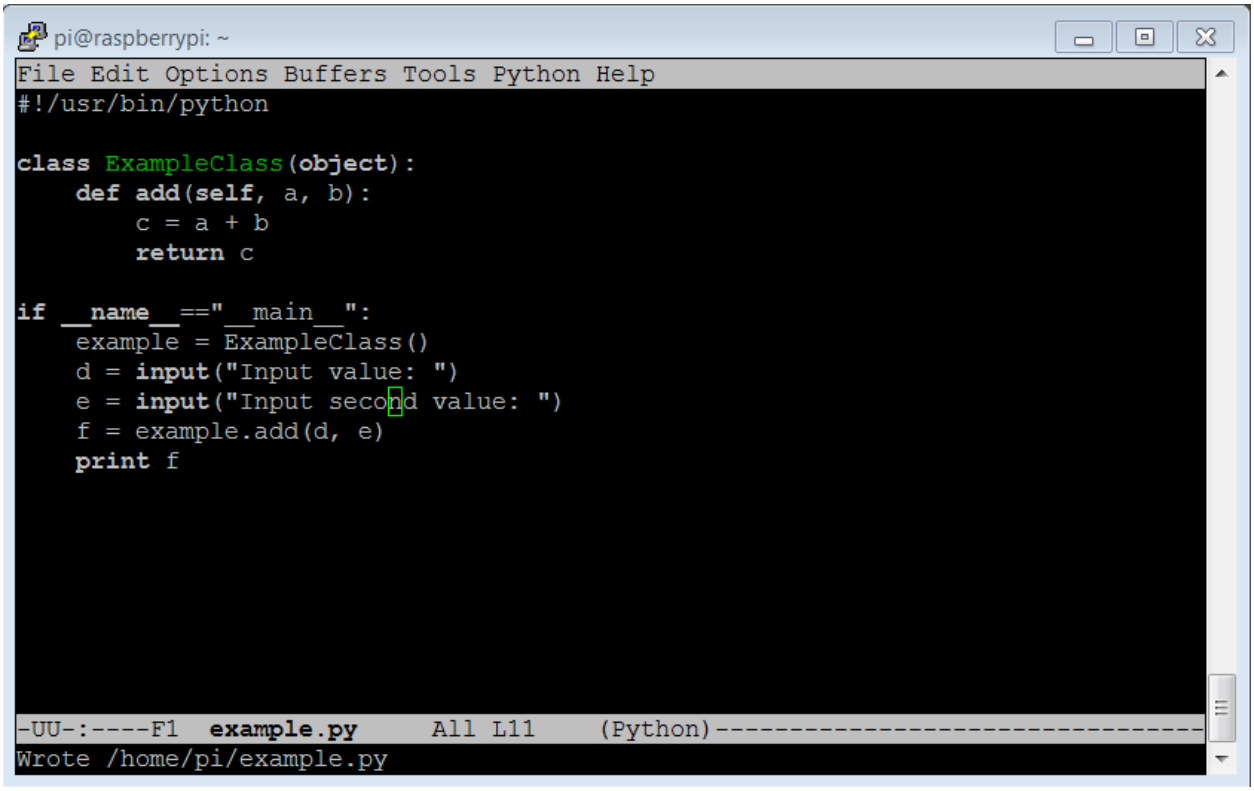

pi@raspberrypi: ~
pi@raspberrypi ~ $ emacs example.py
pi@raspberrypi ~ $ ./example.py
Input value: 3
Input second value: 4
7
Input value: 5
Input second value: 5
10
pi@raspberrypi ~ $

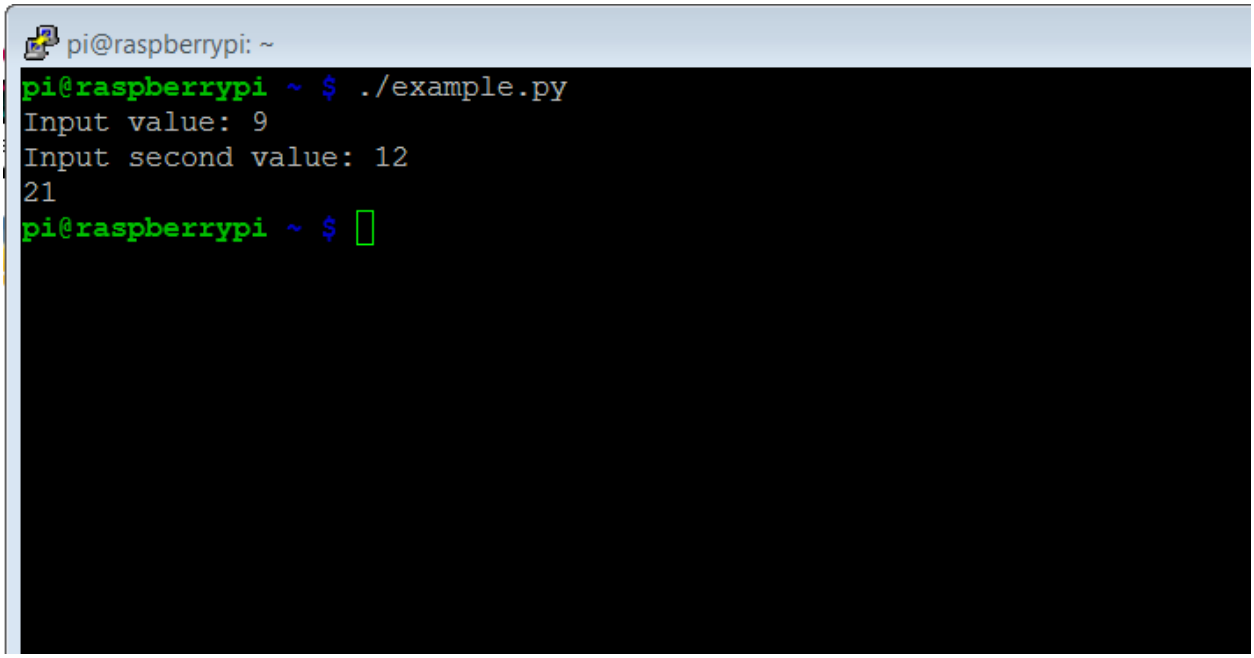

pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
def sum(a, b):
c = a + b
return c
if __name__=="__main__":
d = input("Input value: ")
e = input("Input second value: ")
f = sum(d, e)
print f
-UU-:----F1 example.py All L9 (Python)
Wrote /home/pi/example.py

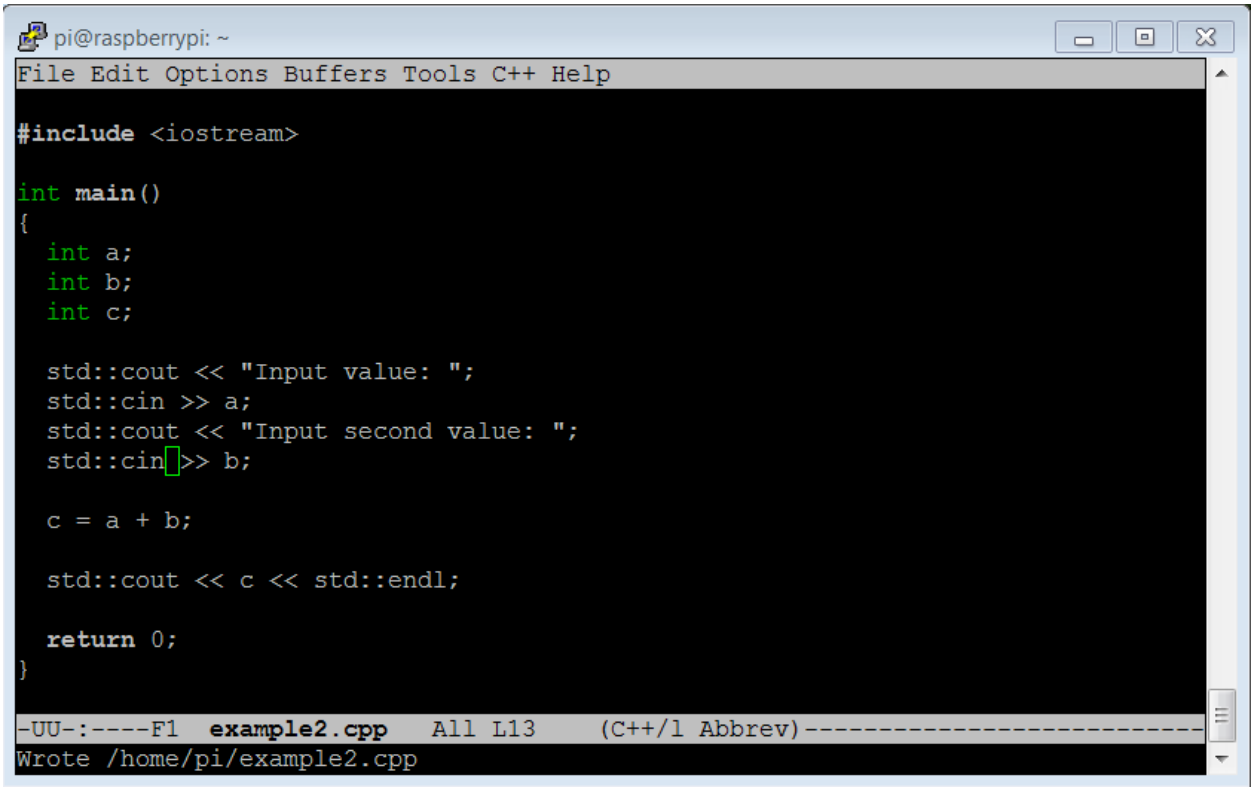

pi@raspberrypi: ~
pi@raspberrypi ~ $ ./example.py
Input value: 6
Input second value: 3
9
pi@raspberrypi ~ $

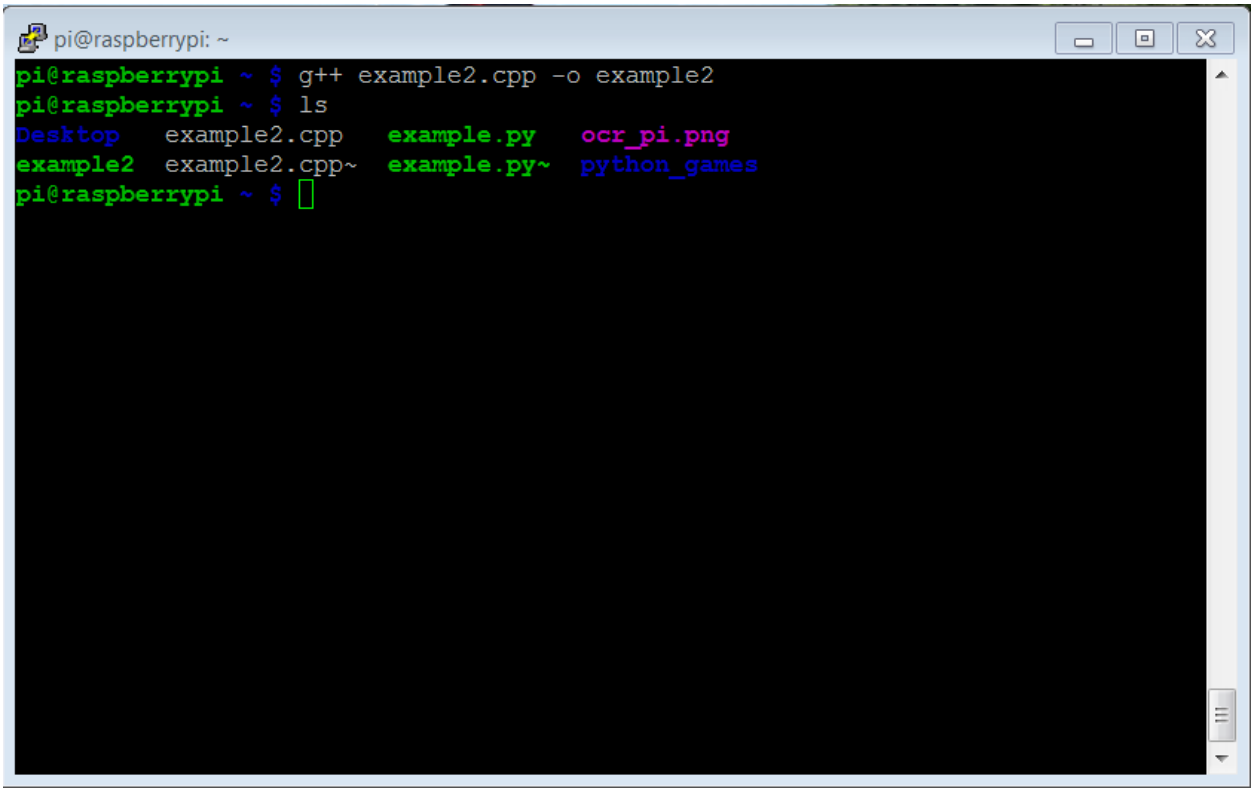

pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
import time
if __name__=="__main__":
d = input("Input value: ")
time.sleep(2)
e = input("Input second value: ")
f = d + e
print f
-UU-:----F1 example.py All L2 (Python)
Wrote /home/pi/example.py

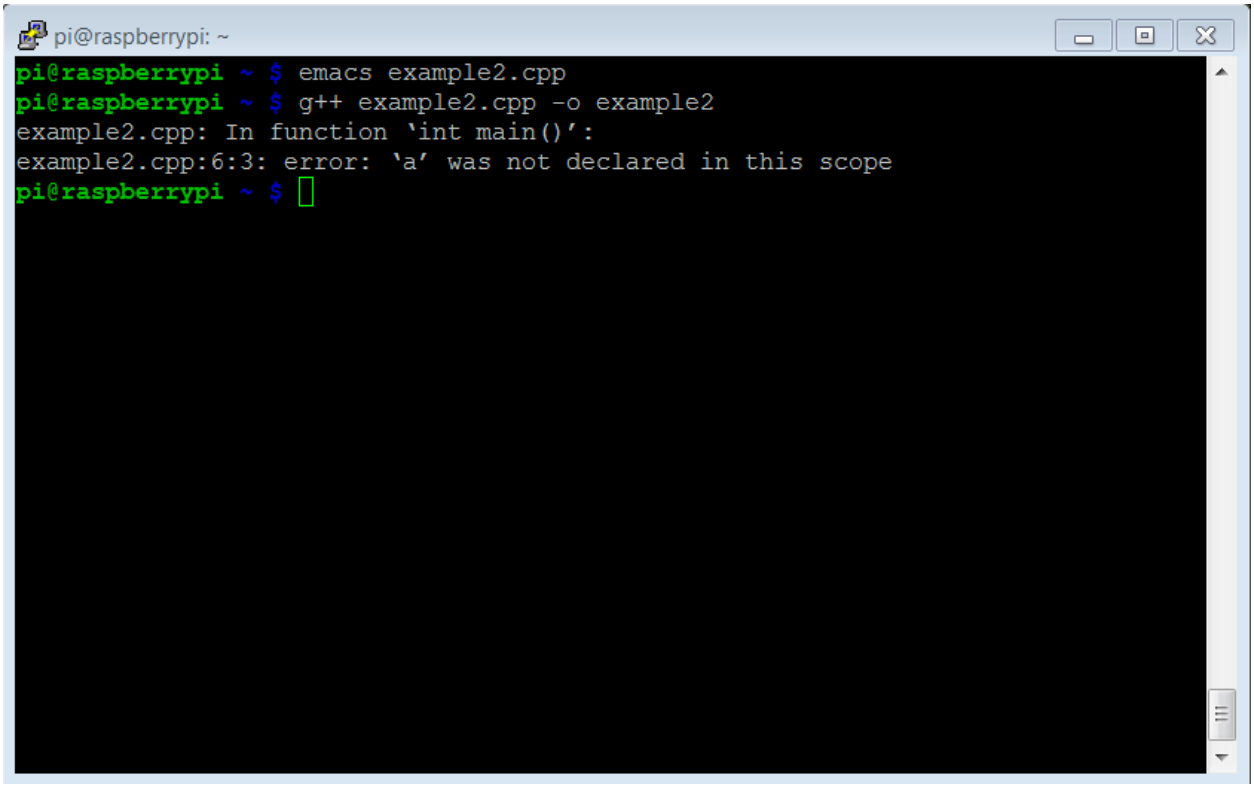

pi@raspberrypi: ~
pi@raspberrypi ~ $ ./example.py
Input value: 5
Input second value: 7
12
pi@raspberrypi ~ $

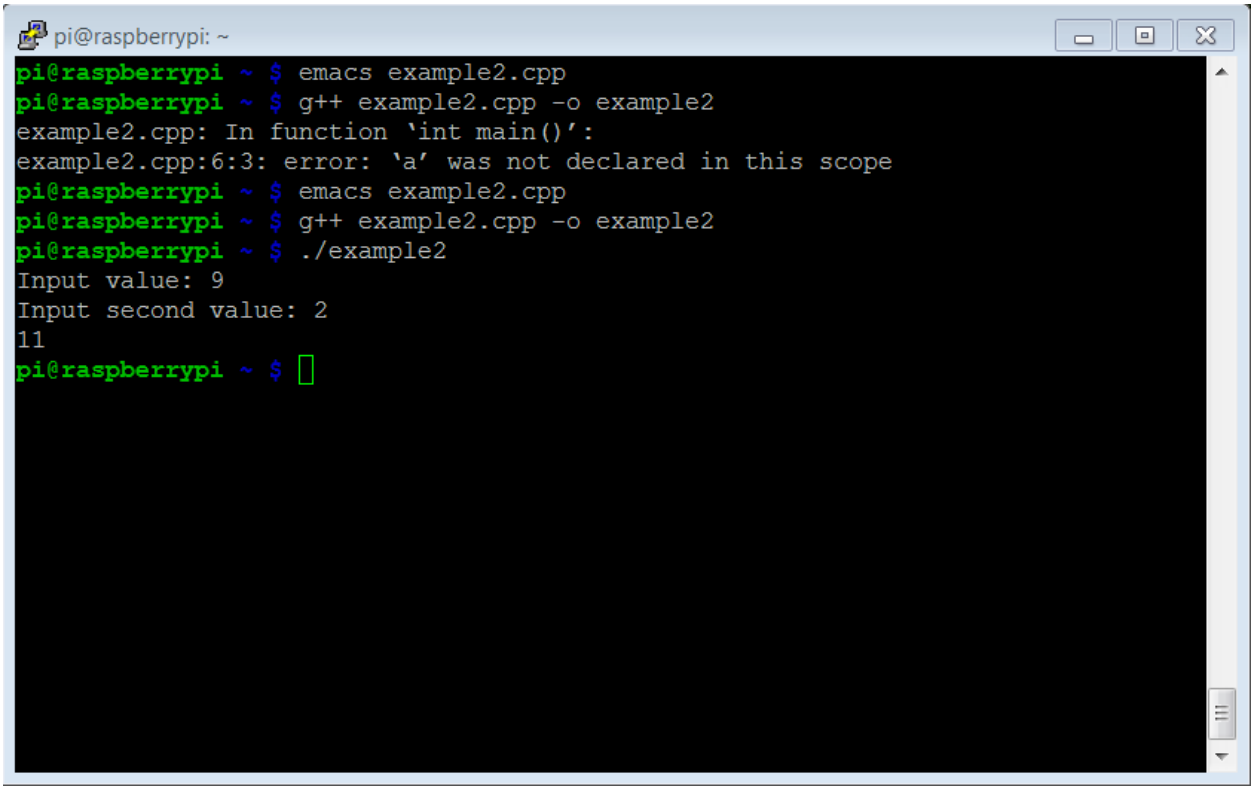

pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
class ExampleClass(object):
def add(self, a, b):
c = a + b
return c
if __name__=="__main__":
example = ExampleClass()
d = input("Input value: ")
e = input("Input second value: ")
f = example.add(d, e)
print f
-UU-:----F1 example.py All L11 (Python)
Wrote /home/pi/example.py


pi@raspberrypi: ~
pi@raspberrypi ~ $ ./example.py
Input value: 9
Input second value: 12
21
pi@raspberrypi ~ $

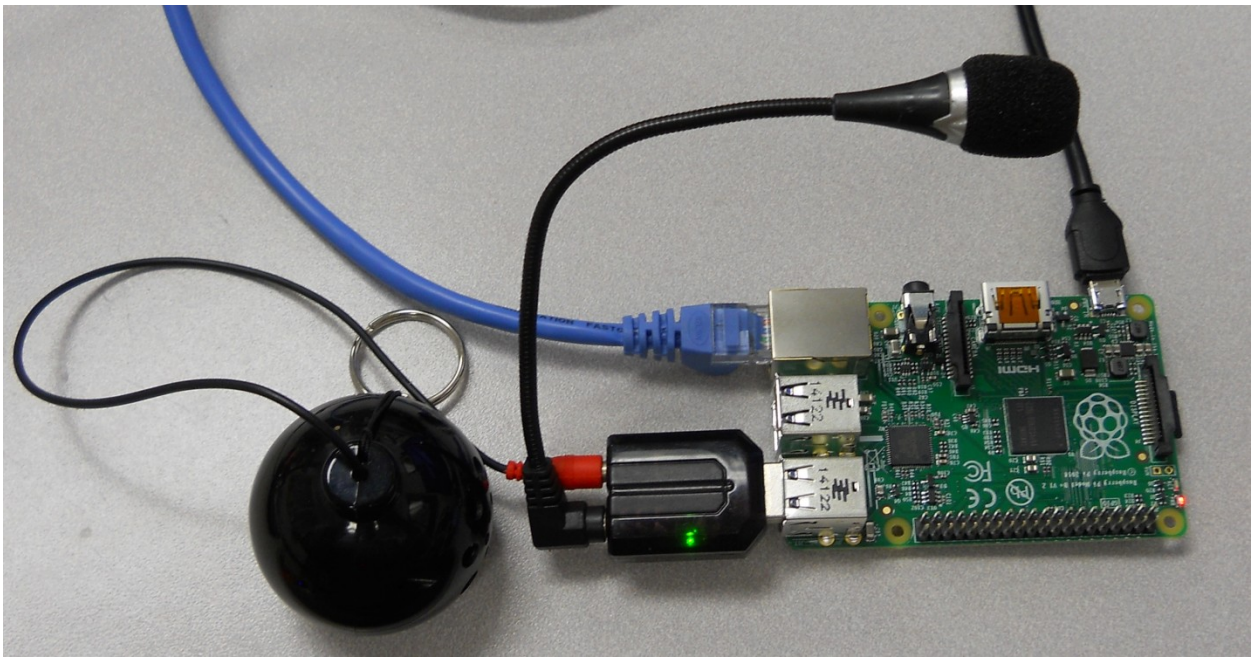

pi@raspberrypi: ~
File Edit Options Buffers Tools C++ Help
#include <iostream>
int main()
{
int a;
int b;
int c;
std::cout << "Input value: ";
std::cin >> a;
std::cout << "Input second value: ";
std::cin >> b;
c = a + b;
std::cout << c << std::endl;
return 0;
}
-UU-:----F1 example2.cpp All L13 (C++/l Abbrev)----------
Wrote /home/pi/example2.cpp

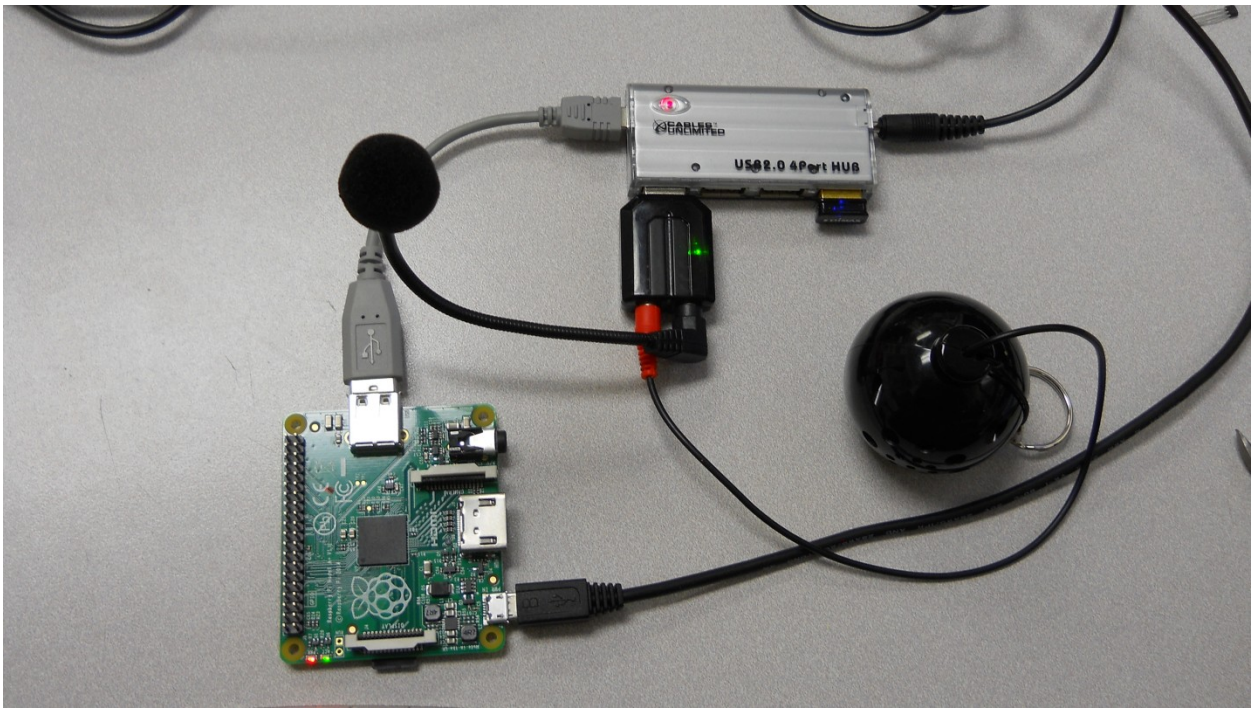

pi@raspberrypi: ~
pi@raspberrypi ~ $ g++ example2.cpp -o example2
pi@raspberrypi ~ $ ls
Desktop example2.cpp example.py ocr_pi.png
example2 example2.cpp~ example.py~ python_games
pi@raspberrypi ~ $

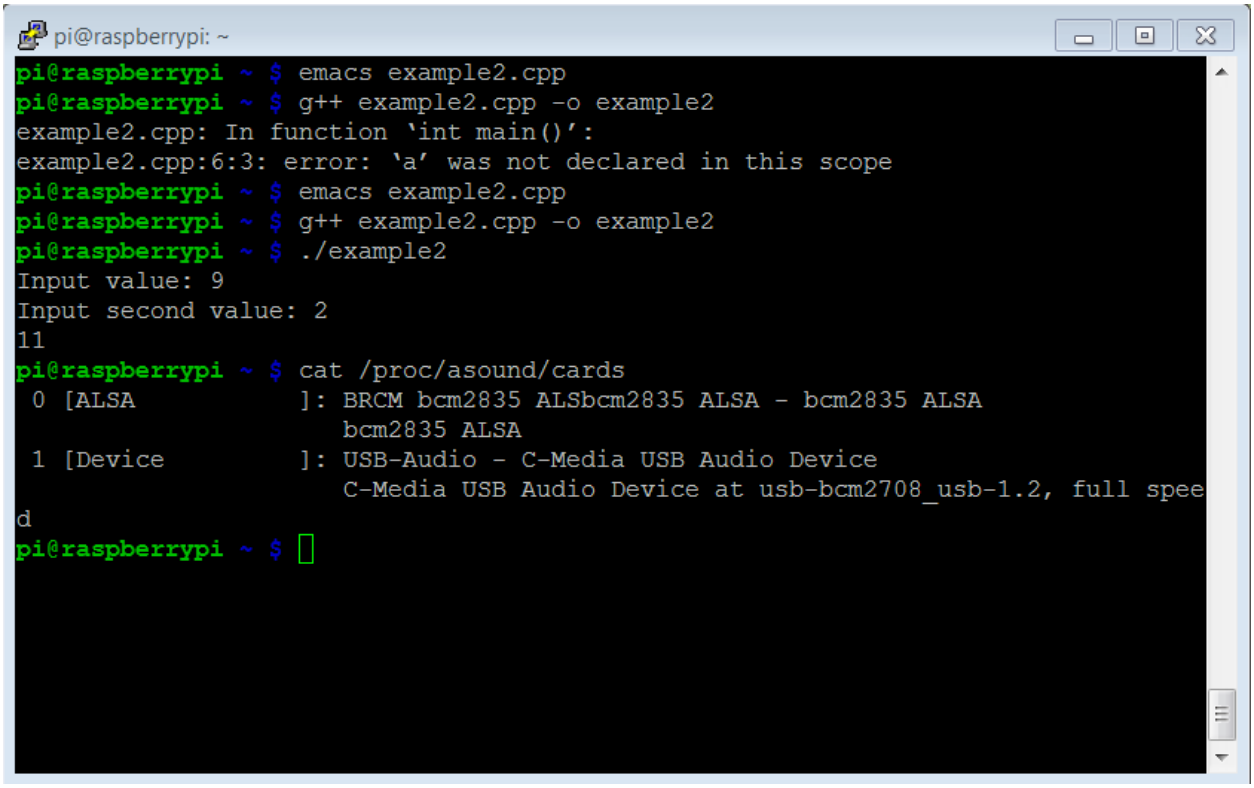

pi@raspberrypi: ~
pi@raspberrypi ~ $ emacs example2.cpp
pi@raspberrypi ~ $ g++ example2.cpp -o example2
example2.cpp: In function 'int main()':
example2.cpp:6:3: error: 'a' was not declared in this scope
pi@raspberrypi ~ $

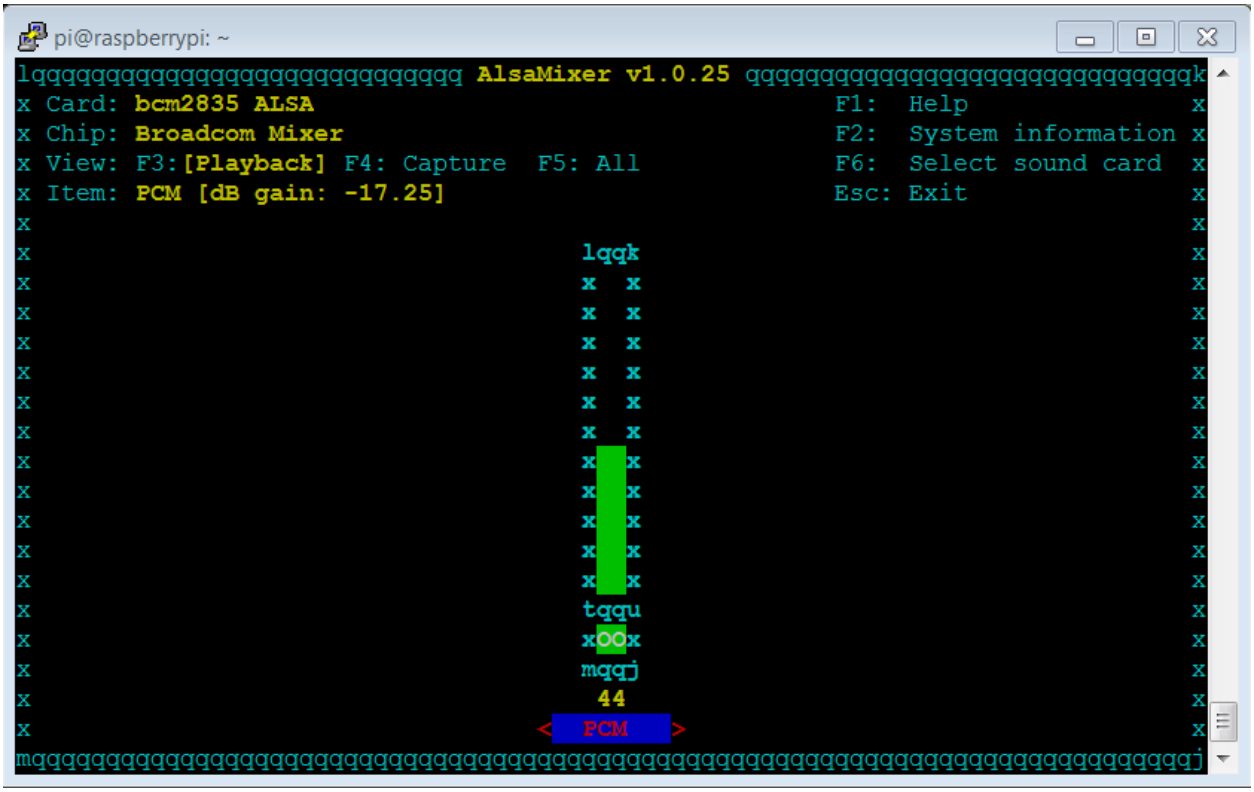

pi@raspberrypi: ~
pi@raspberrypi ~ $ emacs example2.cpp
pi@raspberrypi ~ $ g++ example2.cpp -o example2
example2.cpp: In function 'int main()':
example2.cpp:6:3: error: 'a' was not declared in this scope
pi@raspberrypi ~ $ emacs example2.cpp
pi@raspberrypi ~ $ g++ example2.cpp -o example2
pi@raspberrypi ~ $ ./example2
Input value: 9
Input second value: 2
11
pi@raspberrypi ~ $

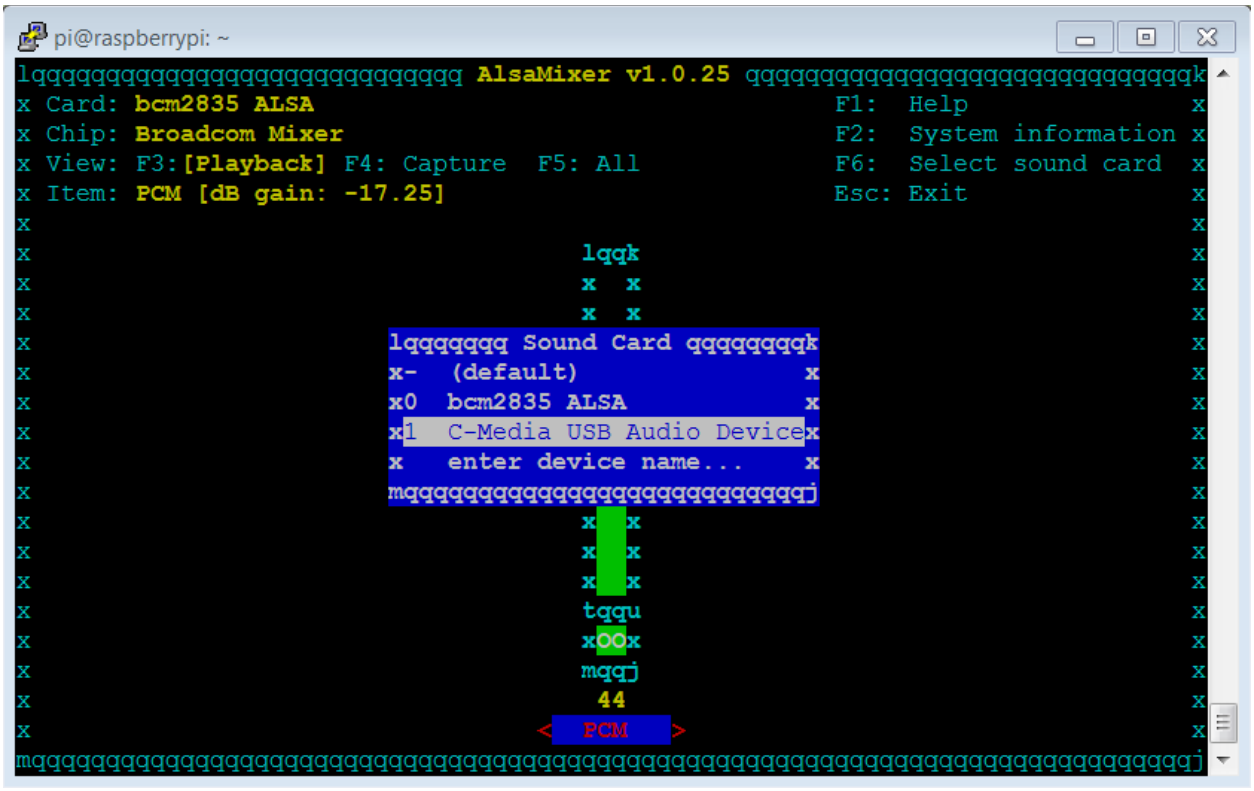
Chapter 3: Providing Speech Input and Output

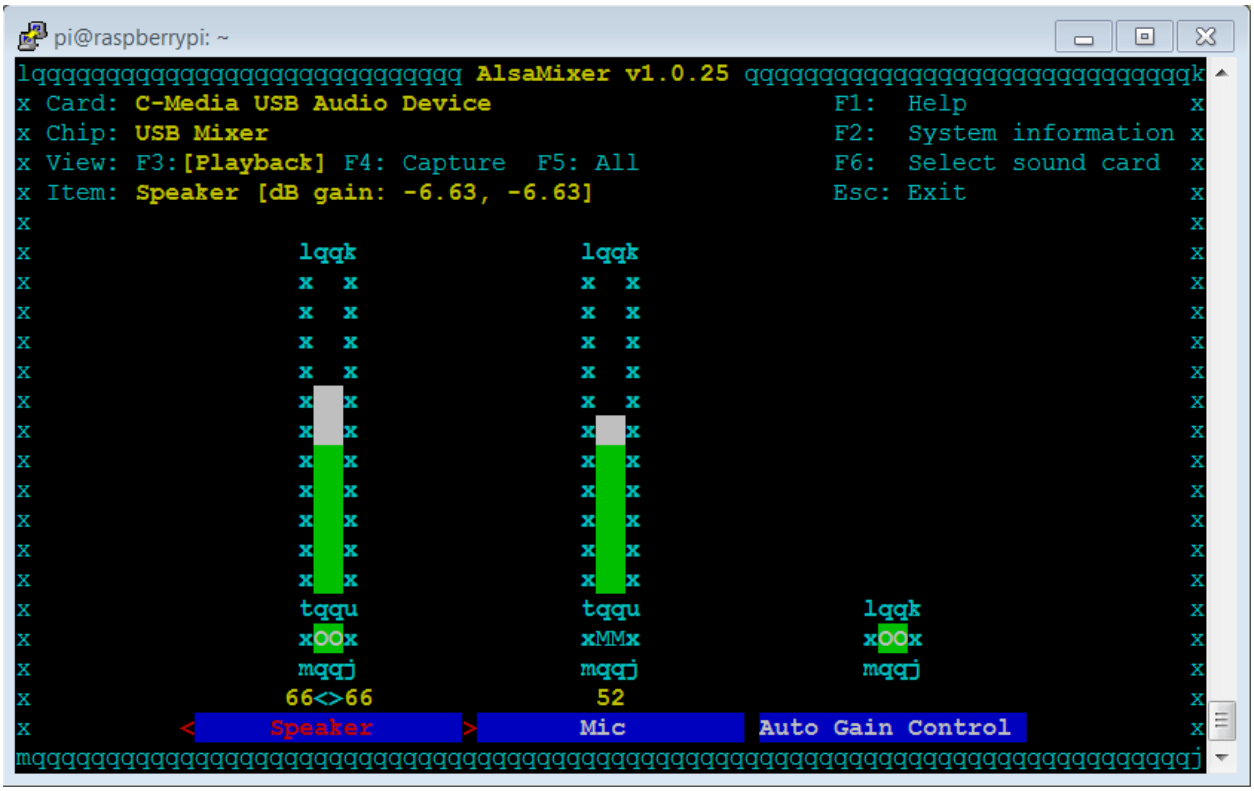


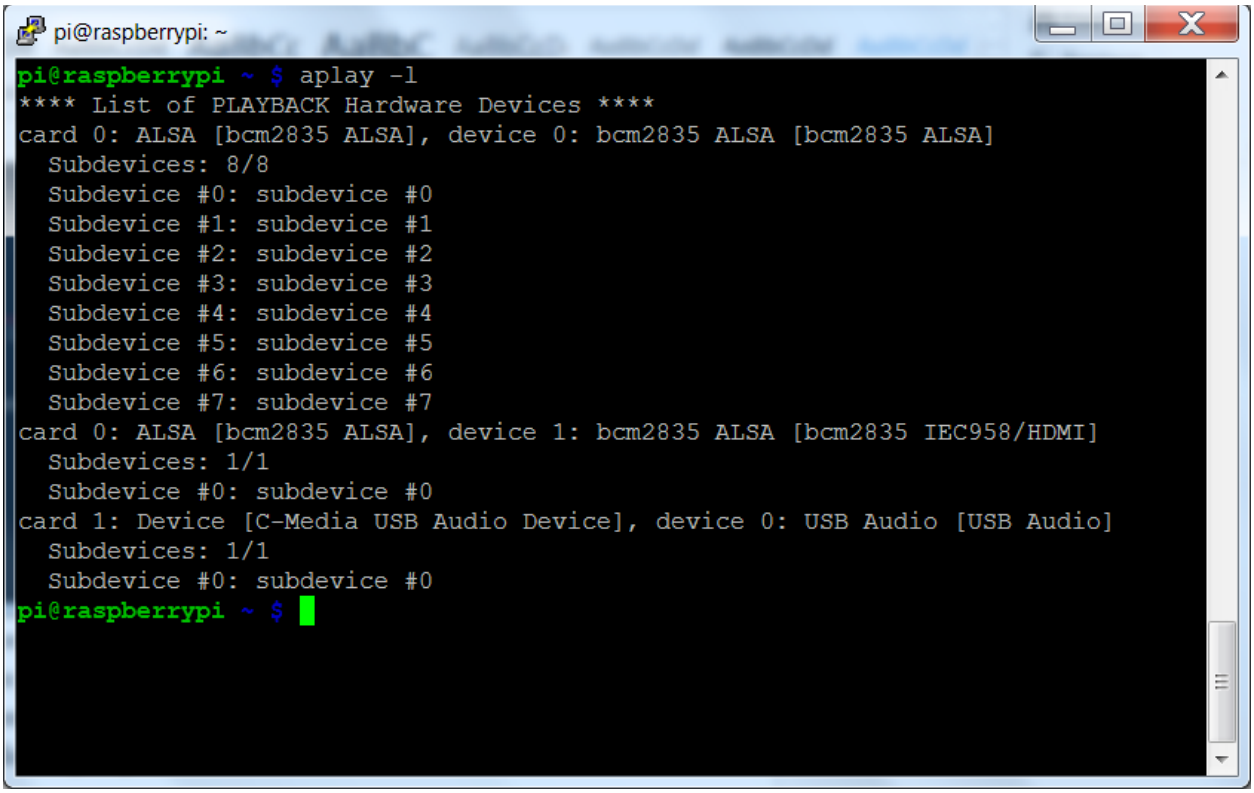

USB2.0 4Port HUB

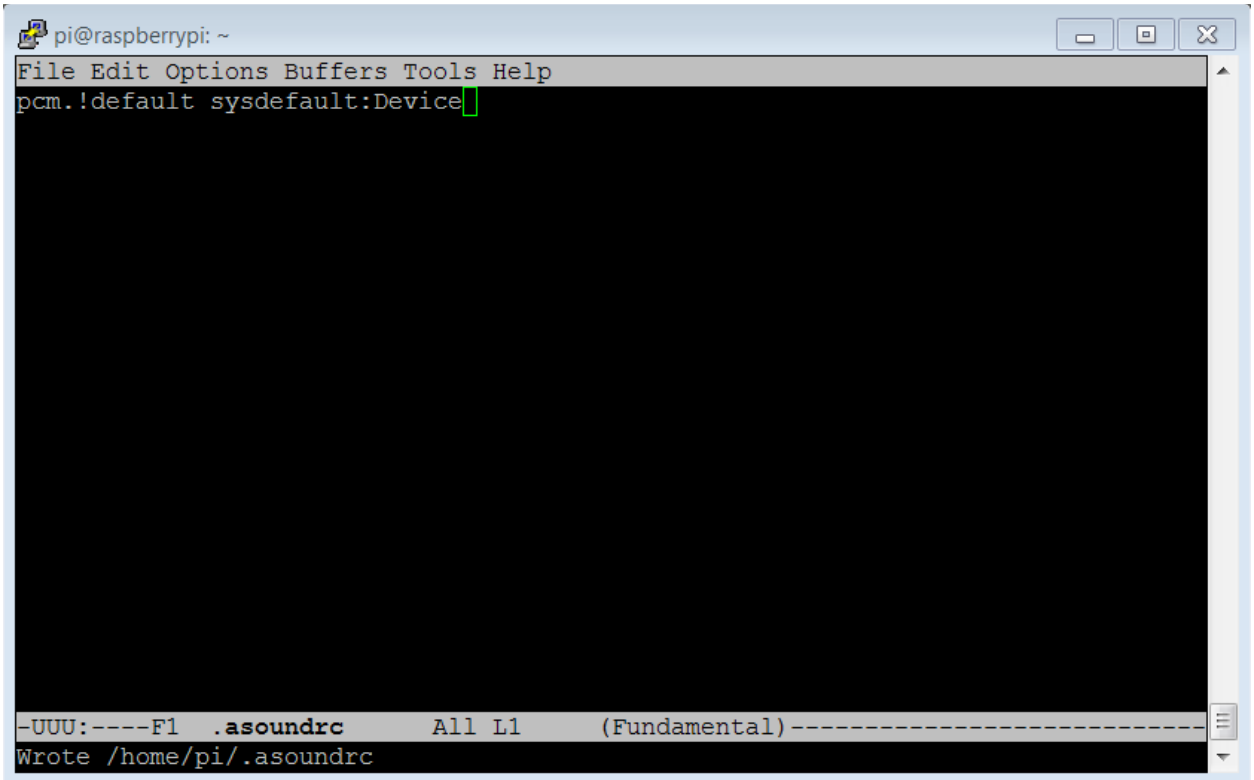

pi@raspberrypi: ~
pi@raspberrypi ~ $ emacs example2.cpp
pi@raspberrypi ~ $ g++ example2.cpp -o example2
example2.cpp: In function 'int main()':
example2.cpp:6:3: error: 'a' was not declared in this scope
pi@raspberrypi ~ $ emacs example2.cpp
pi@raspberrypi ~ $ g++ example2.cpp -o example2
pi@raspberrypi ~ $ ./example2
Input value: 9
Input second value: 2
11
pi@raspberrypi ~ $ cat /proc/asound/cards
0 [ALSA]: BRCM bcm2835 ALSbcm2835 ALSA - bcm2835 ALSA
bcm2835 ALSA
1 [Device]: USB-Audio - C-Media USB Audio Device
C-Media USB Audio Device at usb-bcm2708_usb-1.2, full spee
d
pi@raspberrypi ~ $

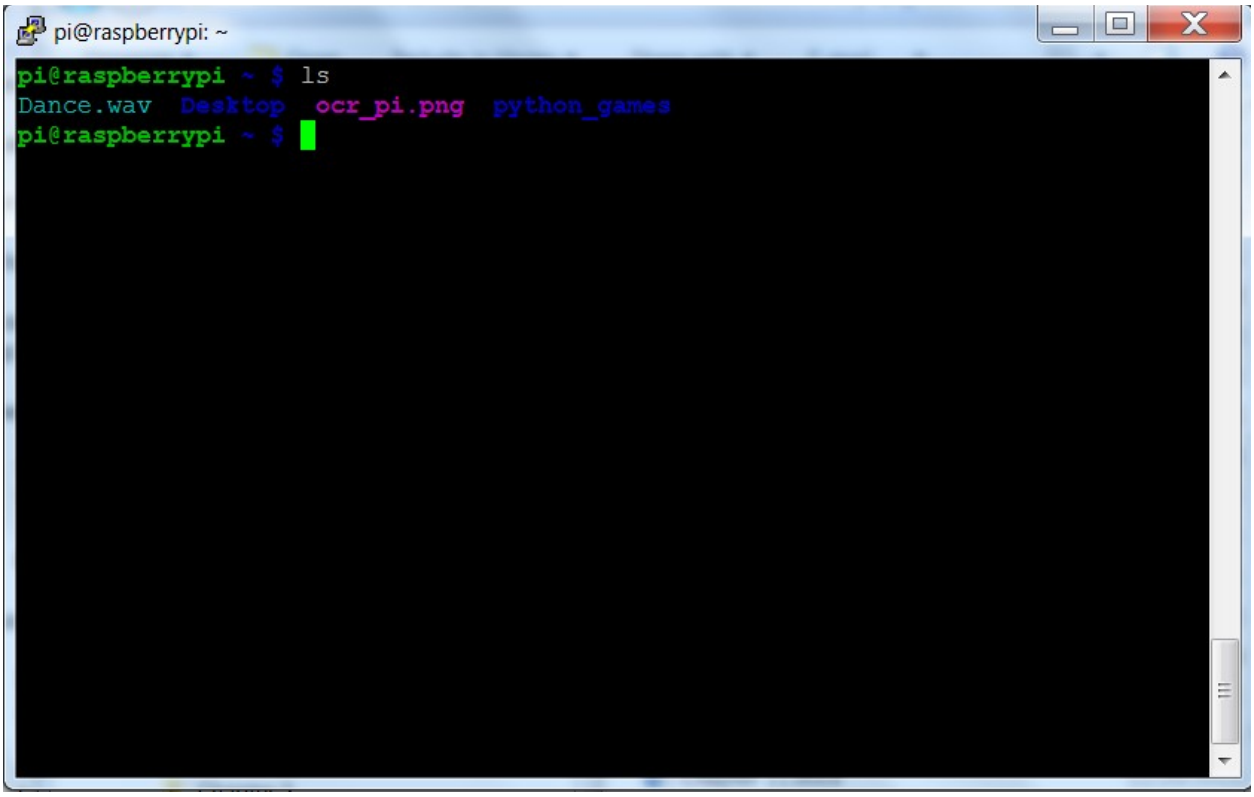

pi@raspberrypi: ~
AlsaMixer v1.0.25
Card: bcm2835 ALSA
Chip: Broadcom Mixer
View: F3:[Playback] F4: Capture F5: All
Item: PCM [dB gain: -17.25]
F1: Help
F2: System information
F6: Select sound card
Esc: Exit
44
PCM

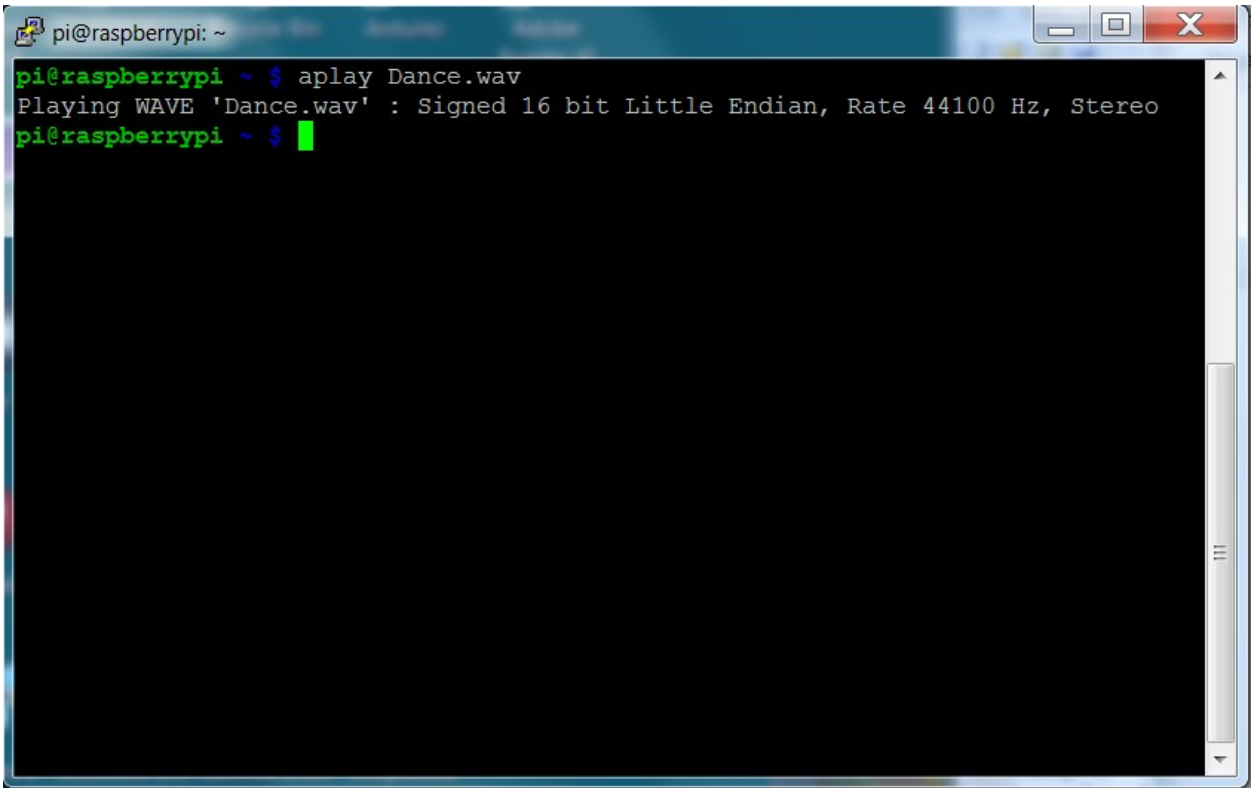

pi@raspberrypi: ~
AlsaMixer v1.0.25
Card: bcm2835 ALSA
Chip: Broadcom Mixer
View: F3:[Playback] F4: Capture F5: All
Item: PCM [dB gain: -17.25]
F1: Help
F2: System information
F6: Select sound card
Esc: Exit
Sound Card
(default)
bcm2835 ALSA
C-Media USB Audio Device
enter device name...
44
PCM

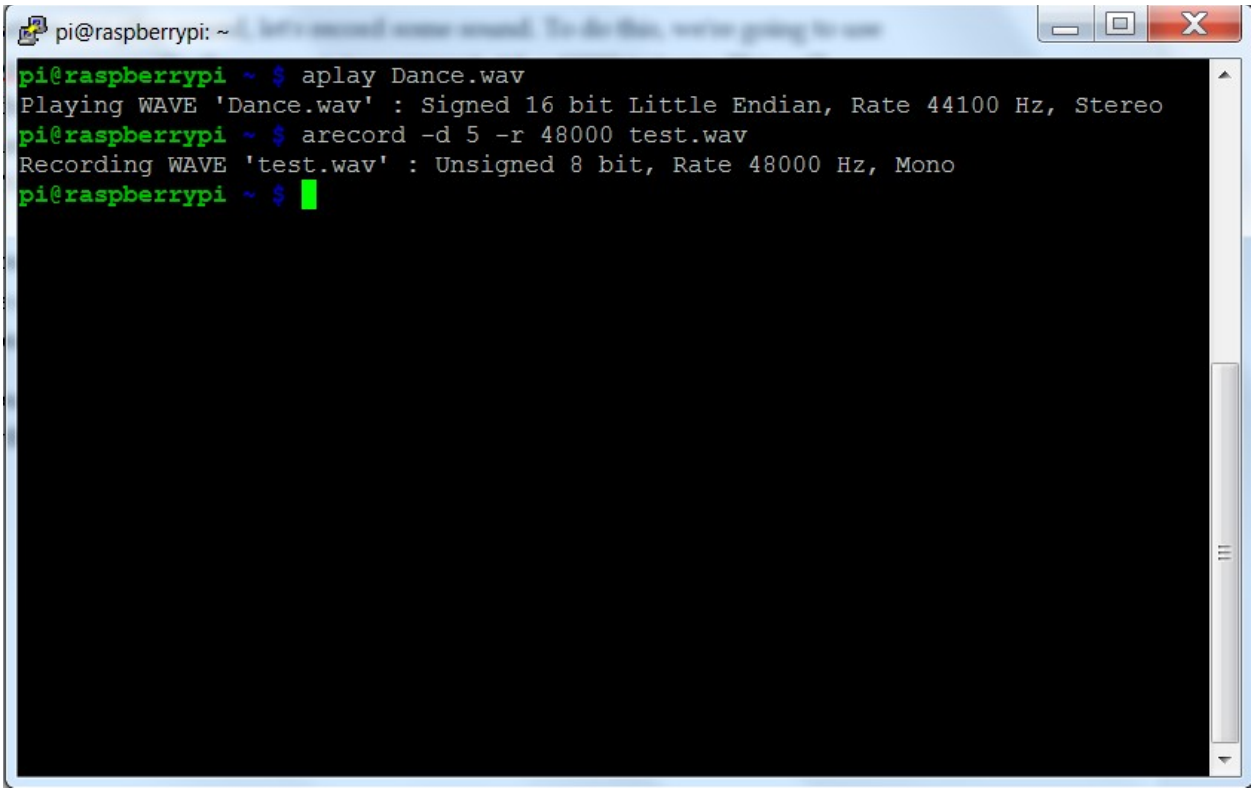

pi@raspberrypi: ~
AlsaMixer v1.0.25
Card: C-Media USB Audio Device
Chip: USB Mixer
View: F3:[Playback] F4: Capture F5: All
Item: Speaker [dB gain: -6.63, -6.63]
F1: Help
F2: System information
F6: Select sound card
Esc: Exit
66<>66
52
Speaker
Mic
Auto Gain Control

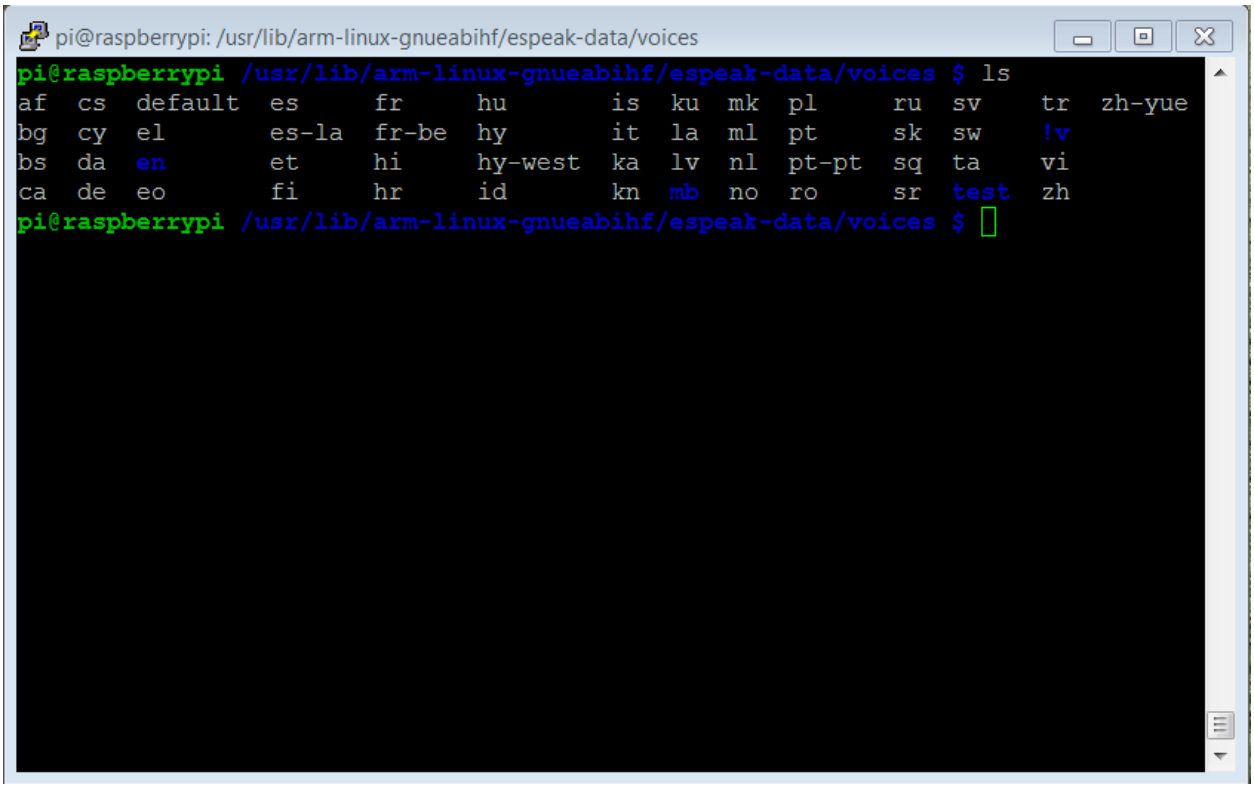

pi@raspberrypi: ~
pi@raspberrypi ~ $ aplay -l
**** List of PLAYBACK Hardware Devices ****
card 0: ALSA [bcm2835 ALSA], device 0: bcm2835 ALSA [bcm2835 ALSA]
Subdevices: 8/8
Subdevice #0: subdevice #0
Subdevice #1: subdevice #1
Subdevice #2: subdevice #2
Subdevice #3: subdevice #3
Subdevice #4: subdevice #4
Subdevice #5: subdevice #5
Subdevice #6: subdevice #6
Subdevice #7: subdevice #7
card 0: ALSA [bcm2835 ALSA], device 1: bcm2835 ALSA [bcm2835 IEC958/HDMI]
Subdevices: 1/1
Subdevice #0: subdevice #0
card 1: Device [C-Media USB Audio Device], device 0: USB Audio [USB Audio]
Subdevices: 1/1
Subdevice #0: subdevice #0
pi@raspberrypi ~ $

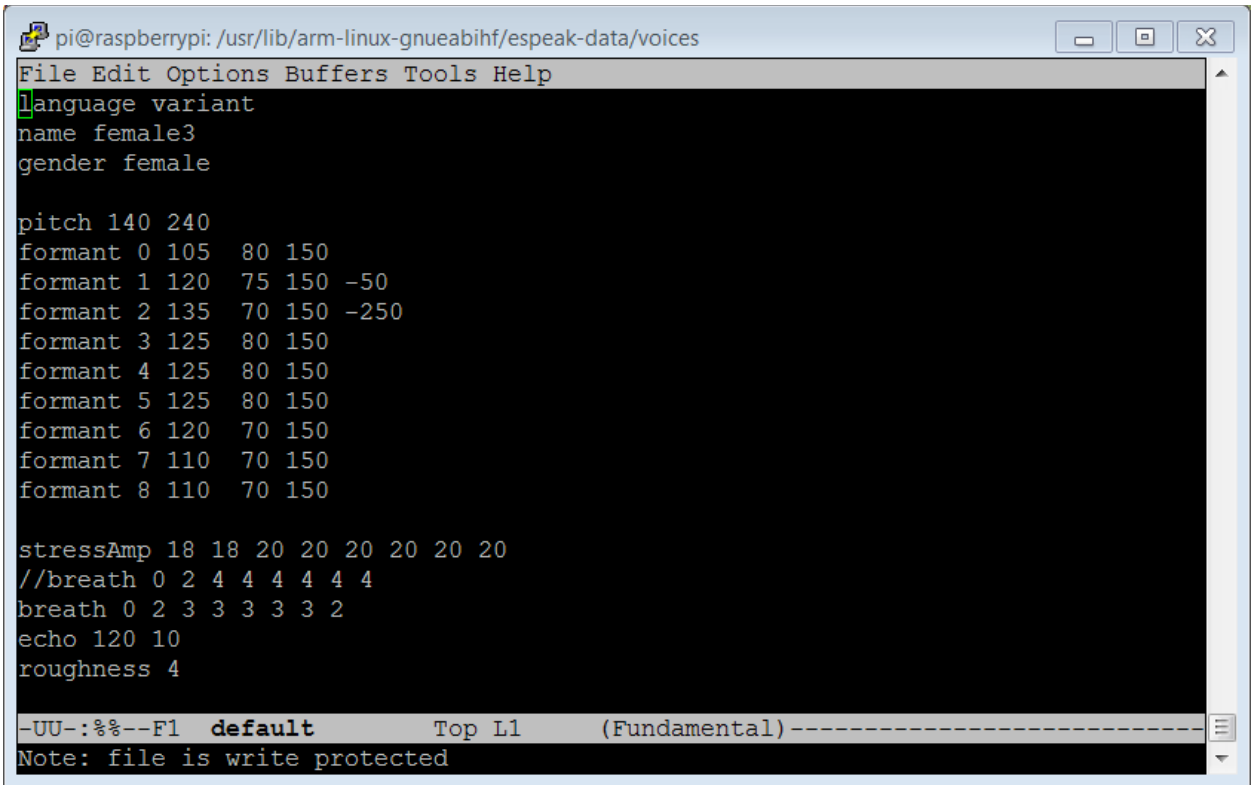

pi@raspberrypi: ~
File Edit Options Buffers Tools Help
pcm.!default sysdefault:Device
-UUU:----F1 .asoundrc All L1 (Fundamental)----------
Wrote /home/pi/.asoundrc

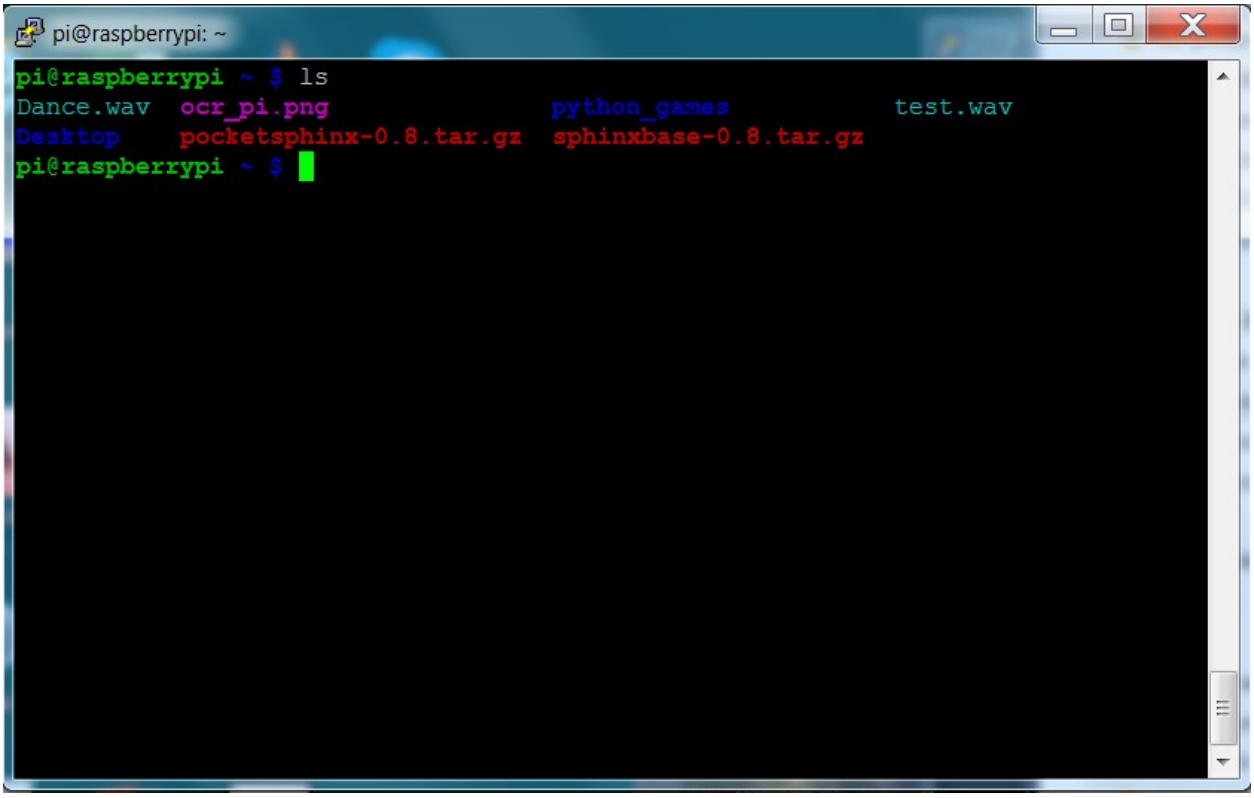

pi@raspberrypi: ~
pi@raspberrypi ~ $ ls
Dance.wav Desktop ocr_pi.png python_games
pi@raspberrypi ~ $

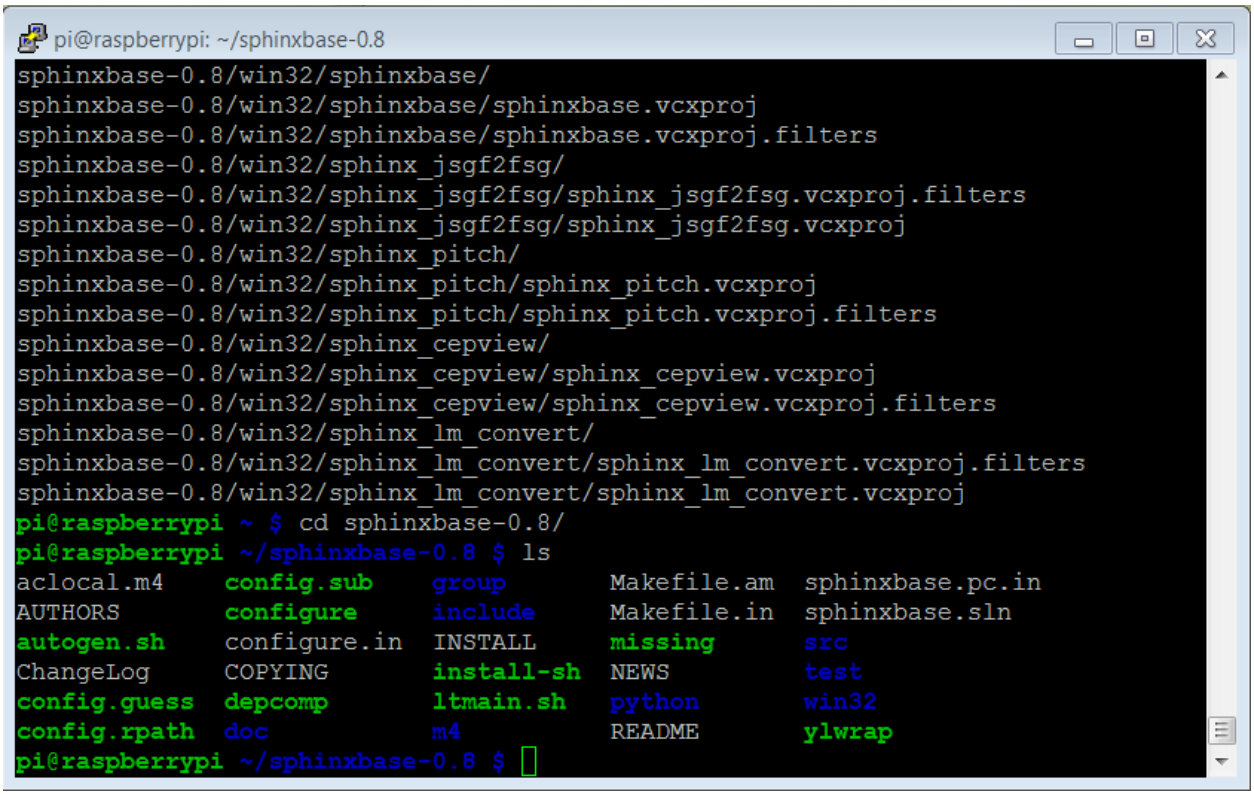

pi@raspberrypi: ~
pi@raspberrypi ~ $ aplay Dance.wav
Playing WAVE 'Dance.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
pi@raspberrypi ~ $

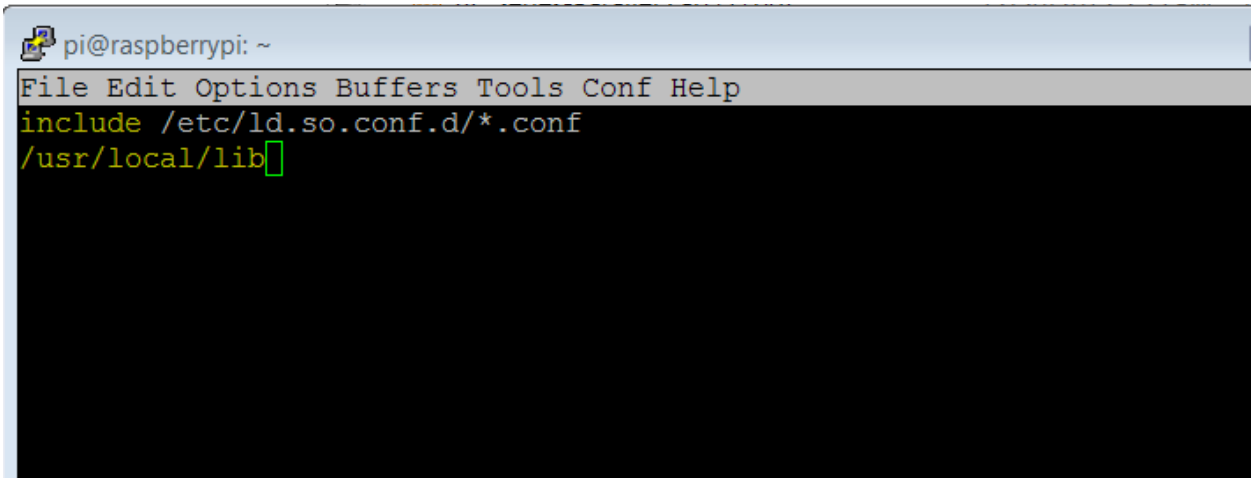

pi@raspberrypi: ~
pi@raspberrypi ~ $ aplay Dance.wav
Playing WAVE 'Dance.wav' : Signed 16 bit Little Endian, Rate 44100 Hz, Stereo
pi@raspberrypi ~ $ arecord -d 5 -r 48000 test.wav
Recording WAVE 'test.wav' : Unsigned 8 bit, Rate 48000 Hz, Mono
pi@raspberrypi ~ $

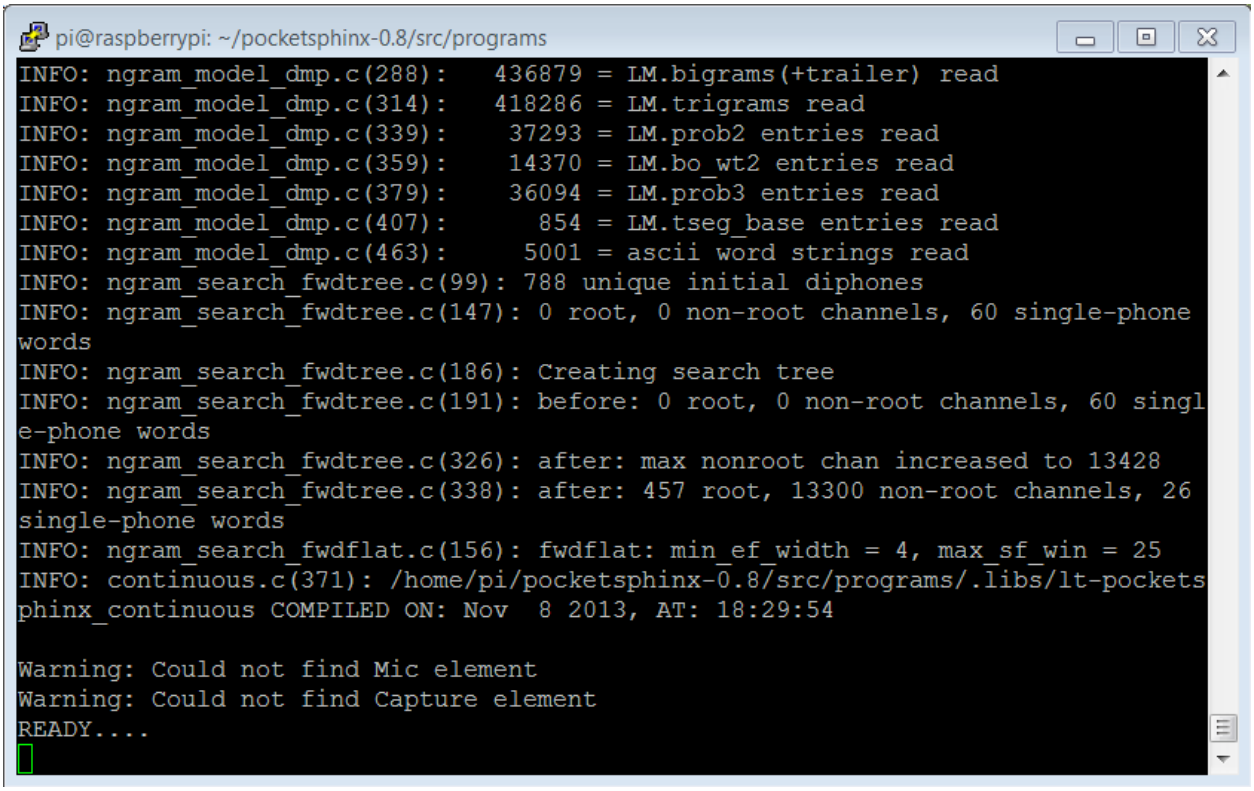

pi@raspberrypi: /usr/lib/arm-linux-gnueabihf/espeak-data/voices
pi@raspberrypi /usr/lib/arm-linux-gnueabihf/espeak-data/voices $ ls
af cs default es fr hu is ku mk pl ru sv tr zh-yue
bg cy el es-la fr-be hy it la ml pt sk sw !v
bs da en et hi hy-west ka lv nl pt-pt sq ta vi
ca de eo fi hr id kn mb no ro sr test zh
pi@raspberrypi /usr/lib/arm-linux-gnueabihf/espeak-data/voices $

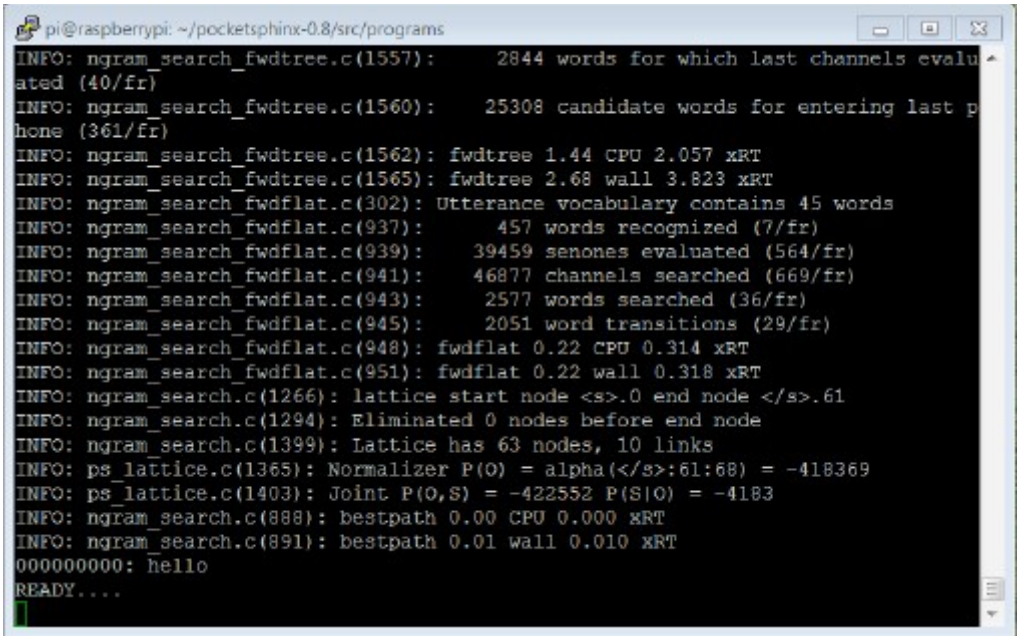

pi@raspberrypi: /usr/lib/arm-linux-gnueabihf/espeak-data/voices
File Edit Options Buffers Tools Help
language variant
name female3
gender female
pitch 140 240
formant 0 105 80 150
formant 1 120 75 150 -50
formant 2 135 70 150 -250
formant 3 125 80 150
formant 4 125 80 150
formant 5 125 80 150
formant 6 120 70 150
formant 7 110 70 150
formant 8 110 70 150
stressAmp 18 18 20 20 20 20 20 20
//breath 0 2 4 4 4 4 4 4
breath 0 2 3 3 3 3 3 2
echo 120 10
roughness 4
-UU-:%%--F1 default Top L1 (Fundamental)
Note: file is write protected

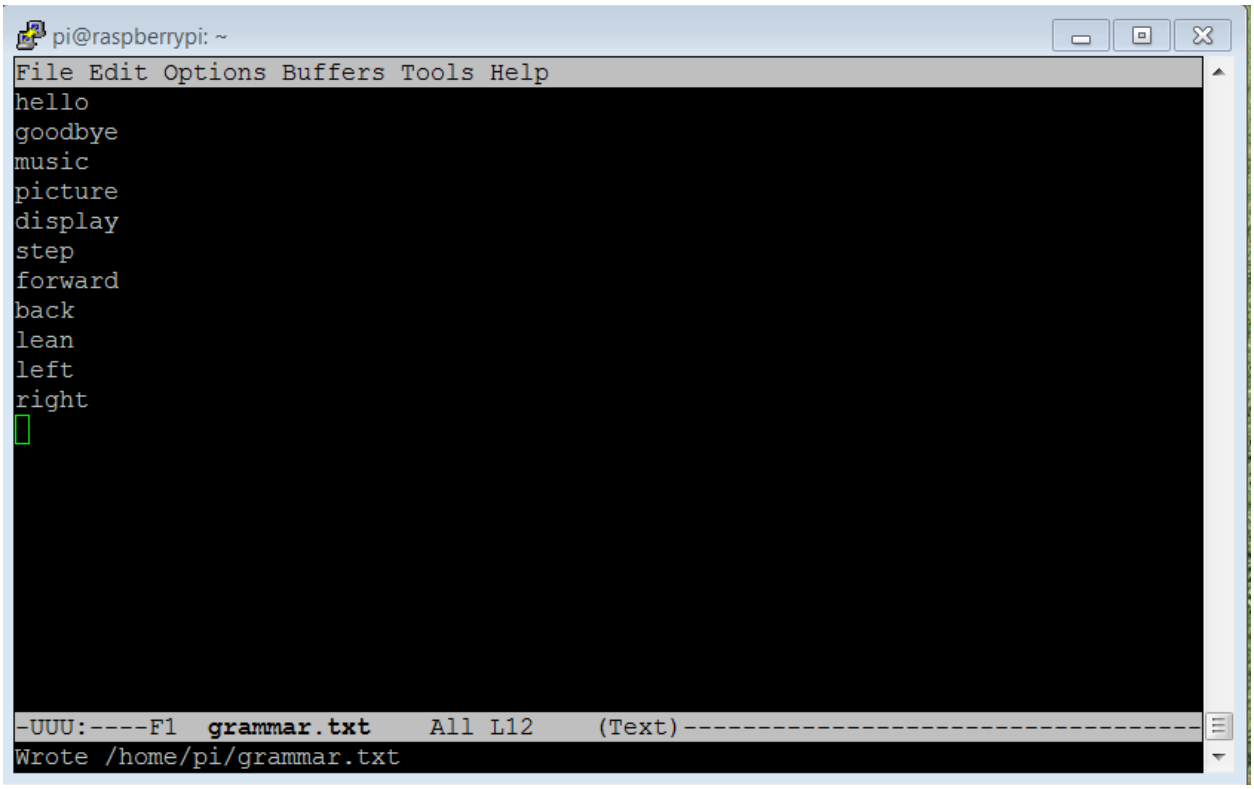

pi@raspberrypi: ~
pi@raspberrypi ~ $ ls
Dance.wav ocr_pi.png python_games test.wav
Desktop pocketsphinx-0.8.tar.gz sphinxbase-0.8.tar.gz
pi@raspberrypi ~ $

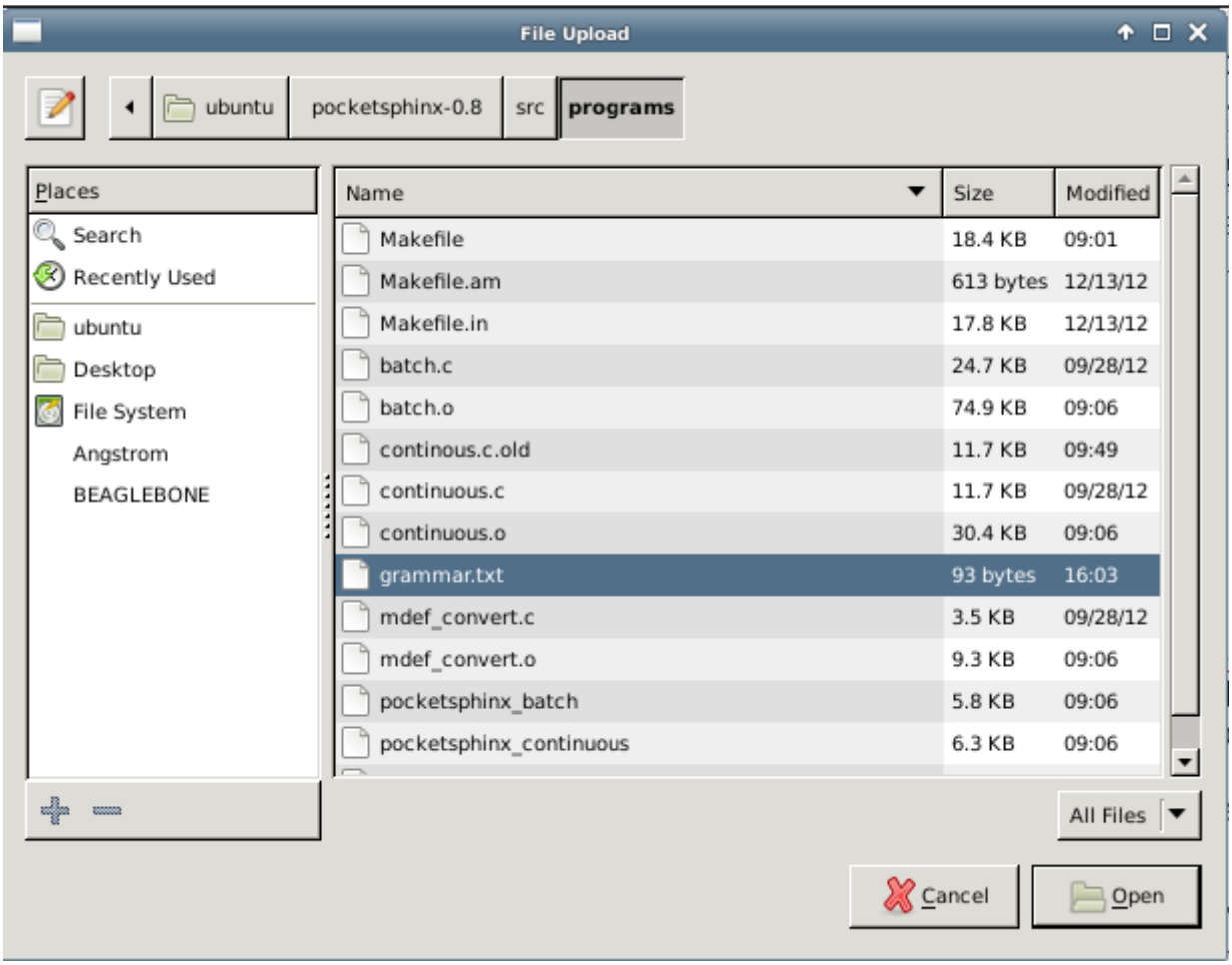

pi@raspberrypi: ~/sphinxbase-0.8
sphinxbase-0.8/win32/sphinxbase/
sphinxbase-0.8/win32/sphinxbase/sphinxbase.vcxproj
sphinxbase-0.8/win32/sphinxbase/sphinxbase.vcxproj.filters
sphinxbase-0.8/win32/sphinx_jsgf2fsg/
sphinxbase-0.8/win32/sphinx_jsgf2fsg/sphinx_jsgf2fsg.vcxproj.filters
sphinxbase-0.8/win32/sphinx_jsgf2fsg/sphinx_jsgf2fsg.vcxproj
sphinxbase-0.8/win32/sphinx_pitch/
sphinxbase-0.8/win32/sphinx_pitch/sphinx_pitch.vcxproj
sphinxbase-0.8/win32/sphinx_pitch/sphinx_pitch.vcxproj.filters
sphinxbase-0.8/win32/sphinx_cepview/
sphinxbase-0.8/win32/sphinx_cepview/sphinx_cepview.vcxproj
sphinxbase-0.8/win32/sphinx_cepview/sphinx_cepview.vcxproj.filters
sphinxbase-0.8/win32/sphinx_lm_convert/
sphinxbase-0.8/win32/sphinx_lm_convert/sphinx_lm_convert.vcxproj.filters
sphinxbase-0.8/win32/sphinx_lm_convert/sphinx_lm_convert.vcxproj
pi@raspberrypi ~ $ cd sphinxbase-0.8/
pi@raspberrypi ~/sphinxbase-0.8 $ ls
aclocal.m4 config.sub group Makefile.am sphinxbase.pc.in
AUTHORS configure include Makefile.in sphinxbase.sln
autogen.sh configure.in INSTALL missing src
ChangeLog COPYING install-sh NEWS test
config.guess depcomp ltmain.sh python win32
config.rpath doc m4 README ylwrap
pi@raspberrypi ~/sphinxbase-0.8 $

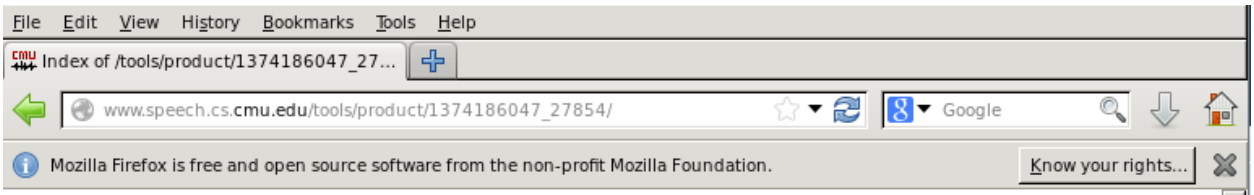

pi@raspberrypi: ~
File Edit Options Buffers Tools Conf Help
include /etc/ld.so.conf.d/*.conf
/usr/local/lib


pi@raspberrypi: ~/pocketsphinx-0.8/src/programs
INFO: ngram_model_dmp.c(288):   436879 = LM.bigrams(+trailer) read
INFO: ngram_model_dmp.c(314):   418286 = LM.trigrams read
INFO: ngram_model_dmp.c(339):   37293 = LM.prob2 entries read
INFO: ngram_model_dmp.c(359):   14370 = LM.bo_wt2 entries read
INFO: ngram_model_dmp.c(379):   36094 = LM.prob3 entries read
INFO: ngram_model_dmp.c(407):   854 = LM.tseg_base entries read
INFO: ngram_model_dmp.c(463):   5001 = ascii word strings read
INFO: ngram_search_fwdtree.c(99): 788 unique initial diphones
INFO: ngram_search_fwdtree.c(147): 0 root, 0 non-root channels, 60 single-phone words
INFO: ngram_search_fwdtree.c(186): Creating search tree
INFO: ngram_search_fwdtree.c(191): before: 0 root, 0 non-root channels, 60 single-phone words
INFO: ngram_search_fwdtree.c(326): after: max nonroot chan increased to 13428
INFO: ngram_search_fwdtree.c(338): after: 457 root, 13300 non-root channels, 26 single-phone words
INFO: ngram_search_fwdflat.c(156): fwdflat: min_ef_width = 4, max_sf_win = 25
INFO: continuous.c(371): /home/pi/pocketsphinx-0.8/src/programs/.libs/lt-pocketsphinx_continuous COMPILED ON: Nov 8 2013, AT: 18:29:54
Warning: Could not find Mic element
Warning: Could not find Capture element
READY....


pi@raspberrypi: ~/pocketsphinx-0.8/src/programs
INFO: ngram_search_fwdtree.c(1557):   2844 words for which last channels evaluated (40/fr)
INFO: ngram_search_fwdtree.c(1560):   25308 candidate words for entering last phone (361/fr)
INFO: ngram_search_fwdtree.c(1562): fwdtree 1.44 CPU 2.057 xRT
INFO: ngram_search_fwdtree.c(1565): fwdtree 2.68 wall 3.823 xRT
INFO: ngram_search_fwdflat.c(302): Utterance vocabulary contains 45 words
INFO: ngram_search_fwdflat.c(937):   457 words recognized (7/fr)
INFO: ngram_search_fwdflat.c(939):   39459 senones evaluated (564/fr)
INFO: ngram_search_fwdflat.c(941):   46877 channels searched (669/fr)
INFO: ngram_search_fwdflat.c(943):   2577 words searched (36/fr)
INFO: ngram_search_fwdflat.c(945):   2051 word transitions (29/fr)
INFO: ngram_search_fwdflat.c(948): fwdflat 0.22 CPU 0.314 xRT
INFO: ngram_search_fwdflat.c(951): fwdflat 0.22 wall 0.318 xRT
INFO: ngram_search.c(1266): lattice start node <s>.0 end node </s>.61
INFO: ngram_search.c(1294): Eliminated 0 nodes before end node
INFO: ngram_search.c(1399): Lattice has 63 nodes, 10 links
INFO: ps_lattice.c(1365): Normalizer P(O) = alpha(</s>:61:68) = -418369
INFO: ps_lattice.c(1403): Joint P(O,S) = -422552 P(S|O) = -4183
INFO: ngram_search.c(888): bestpath 0.00 CPU 0.000 xRT
INFO: ngram_search.c(891): bestpath 0.01 wall 0.010 xRT
000000000: hello
READY....


pi@raspberrypi: ~
File Edit Options Buffers Tools Help
hello
goodbye
music
picture
display
step
forward
back
lean
left
right
-UUU:----F1 grammar.txt All L12 (Text)
Wrote /home/pi/grammar.txt


File Upload
ubuntu
pocketsphinx-0.8
src
programs
Places
Search
Recently Used
ubuntu
Desktop
File System
Angstrom
BEAGLEBONE
Name
Size
Modified
Makefile 18.4 KB 09:01
Makefile.am 613 bytes 12/13/12
Makefile.in 17.8 KB 12/13/12
batch.c 24.7 KB 09/28/12
batch.o 74.9 KB 09:06
continous.c.old 11.7 KB 09:49
continuous.c 11.7 KB 09/28/12
continuous.o 30.4 KB 09:06
grammar.txt 93 bytes 16:03
mdef_convert.c 3.5 KB 09/28/12
mdef_convert.o 9.3 KB 09:06
pocketsphinx_batch 5.8 KB 09:06
pocketsphinx_continuous 6.3 KB 09:06
All Files
Cancel
Open



Sphinx knowledge base generator [lmtool.3]

Your request for a Sphinx knowledge base appears to have been successfully processed!

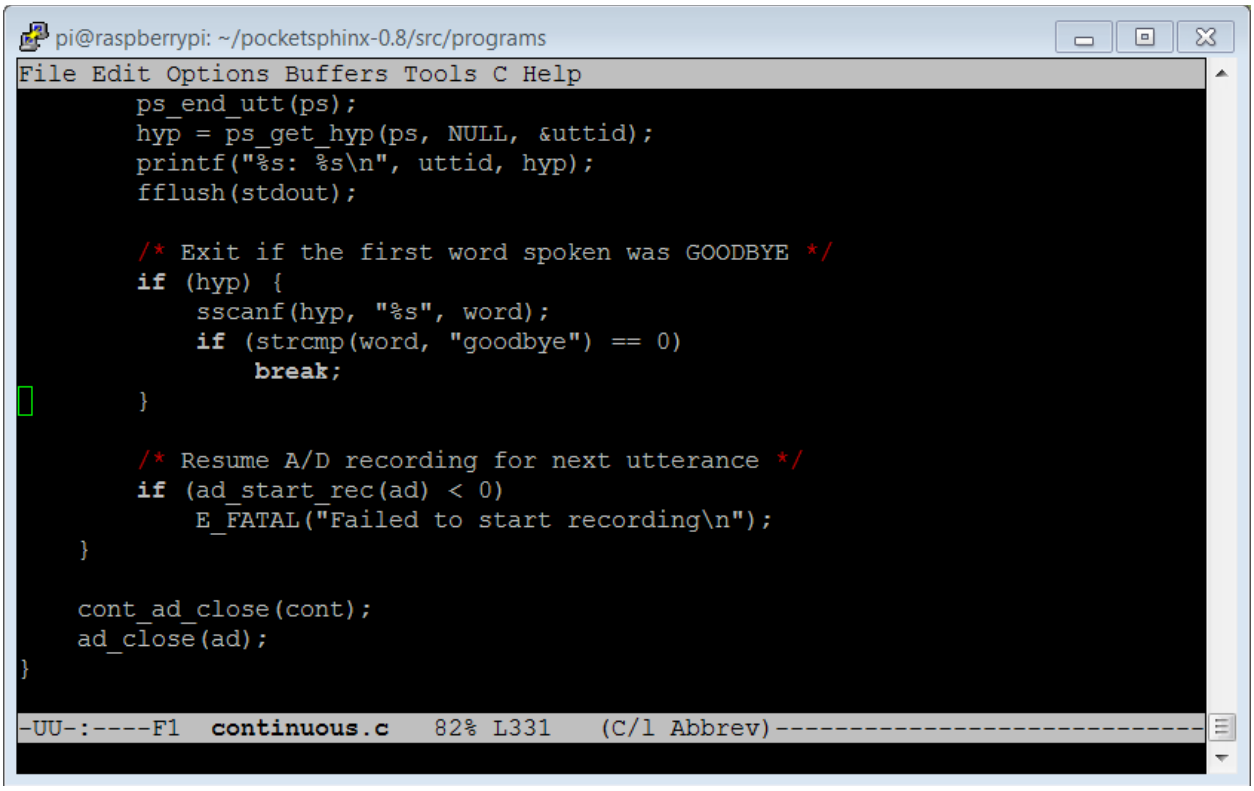
The base name for this set is **1565**. TAR1565.tgz is the compressed version.
Note that this set of files is internally consistent and is best used together.

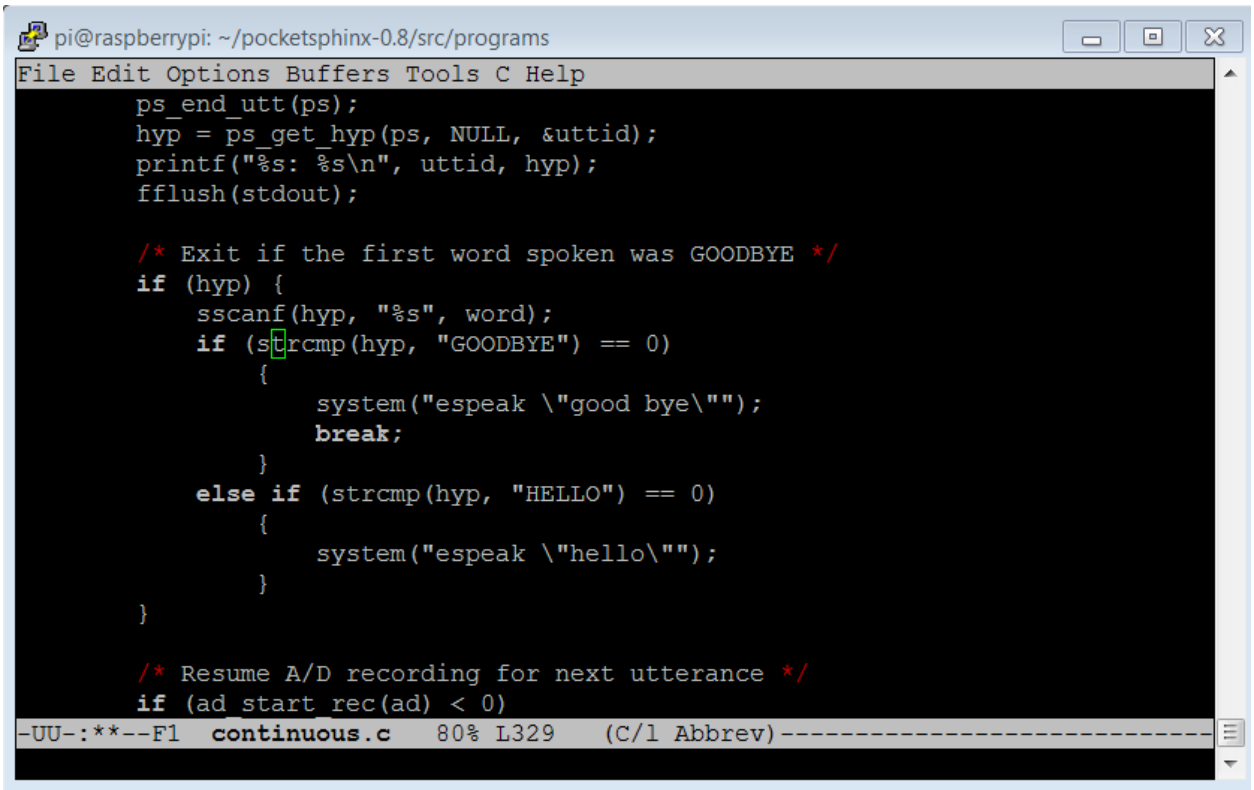
IMPORTANT: Please download these files as soon as possible; they will be deleted in approximately a half hour.

```
SESSION 1374186047_27854
[_INFO_] Found corpus: 11 sentences, 15 unique words
[_INFO_] Found 0 words in extras  (0)
[_INFO_] Language model completed  (0)
[_INFO_] Pronounce completed  (0)
[_STAT_] Elapsed time: 0.021 sec
```

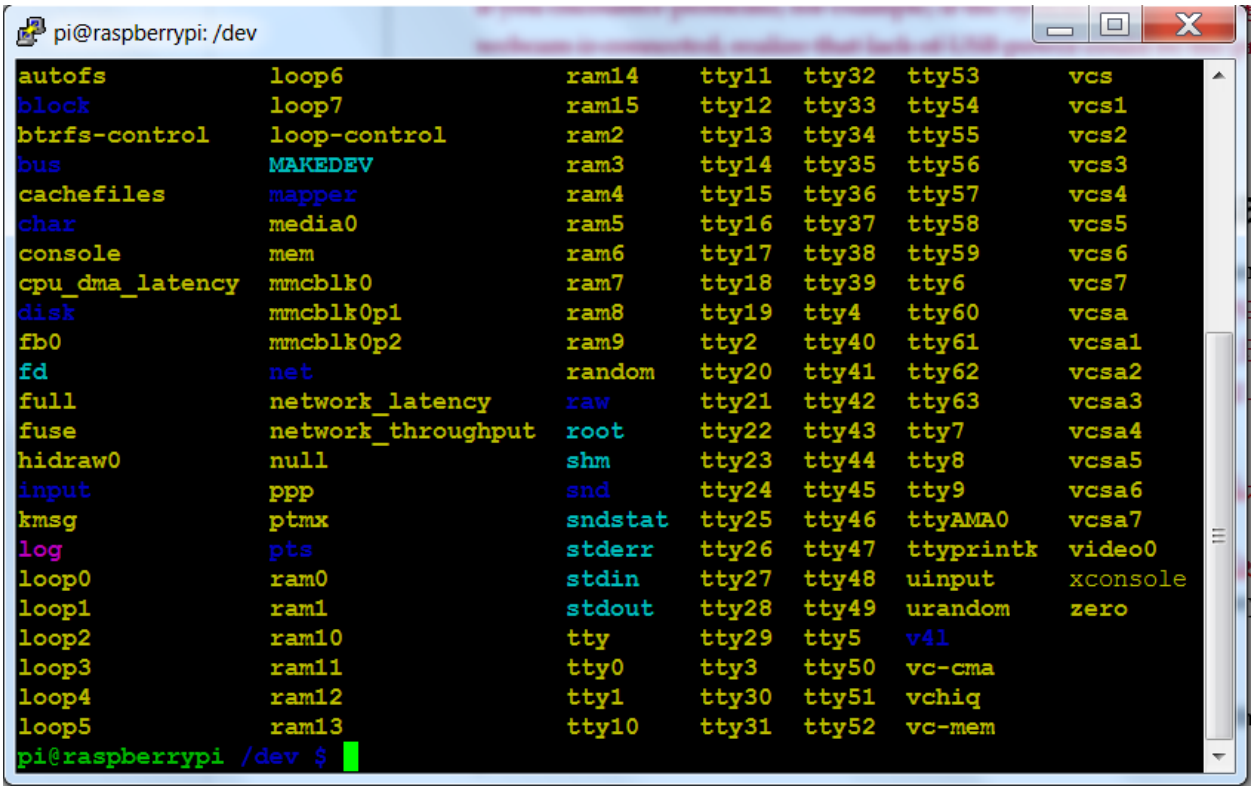
Please include these messages in bug reports.

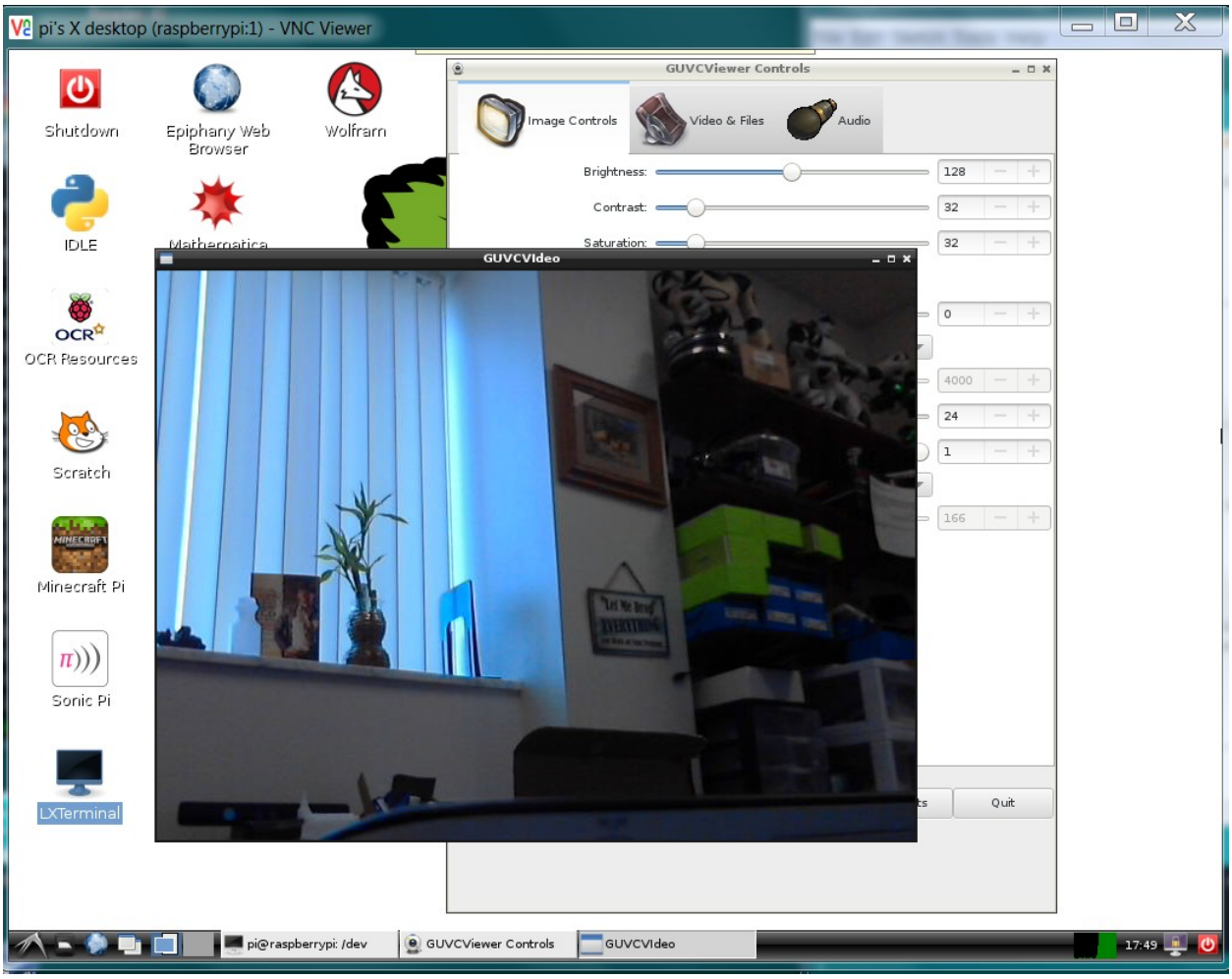
Name	Size	Description
1565.dic	207	*Pronunciation Dictionary*
1565.lm	1.8K	*Language Model*
1565.log_pronounce	159	*Log File*


pi@raspberrypi: ~/pocketsphinx-0.8/src/programs
File Edit Options Buffers Tools C Help
ps_end_utt(ps);
hyp = ps_get_hyp(ps, NULL, &uttid);
printf("%s: %s\n", uttid, hyp);
fflush(stdout);
/* Exit if the first word spoken was GOODBYE */
if (hyp) {
sscanf(hyp, "%s", word);
if (strcmp(word, "goodbye") == 0)
break;
}
/* Resume A/D recording for next utterance */
if (ad_start_rec(ad) < 0)
E_FATAL("Failed to start recording\n");
}
cont_ad_close(cont);
ad_close(ad);
}
-UU-:----F1 continuous.c 82% L331 (C/l Abbrev)

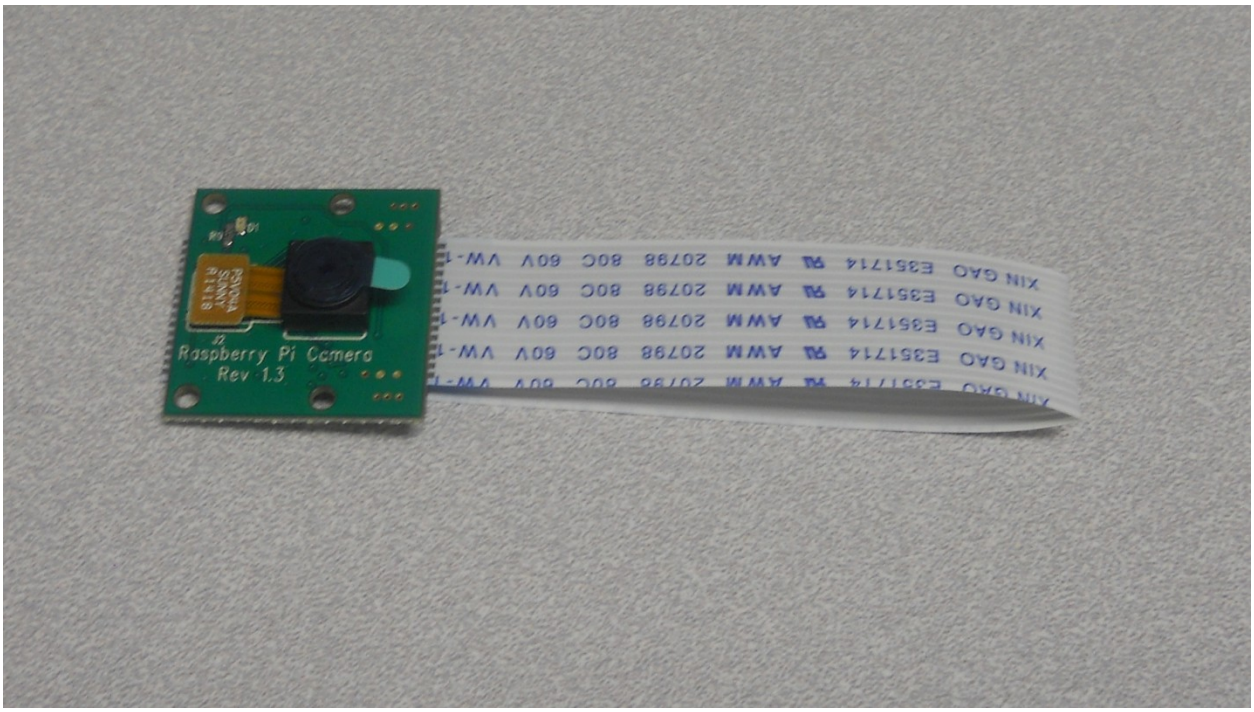

pi@raspberrypi: ~/pocketsphinx-0.8/src/programs
File Edit Options Buffers Tools C Help
ps_end_utt(ps);
hyp = ps_get_hyp(ps, NULL, &uttid);
printf("%s: %s\n", uttid, hyp);
fflush(stdout);
/* Exit if the first word spoken was GOODBYE */
if (hyp) {
sscanf(hyp, "%s", word);
if (strcmp(hyp, "GOODBYE") == 0)
{
system("espeak \"good bye\"");
break;
}
else if (strcmp(hyp, "HELLO") == 0)
{
system("espeak \"hello\"");
}
}
/* Resume A/D recording for next utterance */
if (ad_start_rec(ad) < 0)
-UU-:**--F1 continuous.c 80% L329 (C/l Abbrev)

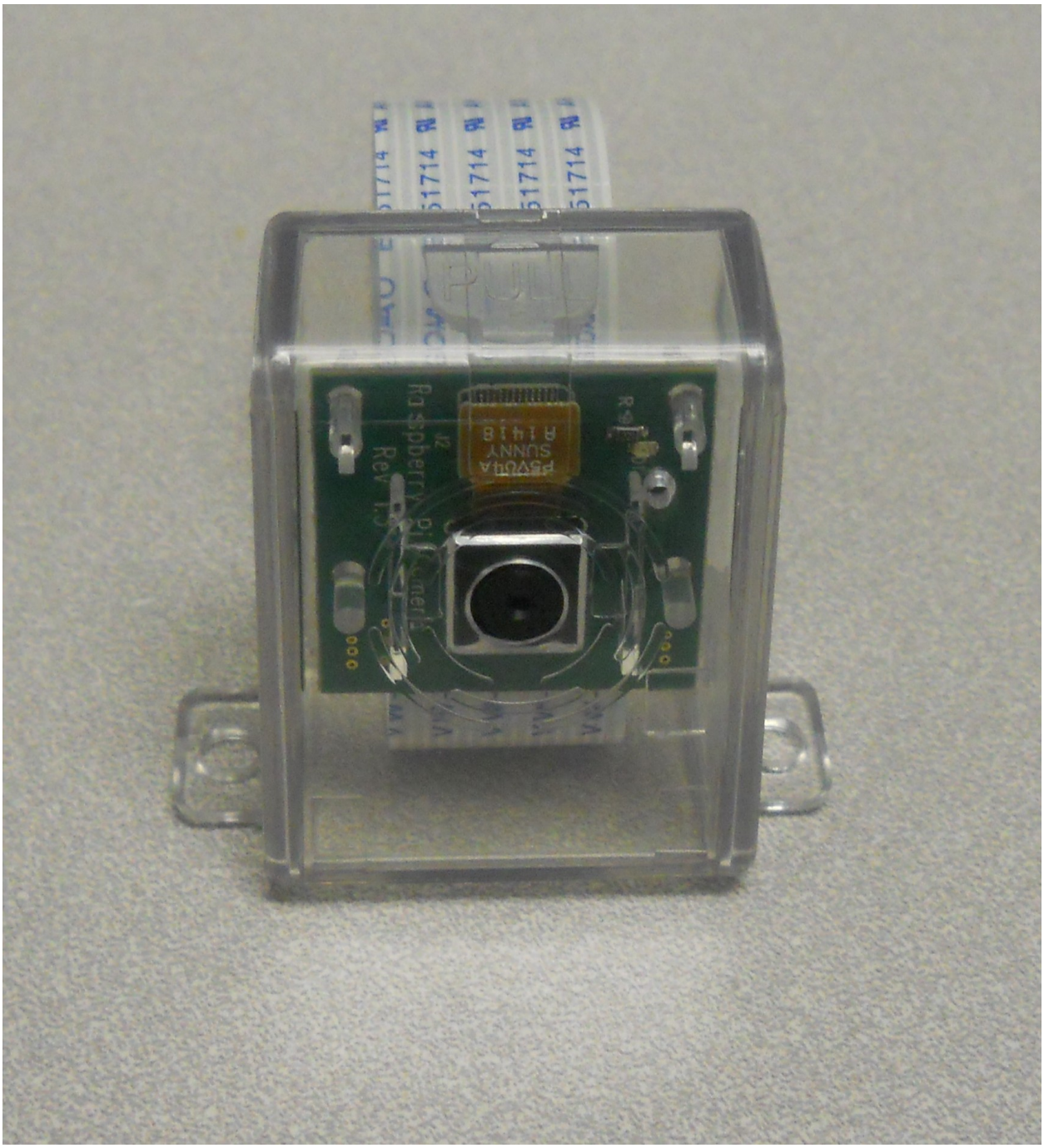
Chapter 4: Adding Vision to Raspberry Pi

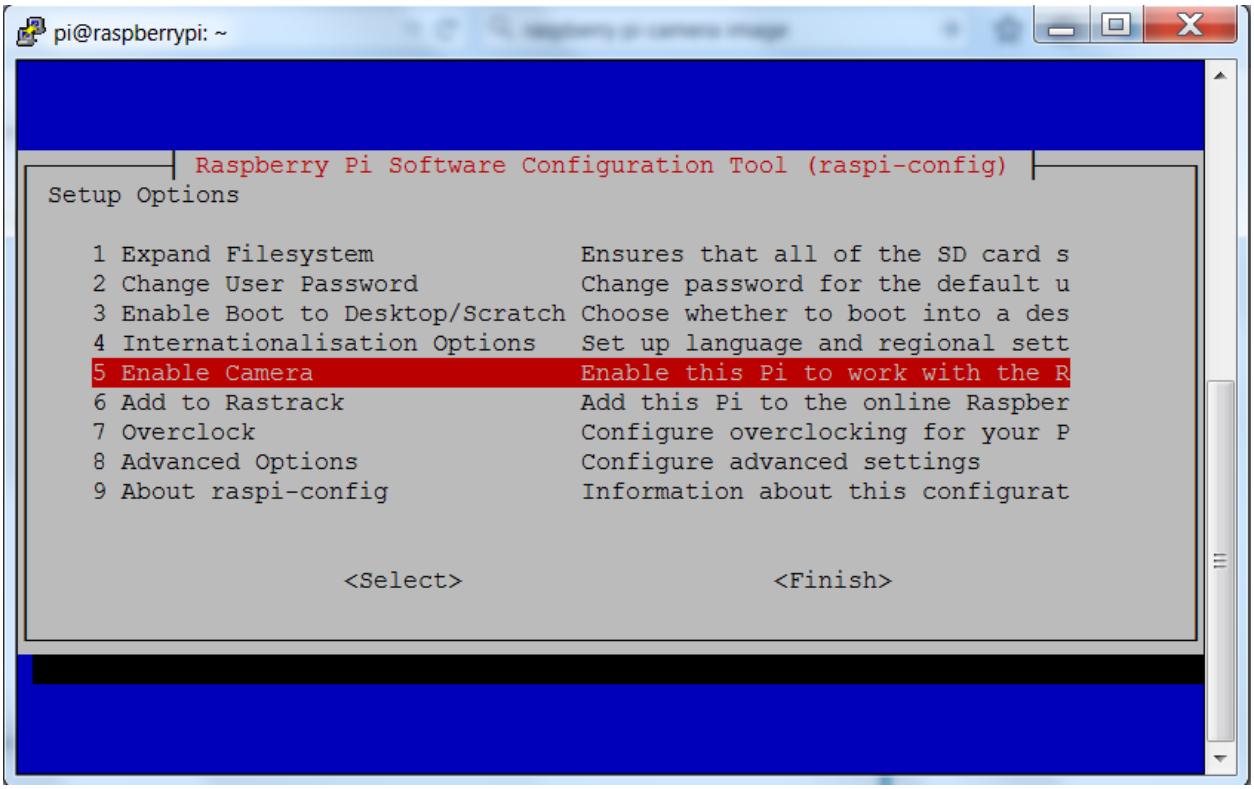


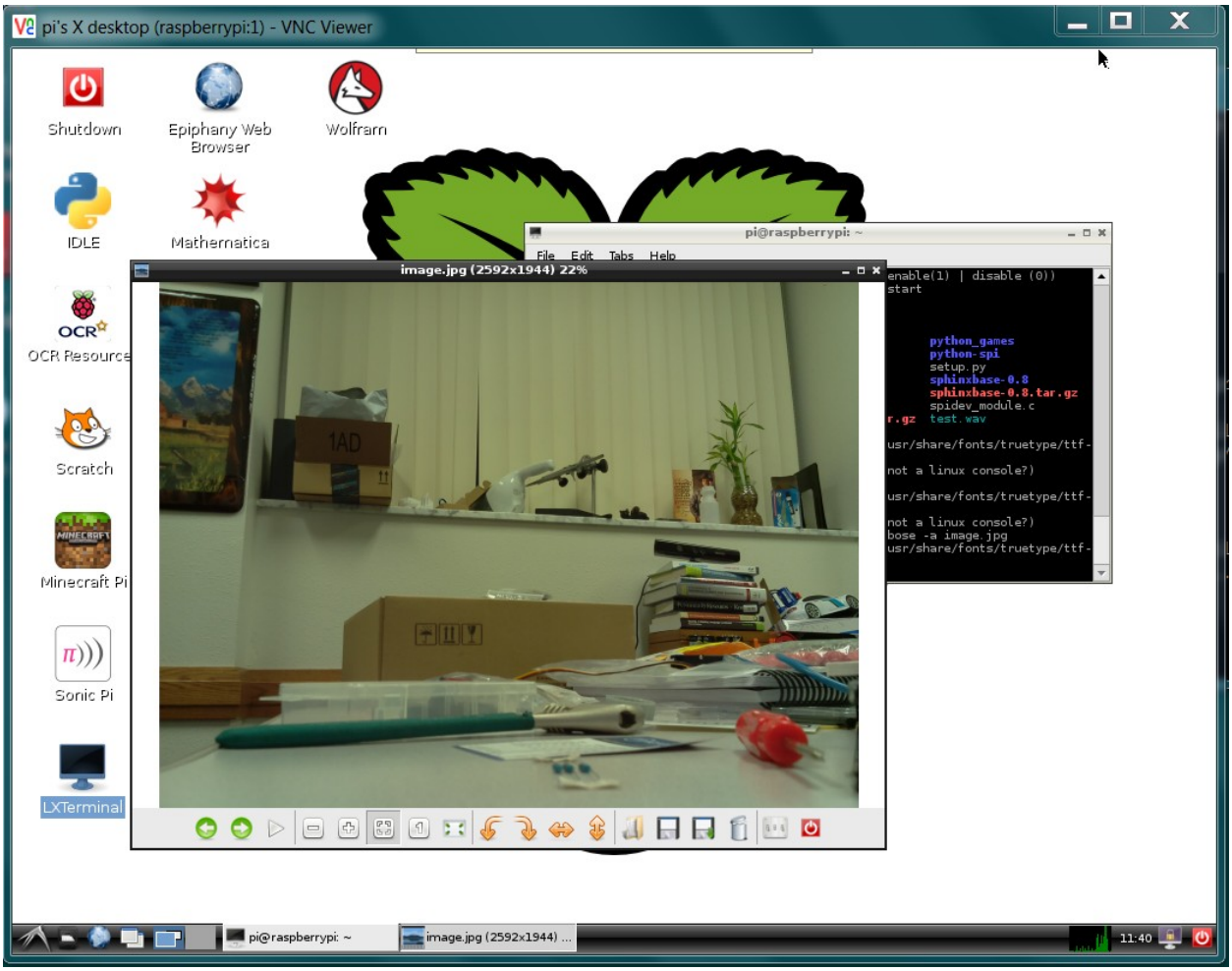

pi's X desktop (raspberrypi:1) - VNC Viewer
Shutdown
Epiphany Web Browser
Wolfram
IDLE
Mathematica
OCR Resources
Scratch
Minecraft Pi
Sonic Pi
LXTerminal
GUVCViewer Controls
Image Controls
Video & Files
Audio
Brightness:
128
Contrast:
32
Saturation:
32
0
4000
24
1
166
Quit
GUVCVIdeo
pi@raspberrypi: /dev
GUVCViewer Controls
GUVCVIdeo
17:49

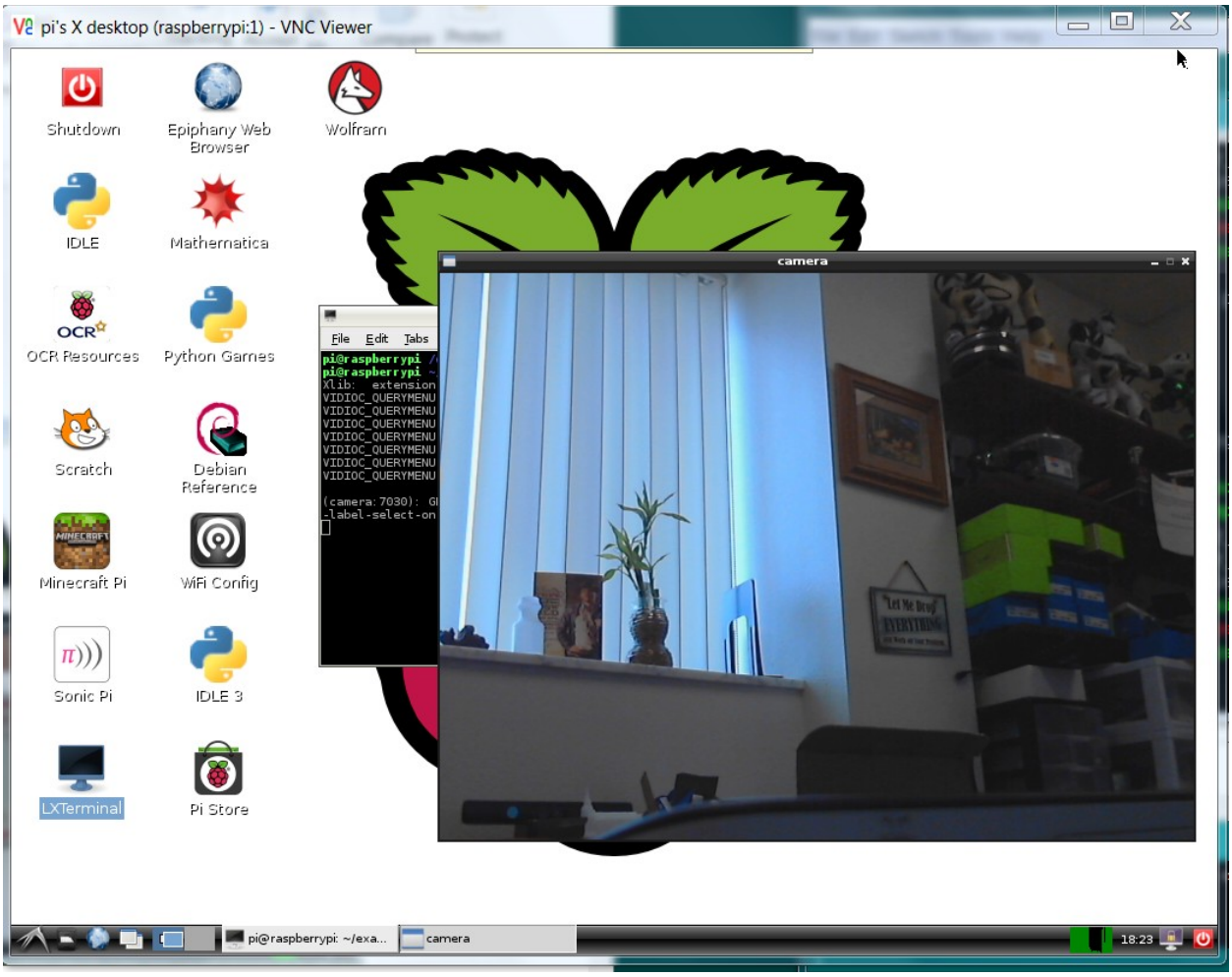
GUVCViewer Controls
Image Controls
Video & Files
Audio
Device:
UVC Camera (046d:0825)
Frame Rate:
25/1 fps
Show
Resolution:
640x480
Camera Output:
MJPG
Image File:
Image.jpg
Open
File num:0
File,Auto
Image Format:
JPG
Take Picture by Default
Video File:
capture.avi
Open
File num:0
File,Auto
Video Codec:
MJPG - compressed
properties
Video Format:
AVI - avi format
Take Video by Default
---- Video Filters ----
Mirror
Invert
Negative
Mono
Pieces
Particles
Capture:
Control Profiles:
Cap. Image
Cap. Video
Save
Open
Defaults
Quit

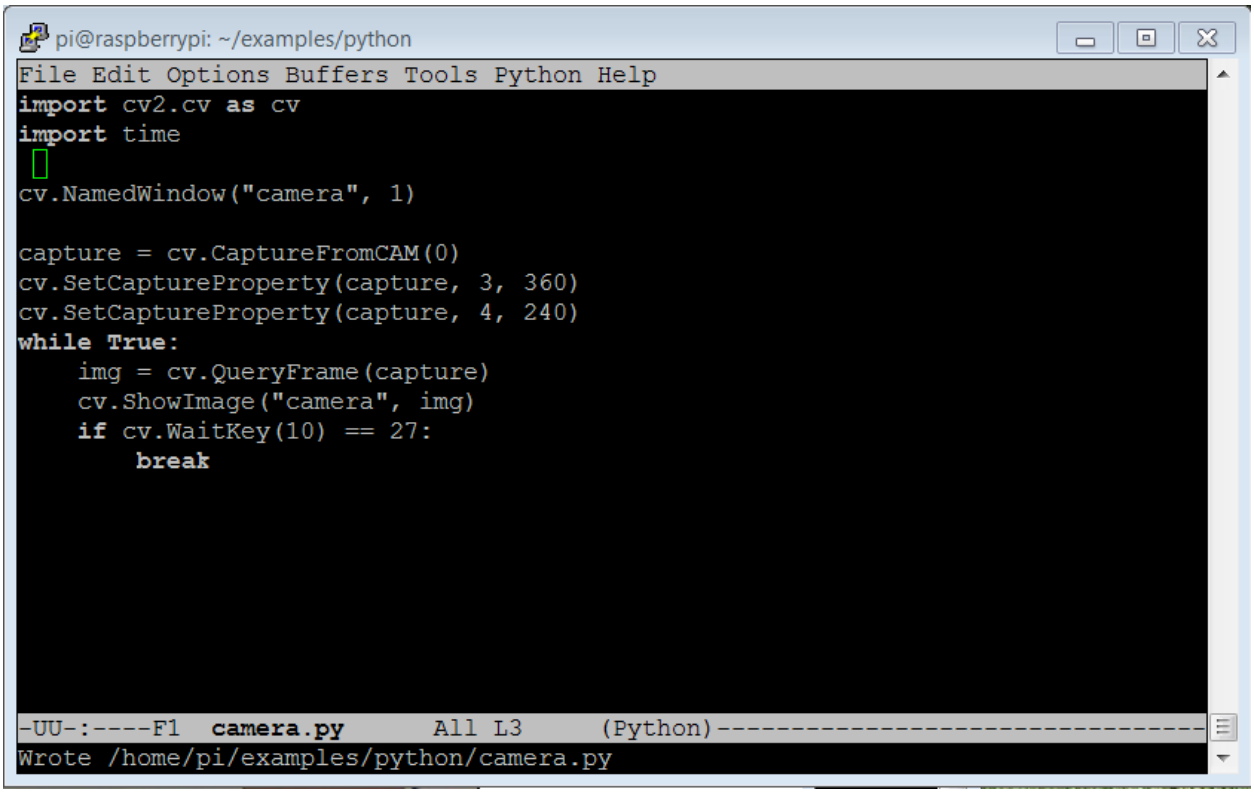

Raspberry Pi Camera
Rev 1.3

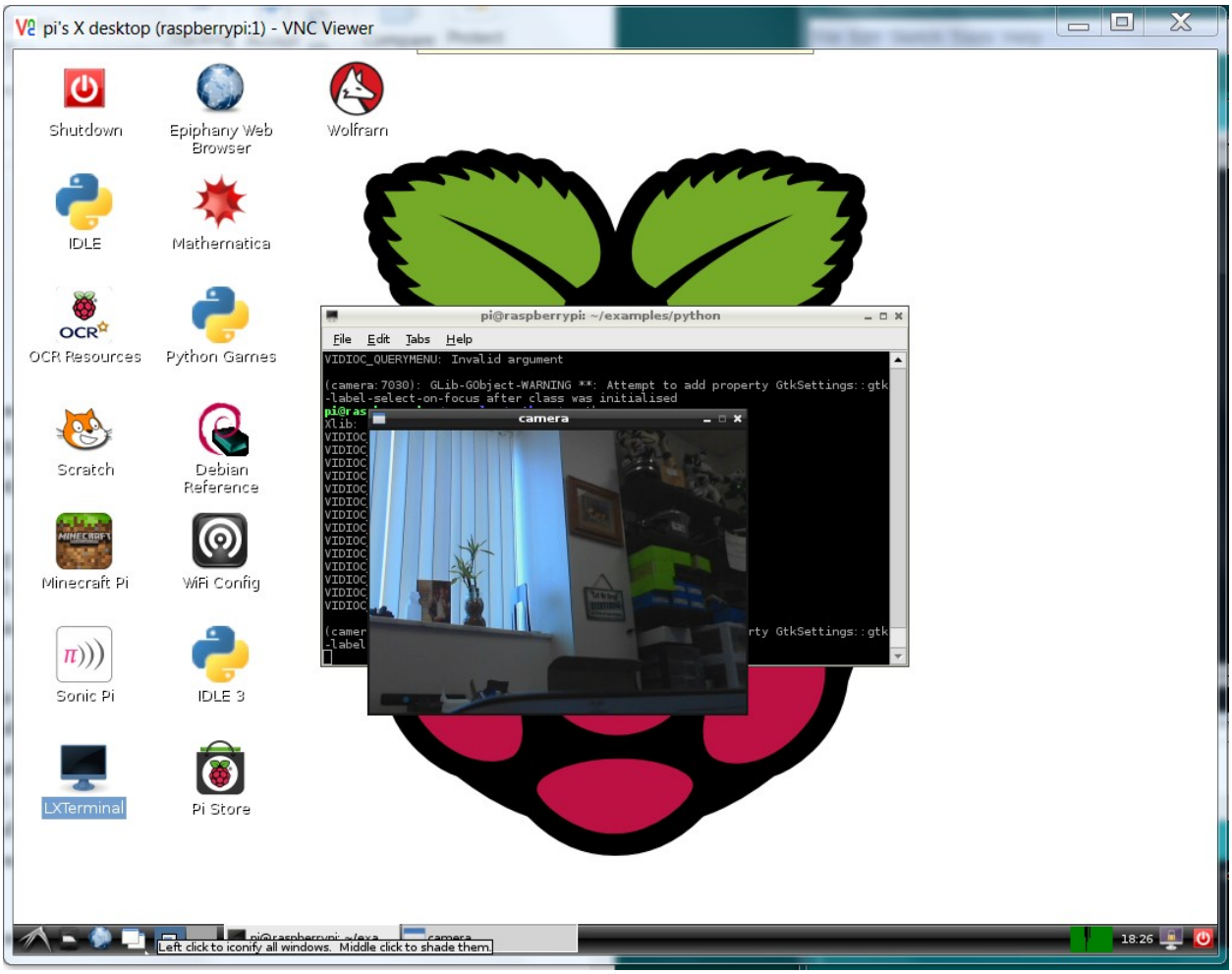

SUNNY
Rev 1.3

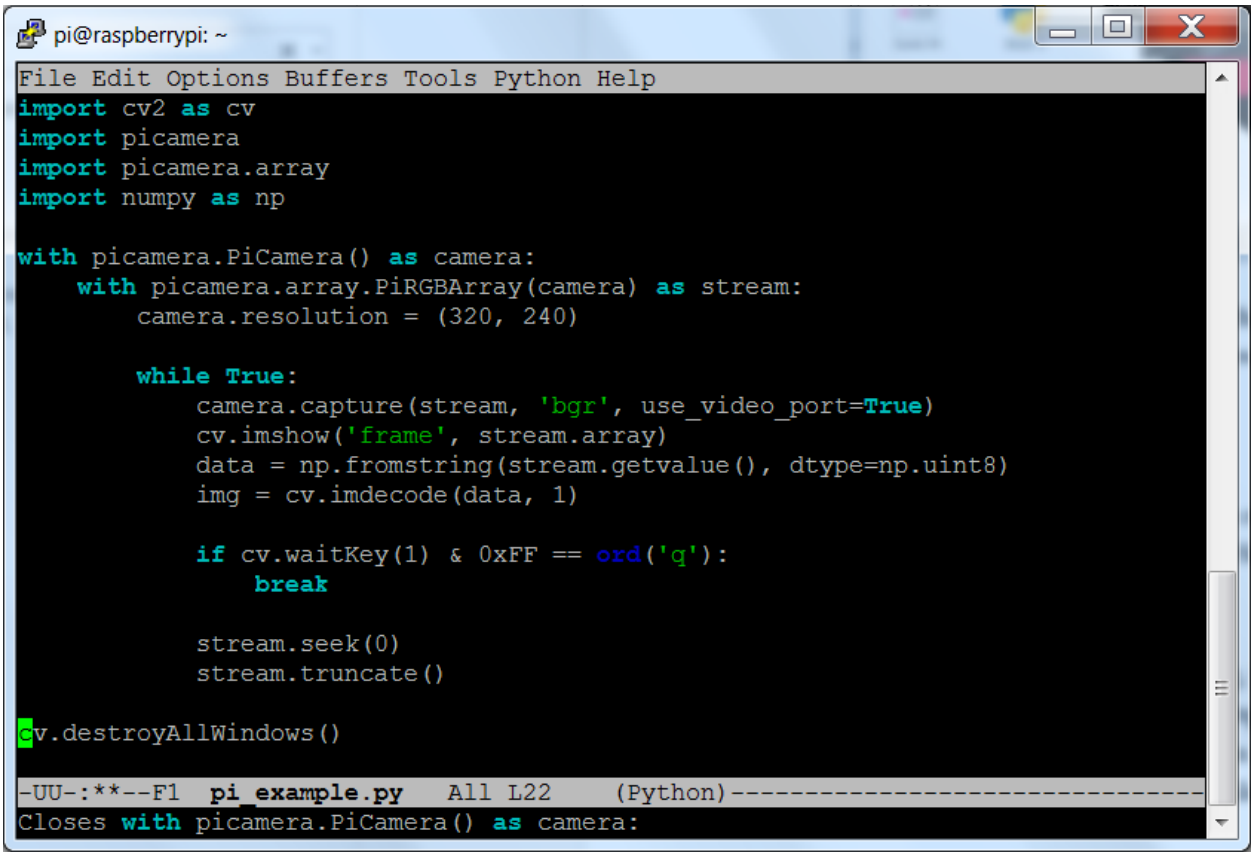

pi@raspberrypi: ~
Raspberry Pi Software Configuration Tool (raspi-config)
Setup Options
1 Expand Filesystem Ensures that all of the SD card s
2 Change User Password Change password for the default u
3 Enable Boot to Desktop/Scratch Choose whether to boot into a des
4 Internationalisation Options Set up language and regional sett
5 Enable Camera Enable this Pi to work with the R
6 Add to Rastrack Add this Pi to the online Raspber
7 Overclock Configure overclocking for your P
8 Advanced Options Configure advanced settings
9 About raspi-config Information about this configurat
<Select>
<Finish>

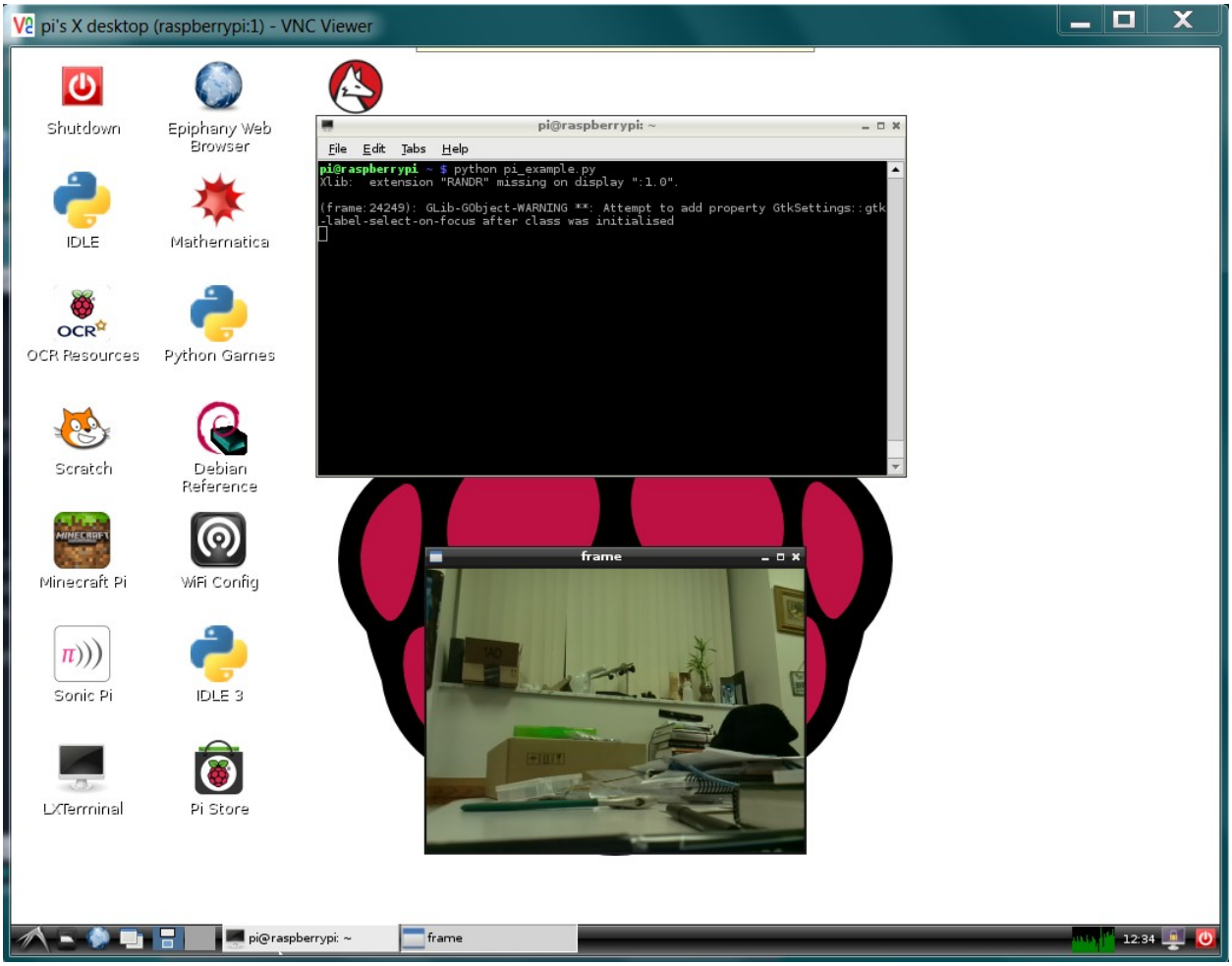

pi's X desktop (raspberrypi:1) - VNC Viewer
Shutdown
Epiphany Web Browser
Wolfram
IDLE
Mathematica
OCR Resource
Scratch
Minecraft Pi
Sonic Pi
LXTerminal
image.jpg (2592x1944) 22%
pi@raspberrypi: ~
File Edit Tabs Help
enable(1) | disable (0))
start
python_games
python-spi
setup.py
sphinxbase-0.8
sphinxbase-0.8.tar.gz
spidev_module.c
r.gz test.wav
usr/share/fonts/truetype/ttf-
not a linux console?)
usr/share/fonts/truetype/ttf-
not a linux console?)
bose -a image.jpg
usr/share/fonts/truetype/ttf-
pi@raspberrypi: ~
image.jpg (2592x1944) ...
11:40

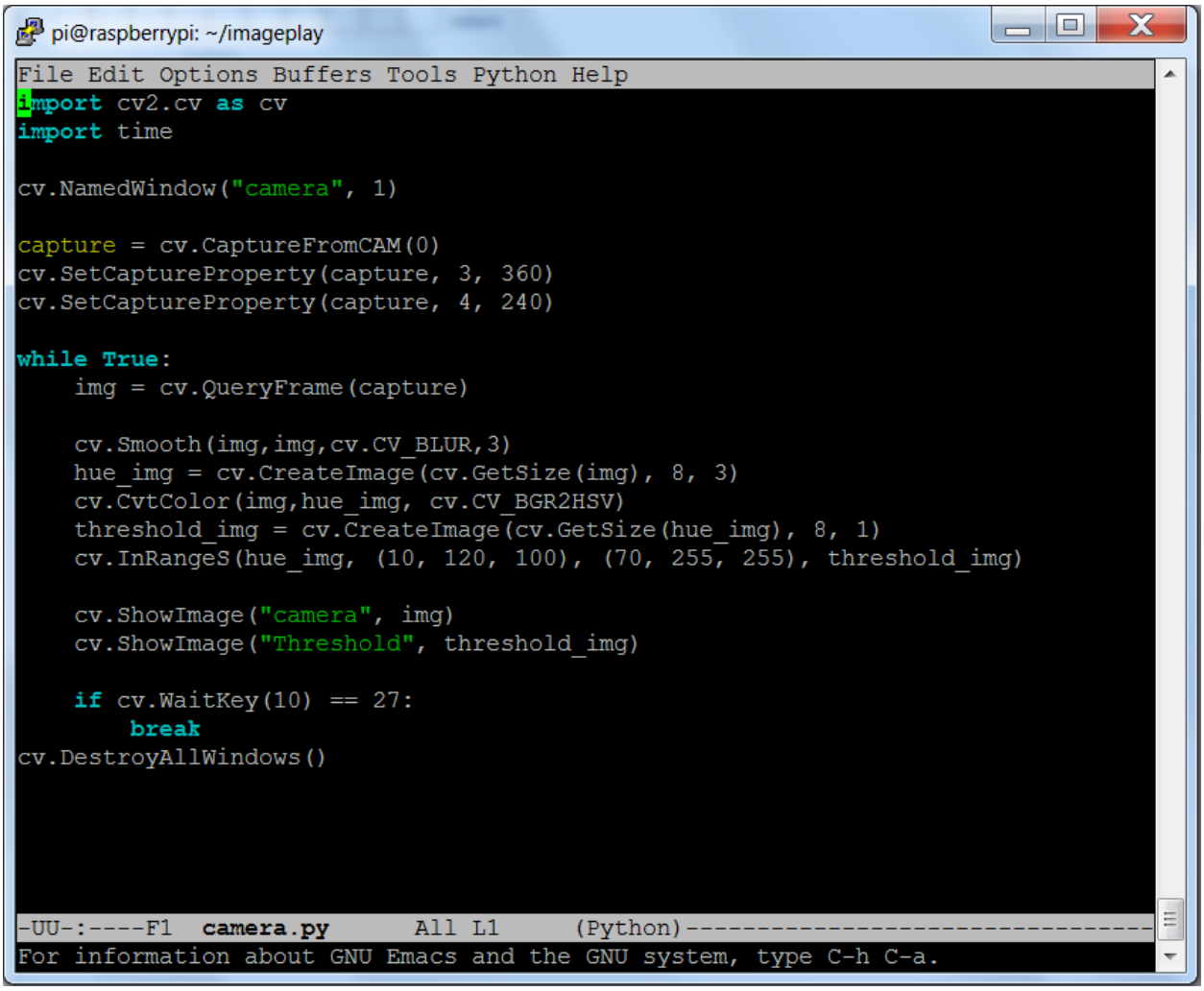

pi's X desktop (raspberrypi:1) - VNC Viewer
Shutdown
Epiphany Web Browser
Wolfram
IDLE
Mathematica
OCR Resources
Python Games
Scratch
Debian Reference
Minecraft Pi
WiFi Config
Sonic Pi
IDLE 3
LXTerminal
Pi Store
camera
File Edit Tabs
pi@raspberrypi
pi@raspberrypi ~
Xlib: extension
VIDIOC_QUERYMENU
VIDIOC_QUERYMENU
VIDIOC_QUERYMENU
VIDIOC_QUERYMENU
VIDIOC_QUERYMENU
VIDIOC_QUERYMENU
(camera:7030): G
-label-select-on
pi@raspberrypi: ~/exa...
camera
18:23

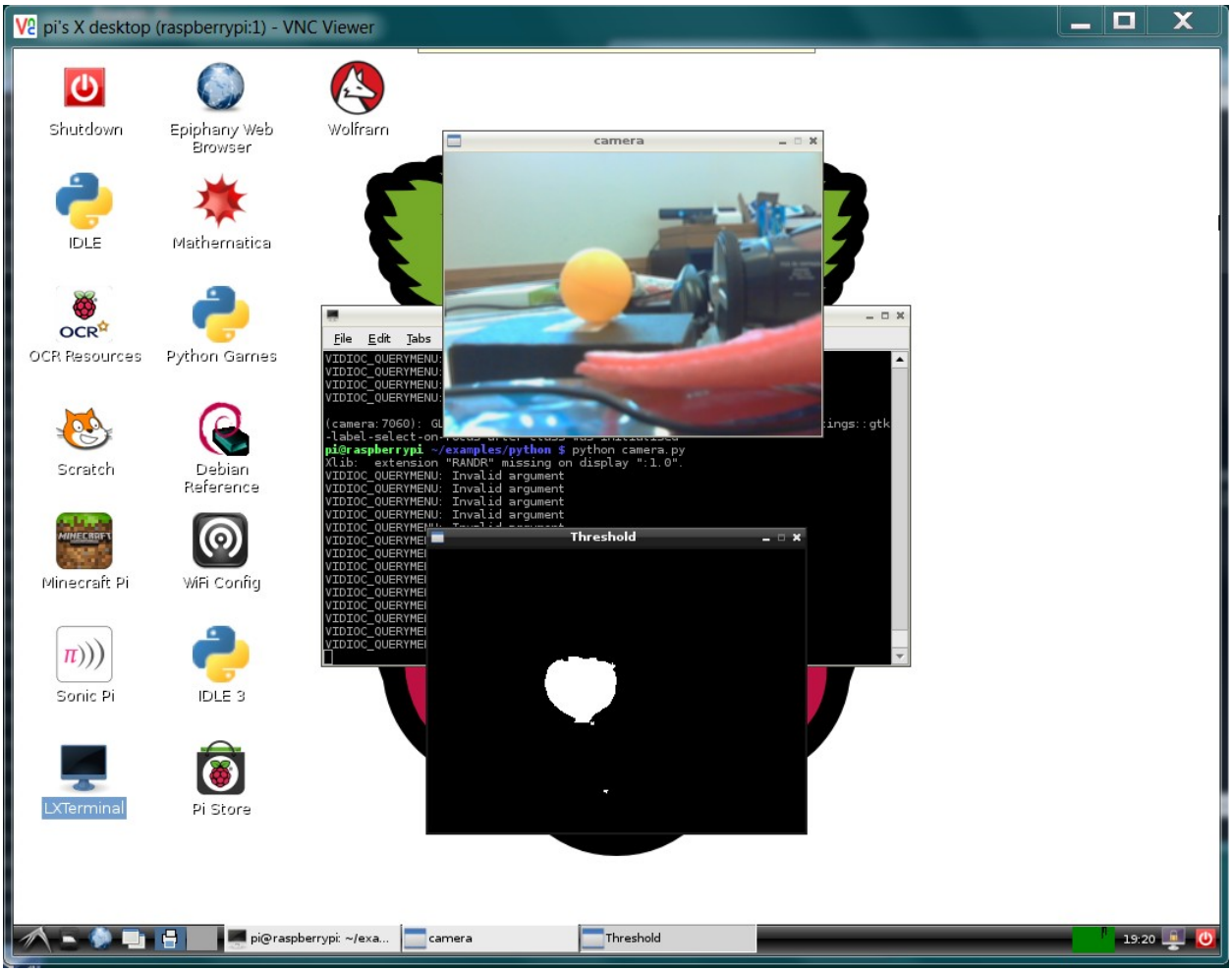

pi@raspberrypi: ~/examples/python
File Edit Options Buffers Tools Python Help
import cv2.cv as cv
import time
cv.NamedWindow("camera", 1)
capture = cv.CaptureFromCAM(0)
cv.SetCaptureProperty(capture, 3, 360)
cv.SetCaptureProperty(capture, 4, 240)
while True:
img = cv.QueryFrame(capture)
cv.ShowImage("camera", img)
if cv.WaitKey(10) == 27:
break
-UU-:----F1 camera.py All L3 (Python)
Wrote /home/pi/examples/python/camera.py

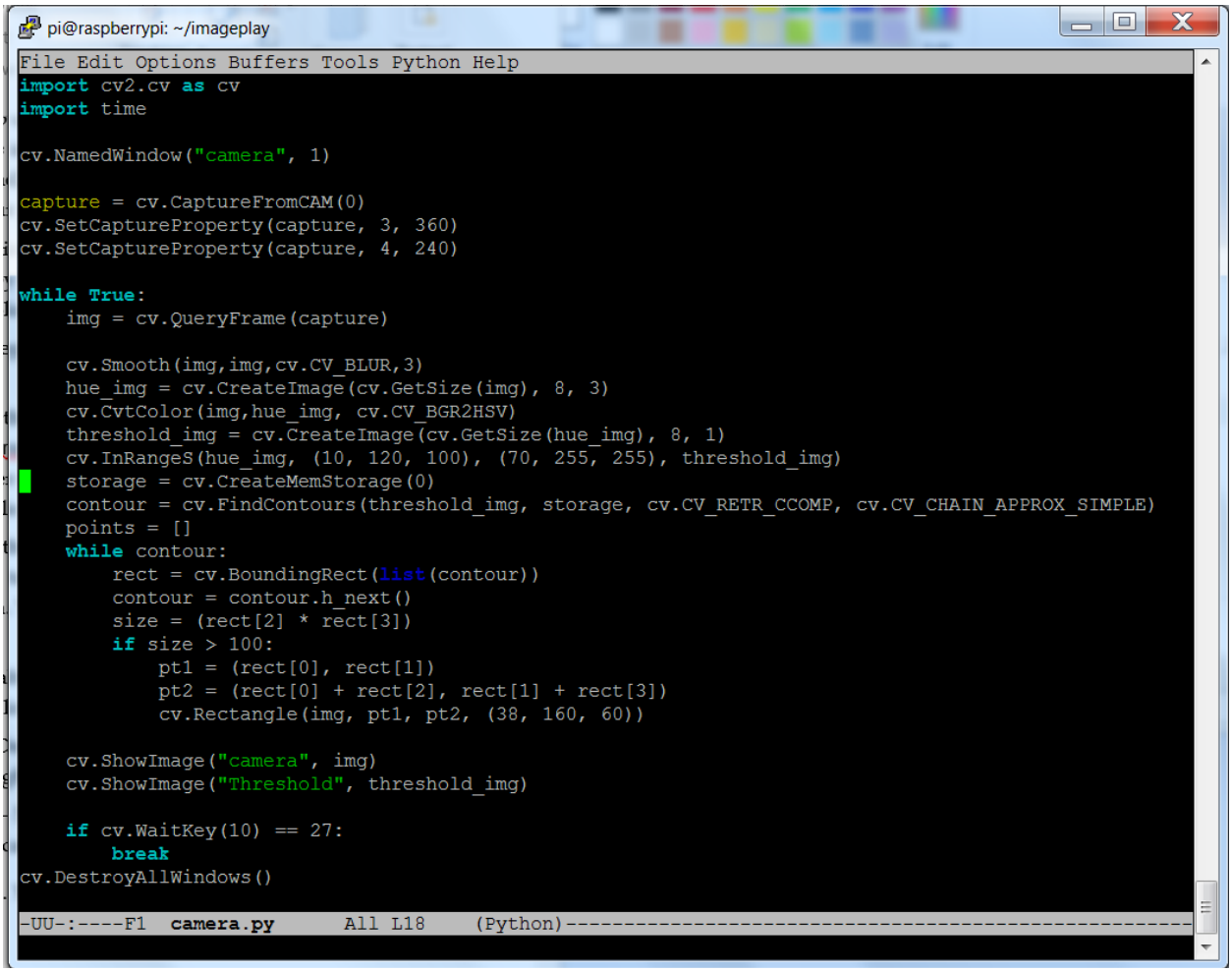

pi's X desktop (raspberrypi:1) - VNC Viewer
Shutdown
Epiphany Web Browser
Wolfram
IDLE
Mathematica
OCR Resources
Python Games
Scratch
Debian Reference
Minecraft Pi
WiFi Config
Sonic Pi
IDLE 3
LXTerminal
Pi Store
pi@raspberrypi: ~/examples/python
File Edit Tabs Help
VIDIOC_QUERYMENU: Invalid argument
(camera:7030): GLib-GObject-WARNING **: Attempt to add property GtkSettings::gtk
-label-select-on-focus after class was initialised
camera
Left click to iconify all windows. Middle click to shade them.
18:26

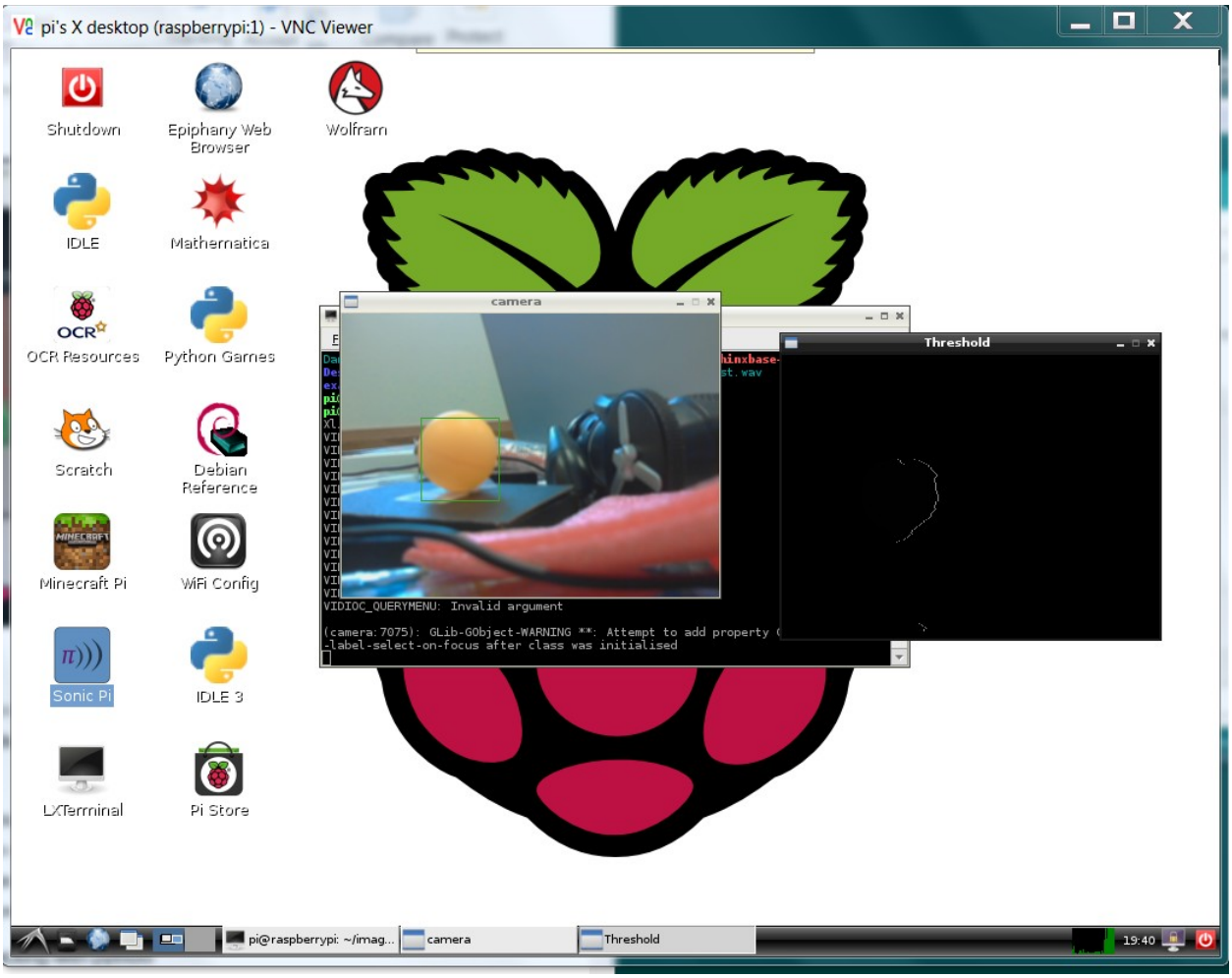

pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
import cv2 as cv
import picamera
import picamera.array
import numpy as np
with picamera.PiCamera() as camera:
with picamera.array.PiRGBArray(camera) as stream:
camera.resolution = (320, 240)
while True:
camera.capture(stream, 'bgr', use_video_port=True)
cv.imshow('frame', stream.array)
data = np.fromstring(stream.getvalue(), dtype=np.uint8)
img = cv.imdecode(data, 1)
if cv.waitKey(1) & 0xFF == ord('q'):
break
stream.seek(0)
stream.truncate()
cv.destroyAllWindows()
-UU-:**--F1 pi_example.py All L22 (Python)
Closes with picamera.PiCamera() as camera:


pi's X desktop (raspberrypi:1) - VNC Viewer
Shutdown
Epiphany Web Browser
IDLE
Mathematica
OCR Resources
Python Games
Scratch
Debian Reference
Minecraft Pi
WiFi Config
Sonic Pi
IDLE 3
LXTerminal
Pi Store
pi@raspberrypi: ~
File Edit Tabs Help
pi@raspberrypi ~ $ python pi_example.py
Xlib: extension "RANDR" missing on display ":1.0".
(frame:24249): GLib-GObject-WARNING **: Attempt to add property GtkSettings::gtk-label-select-on-focus after class was initialised
frame
pi@raspberrypi: ~
frame
12:34

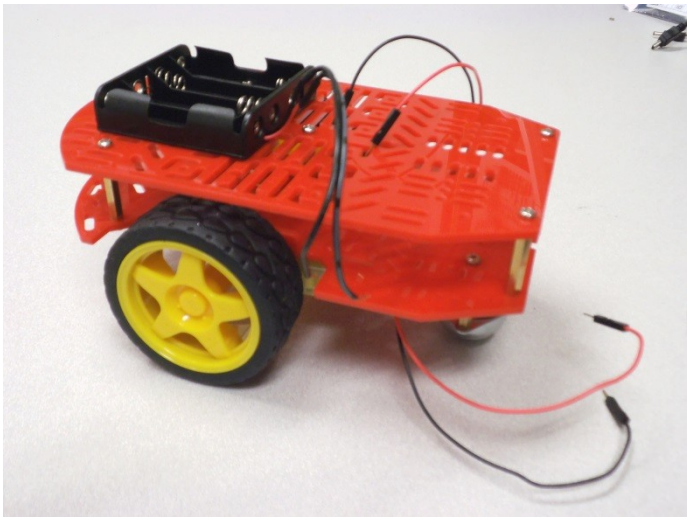

pi@raspberrypi: ~/imageplay
File Edit Options Buffers Tools Python Help
import cv2.cv as cv
import time
cv.NamedWindow("camera", 1)
capture = cv.CaptureFromCAM(0)
cv.SetCaptureProperty(capture, 3, 360)
cv.SetCaptureProperty(capture, 4, 240)
while True:
img = cv.QueryFrame(capture)
cv.Smooth(img,img,cv.CV_BLUR,3)
hue_img = cv.CreateImage(cv.GetSize(img), 8, 3)
cv.CvtColor(img,hue_img, cv.CV_BGR2HSV)
threshold_img = cv.CreateImage(cv.GetSize(hue_img), 8, 1)
cv.InRangeS(hue_img, (10, 120, 100), (70, 255, 255), threshold_img)
cv.ShowImage("camera", img)
cv.ShowImage("Threshold", threshold_img)
if cv.WaitKey(10) == 27:
break
cv.DestroyAllWindows()
-UU-:----F1 camera.py All L1 (Python)
For information about GNU Emacs and the GNU system, type C-h C-a.

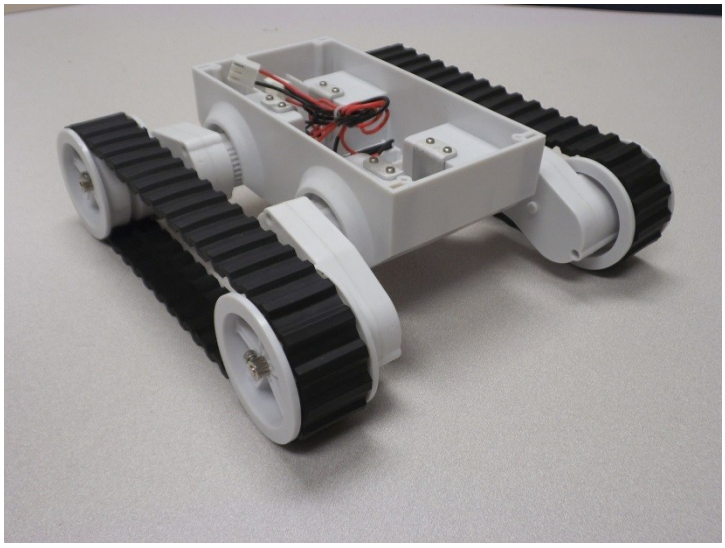

pi's X desktop (raspberrypi:1) - VNC Viewer
Shutdown
Epiphany Web Browser
Wolfram
IDLE
Mathematica
OCR Resources
Python Games
Scratch
Debian Reference
Minecraft Pi
WiFi Config
Sonic Pi
IDLE 3
LXTerminal
Pi Store
camera
Threshold
File Edit Tabs
pi@raspberrypi ~/examples/python $ python camera.py
Xlib: extension "RANDR" missing on display ":1.0".
VIDIOC_QUERYMENU: Invalid argument
pi@raspberrypi: ~/exa...
camera
Threshold
19:20


pi@raspberrypi: ~/imageplay
File Edit Options Buffers Tools Python Help
import cv2.cv as cv
import time
cv.NamedWindow("camera", 1)
capture = cv.CaptureFromCAM(0)
cv.SetCaptureProperty(capture, 3, 360)
cv.SetCaptureProperty(capture, 4, 240)
while True:
img = cv.QueryFrame(capture)
cv.Smooth(img,img,cv.CV_BLUR,3)
hue_img = cv.CreateImage(cv.GetSize(img), 8, 3)
cv.CvtColor(img,hue_img, cv.CV_BGR2HSV)
threshold_img = cv.CreateImage(cv.GetSize(hue_img), 8, 1)
cv.InRangeS(hue_img, (10, 120, 100), (70, 255, 255), threshold_img)
storage = cv.CreateMemStorage(0)
contour = cv.FindContours(threshold_img, storage, cv.CV_RETR_CCOMP, cv.CV_CHAIN_APPROX_SIMPLE)
points = []
while contour:
rect = cv.BoundingRect(list(contour))
contour = contour.h_next()
size = (rect[2] * rect[3])
if size > 100:
pt1 = (rect[0], rect[1])
pt2 = (rect[0] + rect[2], rect[1] + rect[3])
cv.Rectangle(img, pt1, pt2, (38, 160, 60))
cv.ShowImage("camera", img)
cv.ShowImage("Threshold", threshold_img)
if cv.WaitKey(10) == 27:
break
cv.DestroyAllWindows()
-UU-:----F1 camera.py All L18 (Python)

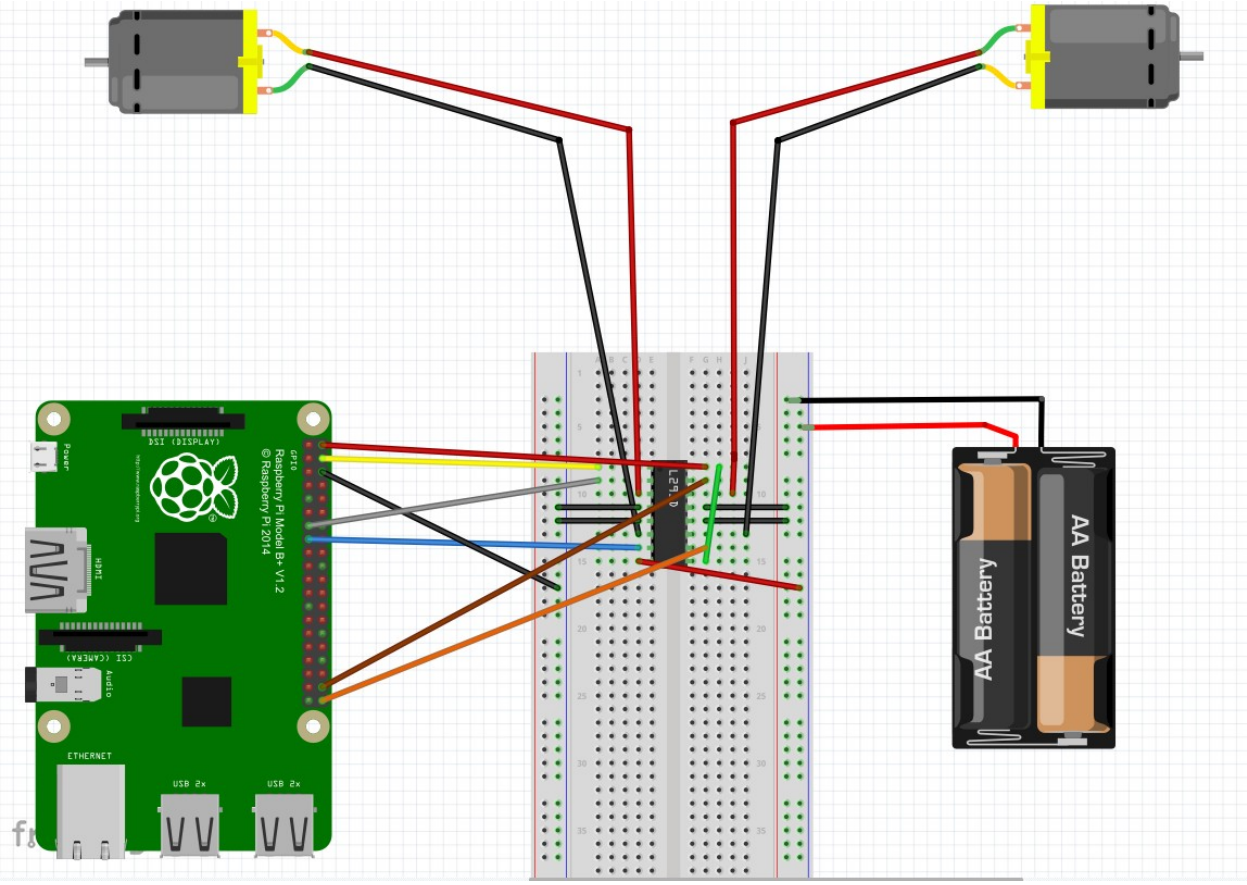

pi's X desktop (raspberrypi:1) - VNC Viewer
Shutdown
Epiphany Web Browser
Wolfram
IDLE
Mathematica
OCR Resources
Python Games
Scratch
Debian Reference
Minecraft Pi
WiFi Config
Sonic Pi
IDLE 3
LXTerminal
Pi Store
camera
Threshold
VIDIOC_QUERYMENU: Invalid argument
(camera:7075): GLib-GObject-WARNING **: Attempt to add property
-label-select-on-focus after class was initialised
pi@raspberrypi: ~/imag...
camera
Threshold
19:40

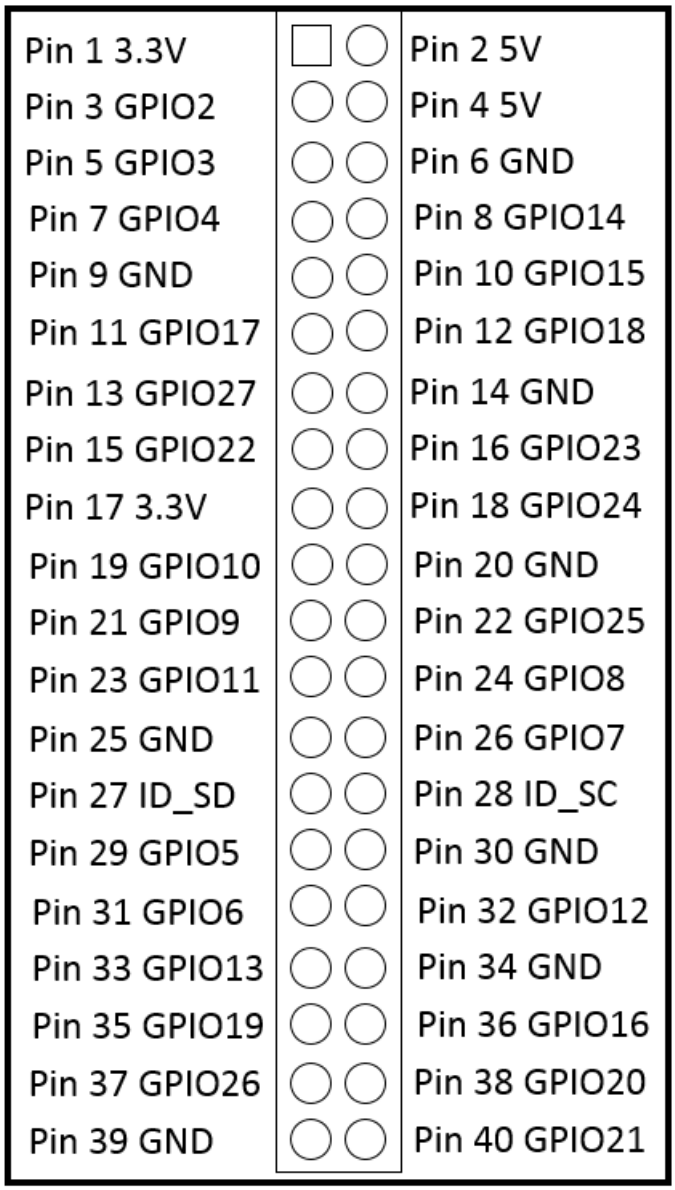
Chapter 5: Creating Mobile Robots on Wheels

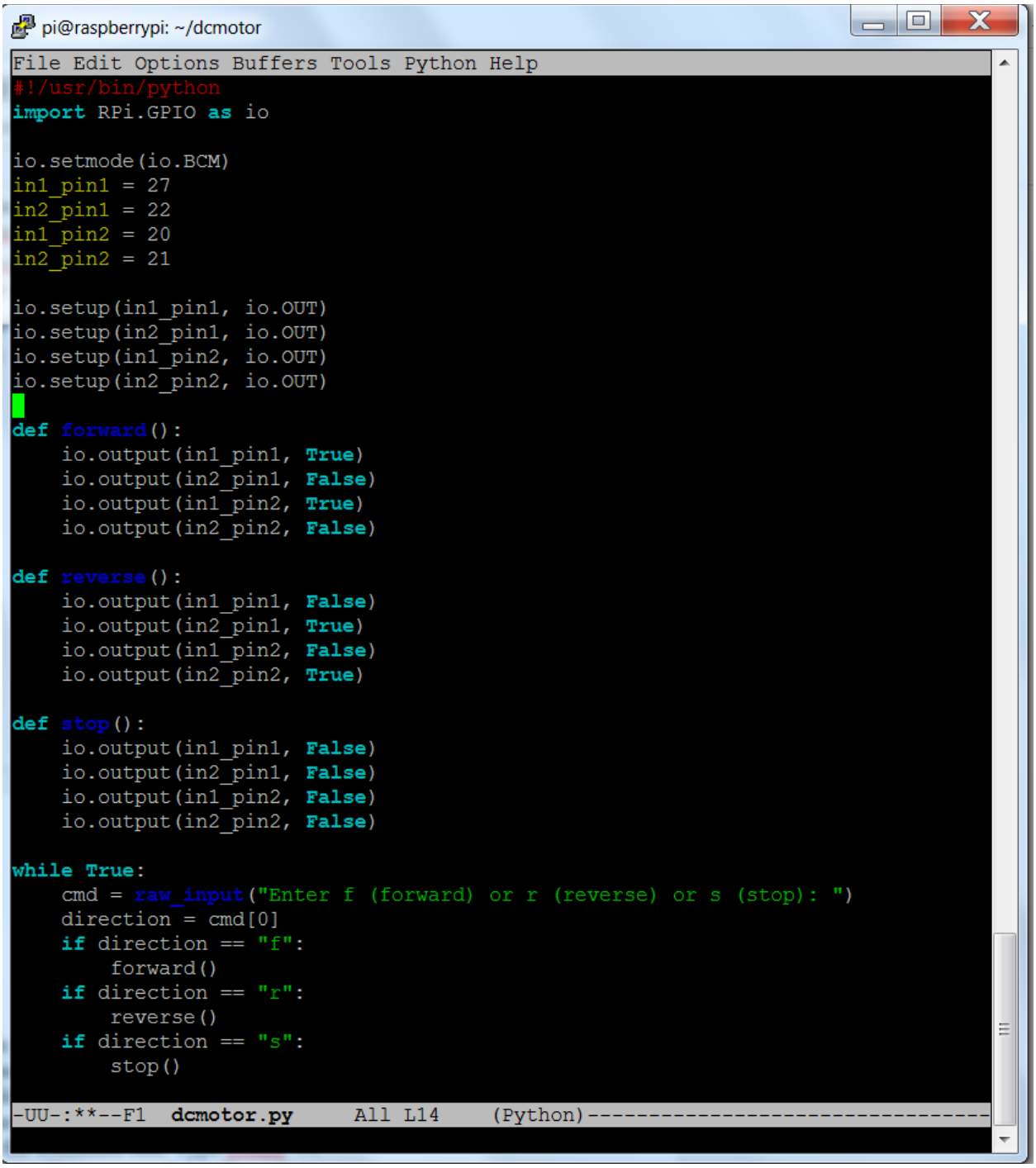


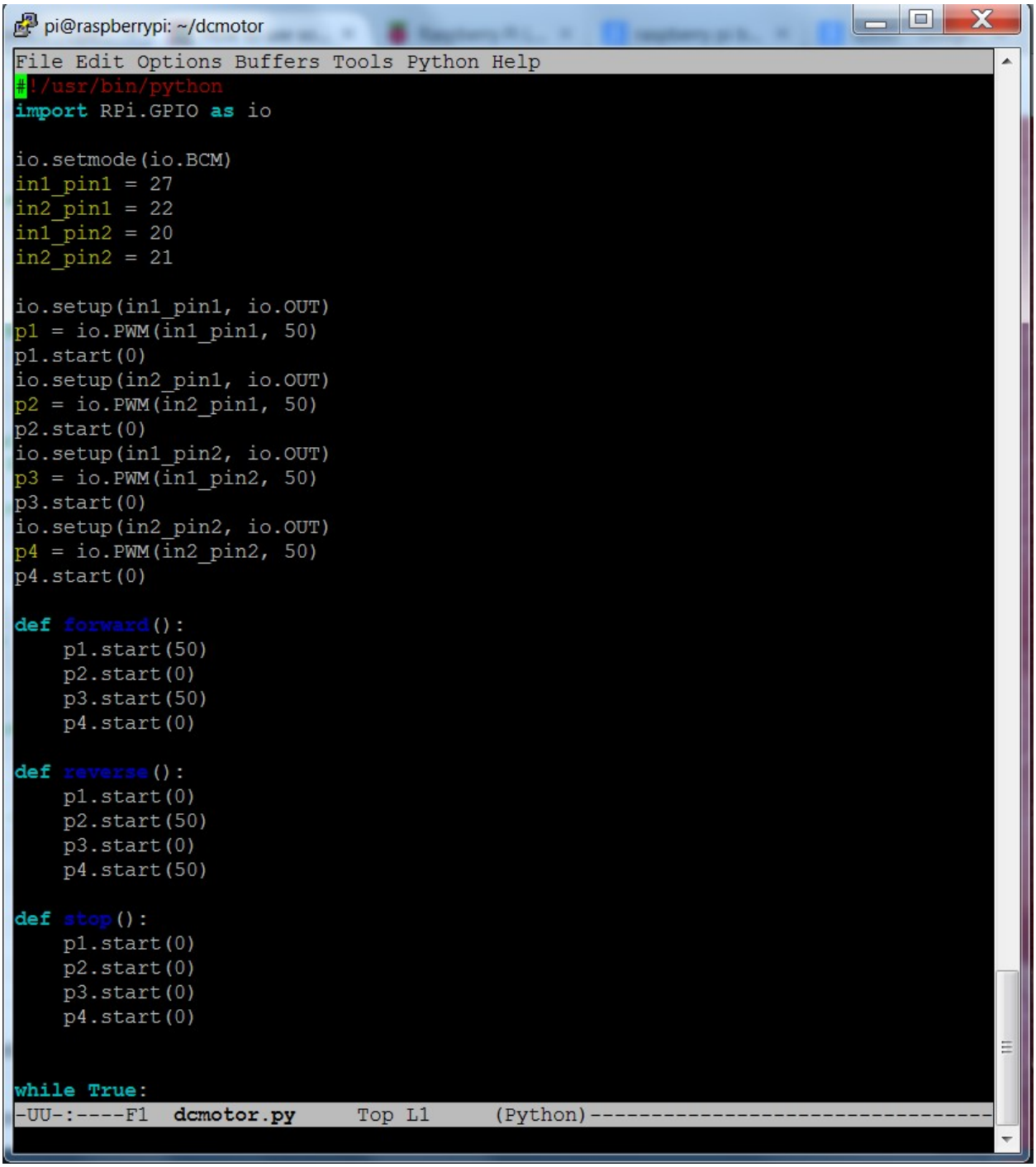


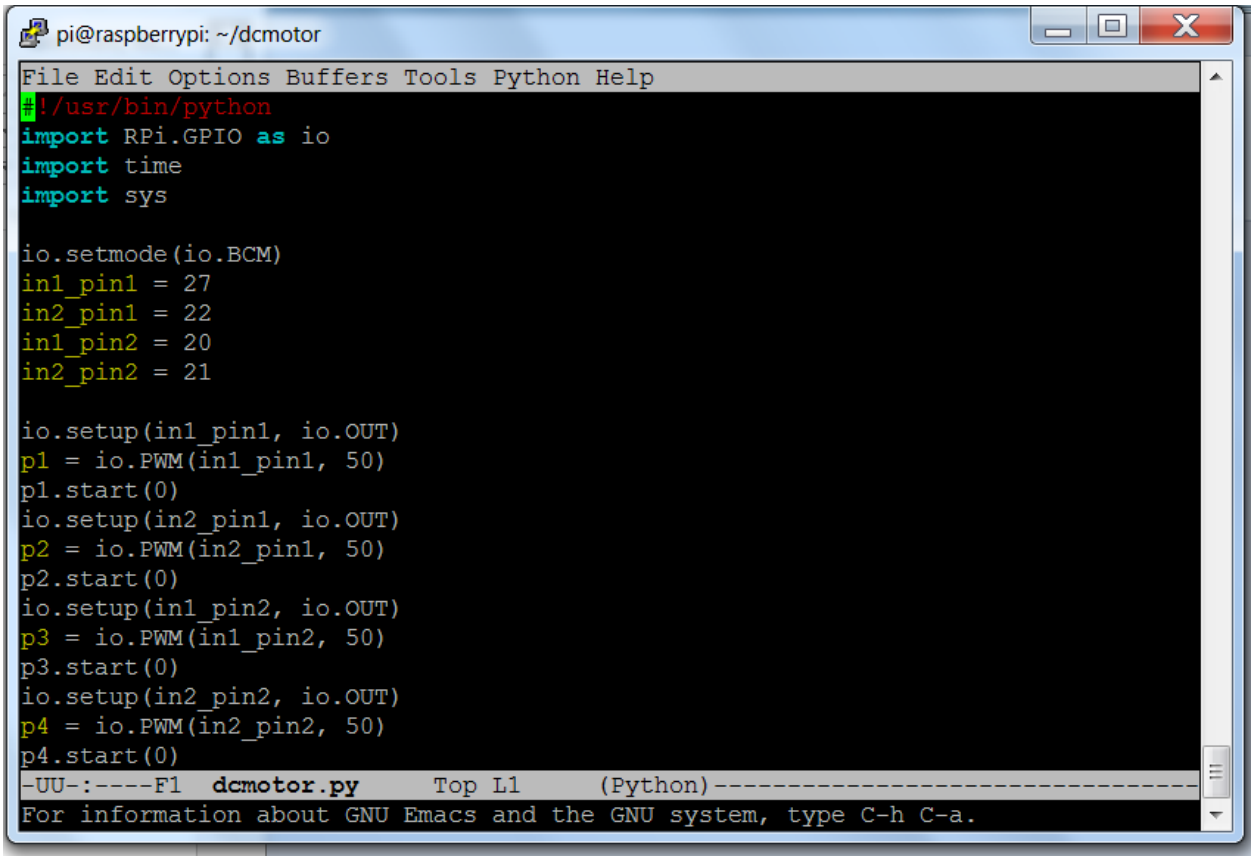
POWERDOCKS

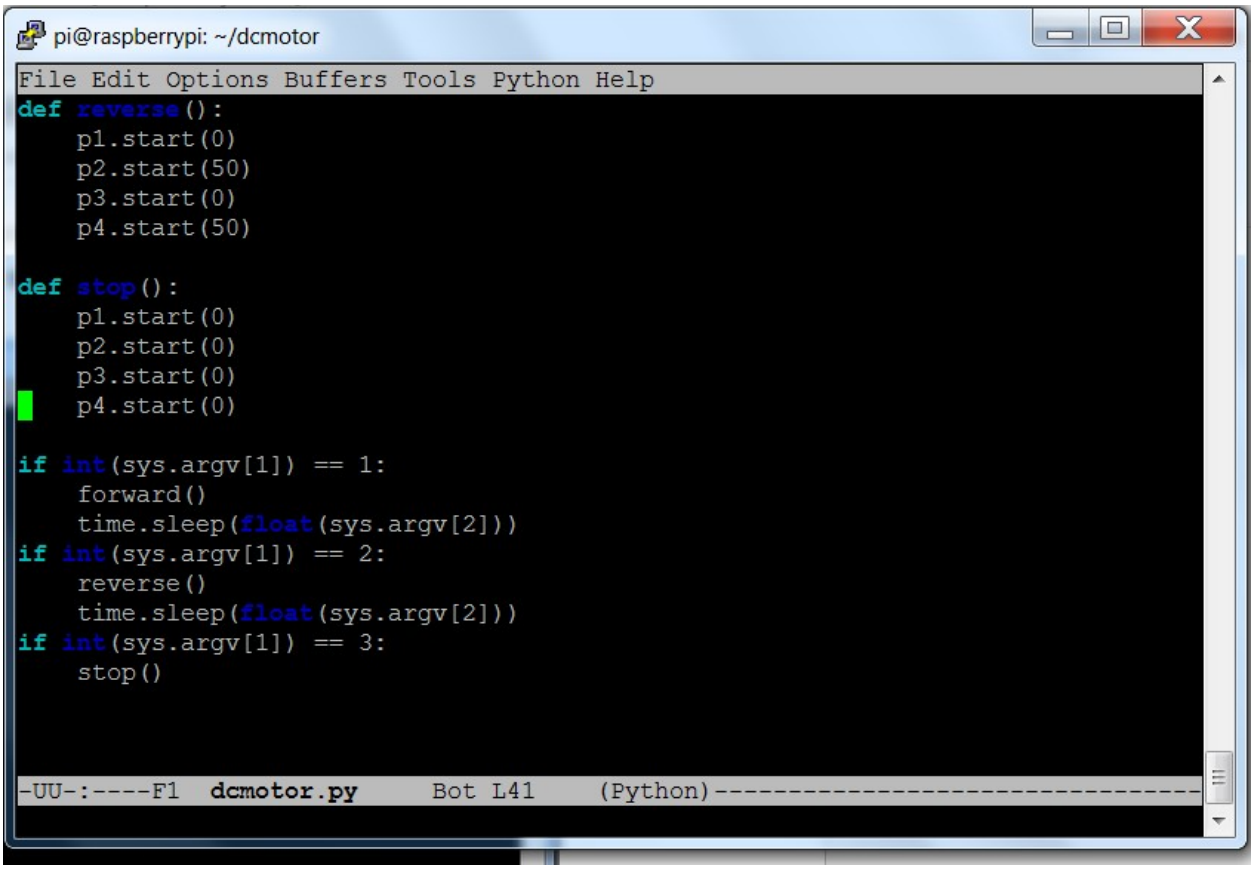

DSI (DISPLAY)
Power
HDMI
CSI (CAMERA)
Audio
ETHERNET
USB 2x
USB 2x
GPIO
Raspberry Pi Model B+ V1.2
© Raspberry Pi 2014
L293D
AA Battery
AA Battery

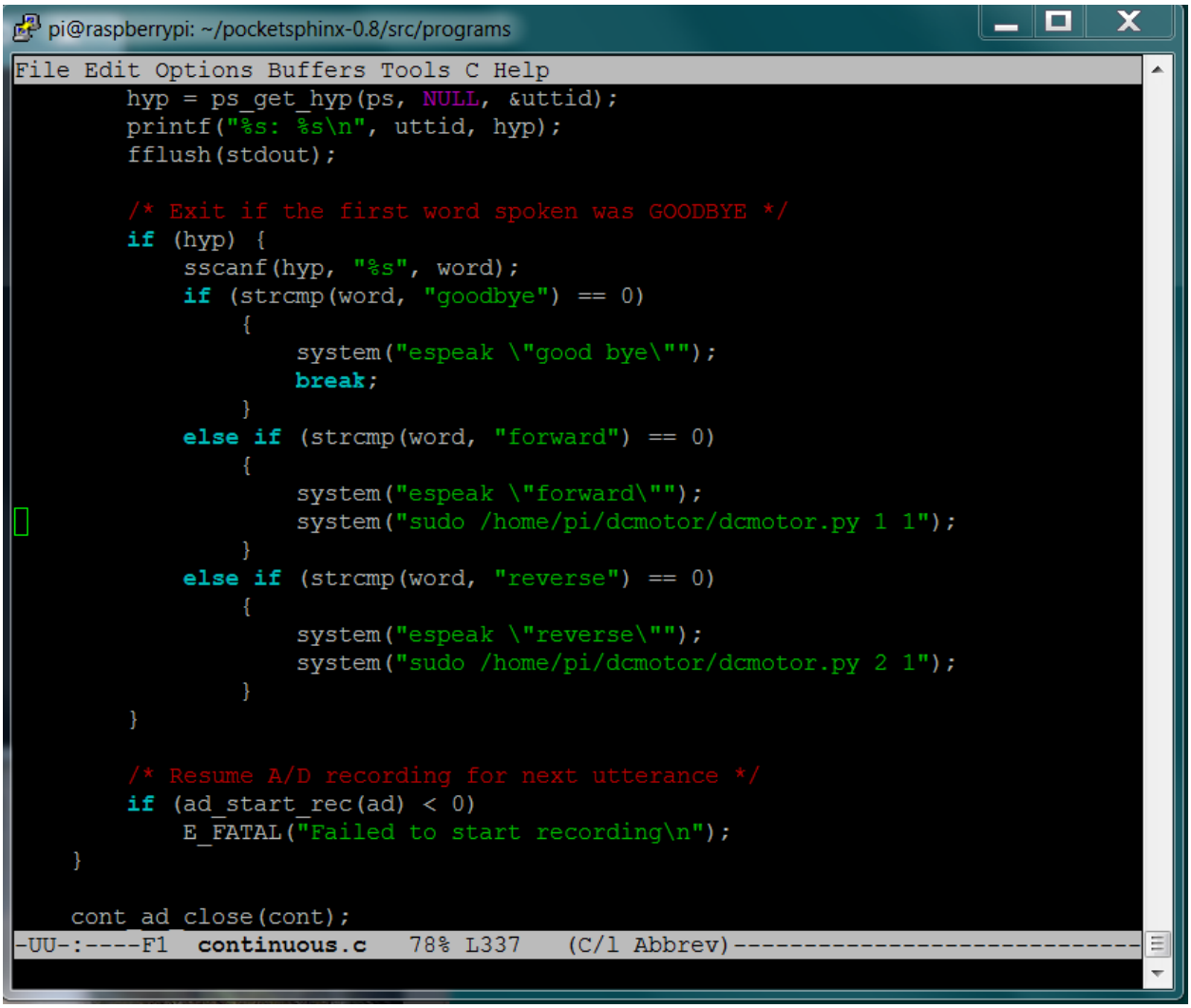

Pin 1 3.3V
Pin 2 5V
Pin 3 GPIO2
Pin 4 5V
Pin 5 GPIO3
Pin 6 GND
Pin 7 GPIO4
Pin 8 GPIO14
Pin 9 GND
Pin 10 GPIO15
Pin 11 GPIO17
Pin 12 GPIO18
Pin 13 GPIO27
Pin 14 GND
Pin 15 GPIO22
Pin 16 GPIO23
Pin 17 3.3V
Pin 18 GPIO24
Pin 19 GPIO10
Pin 20 GND
Pin 21 GPIO9
Pin 22 GPIO25
Pin 23 GPIO11
Pin 24 GPIO8
Pin 25 GND
Pin 26 GPIO7
Pin 27 ID_SD
Pin 28 ID_SC
Pin 29 GPIO5
Pin 30 GND
Pin 31 GPIO6
Pin 32 GPIO12
Pin 33 GPIO13
Pin 34 GND
Pin 35 GPIO19
Pin 36 GPIO16
Pin 37 GPIO26
Pin 38 GPIO20
Pin 39 GND
Pin 40 GPIO21


pi@raspberrypi: ~/dcmotor
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
import RPi.GPIO as io
io.setmode(io.BCM)
in1_pin1 = 27
in2_pin1 = 22
in1_pin2 = 20
in2_pin2 = 21
io.setup(in1_pin1, io.OUT)
io.setup(in2_pin1, io.OUT)
io.setup(in1_pin2, io.OUT)
io.setup(in2_pin2, io.OUT)
def forward():
io.output(in1_pin1, True)
io.output(in2_pin1, False)
io.output(in1_pin2, True)
io.output(in2_pin2, False)
def reverse():
io.output(in1_pin1, False)
io.output(in2_pin1, True)
io.output(in1_pin2, False)
io.output(in2_pin2, True)
def stop():
io.output(in1_pin1, False)
io.output(in2_pin1, False)
io.output(in1_pin2, False)
io.output(in2_pin2, False)
while True:
cmd = raw_input("Enter f (forward) or r (reverse) or s (stop): ")
direction = cmd[0]
if direction == "f":
forward()
if direction == "r":
reverse()
if direction == "s":
stop()
-UU-:**--F1 dcmotor.py All L14 (Python)

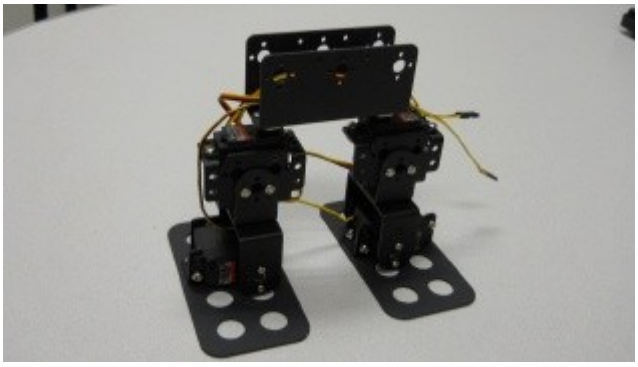

pi@raspberrypi: ~/dcmotor
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
import RPi.GPIO as io
io.setmode(io.BCM)
in1_pin1 = 27
in2_pin1 = 22
in1_pin2 = 20
in2_pin2 = 21
io.setup(in1_pin1, io.OUT)
p1 = io.PWM(in1_pin1, 50)
p1.start(0)
io.setup(in2_pin1, io.OUT)
p2 = io.PWM(in2_pin1, 50)
p2.start(0)
io.setup(in1_pin2, io.OUT)
p3 = io.PWM(in1_pin2, 50)
p3.start(0)
io.setup(in2_pin2, io.OUT)
p4 = io.PWM(in2_pin2, 50)
p4.start(0)
def forward():
p1.start(50)
p2.start(0)
p3.start(50)
p4.start(0)
def reverse():
p1.start(0)
p2.start(50)
p3.start(0)
p4.start(50)
def stop():
p1.start(0)
p2.start(0)
p3.start(0)
p4.start(0)
while True:
-UU-:----F1 dcmotor.py Top L1 (Python)

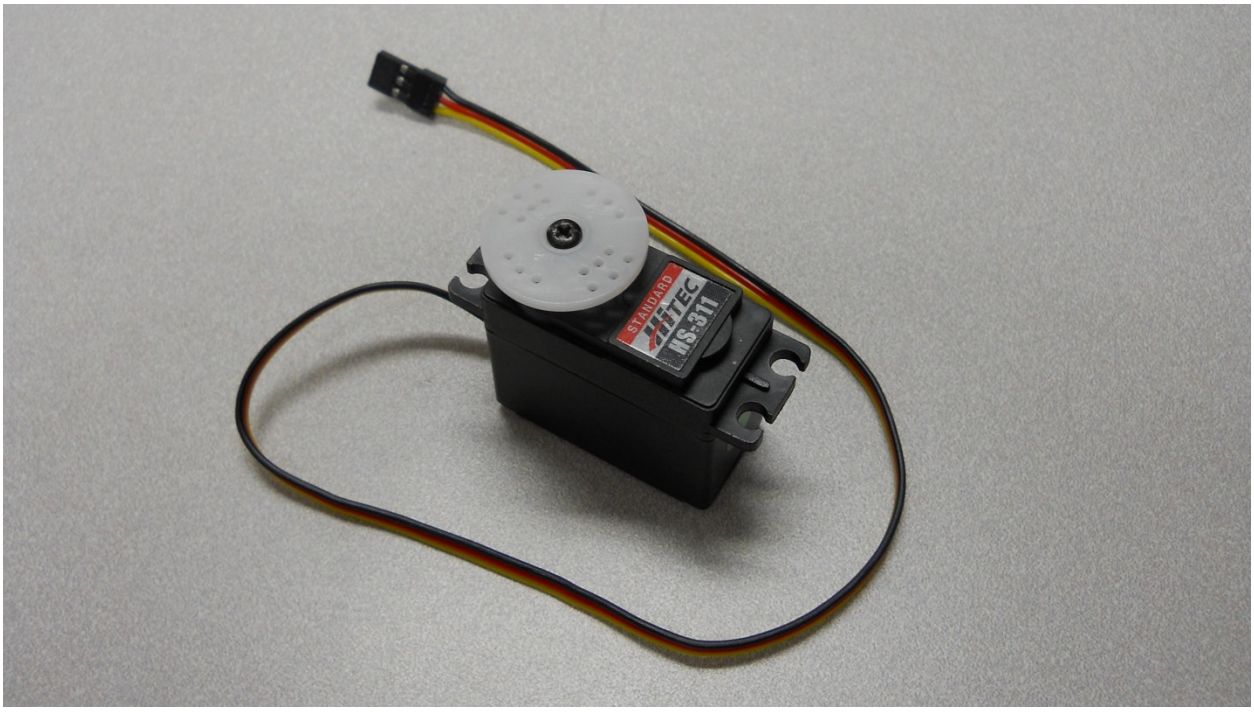

pi@raspberrypi: ~/dcmotor
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
import RPi.GPIO as io
import time
import sys
io.setmode(io.BCM)
in1_pin1 = 27
in2_pin1 = 22
in1_pin2 = 20
in2_pin2 = 21
io.setup(in1_pin1, io.OUT)
p1 = io.PWM(in1_pin1, 50)
p1.start(0)
io.setup(in2_pin1, io.OUT)
p2 = io.PWM(in2_pin1, 50)
p2.start(0)
io.setup(in1_pin2, io.OUT)
p3 = io.PWM(in1_pin2, 50)
p3.start(0)
io.setup(in2_pin2, io.OUT)
p4 = io.PWM(in2_pin2, 50)
p4.start(0)
-UU-:----F1 dcmotor.py Top L1 (Python)
For information about GNU Emacs and the GNU system, type C-h C-a.


pi@raspberrypi: ~/dcmotor
File Edit Options Buffers Tools Python Help
def reverse():
p1.start(0)
p2.start(50)
p3.start(0)
p4.start(50)
def stop():
p1.start(0)
p2.start(0)
p3.start(0)
p4.start(0)
if int(sys.argv[1]) == 1:
forward()
time.sleep(float(sys.argv[2]))
if int(sys.argv[1]) == 2:
reverse()
time.sleep(float(sys.argv[2]))
if int(sys.argv[1]) == 3:
stop()
-UU-:----F1 dcmotor.py Bot L41 (Python)

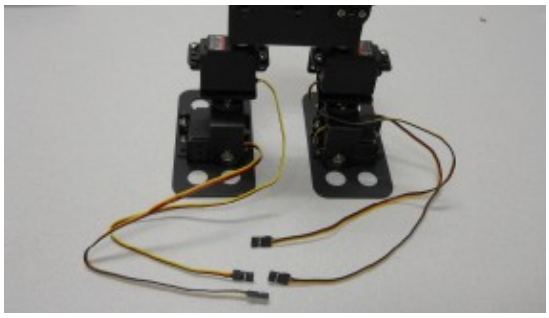

pi@raspberrypi: ~/pocketsphinx-0.8/src/programs
File Edit Options Buffers Tools C Help
hyp = ps_get_hyp(ps, NULL, &uttid);
printf("%s: %s\n", uttid, hyp);
fflush(stdout);
/* Exit if the first word spoken was GOODBYE */
if (hyp) {
sscanf(hyp, "%s", word);
if (strcmp(word, "goodbye") == 0)
{
system("espeak \"good bye\"");
break;
}
else if (strcmp(word, "forward") == 0)
{
system("espeak \"forward\"");
system("sudo /home/pi/dcmotor/dcmotor.py 1 1");
}
else if (strcmp(word, "reverse") == 0)
{
system("espeak \"reverse\"");
system("sudo /home/pi/dcmotor/dcmotor.py 2 1");
}
}
/* Resume A/D recording for next utterance */
if (ad_start_rec(ad) < 0)
E_FATAL("Failed to start recording\n");
}
cont_ad_close(cont);
-UU-:----F1 continuous.c 78% L337 (C/l Abbrev)

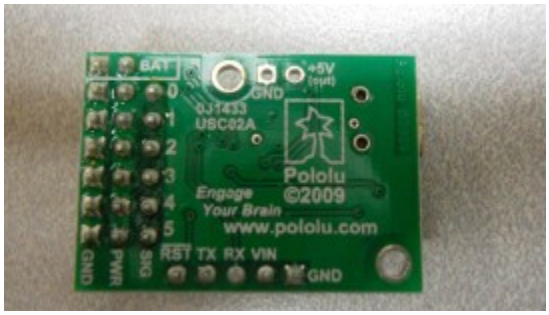
Chapter 6: Controlling the Movement of a Robot with Legs

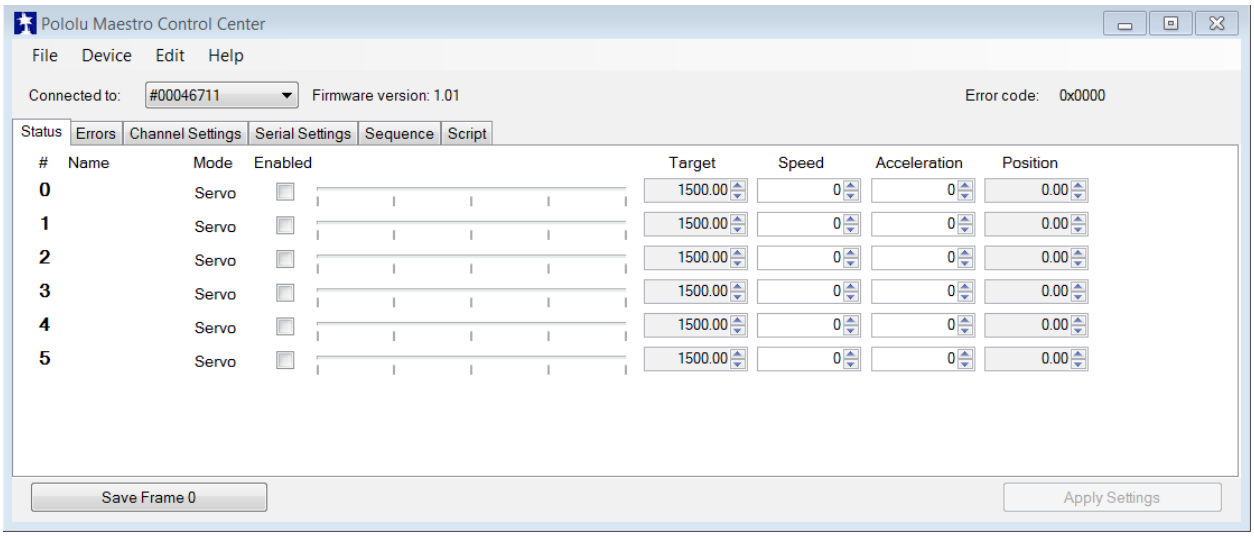


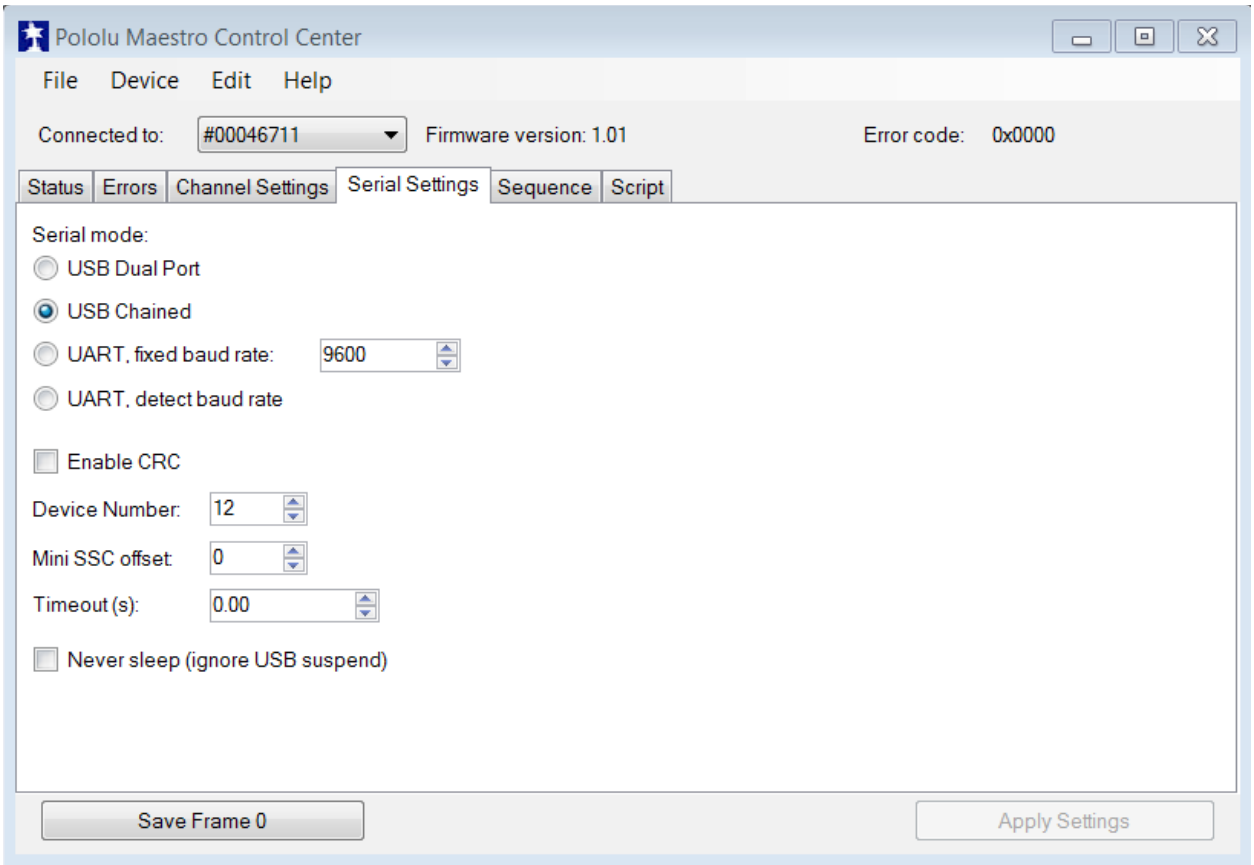


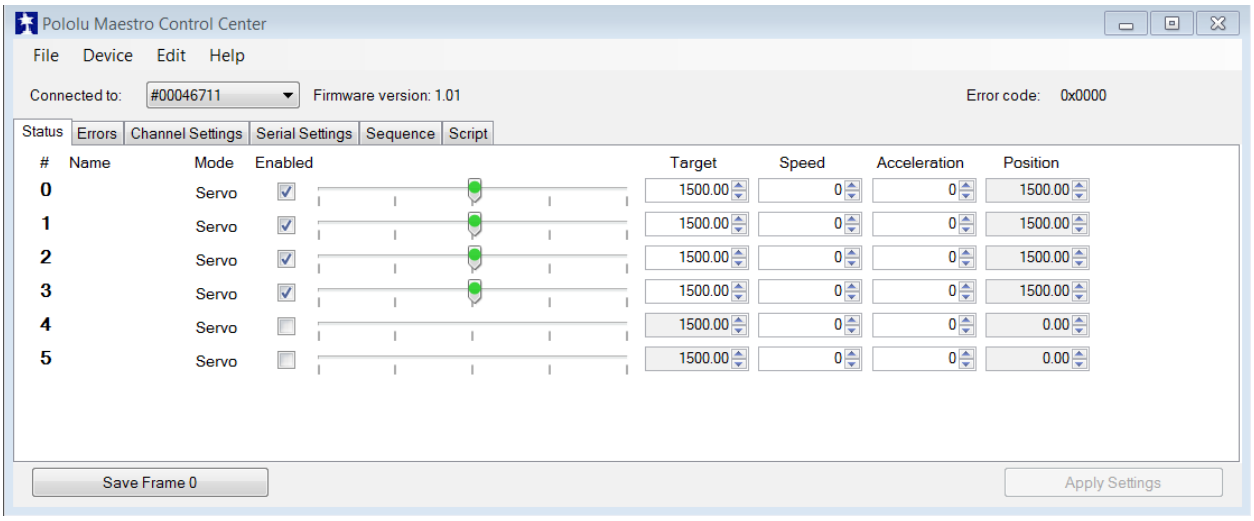
POWERPOCKS

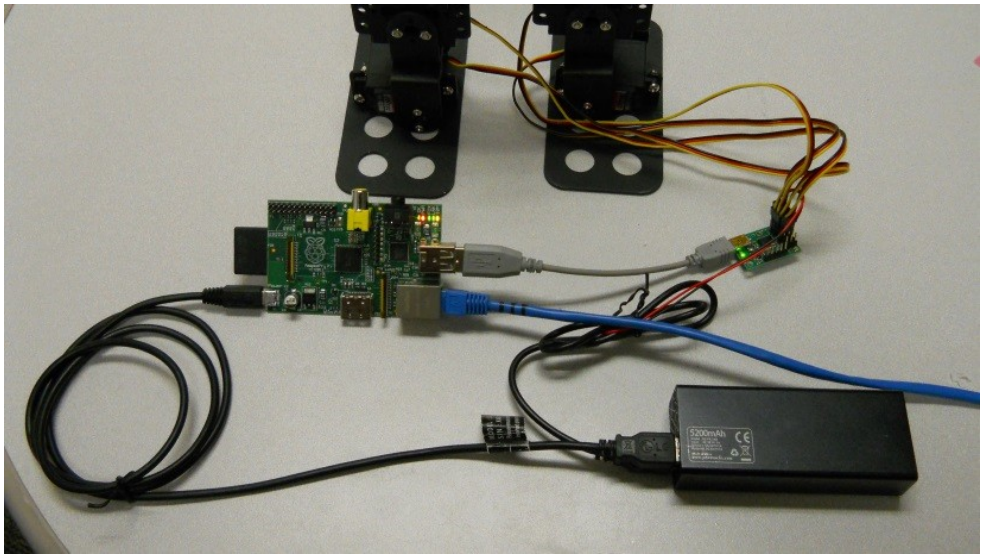


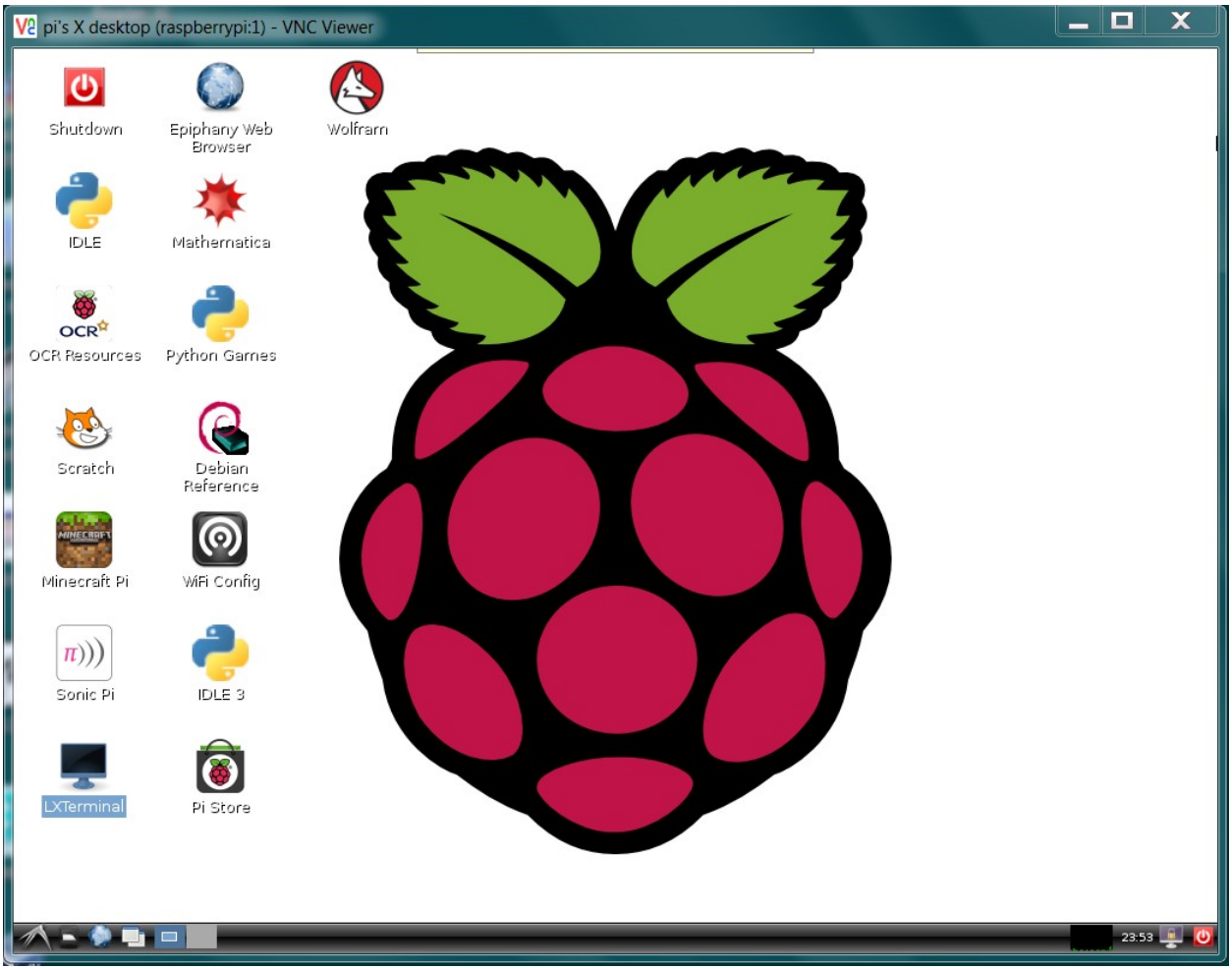

BAT
GND
+5V
0J1433
USC02A
0
1
2
3
4
5
GND
PWR
SIG
Pololu
©2009
Engage
Your Brain
www.pololu.com
RST TX RX VIN
GND

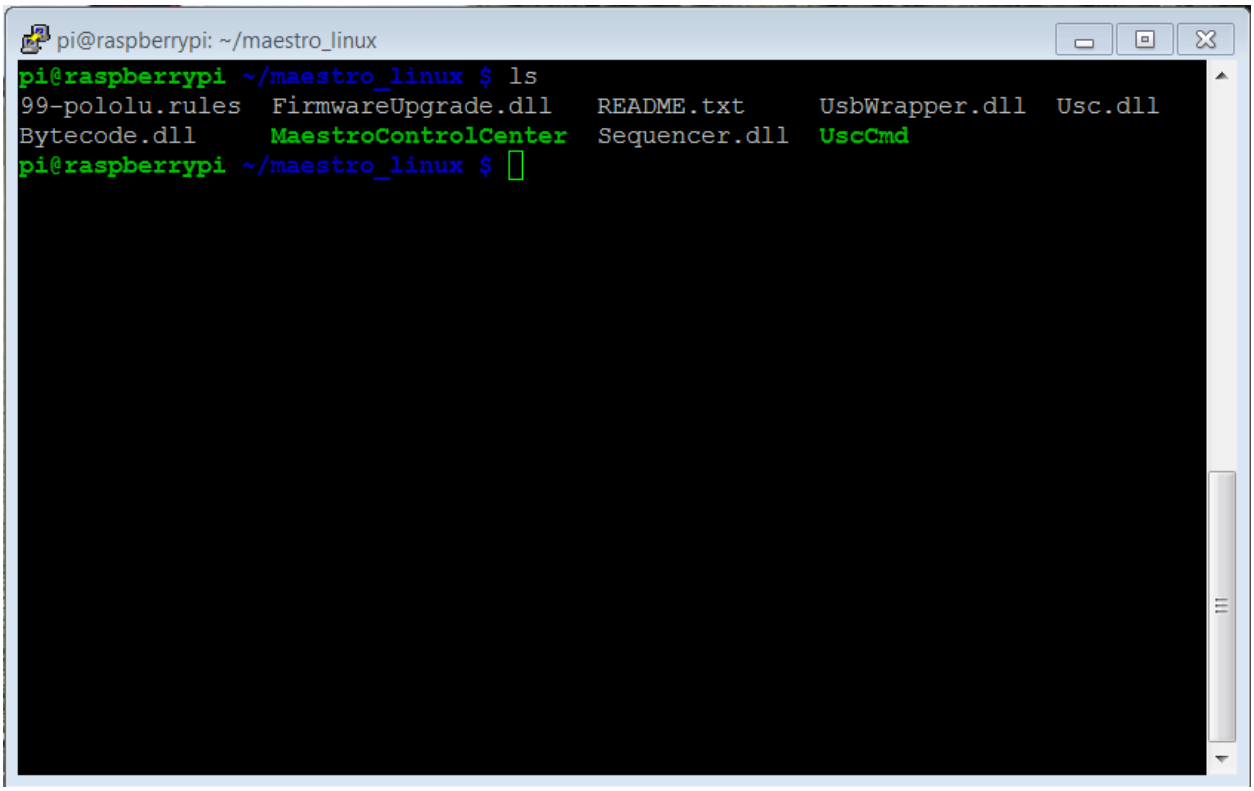

Pololu Maestro Control Center
File Device Edit Help
Connected to: #00046711 Firmware version: 1.01 Error code: 0x0000
Status Errors Channel Settings Serial Settings Sequence Script
Name Mode Enabled Target Speed Acceleration Position
0 Servo 1500.00 0 0 0.00
1 Servo 1500.00 0 0 0.00
2 Servo 1500.00 0 0 0.00
3 Servo 1500.00 0 0 0.00
4 Servo 1500.00 0 0 0.00
5 Servo 1500.00 0 0 0.00
Save Frame 0
Apply Settings

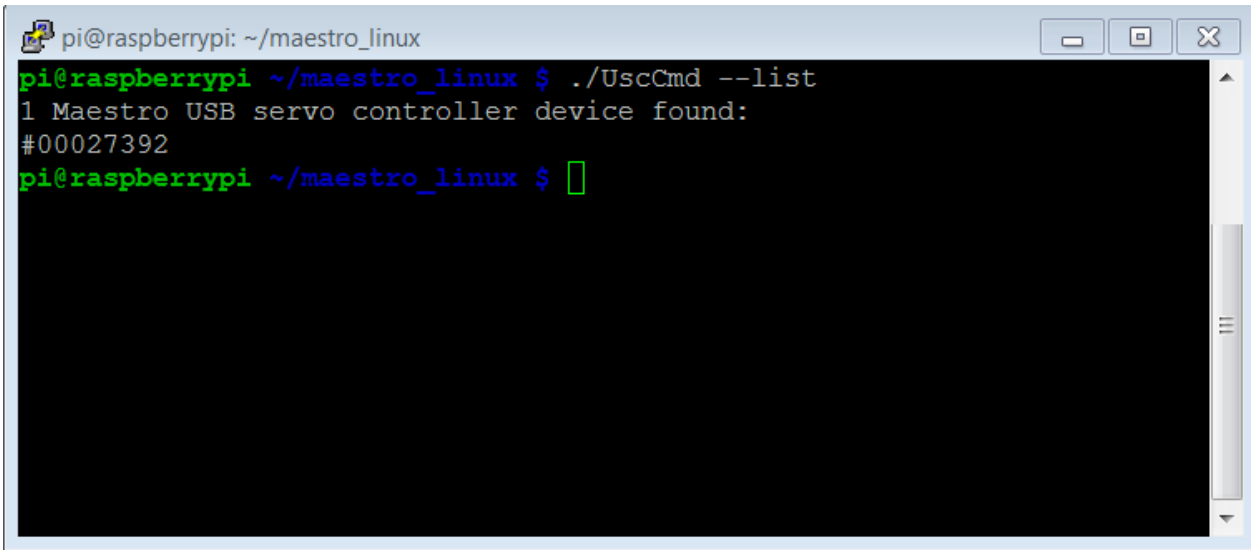

Pololu Maestro Control Center
File Device Edit Help
Connected to: #00046711 Firmware version: 1.01 Error code: 0x0000
Status Errors Channel Settings Serial Settings Sequence Script
Serial mode:
USB Dual Port
USB Chained
UART, fixed baud rate: 9600
UART, detect baud rate
Enable CRC
Device Number: 12
Mini SSC offset: 0
Timeout (s): 0.00
Never sleep (ignore USB suspend)
Save Frame 0
Apply Settings

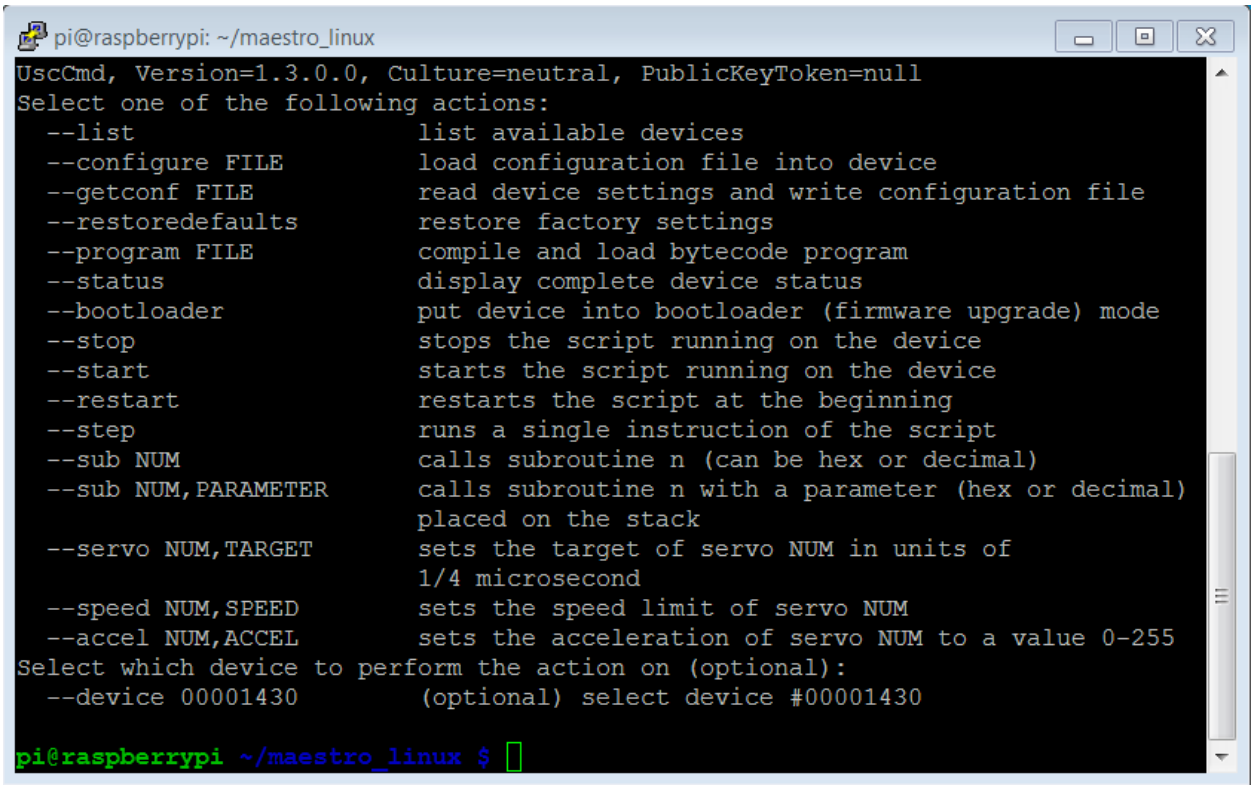

Pololu Maestro Control Center
File
Device
Edit
Help
Connected to:
#00046711
Firmware version: 1.01
Error code:
0x0000
Status
Errors
Channel Settings
Serial Settings
Sequence
Script
Name Mode Enabled Target Speed Acceleration Position
0 Servo 1500.00 0 0 1500.00
1 Servo 1500.00 0 0 1500.00
2 Servo 1500.00 0 0 1500.00
3 Servo 1500.00 0 0 1500.00
4 Servo 1500.00 0 0 0.00
5 Servo 1500.00 0 0 0.00
Save Frame 0
Apply Settings

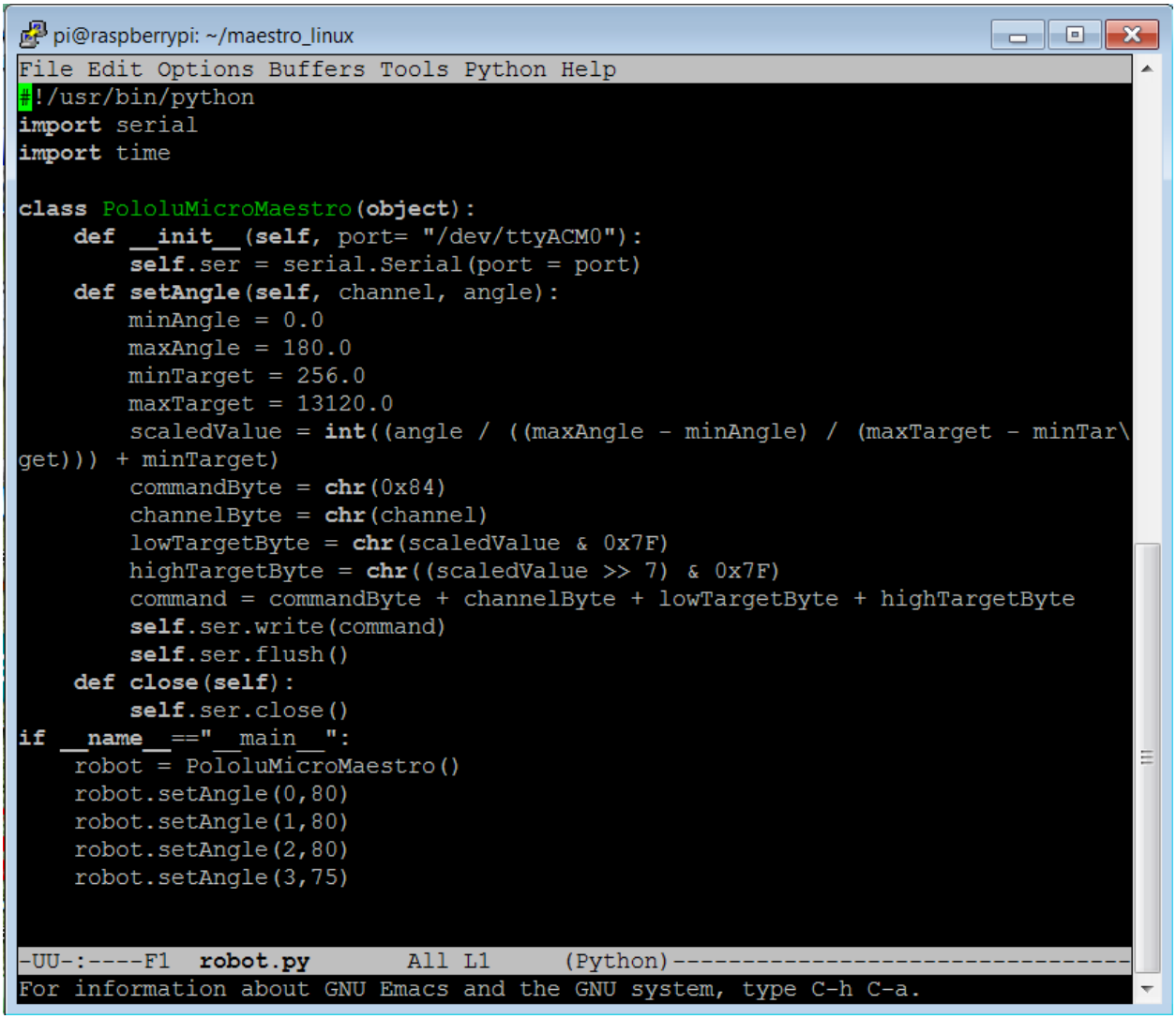


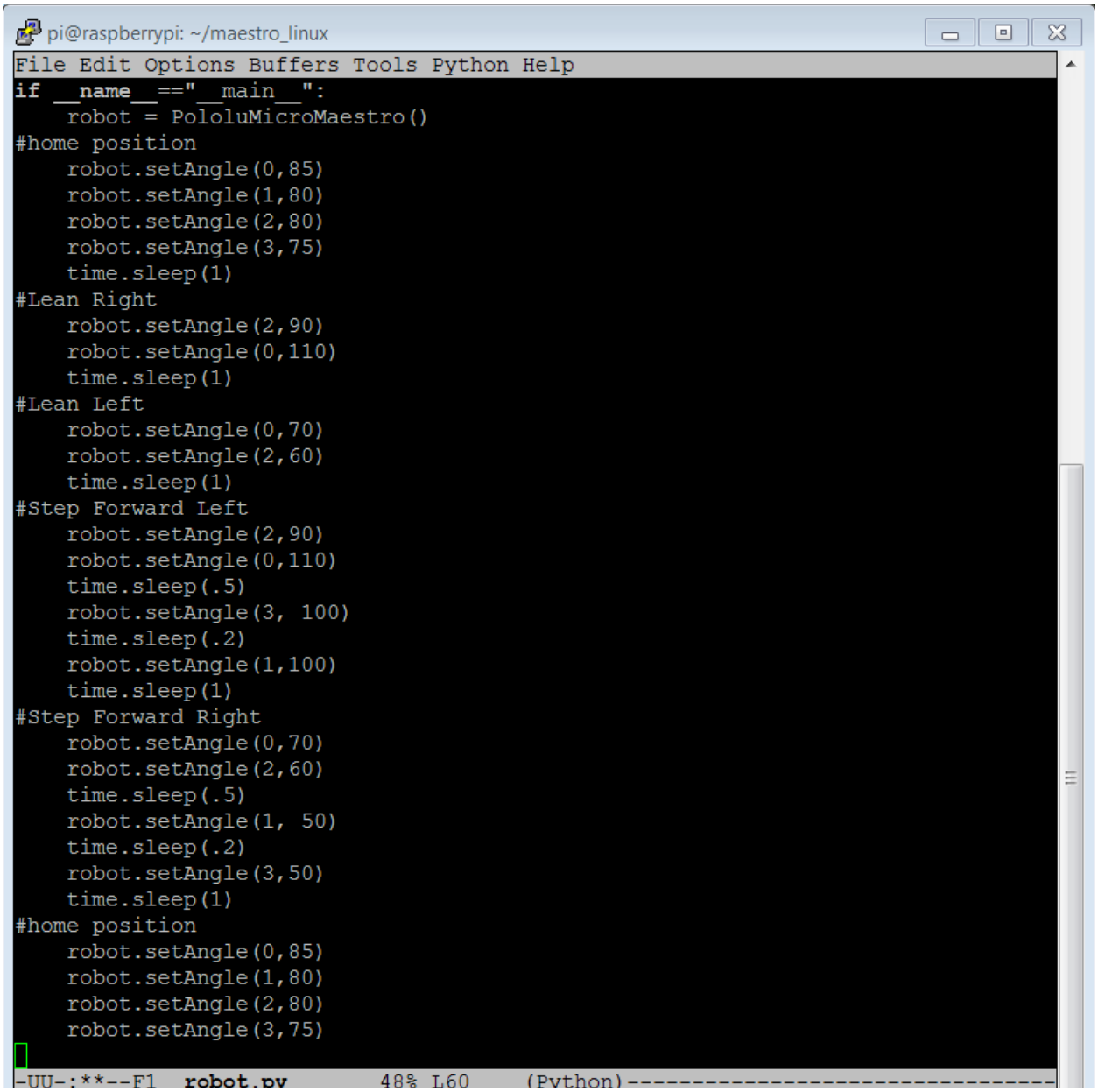

pi's X desktop (raspberrypi:1) - VNC Viewer
Shutdown
Epiphany Web Browser
Wolfram
IDLE
Mathematica
OCR Resources
Python Games
Scratch
Debian Reference
Minecraft Pi
WiFi Config
Sonic Pi
IDLE 3
LXTerminal
Pi Store
23:53


pi@raspberrypi: ~/maestro_linux
pi@raspberrypi ~/maestro_linux $ ls
99-pololu.rules FirmwareUpgrade.dll README.txt UsbWrapper.dll Usc.dll
Bytecode.dll MaestroControlCenter Sequencer.dll UscCmd
pi@raspberrypi ~/maestro_linux $


pi@raspberrypi: ~/maestro_linux
pi@raspberrypi ~/maestro_linux $ ./UscCmd --list
1 Maestro USB servo controller device found:
#00027392
pi@raspberrypi ~/maestro_linux $

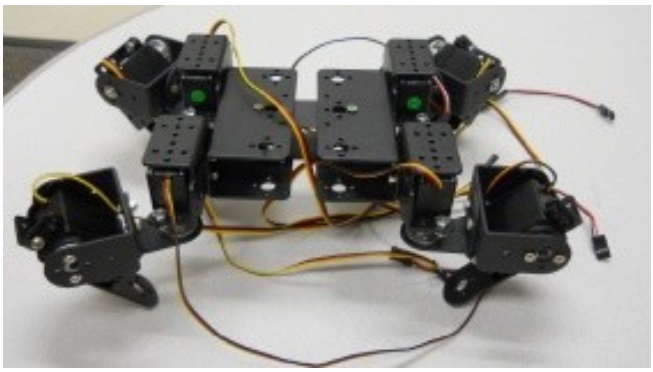

pi@raspberrypi: ~/maestro_linux
UscCmd, Version=1.3.0.0, Culture=neutral, PublicKeyToken=null
Select one of the following actions:
--list list available devices
--configure FILE load configuration file into device
--getconf FILE read device settings and write configuration file
--restoredefaults restore factory settings
--program FILE compile and load bytecode program
--status display complete device status
--bootloader put device into bootloader (firmware upgrade) mode
--stop stops the script running on the device
--start starts the script running on the device
--restart restarts the script at the beginning
--step runs a single instruction of the script
--sub NUM calls subroutine n (can be hex or decimal)
--sub NUM,PARAMETER calls subroutine n with a parameter (hex or decimal)
placed on the stack
--servo NUM,TARGET sets the target of servo NUM in units of
1/4 microsecond
--speed NUM,SPEED sets the speed limit of servo NUM
--accel NUM,ACCEL sets the acceleration of servo NUM to a value 0-255
Select which device to perform the action on (optional):
--device 00001430 (optional) select device #00001430
pi@raspberrypi ~/maestro_linux $


pi@raspberrypi: ~/maestro_linux
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
import serial
import time
class PololuMicroMaestro(object):
def __init__(self, port= "/dev/ttyACM0"):
self.ser = serial.Serial(port = port)
def setAngle(self, channel, angle):
minAngle = 0.0
maxAngle = 180.0
minTarget = 256.0
maxTarget = 13120.0
scaledValue = int((angle / ((maxAngle - minAngle) / (maxTarget - minTar\
get))) + minTarget)
commandByte = chr(0x84)
channelByte = chr(channel)
lowTargetByte = chr(scaledValue & 0x7F)
highTargetByte = chr((scaledValue >> 7) & 0x7F)
command = commandByte + channelByte + lowTargetByte + highTargetByte
self.ser.write(command)
self.ser.flush()
def close(self):
self.ser.close()
if __name__=="__main__":
robot = PololuMicroMaestro()
robot.setAngle(0,80)
robot.setAngle(1,80)
robot.setAngle(2,80)
robot.setAngle(3,75)
-UU-:----F1 robot.py All L1 (Python)
For information about GNU Emacs and the GNU system, type C-h C-a.

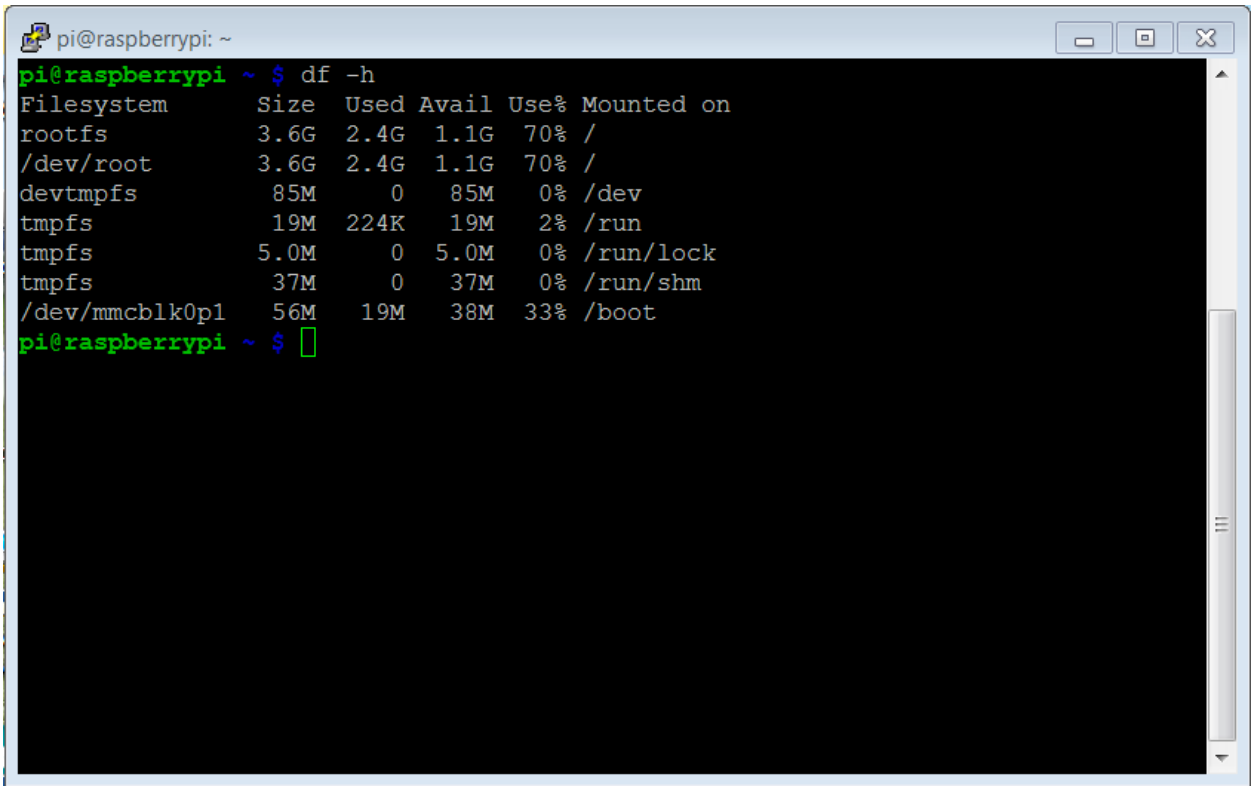

pi@raspberrypi: ~/maestro_linux
File Edit Options Buffers Tools Python Help
if __name__=="__main__":
robot = PololuMicroMaestro()
#home position
robot.setAngle(0,85)
robot.setAngle(1,80)
robot.setAngle(2,80)
robot.setAngle(3,75)
time.sleep(1)
#Lean Right
robot.setAngle(2,90)
robot.setAngle(0,110)
time.sleep(1)
#Lean Left
robot.setAngle(0,70)
robot.setAngle(2,60)
time.sleep(1)
#Step Forward Left
robot.setAngle(2,90)
robot.setAngle(0,110)
time.sleep(.5)
robot.setAngle(3, 100)
time.sleep(.2)
robot.setAngle(1,100)
time.sleep(1)
#Step Forward Right
robot.setAngle(0,70)
robot.setAngle(2,60)
time.sleep(.5)
robot.setAngle(1, 50)
time.sleep(.2)
robot.setAngle(3,50)
time.sleep(1)
#home position
robot.setAngle(0,85)
robot.setAngle(1,80)
robot.setAngle(2,80)
robot.setAngle(3,75)
-UU-:**--F1 robot.py 48% L60 (Python)

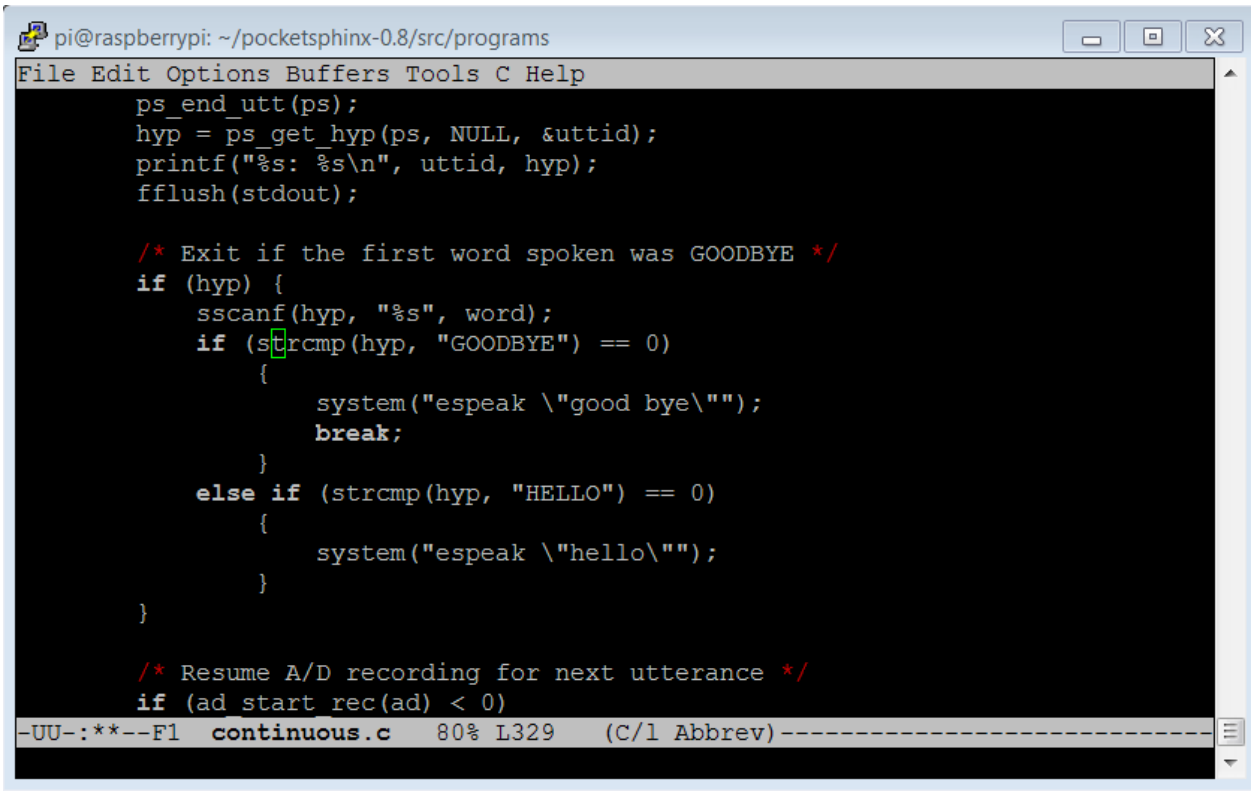
pi@raspberrypi: ~/pocketsphinx-0.8/src/programs

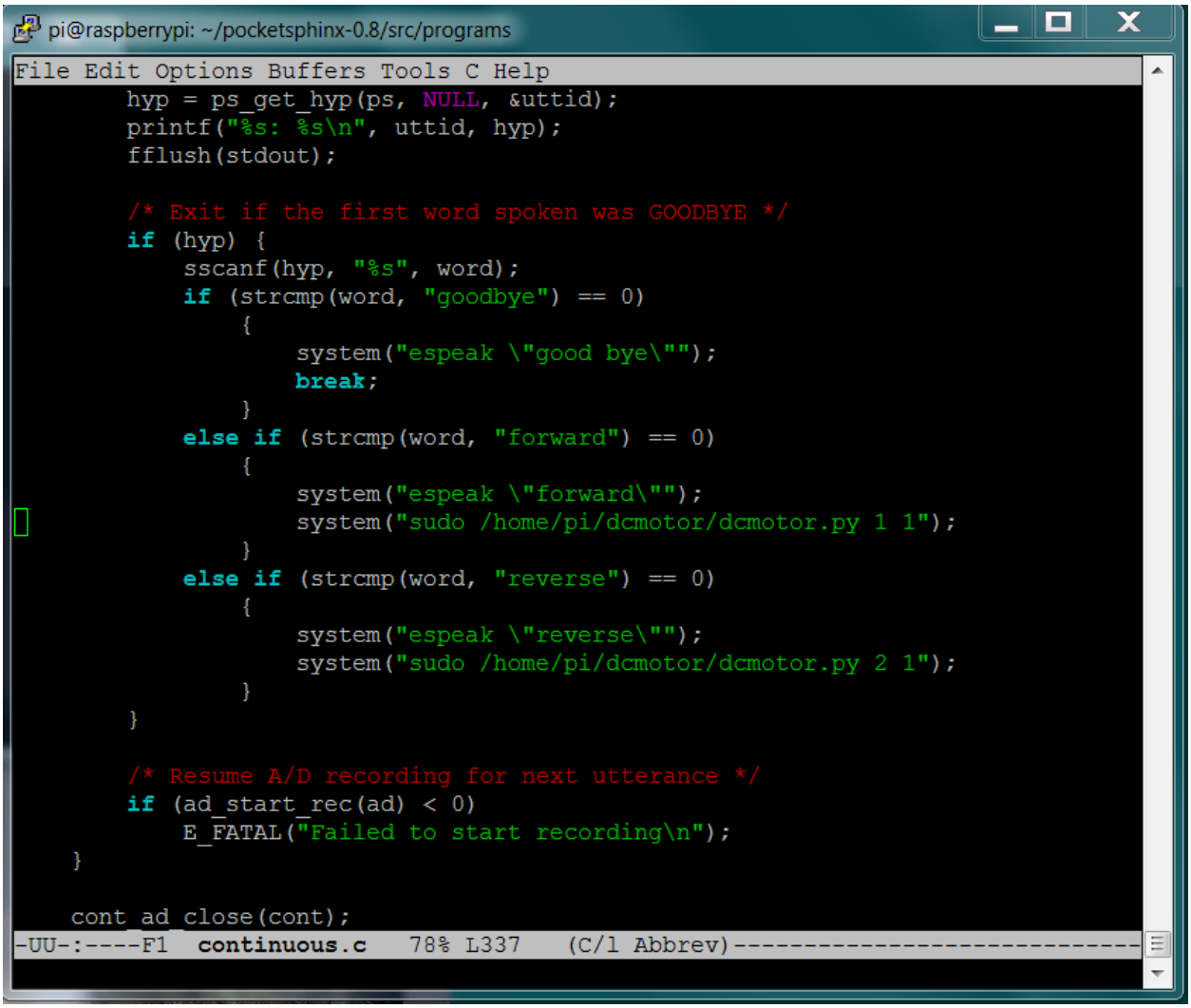
```
File Edit Options Buffers Tools C Help
            sscanf(hyp, "%s", word);
            if (strcmp(hyp, "GOODBYE") == 0)
                {
                    system("espeak \"good bye\"");
                    break;
                }
            else if (strcmp(hyp, "hello") == 0)
                {
                    system("espeak \"hello\"");
                }
            else if (strcmp(hyp, "forward"))
                {
                    system("espeak \"moving robot\"");
                    system("home/pi/maestro_linux/robot.py");
                }
        }

        /* Resume A/D recording for next utterance */
        if (ad_start_rec(ad) < 0)
            E_FATAL("Failed to start recording\n");
    }
-UU-:----F1  continuous.c    80% L339    (C/l Abbrev)----------------------------
Wrote /home/pi/pocketsphinx-0.8/src/programs/continuous.c
```

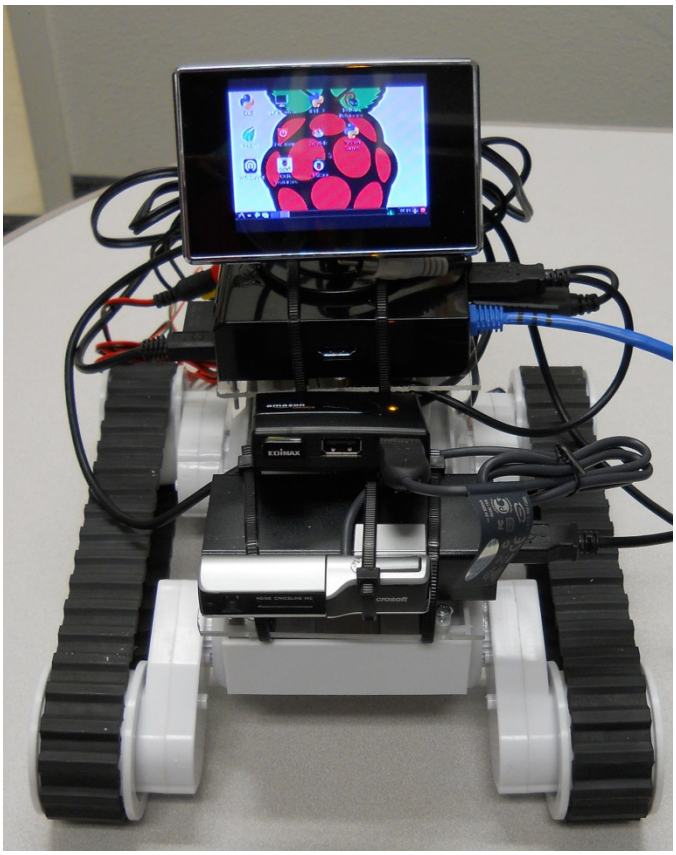


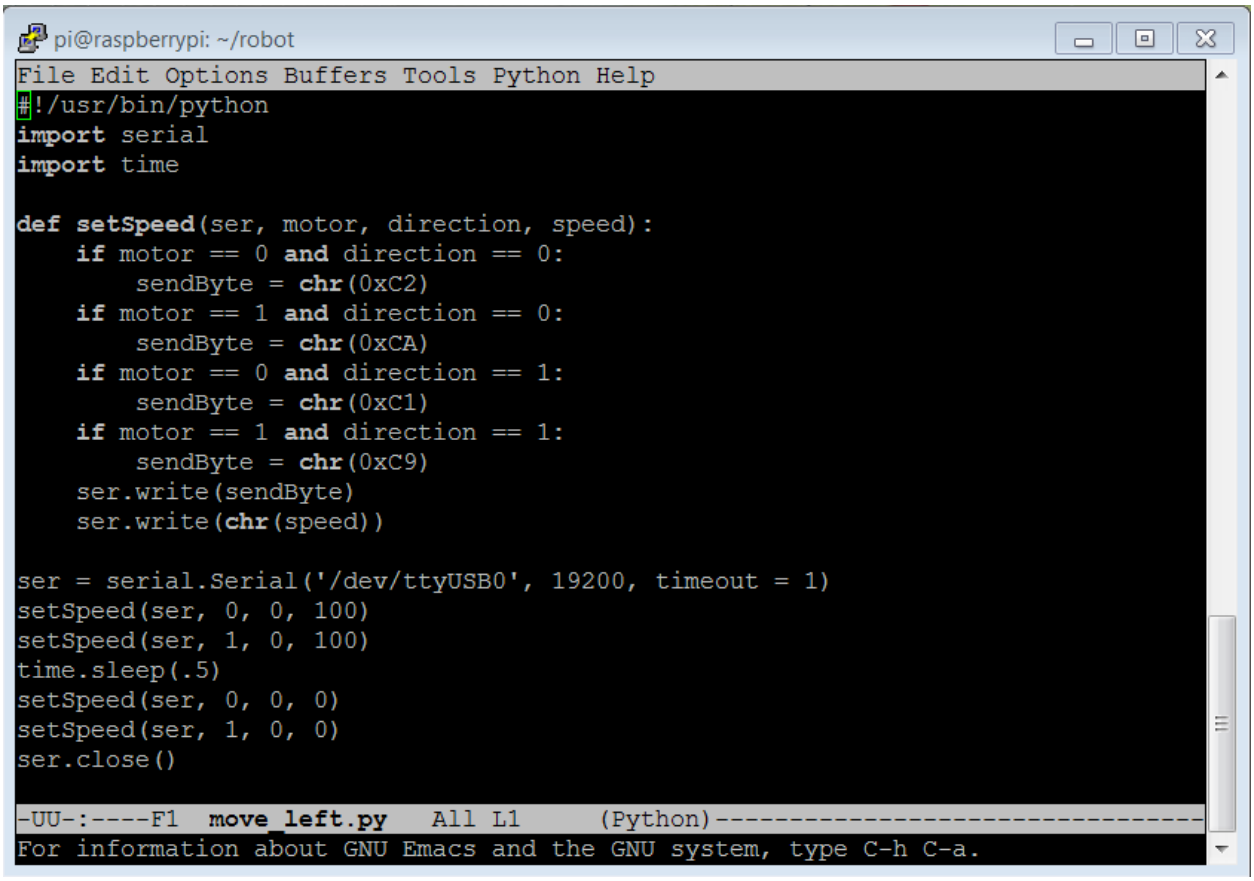
Chapter 10: System Dynamics

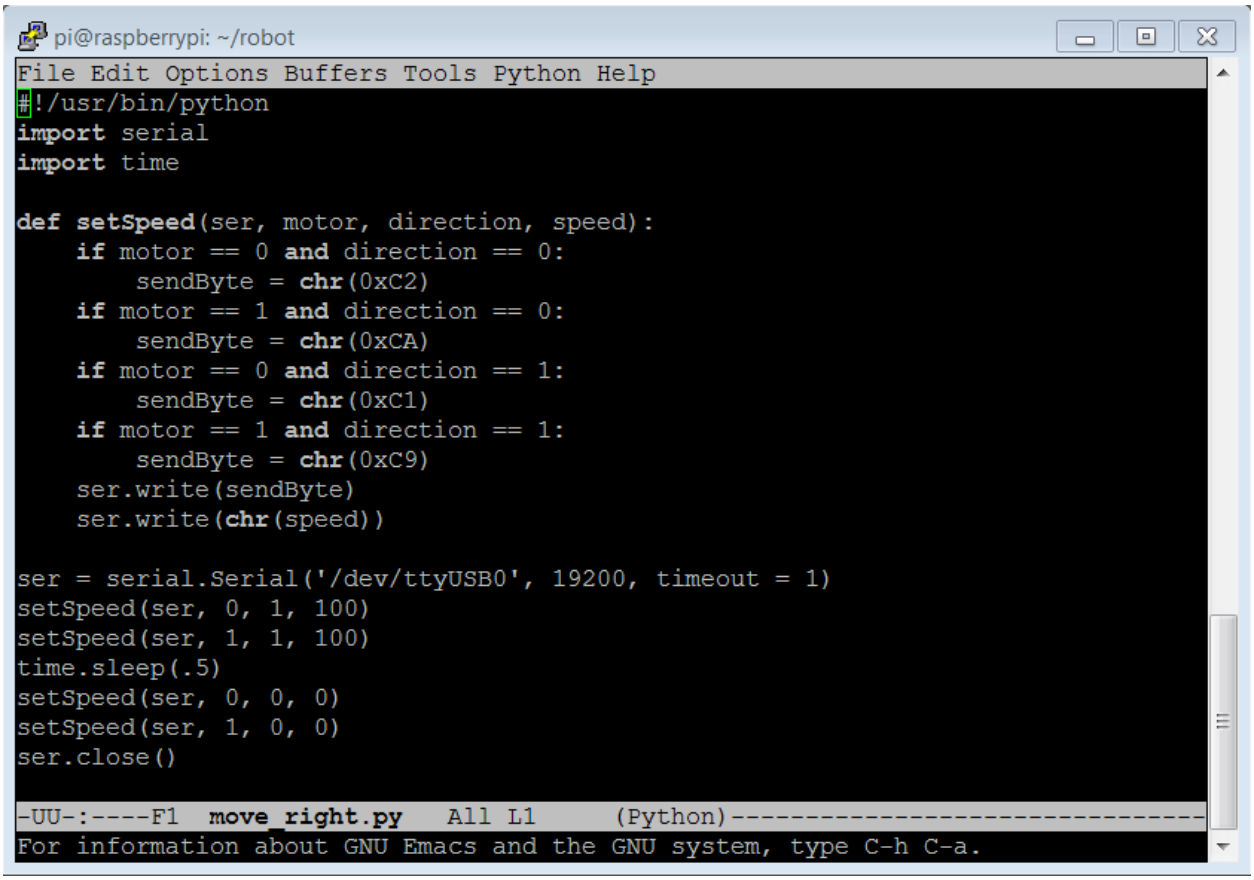



pi@raspberrypi: ~/pocketsphinx-0.8/src/programs
File Edit Options Buffers Tools C Help
ps_end_utt(ps);
hyp = ps_get_hyp(ps, NULL, &uttid);
printf("%s: %s\n", uttid, hyp);
fflush(stdout);
/* Exit if the first word spoken was GOODBYE */
if (hyp) {
sscanf(hyp, "%s", word);
if (strcmp(hyp, "GOODBYE") == 0)
{
system("espeak \"good bye\"");
break;
}
else if (strcmp(hyp, "HELLO") == 0)
{
system("espeak \"hello\"");
}
}
/* Resume A/D recording for next utterance */
if (ad_start_rec(ad) < 0)
-UU-:**--F1 continuous.c 80% L329 (C/l Abbrev)


pi@raspberrypi: ~/pocketsphinx-0.8/src/programs
File Edit Options Buffers Tools C Help
hyp = ps_get_hyp(ps, NULL, &uttid);
printf("%s: %s\n", uttid, hyp);
fflush(stdout);
/* Exit if the first word spoken was GOODBYE */
if (hyp) {
sscanf(hyp, "%s", word);
if (strcmp(word, "goodbye") == 0)
{
system("espeak \"good bye\"");
break;
}
else if (strcmp(word, "forward") == 0)
{
system("espeak \"forward\"");
system("sudo /home/pi/dcmotor/dcmotor.py 1 1");
}
else if (strcmp(word, "reverse") == 0)
{
system("espeak \"reverse\"");
system("sudo /home/pi/dcmotor/dcmotor.py 2 1");
}
}
/* Resume A/D recording for next utterance */
if (ad_start_rec(ad) < 0)
E_FATAL("Failed to start recording\n");
}
cont_ad_close(cont);
-UU-:----F1 continuous.c 78% L337 (C/l Abbrev)


amazon
EDIMAX


pi@raspberrypi: ~/robot
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
import serial
import time
def setSpeed(ser, motor, direction, speed):
if motor == 0 and direction == 0:
sendByte = chr(0xC2)
if motor == 1 and direction == 0:
sendByte = chr(0xCA)
if motor == 0 and direction == 1:
sendByte = chr(0xC1)
if motor == 1 and direction == 1:
sendByte = chr(0xC9)
ser.write(sendByte)
ser.write(chr(speed))
ser = serial.Serial('/dev/ttyUSB0', 19200, timeout = 1)
setSpeed(ser, 0, 0, 100)
setSpeed(ser, 1, 0, 100)
time.sleep(.5)
setSpeed(ser, 0, 0, 0)
setSpeed(ser, 1, 0, 0)
ser.close()
-UU-:----F1 move_left.py All L1 (Python)
For information about GNU Emacs and the GNU system, type C-h C-a.

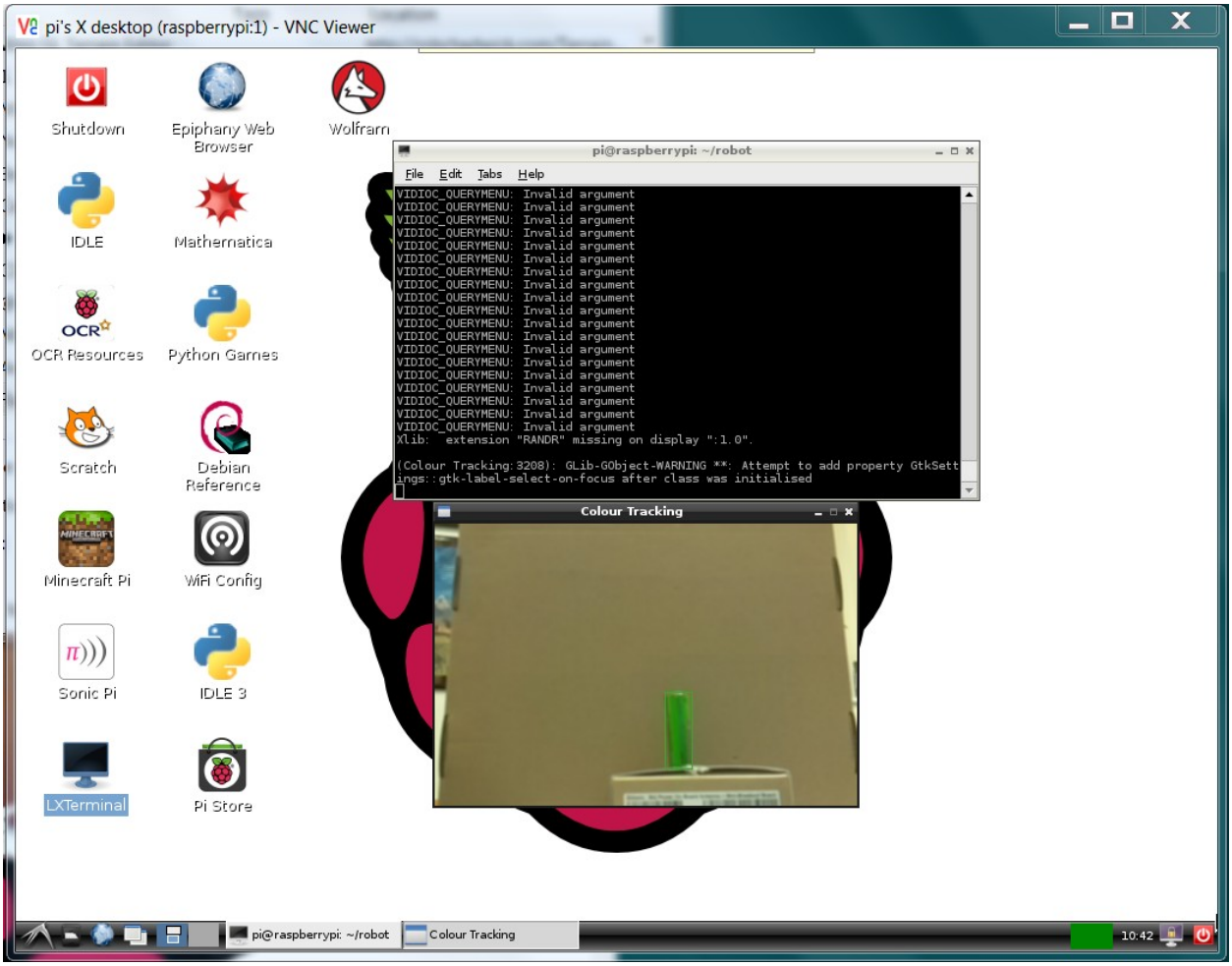

pi@raspberrypi: ~/robot
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
import serial
import time
def setSpeed(ser, motor, direction, speed):
if motor == 0 and direction == 0:
sendByte = chr(0xC2)
if motor == 1 and direction == 0:
sendByte = chr(0xCA)
if motor == 0 and direction == 1:
sendByte = chr(0xC1)
if motor == 1 and direction == 1:
sendByte = chr(0xC9)
ser.write(sendByte)
ser.write(chr(speed))
ser = serial.Serial('/dev/ttyUSB0', 19200, timeout = 1)
setSpeed(ser, 0, 1, 100)
setSpeed(ser, 1, 1, 100)
time.sleep(.5)
setSpeed(ser, 0, 0, 0)
setSpeed(ser, 1, 0, 0)
ser.close()
-UU-:----F1 move_right.py All L1 (Python)
For information about GNU Emacs and the GNU system, type C-h C-a.

pi@raspberrypi: ~/robot

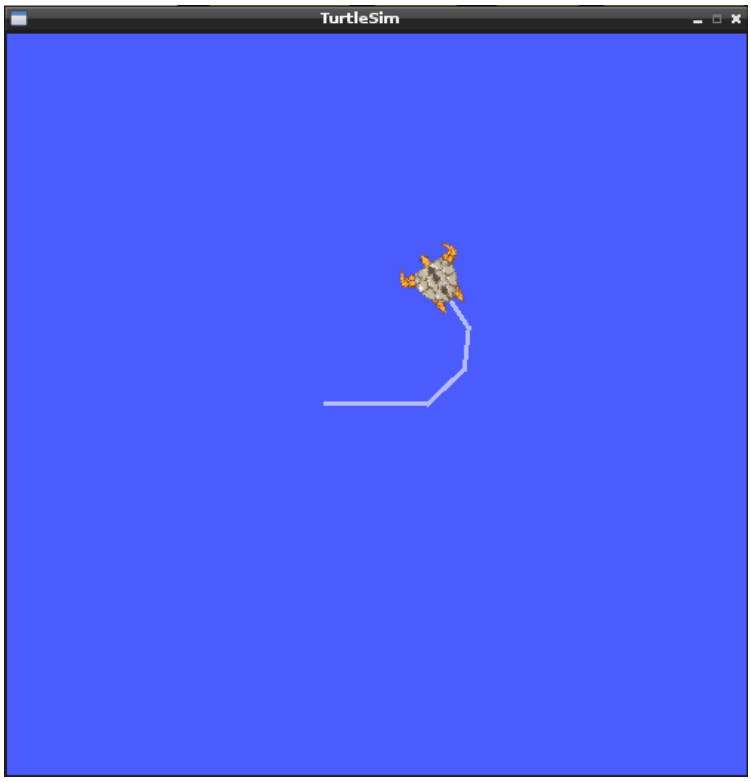
File Edit Options Buffers Tools Python Help

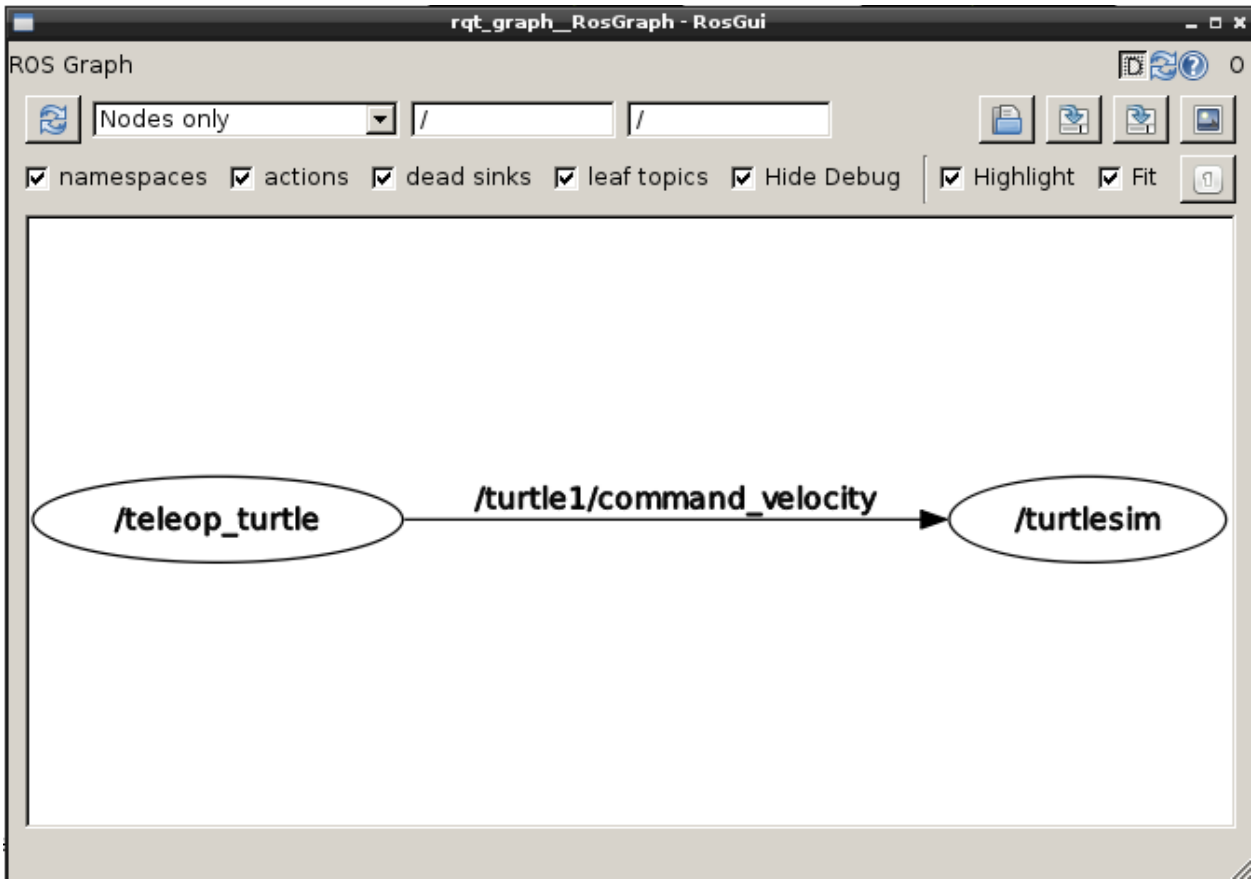
```
import cv2.cv as cv
import time
import subprocess

capture = cv.CaptureFromCAM(0)
cv.SetCaptureProperty(capture, 3, 360)
cv.SetCaptureProperty(capture, 4, 240)

while True:
    img = cv.QueryFrame(capture)
    cv.Smooth(img,img,cv.CV_BLUR,3)
    hue_img = cv.CreateImage(cv.GetSize(img), 8, 3)
    cv.CvtColor(img,hue_img, cv.CV_BGR2HSV)
    threshold_img = cv.CreateImage(cv.GetSize(hue_img), 8, 1)
    cv.InRangeS(hue_img, (38,120, 60), (75, 255, 255), threshold_img)
    storage = cv.CreateMemStorage(0)
    contour = cv.FindContours(threshold_img, storage, cv.CV_RETR_CCOMP, cv.CV_C\
HAIN_APPROX_SIMPLE)
    points = []
    cx = 0
    cy = 0
    while contour:
        rect = cv.BoundingRect(list(contour))
        contour = contour.h_next()
        size = (rect[2] * rect[3])
        if size > 100:
            pt1 = (rect[0], rect[1])
            pt2 = (rect[0] + rect[2], rect[1] + rect[3])
            cx = rect[0]
            cy = rect[1]
            cv.Rectangle(img, pt1, pt2, (38, 160, 60))
    cv.ShowImage("Colour Tracking", img)
    if cx > 280:
        text = '"moving right"'
        subprocess.call('espeak '+text, shell = True)
        subprocess.call('./move_right.py')
    if cx < 20 and cx > 0:
        text = '"moving left"'
        subprocess.call('espeak '+text, shell = True)
        subprocess.call('./move_left.py')
    if cv.WaitKey(10) == 27:
        break
```

-UU-:**--F1 **follow.py**   All L8   (Python)----------

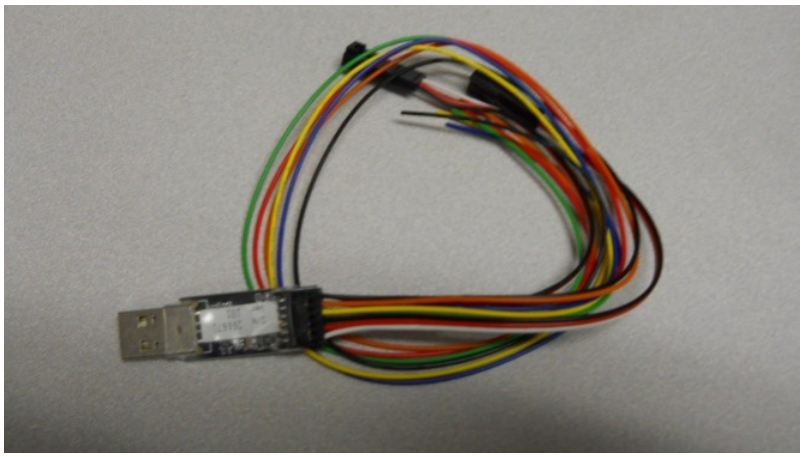

pi's X desktop (raspberrypi:1) - VNC Viewer
Shutdown
Epiphany Web Browser
Wolfram
IDLE
Mathematica
OCR Resources
Python Games
Scratch
Debian Reference
Minecraft Pi
WiFi Config
Sonic Pi
IDLE 3
LXTerminal
Pi Store
pi@raspberrypi: ~/robot
File Edit Tabs Help
VIDIOC_QUERYMENU: Invalid argument
Xlib: extension "RANDR" missing on display ":1.0".
(Colour Tracking:3208): GLib-GObject-WARNING **: Attempt to add property GtkSettings::gtk-label-select-on-focus after class was initialised
Colour Tracking
pi@raspberrypi: ~/robot
Colour Tracking
10:42

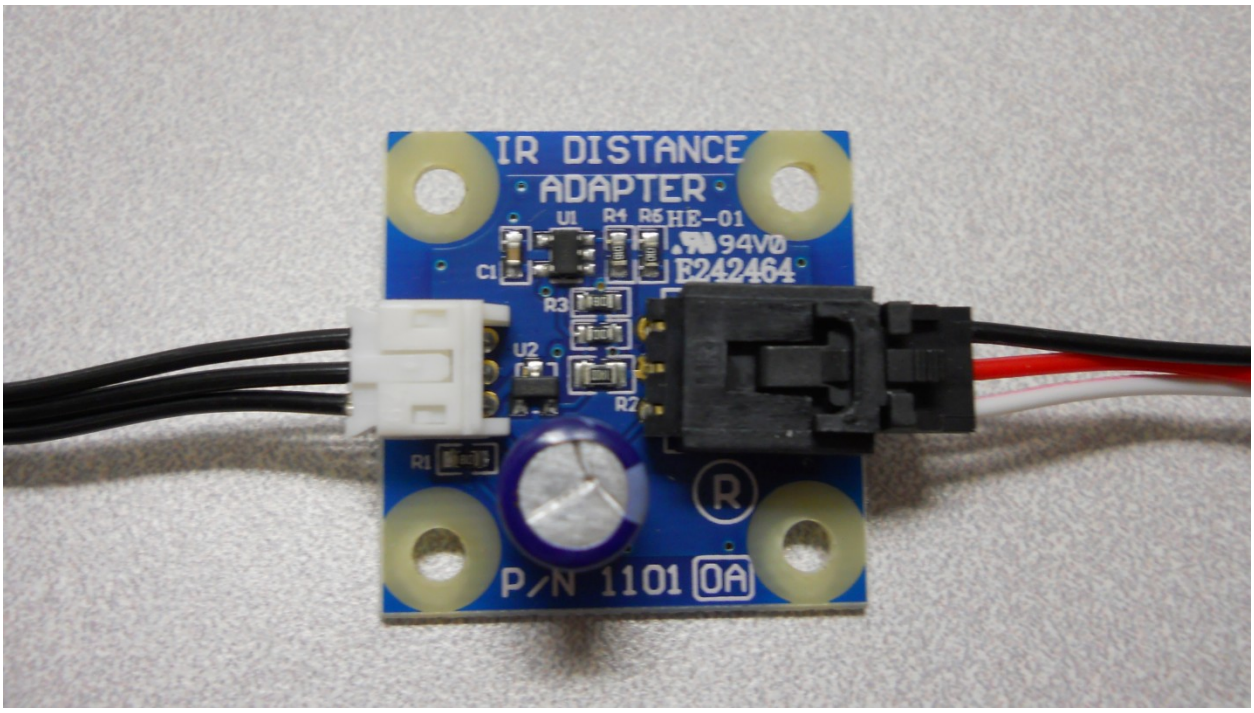
```
pi@raspberrypi: ~
pi@raspberrypi ~ $ export | grep ROS
declare -x ROS_DISTRO="groovy"
declare -x ROS_ETC_DIR="/opt/ros/groovy/etc/ros"
declare -x ROS_MASTER_URI="http://localhost:11311"
declare -x ROS_PACKAGE_PATH="/opt/ros/groovy/share:/opt/ros/groovy/stacks"
declare -x ROS_ROOT="/opt/ros/groovy/share/ros"
pi@raspberrypi ~ $
```

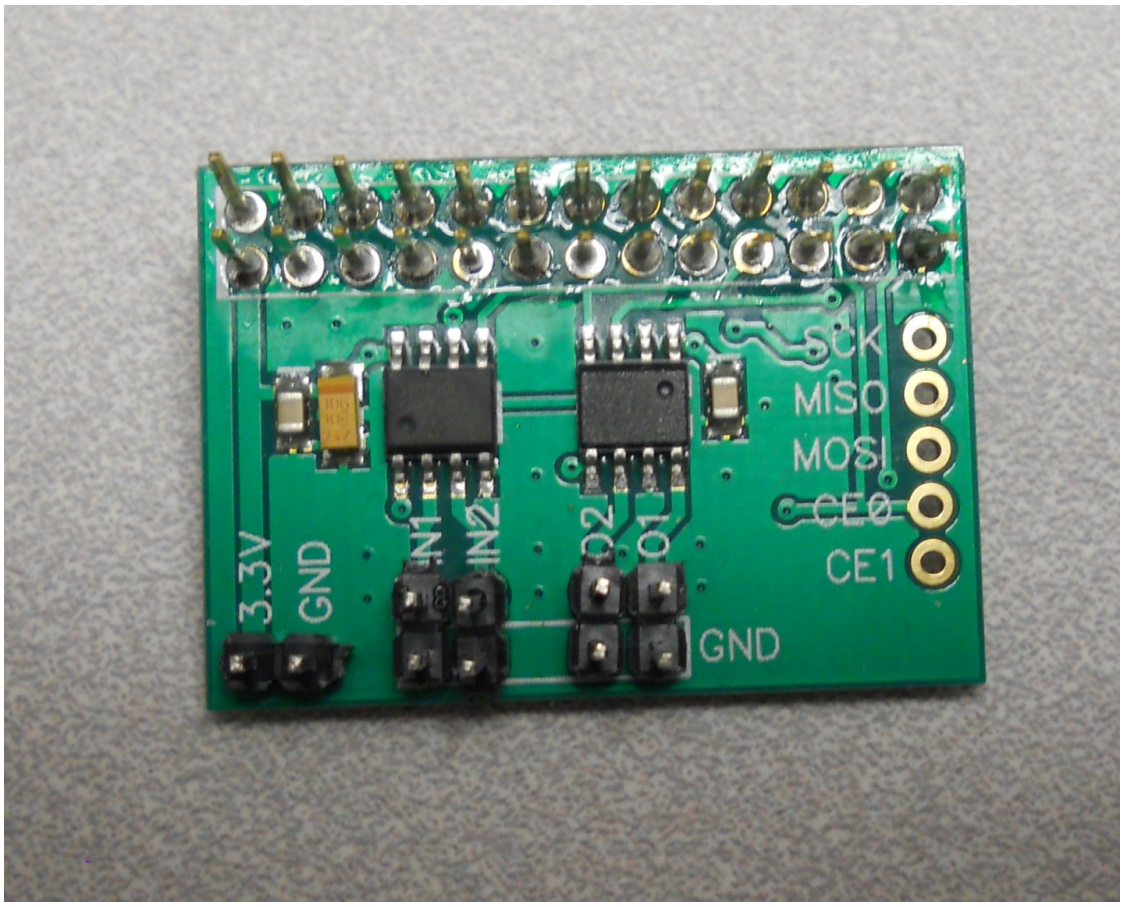

TurtleSim

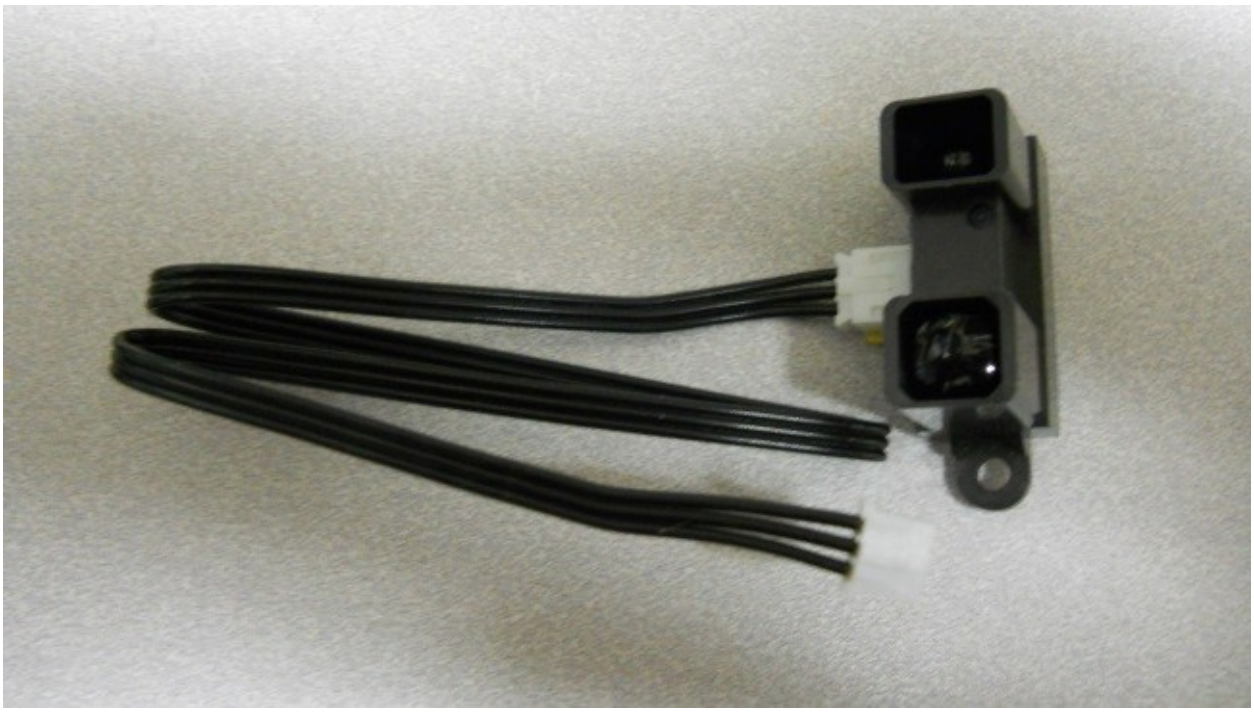

rqt_graph__RosGraph - RosGui
ROS Graph
Nodes only
/
/
namespaces
actions
dead sinks
leaf topics
Hide Debug
Highlight
Fit
/teleop_turtle
/turtle1/command_velocity
/turtlesim

Chapter 7: Avoiding Obstacles Using Sensors

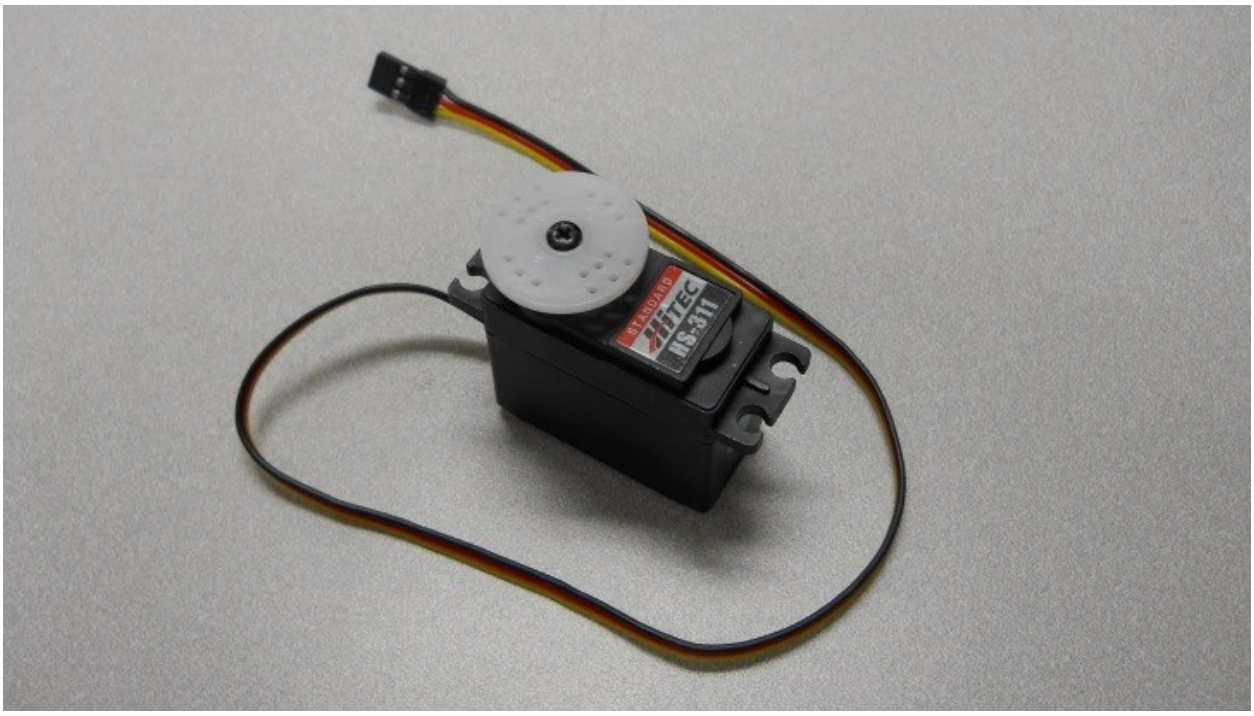


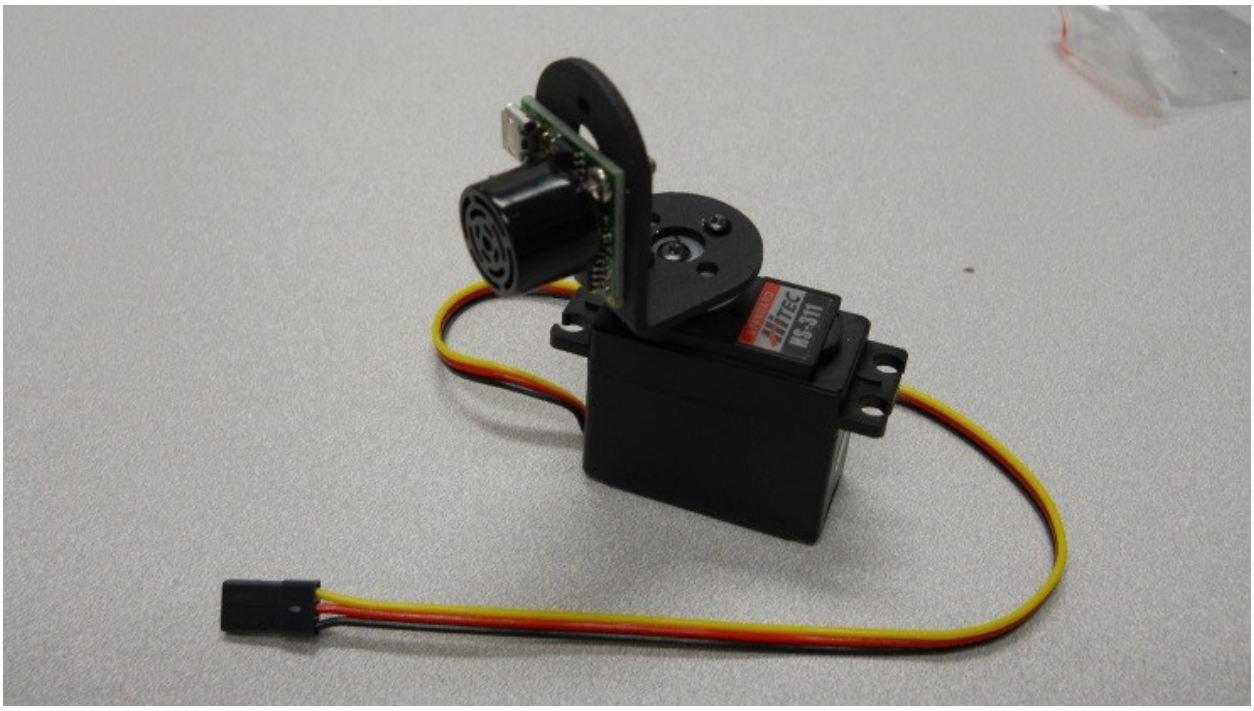


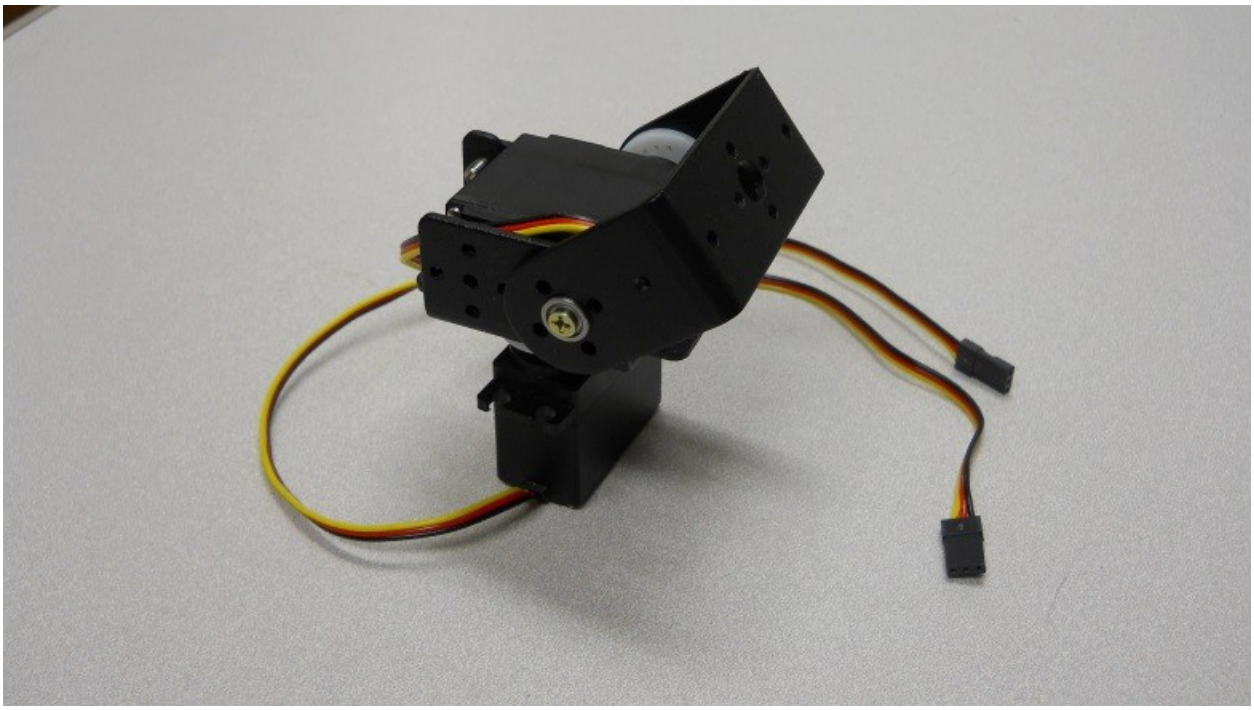

3.3V
GND
IN1
IN2
O2
O1
GND
SCK
MISO
MOSI
CE0
CE1

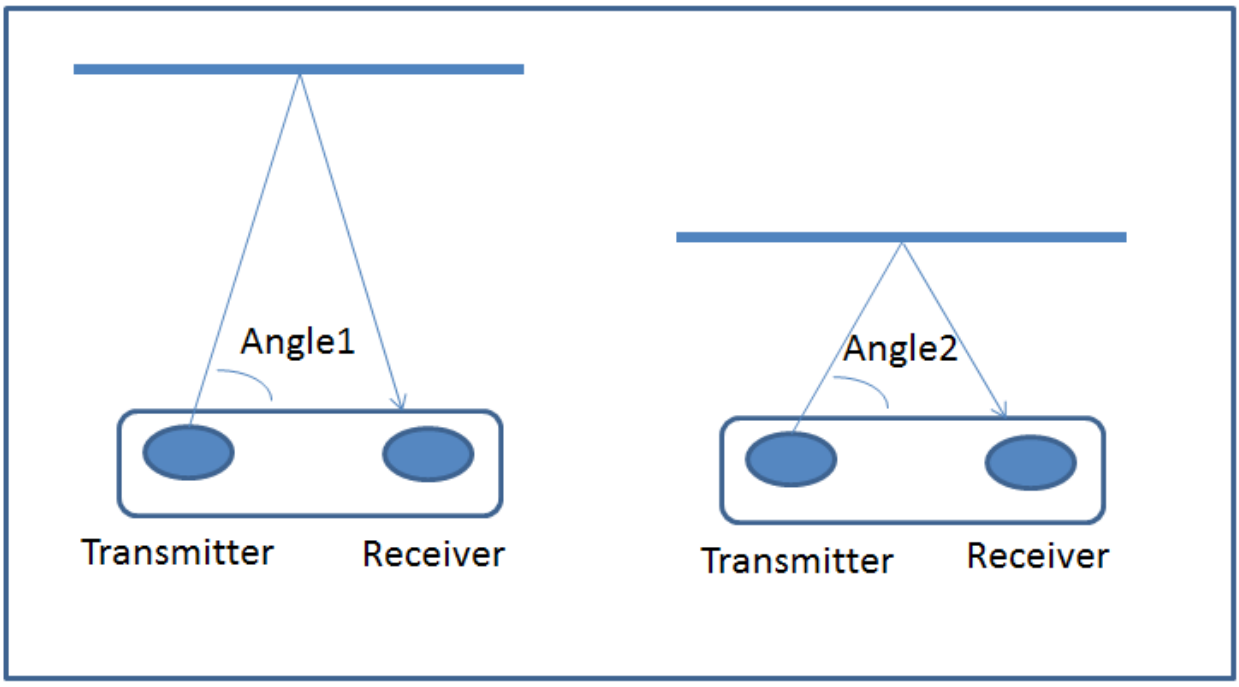


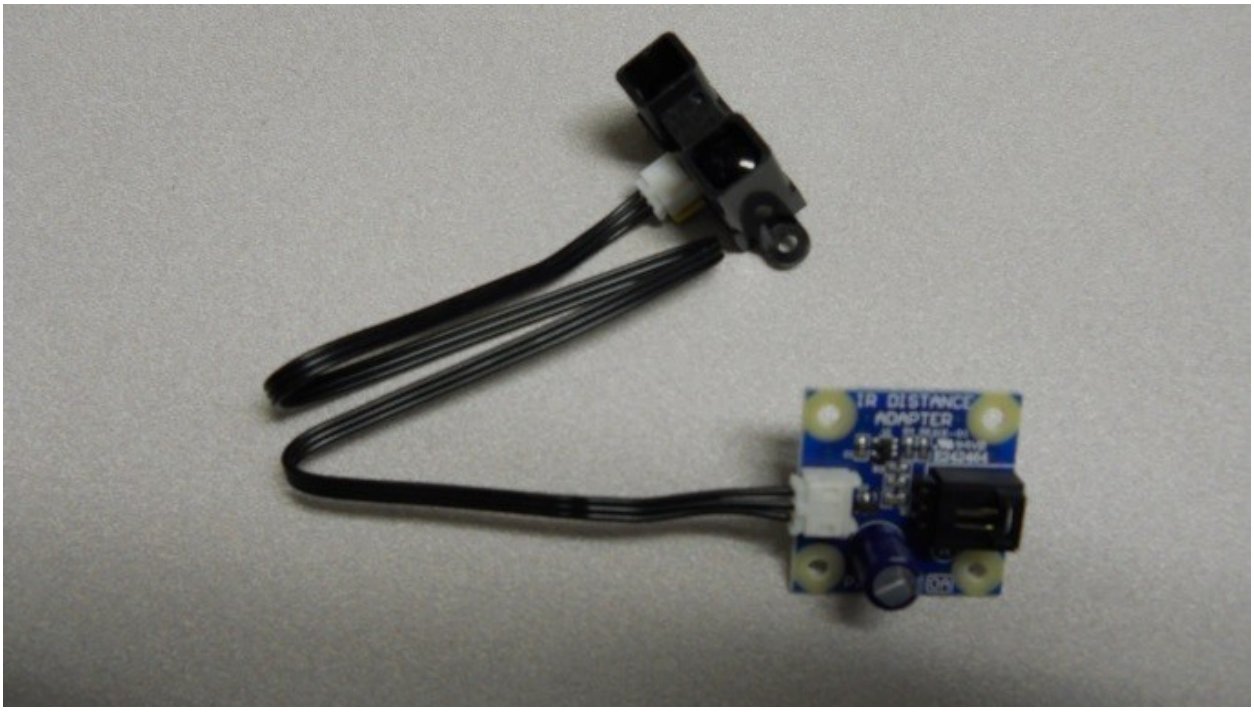
USB-ProxSonar®-EZ™
USB Ultrasonic
Proximity Sensor
-Controlled Beam Angle and
Detection Zone
-USB interface
-Multi-sensor
Operation
MB1414 (5ft.)
MB1434 (2ft.)
MB1424 (3ft.)
MB1444 (1ft.)
MB_____
ProxSonar, MaxBotix, EZ
are trademarks of
MaxBotix Inc.
Patent 7,679,996
RoHS
COMPLIANT
www.maxbotix.com

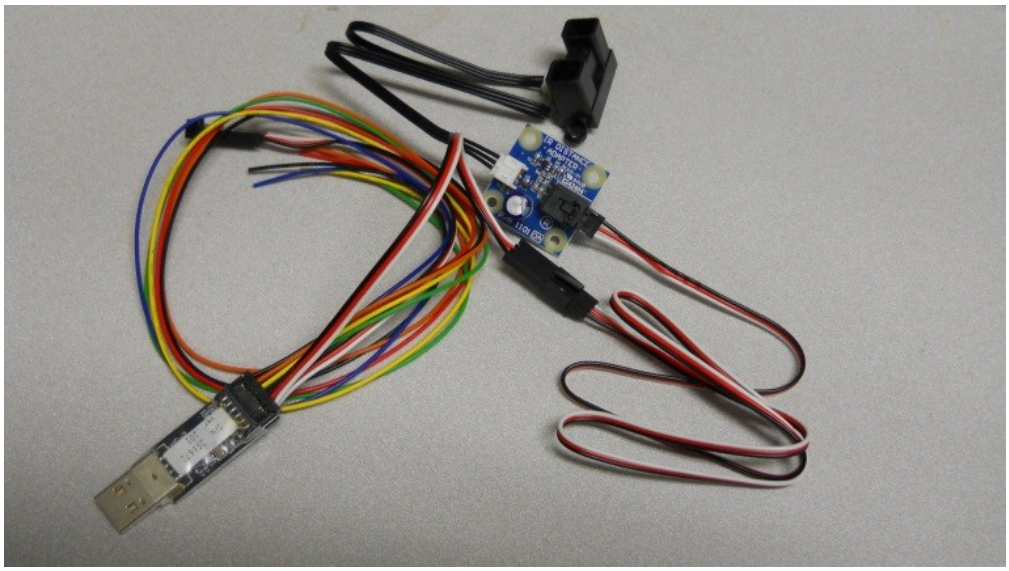

STANDARD
HITEC
HS-311

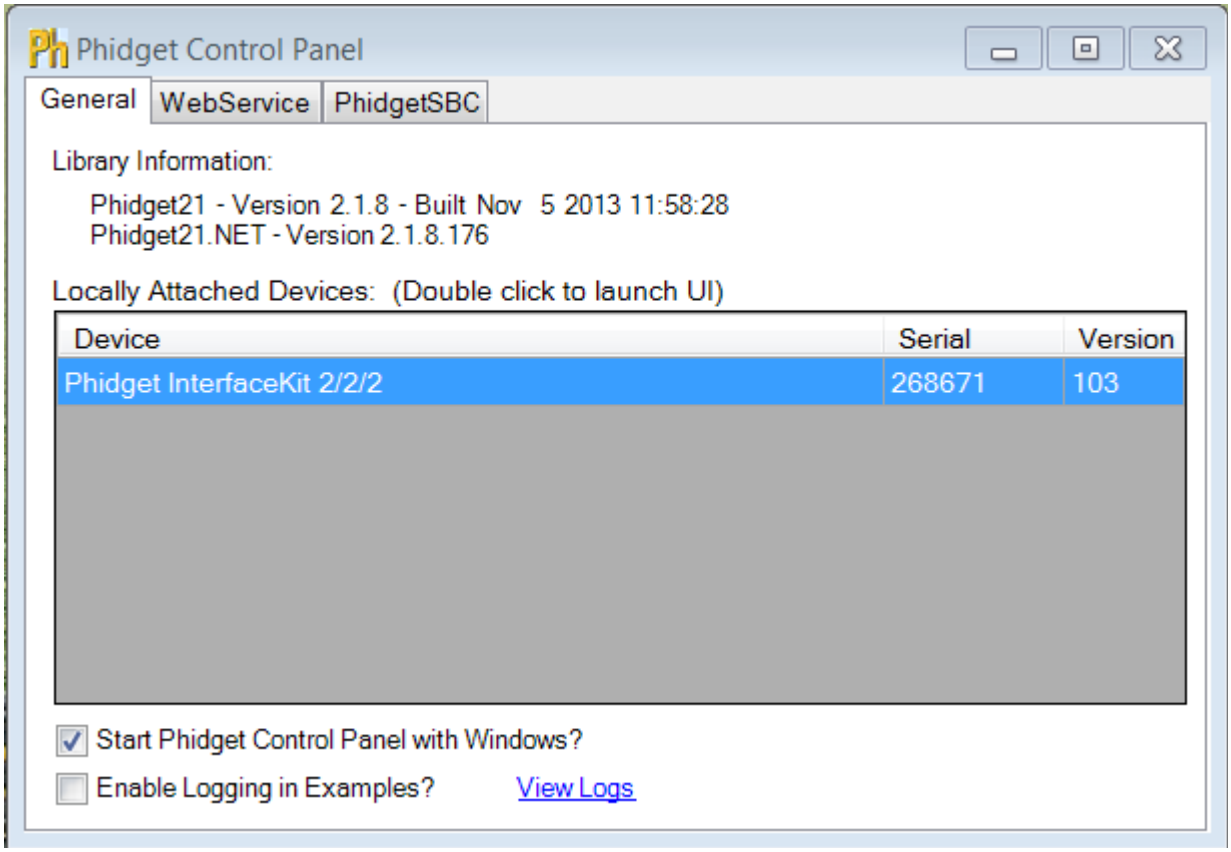

HiTEC
HS-311

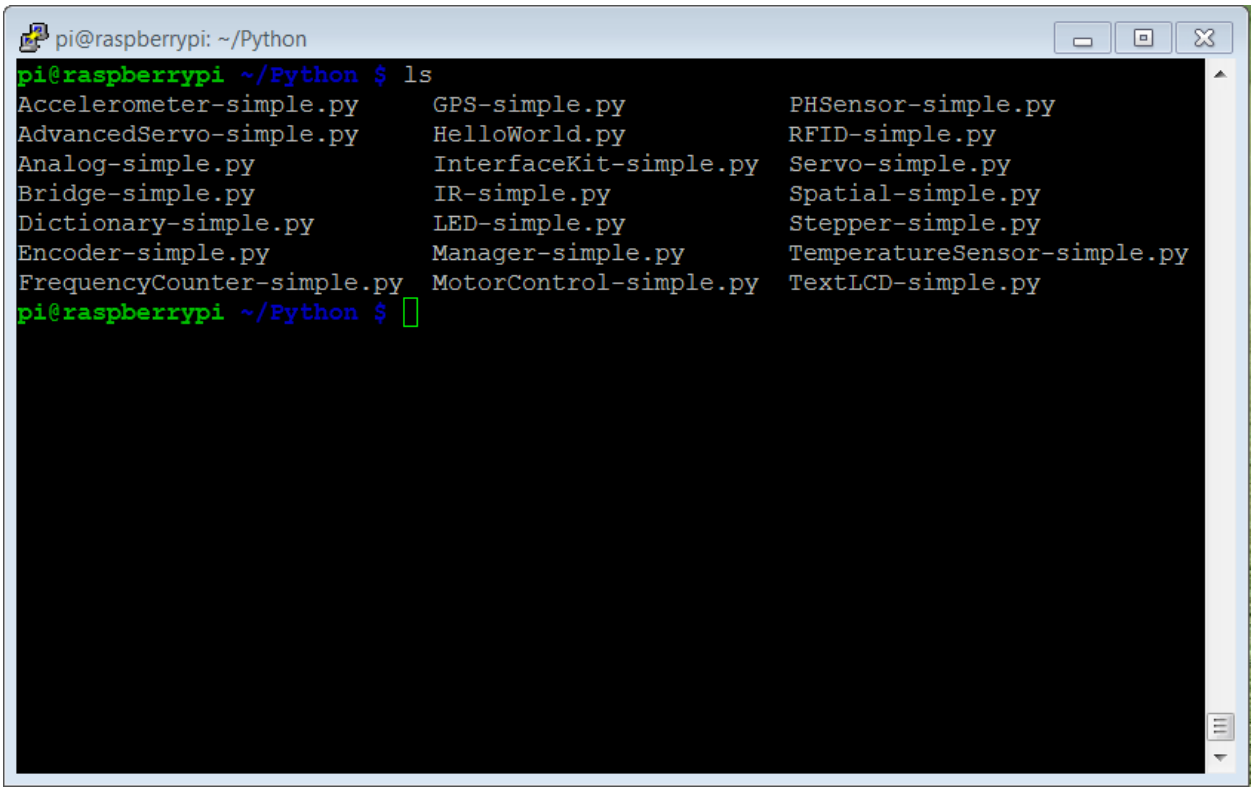


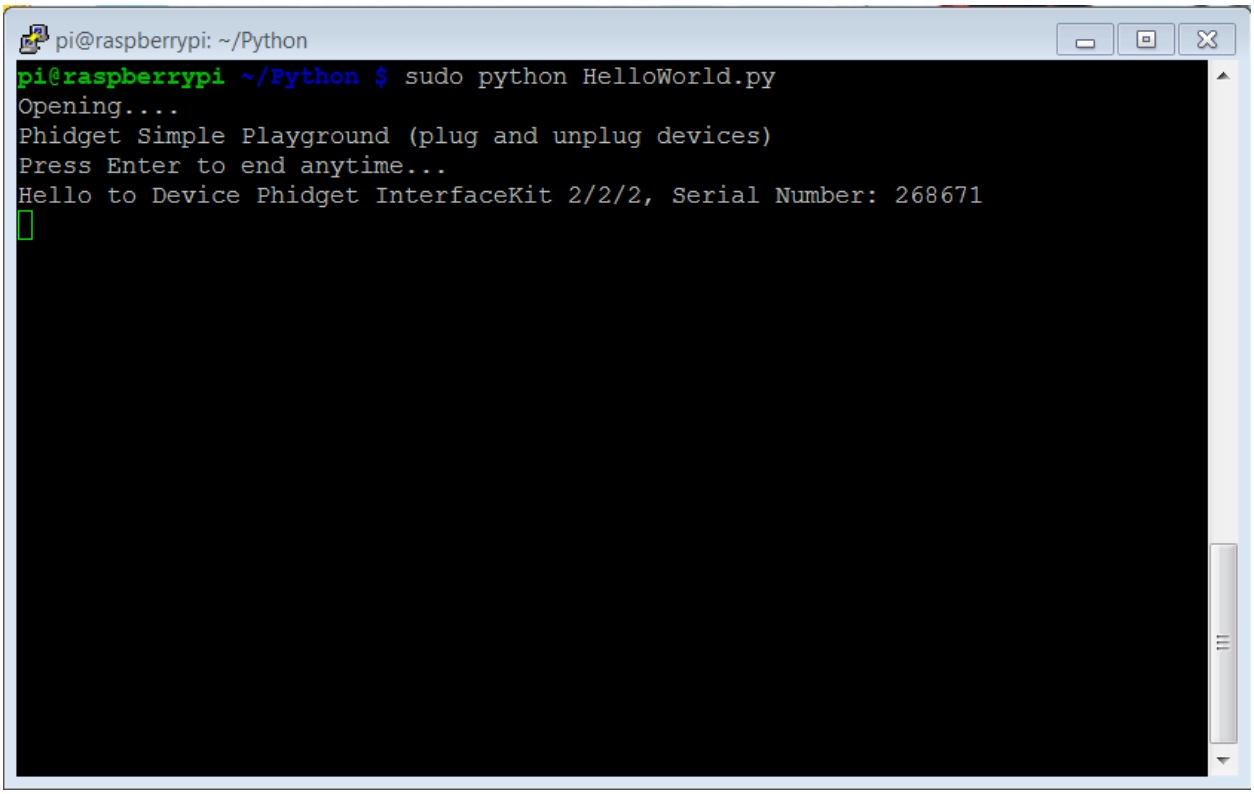

Angle1
Transmitter
Receiver
Angle2
Transmitter
Receiver

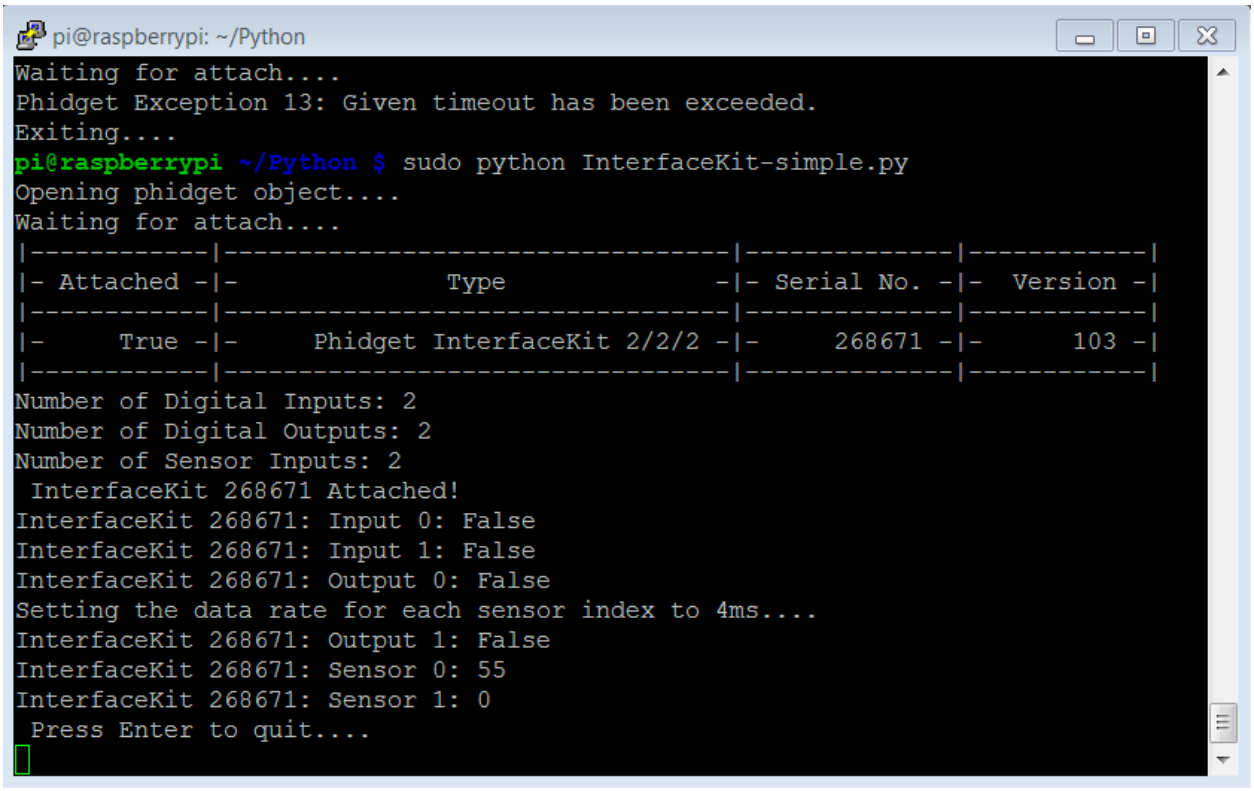


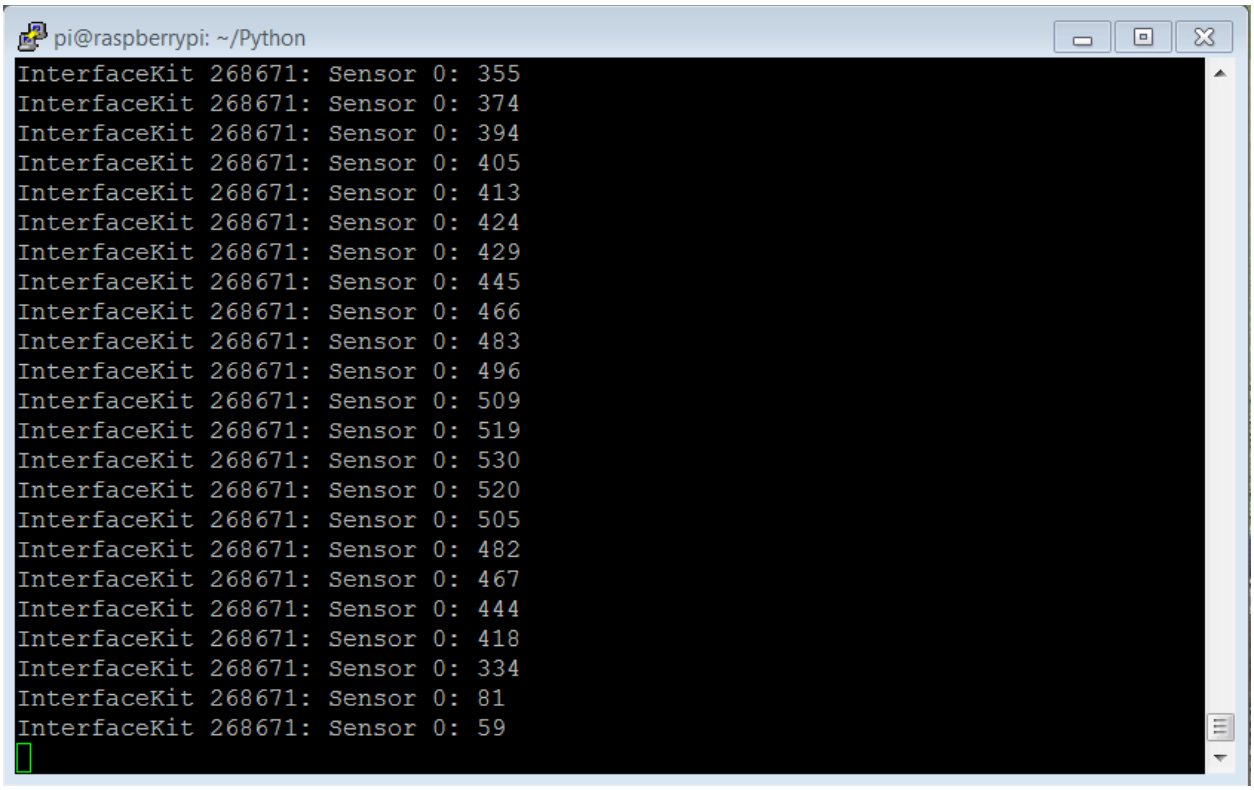


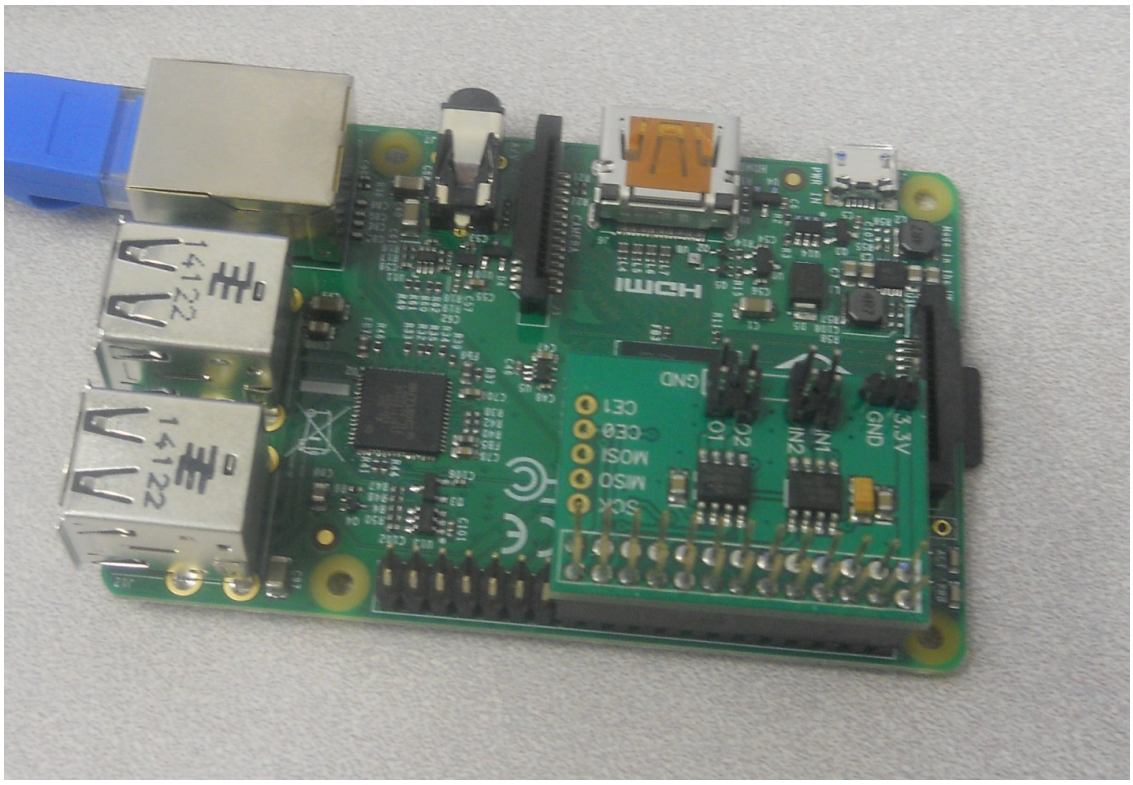

Phidget Control Panel
General
WebService
PhidgetSBC
Library Information:
Phidget21 - Version 2.1.8 - Built Nov 5 2013 11:58:28
Phidget21.NET - Version 2.1.8.176
Locally Attached Devices: (Double click to launch UI)
Device
Serial
Version
Phidget InterfaceKit 2/2/2
268671
103
Start Phidget Control Panel with Windows?
Enable Logging in Examples?
View Logs

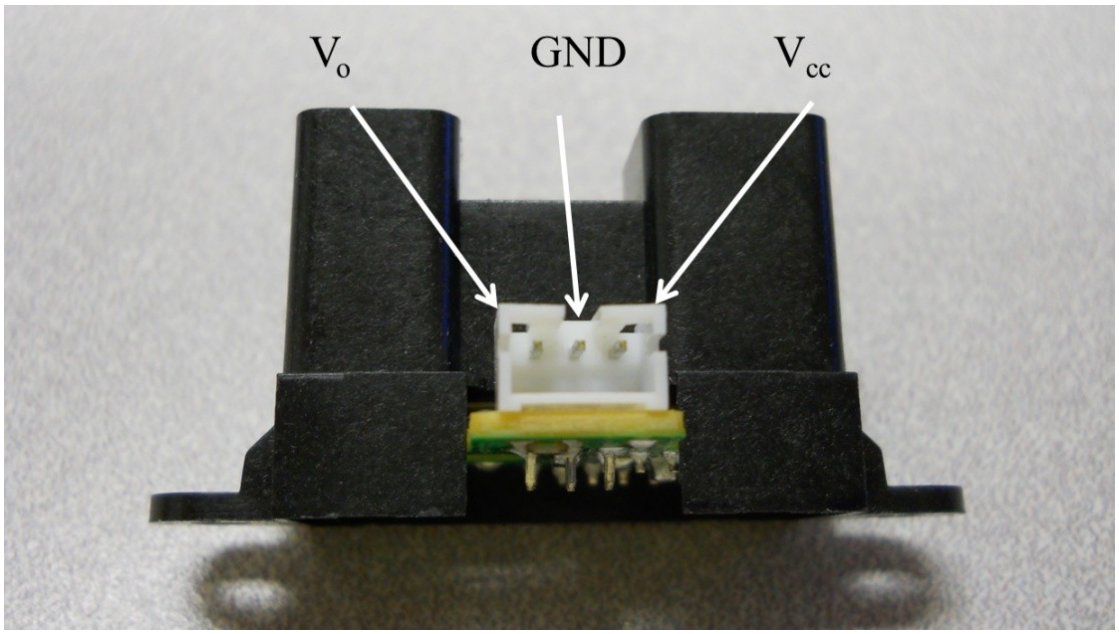

pi@raspberrypi: ~/Python
pi@raspberrypi ~/Python $ ls
Accelerometer-simple.py GPS-simple.py PHSensor-simple.py
AdvancedServo-simple.py HelloWorld.py RFID-simple.py
Analog-simple.py InterfaceKit-simple.py Servo-simple.py
Bridge-simple.py IR-simple.py Spatial-simple.py
Dictionary-simple.py LED-simple.py Stepper-simple.py
Encoder-simple.py Manager-simple.py TemperatureSensor-simple.py
FrequencyCounter-simple.py MotorControl-simple.py TextLCD-simple.py
pi@raspberrypi ~/Python $

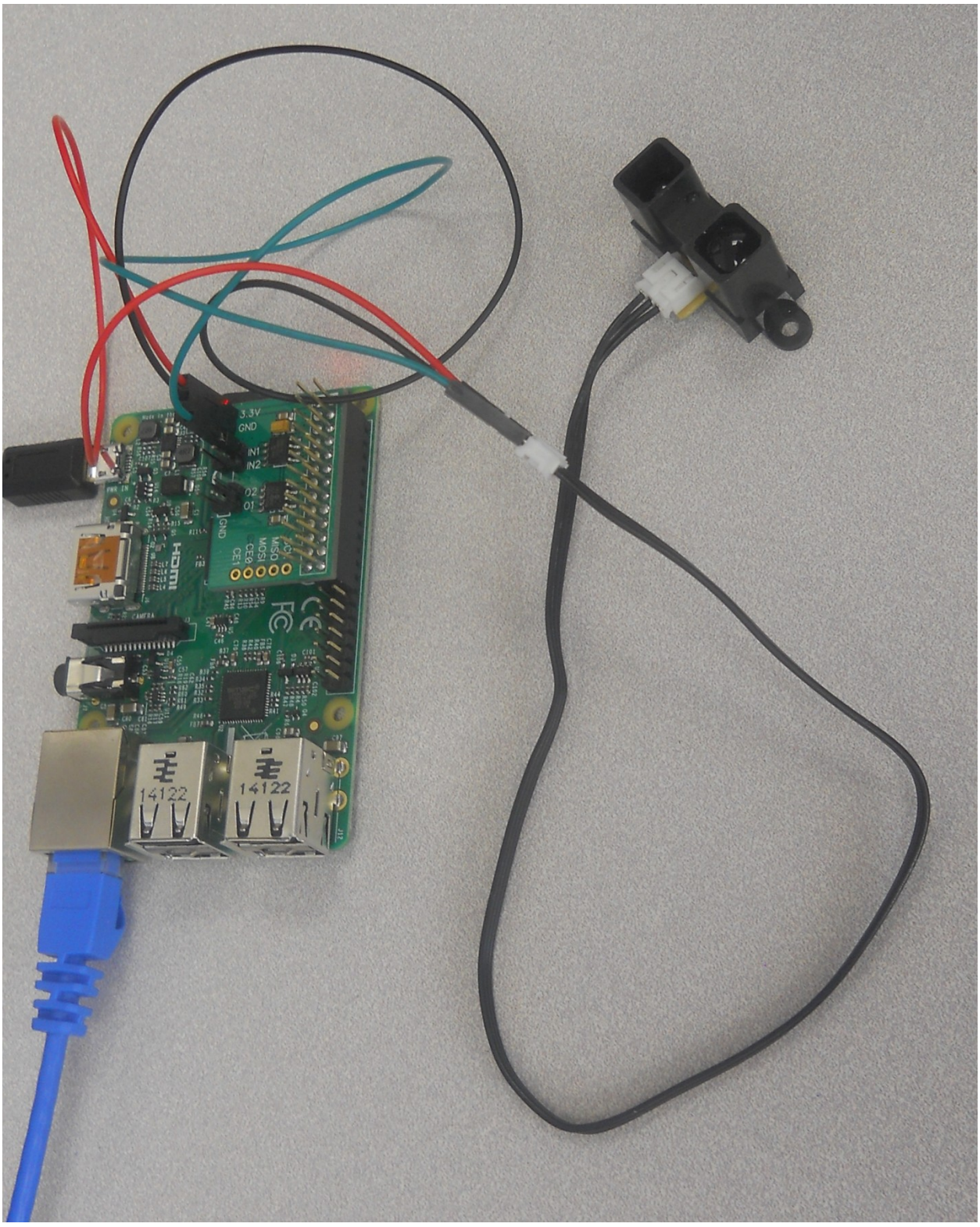

pi@raspberrypi: ~/Python
pi@raspberrypi ~/Python $ sudo python HelloWorld.py
Opening....
Phidget Simple Playground (plug and unplug devices)
Press Enter to end anytime...
Hello to Device Phidget InterfaceKit 2/2/2, Serial Number: 268671

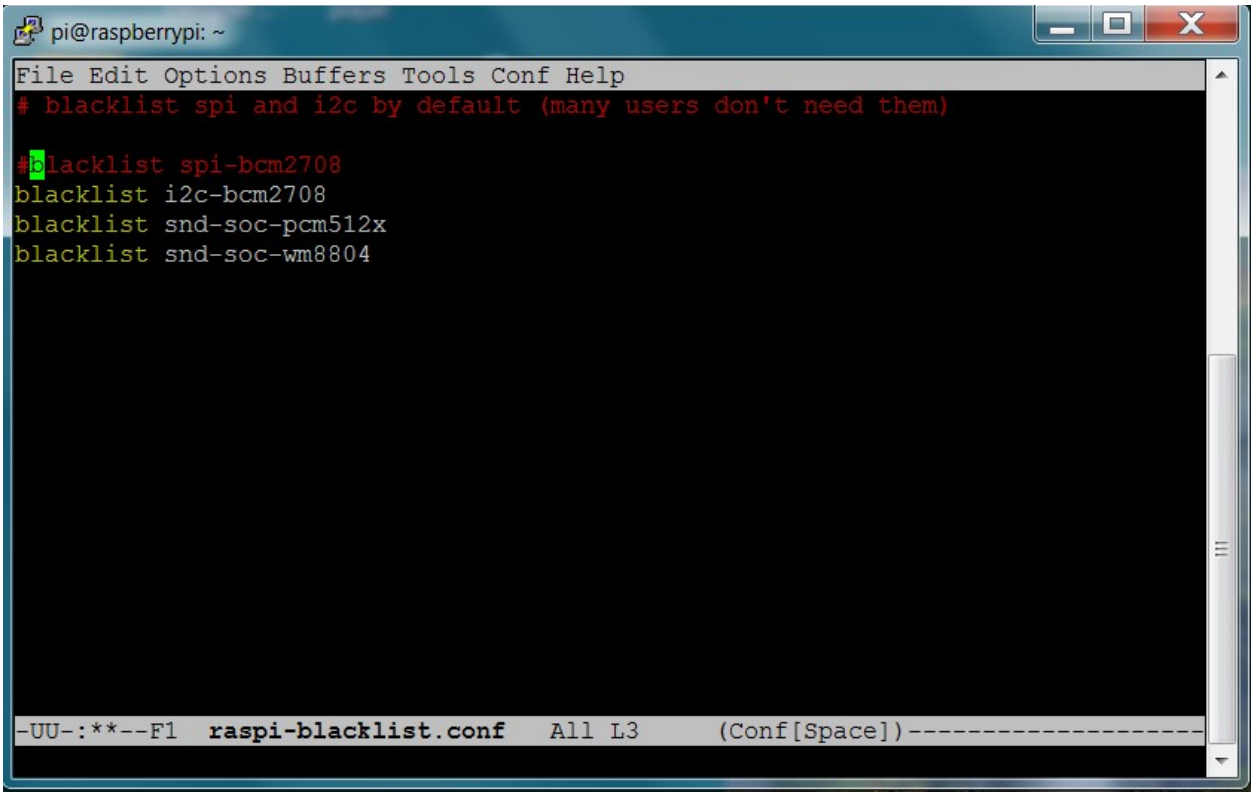

pi@raspberrypi: ~/Python
Waiting for attach....
Phidget Exception 13: Given timeout has been exceeded.
Exiting....
pi@raspberrypi ~/Python $ sudo python InterfaceKit-simple.py
Opening phidget object....
Waiting for attach....
|------------|----------------------------------|--------------|------------|
- Attached -	- Type -	- Serial No. -	- Version -
- True -	- Phidget InterfaceKit 2/2/2 -	- 268671 -	- 103 -
Number of Digital Inputs: 2
Number of Digital Outputs: 2
Number of Sensor Inputs: 2
 InterfaceKit 268671 Attached!
InterfaceKit 268671: Input 0: False
InterfaceKit 268671: Input 1: False
InterfaceKit 268671: Output 0: False
Setting the data rate for each sensor index to 4ms....
InterfaceKit 268671: Output 1: False
InterfaceKit 268671: Sensor 0: 55
InterfaceKit 268671: Sensor 1: 0
 Press Enter to quit....

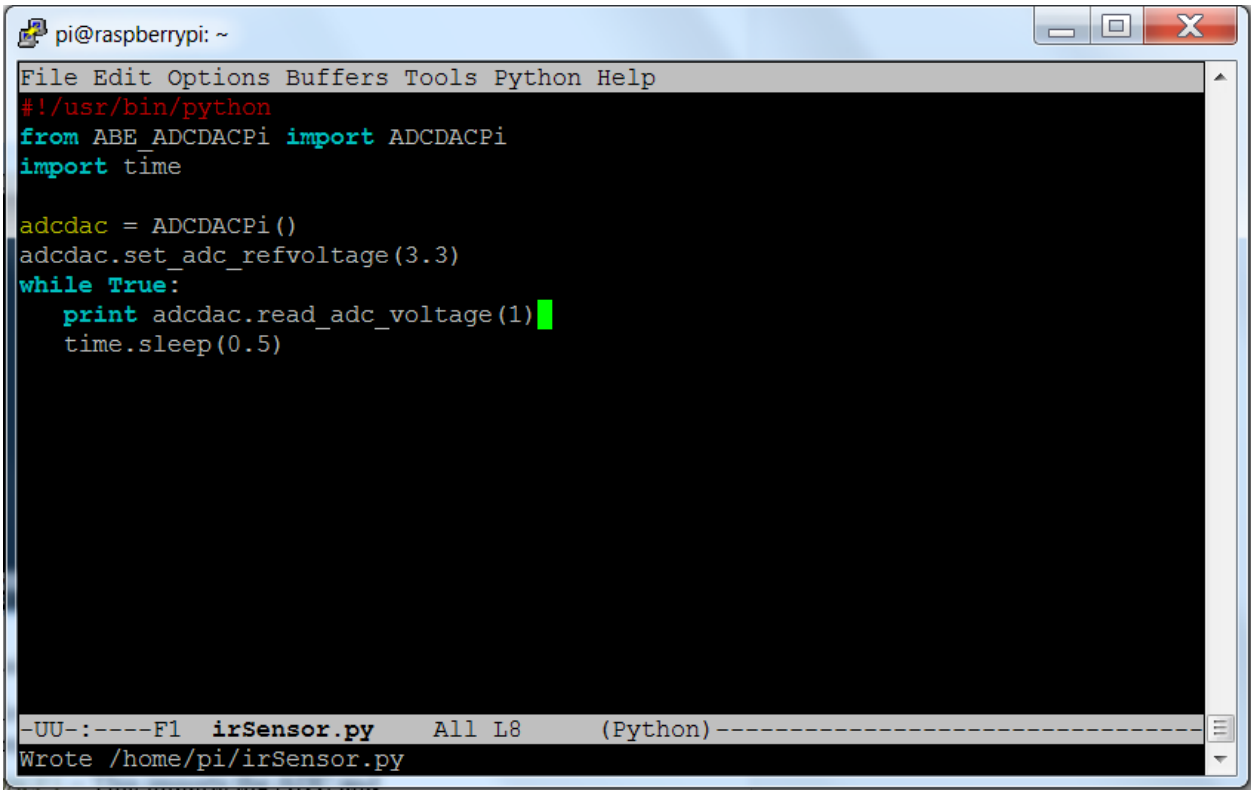

pi@raspberrypi: ~/Python
InterfaceKit 268671: Sensor 0: 355
InterfaceKit 268671: Sensor 0: 374
InterfaceKit 268671: Sensor 0: 394
InterfaceKit 268671: Sensor 0: 405
InterfaceKit 268671: Sensor 0: 413
InterfaceKit 268671: Sensor 0: 424
InterfaceKit 268671: Sensor 0: 429
InterfaceKit 268671: Sensor 0: 445
InterfaceKit 268671: Sensor 0: 466
InterfaceKit 268671: Sensor 0: 483
InterfaceKit 268671: Sensor 0: 496
InterfaceKit 268671: Sensor 0: 509
InterfaceKit 268671: Sensor 0: 519
InterfaceKit 268671: Sensor 0: 530
InterfaceKit 268671: Sensor 0: 520
InterfaceKit 268671: Sensor 0: 505
InterfaceKit 268671: Sensor 0: 482
InterfaceKit 268671: Sensor 0: 467
InterfaceKit 268671: Sensor 0: 444
InterfaceKit 268671: Sensor 0: 418
InterfaceKit 268671: Sensor 0: 334
InterfaceKit 268671: Sensor 0: 81
InterfaceKit 268671: Sensor 0: 59

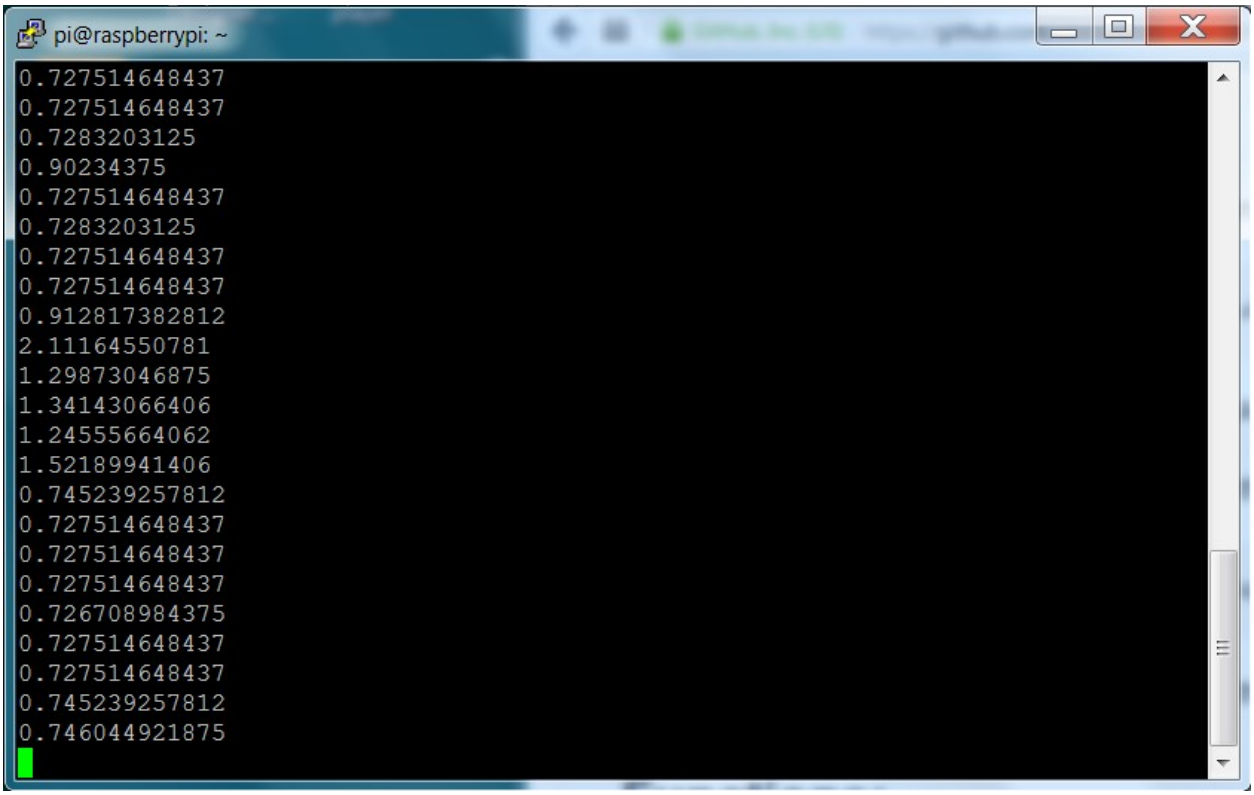

GND
CE1
CE0
MOSI
MISO
SCK
3.3V
GND

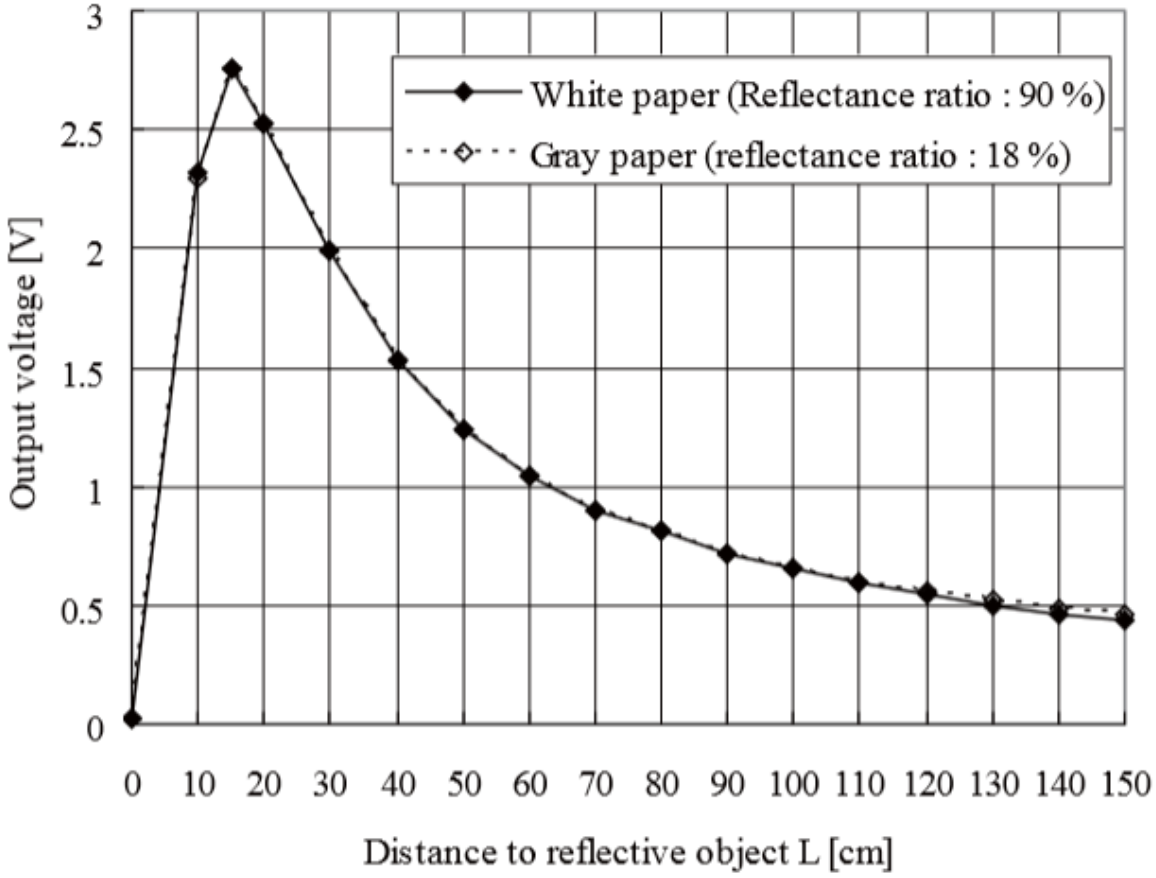

V_o
GND
V_{cc}

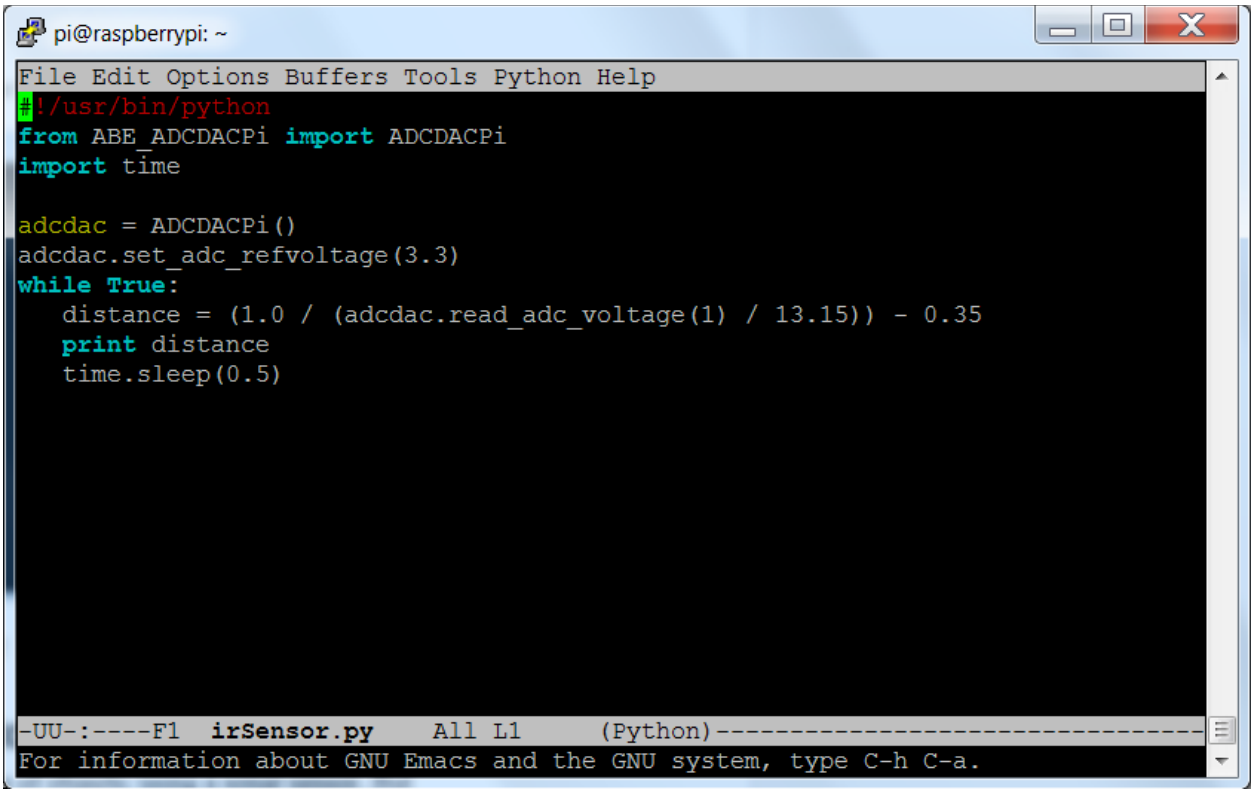

3.3V
GND
IN1
IN2
O2
O1
GND
SCLK
MISO
MOSI
CE0
CE1
14122
14122

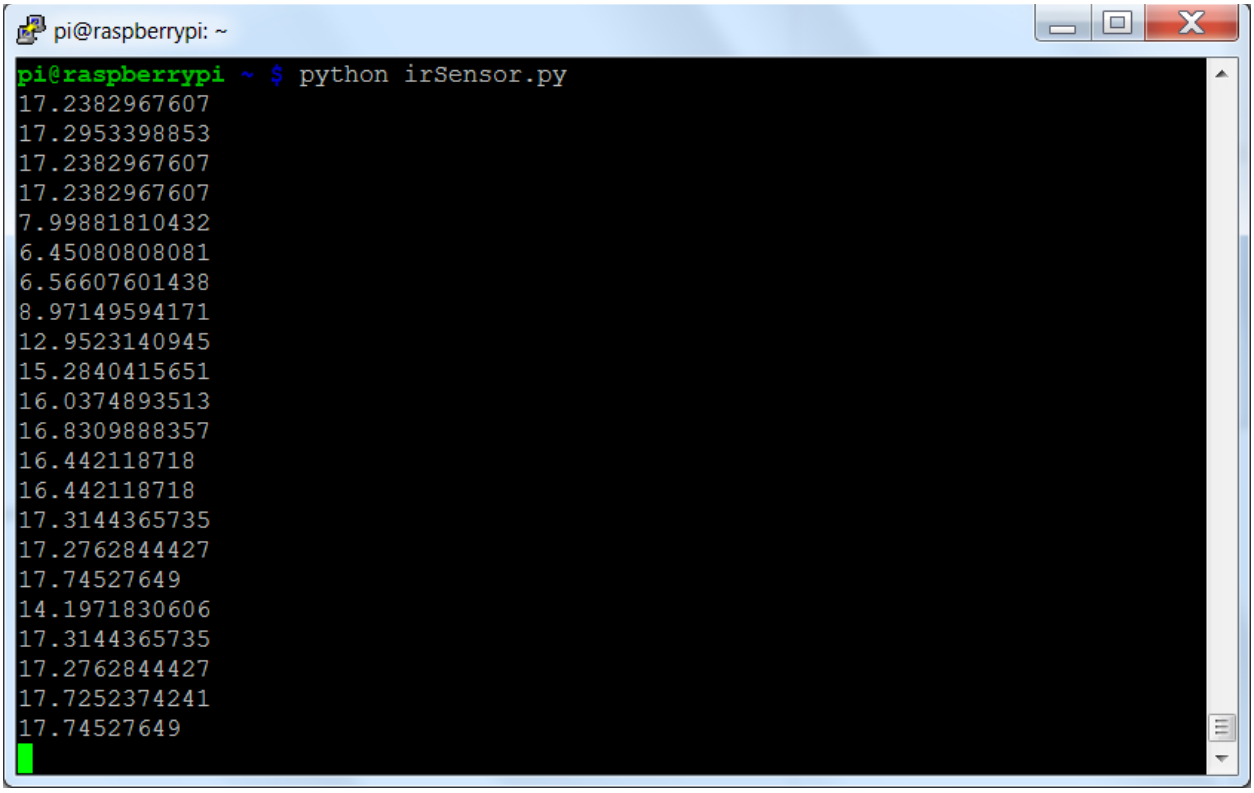

pi@raspberrypi: ~
File Edit Options Buffers Tools Conf Help
blacklist spi and i2c by default (many users don't need them)
#blacklist spi-bcm2708
blacklist i2c-bcm2708
blacklist snd-soc-pcm512x
blacklist snd-soc-wm8804
-UU-:**--F1 raspi-blacklist.conf All L3 (Conf[Space])

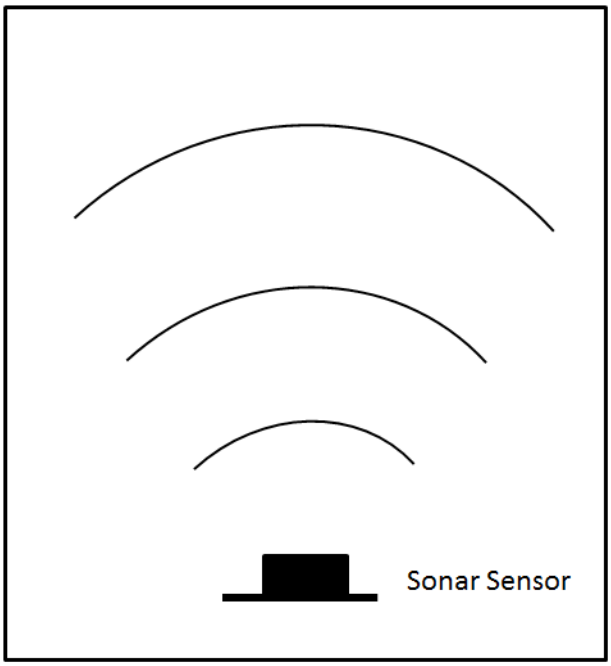

pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
from ABE_ADCDACPi import ADCDACPi
import time
adcdac = ADCDACPi()
adcdac.set_adc_refvoltage(3.3)
while True:
print adcdac.read_adc_voltage(1)
time.sleep(0.5)
-UU-:----F1 irSensor.py All L8 (Python)
Wrote /home/pi/irSensor.py

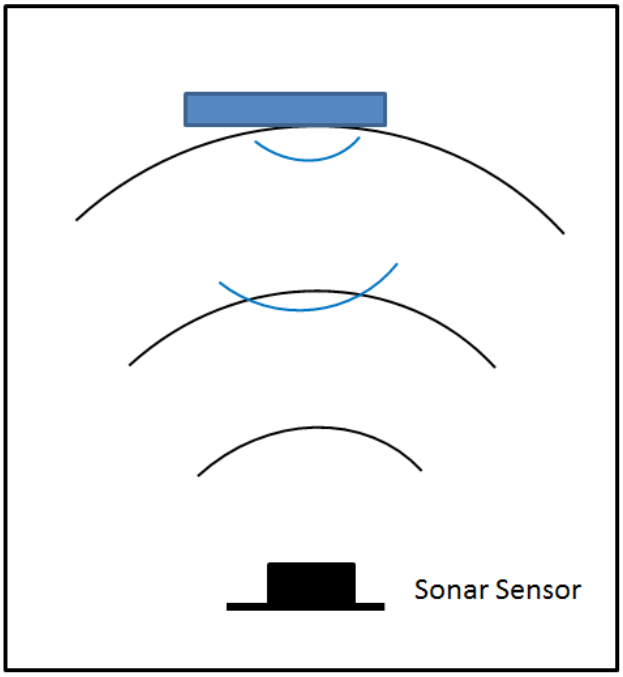

pi@raspberrypi: ~
0.727514648437
0.727514648437
0.7283203125
0.90234375
0.727514648437
0.7283203125
0.727514648437
0.727514648437
0.912817382812
2.11164550781
1.29873046875
1.34143066406
1.24555664062
1.52189941406
0.745239257812
0.727514648437
0.727514648437
0.727514648437
0.726708984375
0.727514648437
0.727514648437
0.745239257812
0.746044921875


White paper (Reflectance ratio : 90 %)
Gray paper (reflectance ratio : 18 %)
Output voltage [V]
3
2.5
2
1.5
1
0.5
0
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150
Distance to reflective object L [cm]


pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
from ABE_ADCDACPi import ADCDACPi
import time
adcdac = ADCDACPi()
adcdac.set_adc_refvoltage(3.3)
while True:
distance = (1.0 / (adcdac.read_adc_voltage(1) / 13.15)) - 0.35
print distance
time.sleep(0.5)
-UU-:----F1 irSensor.py All L1 (Python)
For information about GNU Emacs and the GNU system, type C-h C-a.


pi@raspberrypi: ~
pi@raspberrypi ~ $ python irSensor.py
17.2382967607
17.2953398853
17.2382967607
17.2382967607
7.99881810432
6.45080808081
6.56607601438
8.97149594171
12.9523140945
15.2840415651
16.0374893513
16.8309888357
16.442118718
16.442118718
17.3144365735
17.2762844427
17.74527649
14.1971830606
17.3144365735
17.2762844427
17.7252374241
17.74527649


Sonar Sensor


Sonar Sensor

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Tutorials & Application Notes
Contact
News

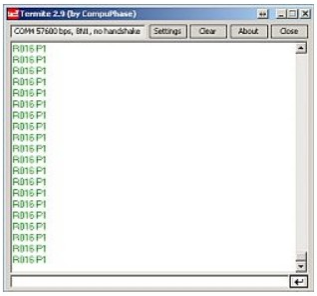
SENSORS PORTAL MAGAZINE TOP 10 Products of 2012

We are glad to support FRC FIRST Robotics Competition

F.I.R.S.T.® ROBOTICS 2014
Author: Tom Bonar Date: 12/04/2013

Terminal Program Setup Guide

| Written By: Tom Bonar | DatePosted: 10-25-2012 | Updated 04-03-2013 |



This article provides instruction on the easy setup for the MaxBotix® Inc., USB-MaxSonar® ultrasonic sensor lines. This instructional set will help you set up the USB-MaxSonar® ultrasonic sensors with your computer system.

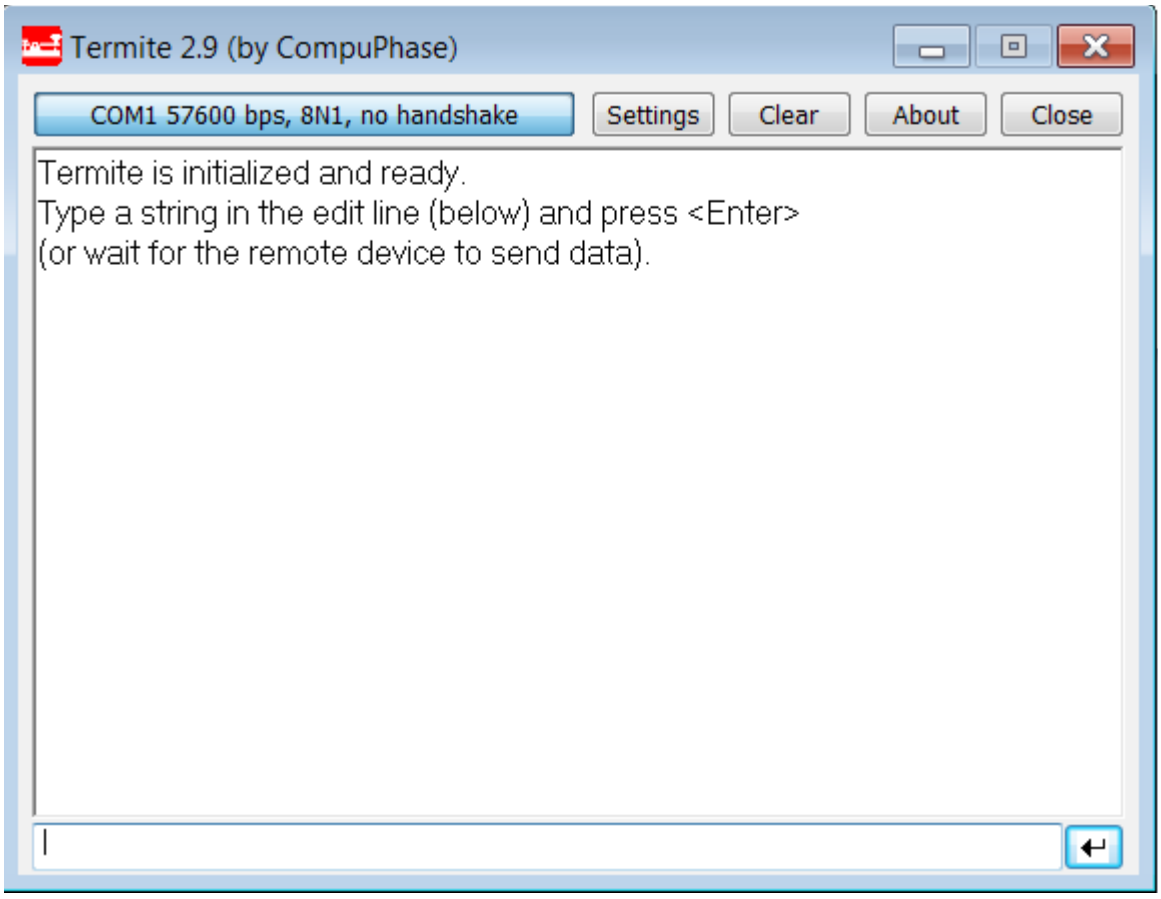
Windows Download

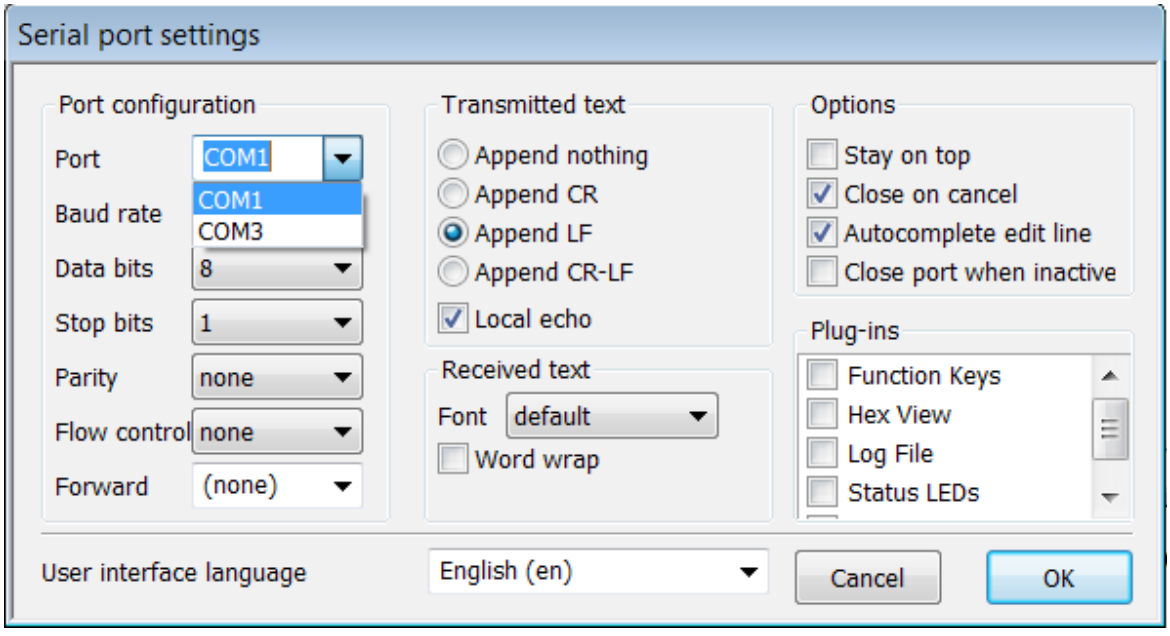
Linux Download

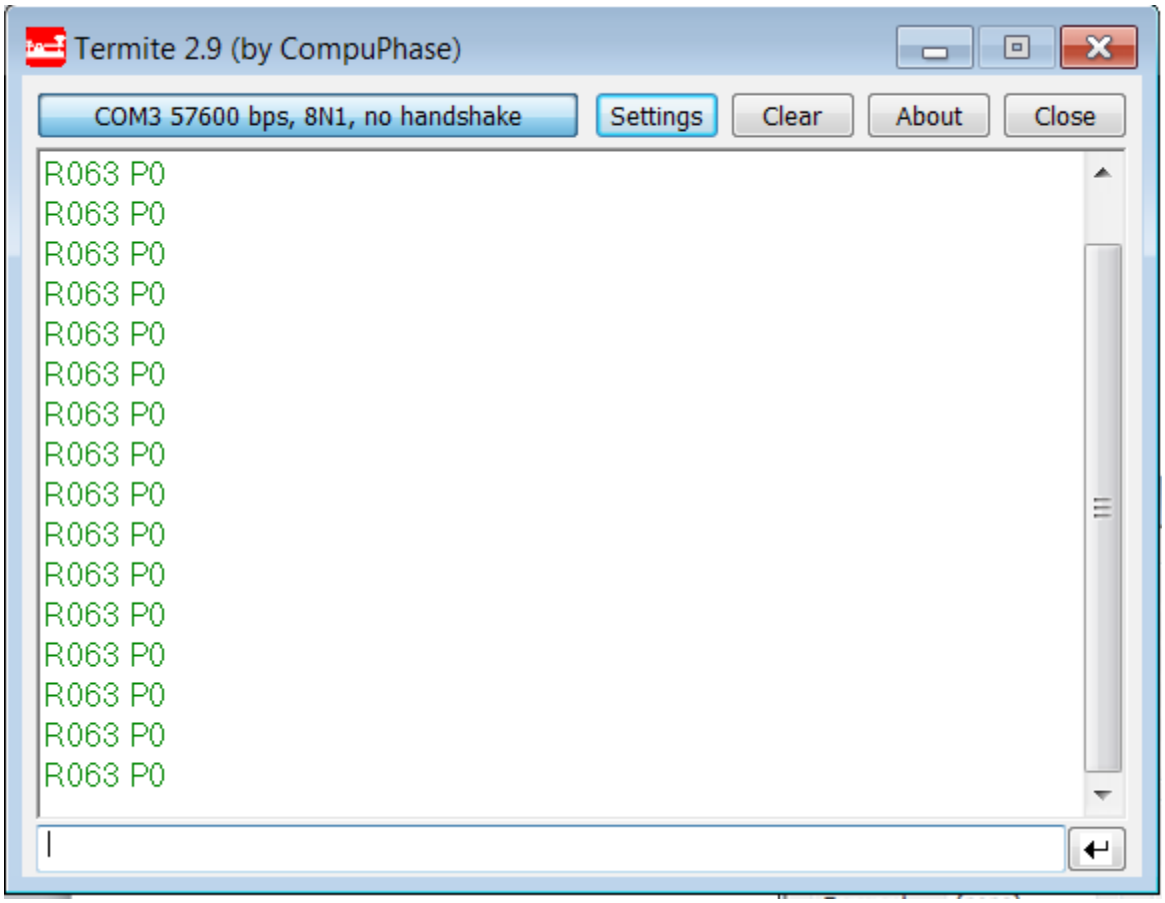
Apple Download

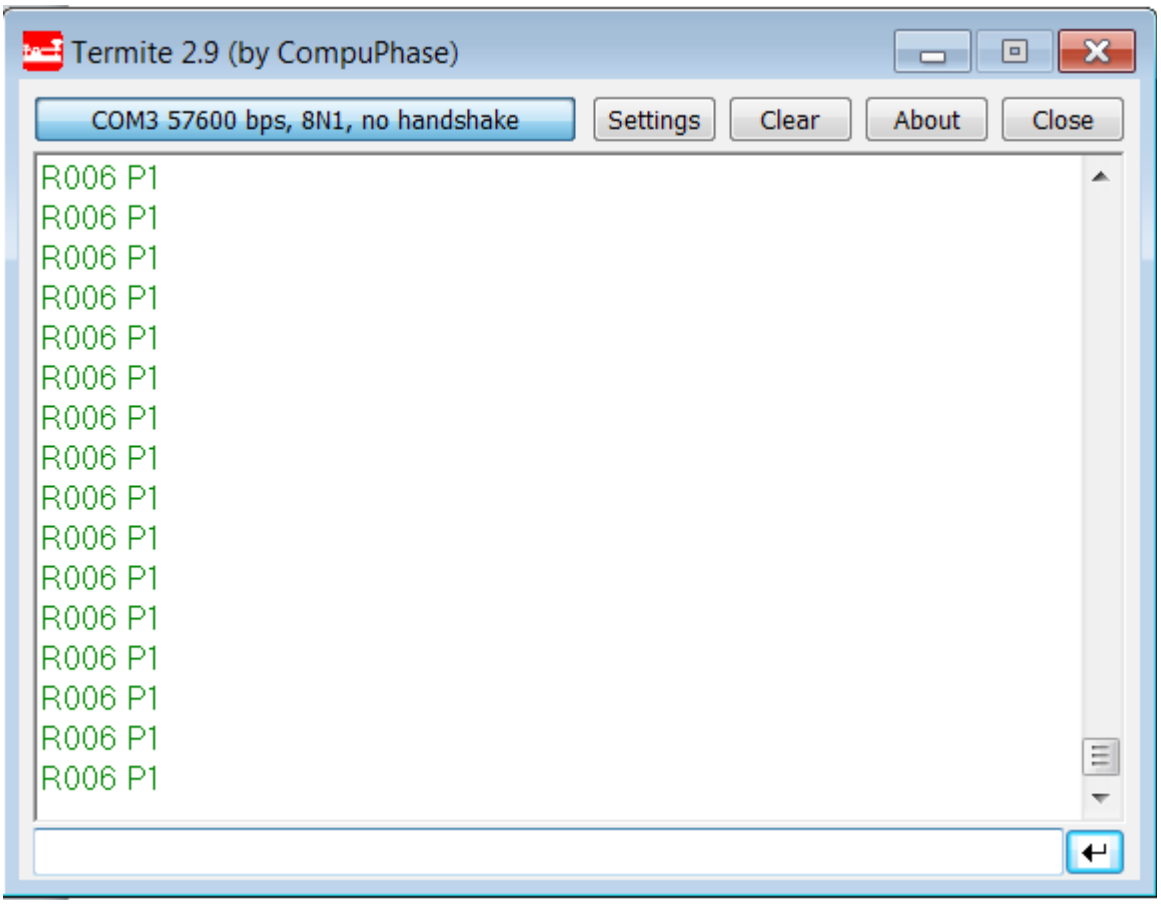
Please use your prefered operating system instruction set:
Windows
Linux
Apple OS

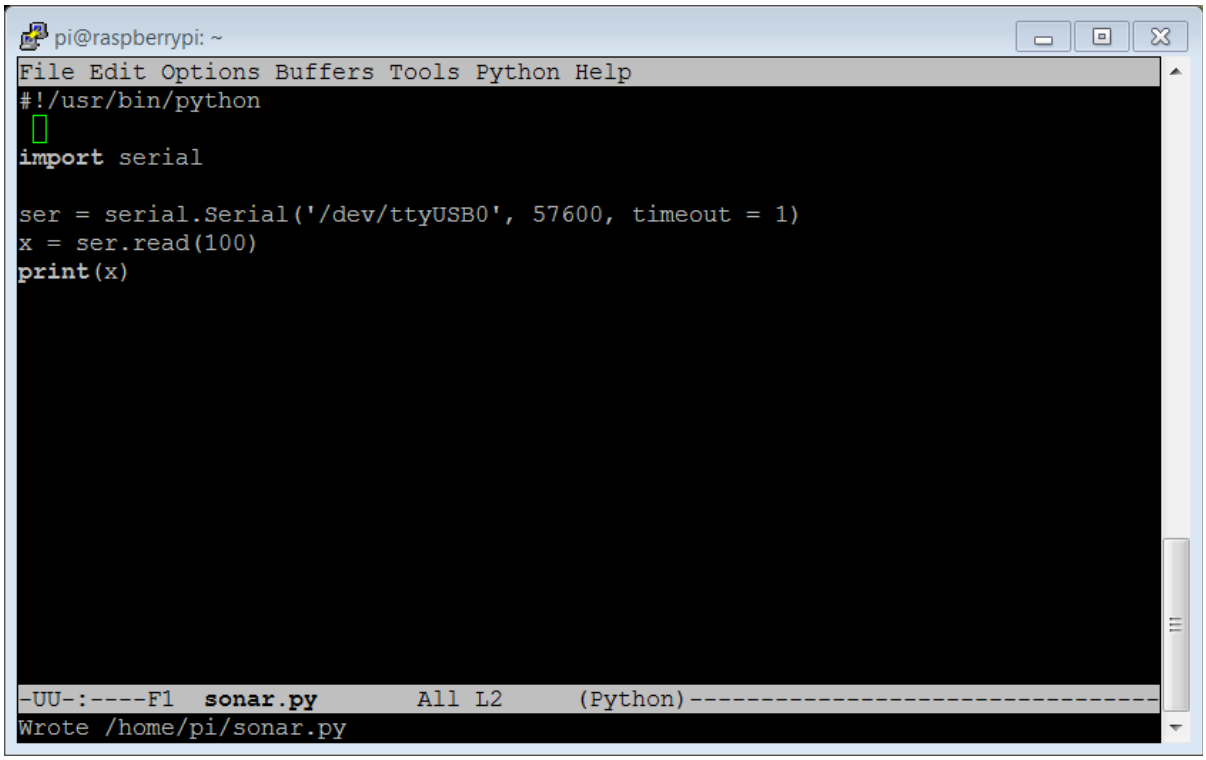
Name	Date modified	Type	Size
Function_Keys.flt	9/16/2013 5:53 PM	FLT File	36 KB
Hex_View.flt	9/16/2013 5:53 PM	FLT File	36 KB
Log_File.flt	9/16/2013 5:53 PM	FLT File	47 KB
setup.log	9/16/2013 5:53 PM	Text Document	2 KB
Status_LEDs.flt	9/16/2013 5:53 PM	FLT File	33 KB
Termite.exe	9/16/2013 5:53 PM	Application	116 KB
Timestamp.flt	9/16/2013 5:53 PM	FLT File	39 KB
WritingFilters.pdf	9/16/2013 5:53 PM	Adobe Acrobat D...	66 KB

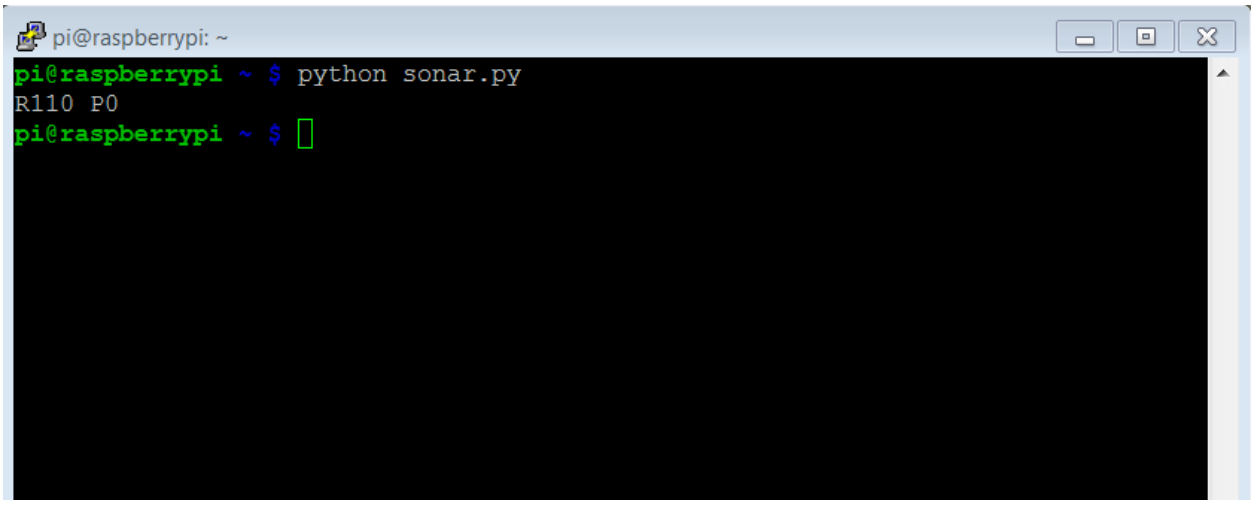

Termite 2.9 (by CompuPhase)
COM1 57600 bps, 8N1, no handshake
Settings
Clear
About
Close
Termite is initialized and ready.
Type a string in the edit line (below) and press <Enter>
(or wait for the remote device to send data).

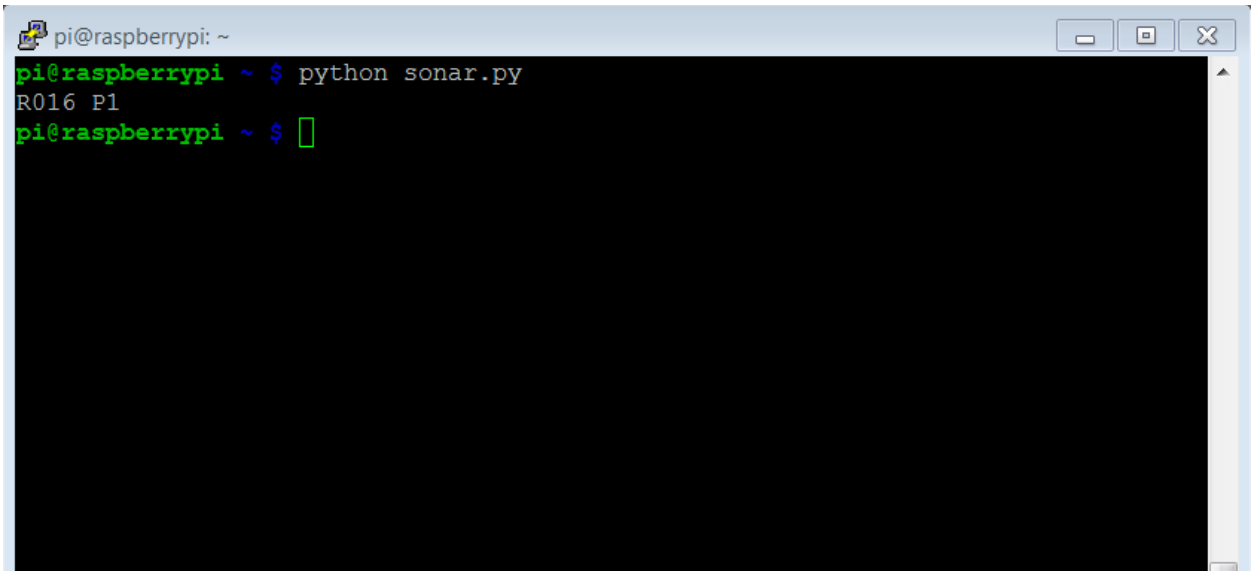

Serial port settings
Port configuration
Port
COM1
COM1
COM3
Baud rate
Data bits
8
Stop bits
1
Parity
none
Flow control
none
Forward
(none)
Transmitted text
Append nothing
Append CR
Append LF
Append CR-LF
Local echo
Received text
Font
default
Word wrap
Options
Stay on top
Close on cancel
Autocomplete edit line
Close port when inactive
Plug-ins
Function Keys
Hex View
Log File
Status LEDs
User interface language
English (en)
Cancel
OK

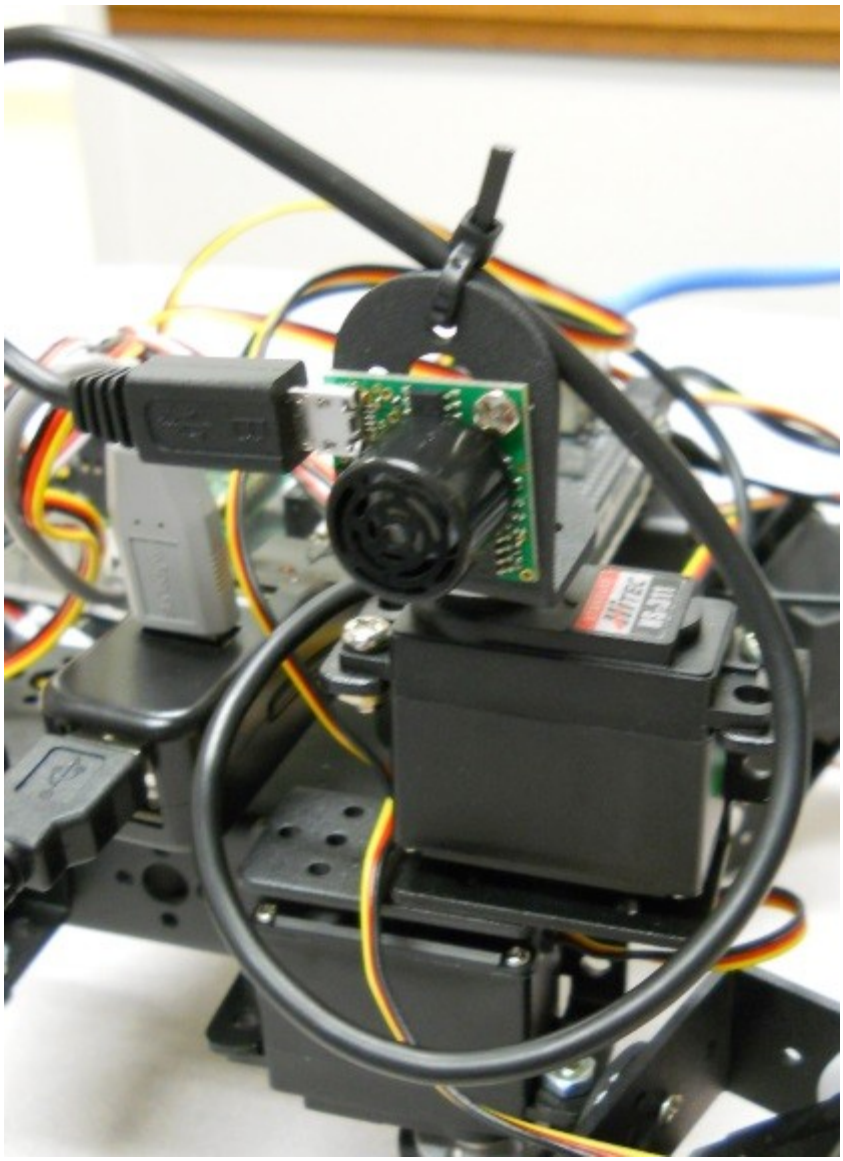

Termite 2.9 (by CompuPhase)
COM3 57600 bps, 8N1, no handshake
Settings
Clear
About
Close
R063 P0
R063 P0
R063 P0
R063 P0
R063 P0
R063 P0
R063 P0
R063 P0
R063 P0
R063 P0
R063 P0
R063 P0
R063 P0
R063 P0
R063 P0

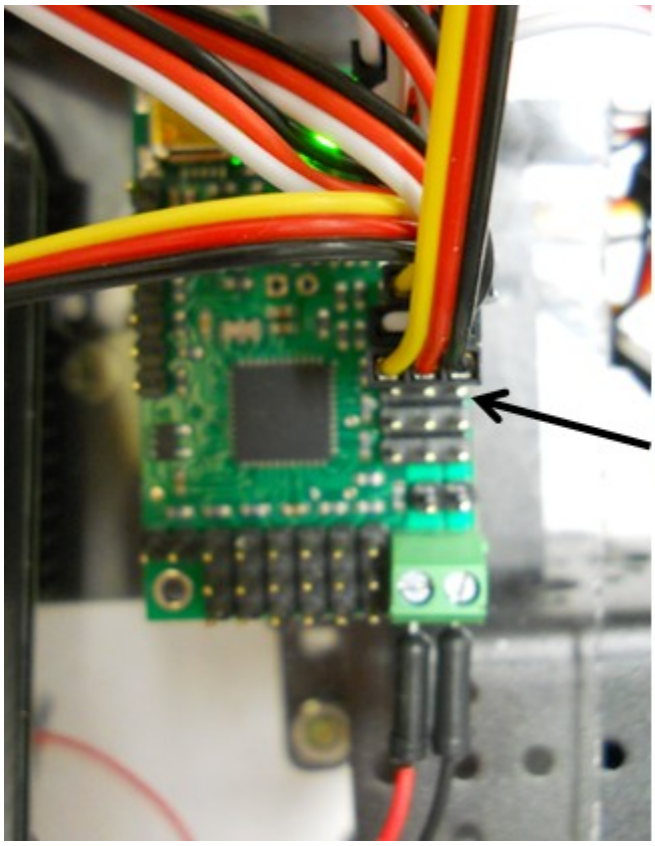

Termite 2.9 (by CompuPhase)
COM3 57600 bps, 8N1, no handshake
Settings
Clear
About
Close
R006 P1
R006 P1
R006 P1
R006 P1
R006 P1
R006 P1
R006 P1
R006 P1
R006 P1
R006 P1
R006 P1
R006 P1
R006 P1
R006 P1
R006 P1

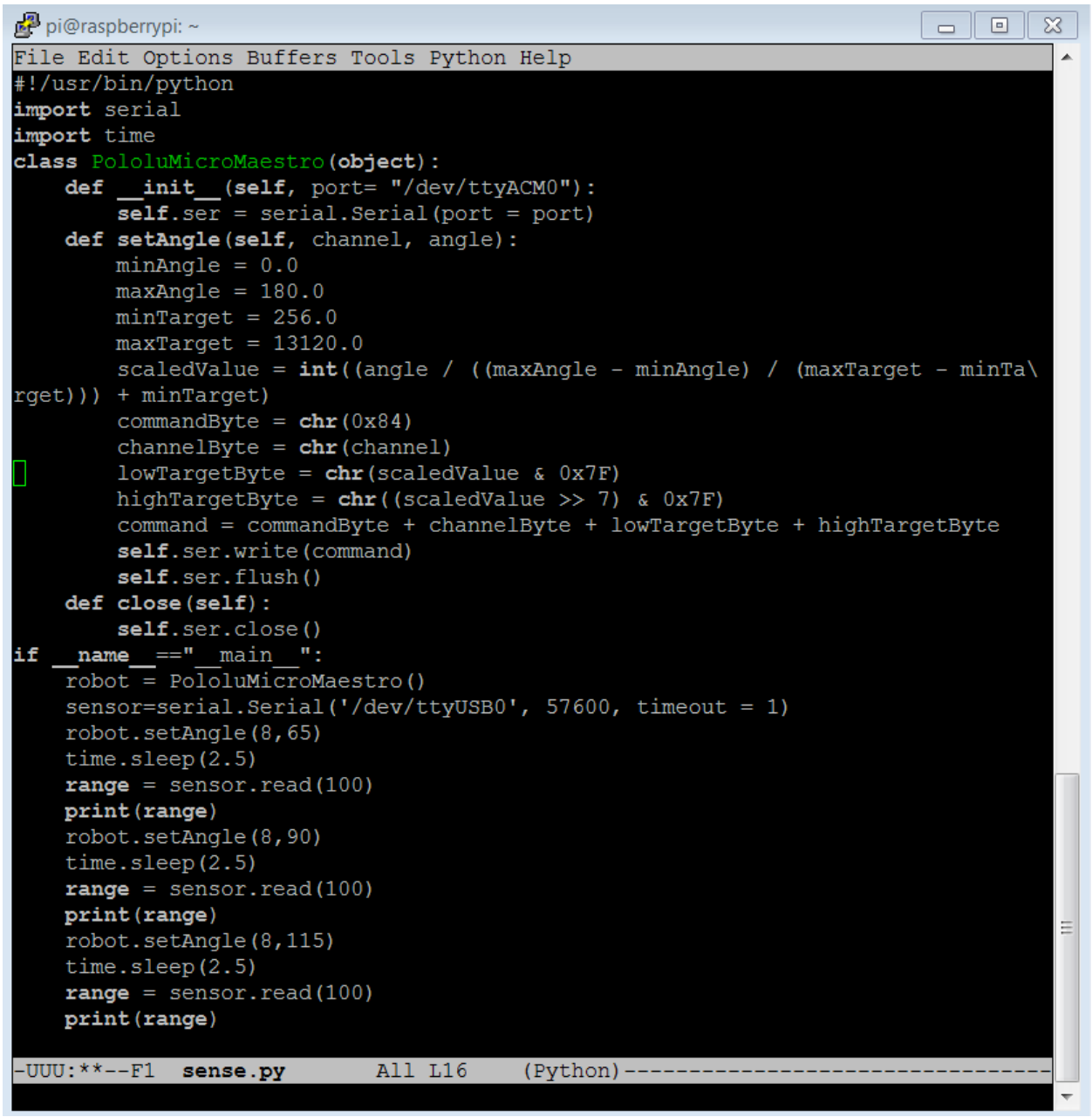

pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
import serial
ser = serial.Serial('/dev/ttyUSB0', 57600, timeout = 1)
x = ser.read(100)
print(x)
-UU-:----F1 sonar.py All L2 (Python)
Wrote /home/pi/sonar.py

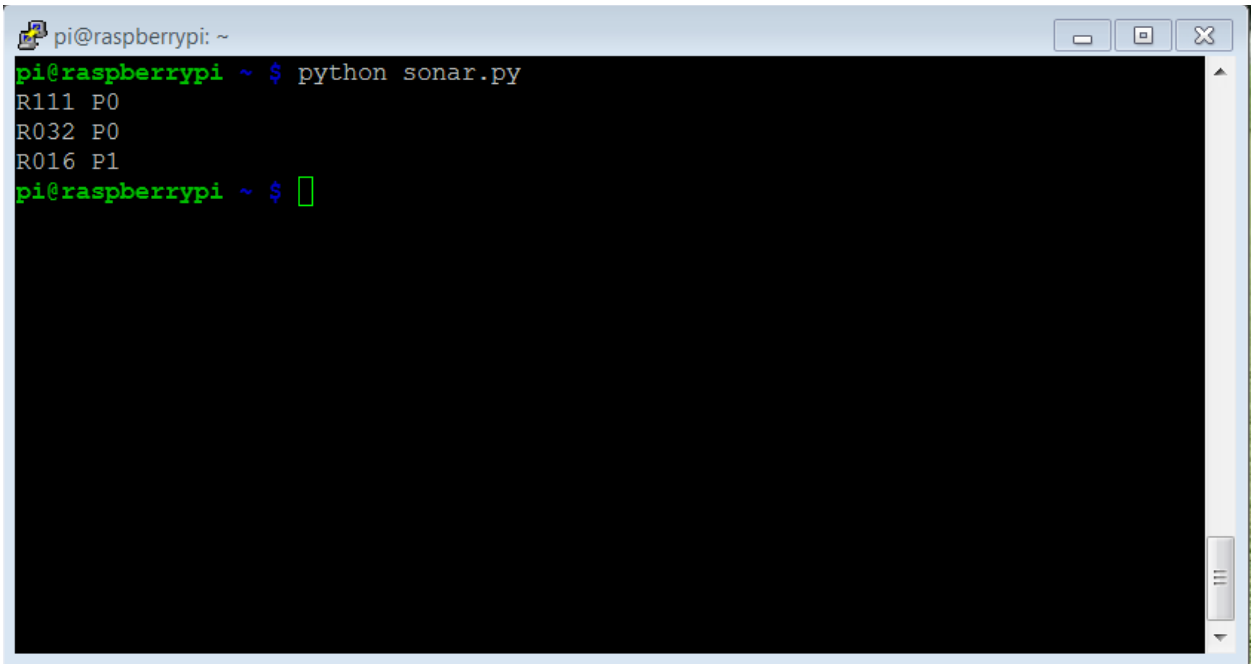

pi@raspberrypi: ~
pi@raspberrypi ~ $ python sonar.py
R110 P0
pi@raspberrypi ~ $


pi@raspberrypi: ~
pi@raspberrypi ~ $ python sonar.py
R016 P1
pi@raspberrypi ~ $

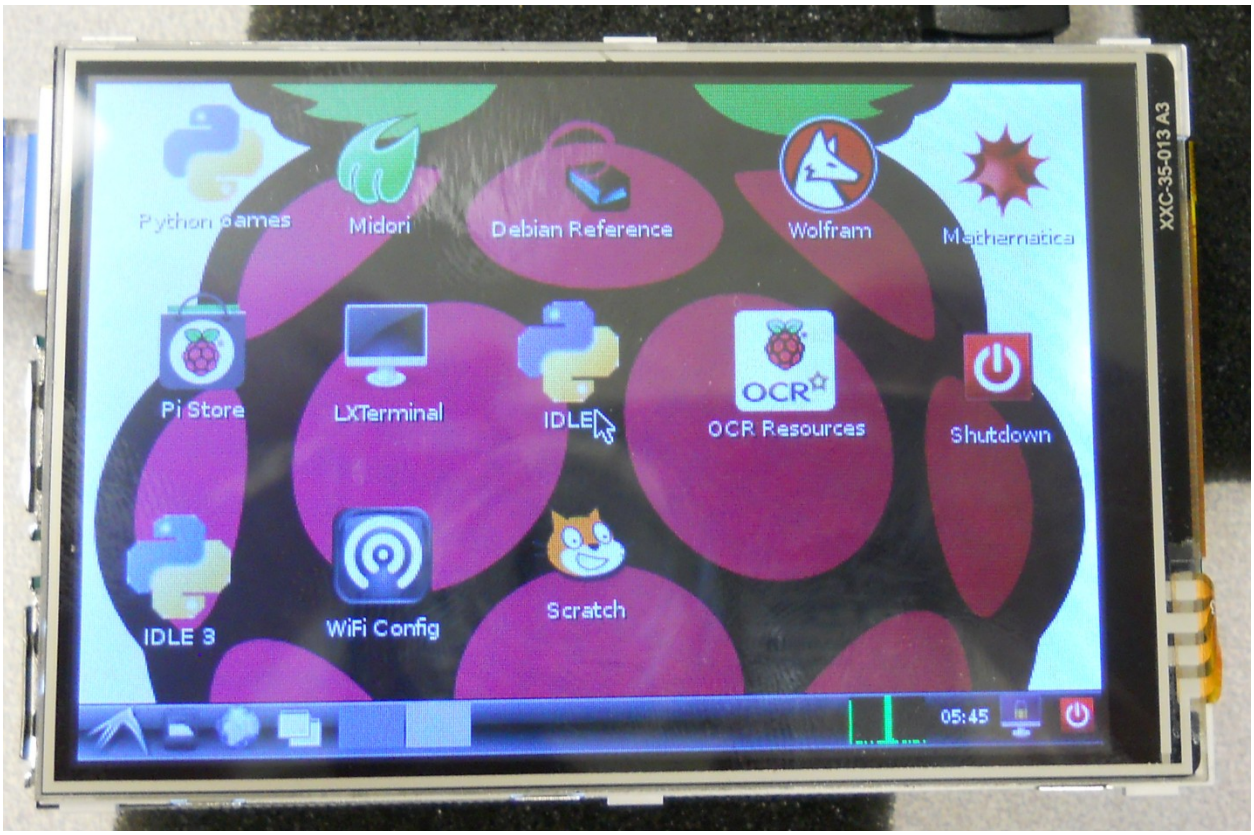


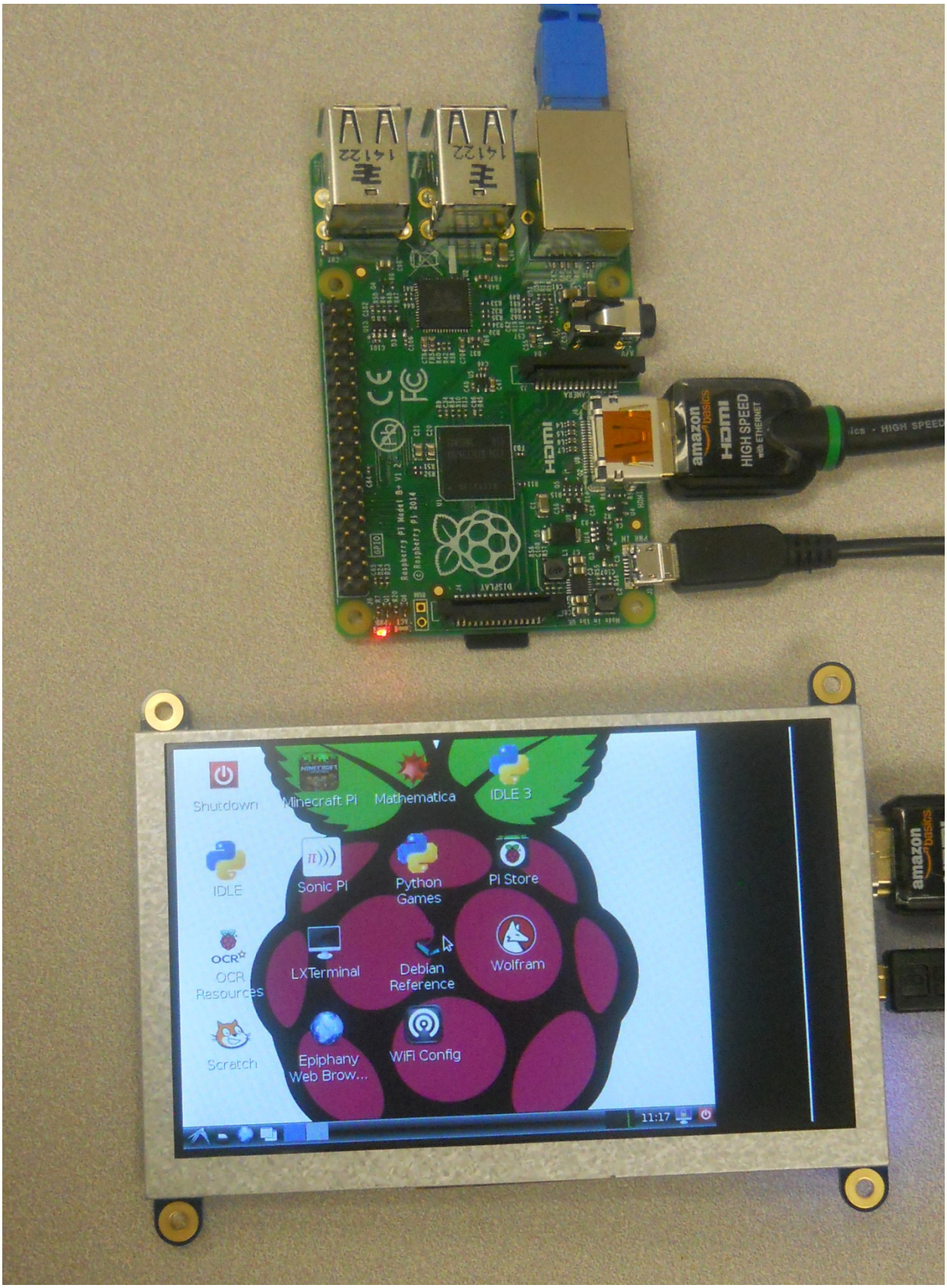

Servo connector


pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
import serial
import time
class PololuMicroMaestro(object):
def __init__(self, port= "/dev/ttyACM0"):
self.ser = serial.Serial(port = port)
def setAngle(self, channel, angle):
minAngle = 0.0
maxAngle = 180.0
minTarget = 256.0
maxTarget = 13120.0
scaledValue = int((angle / ((maxAngle - minAngle) / (maxTarget - minTa\
rget))) + minTarget)
commandByte = chr(0x84)
channelByte = chr(channel)
lowTargetByte = chr(scaledValue & 0x7F)
highTargetByte = chr((scaledValue >> 7) & 0x7F)
command = commandByte + channelByte + lowTargetByte + highTargetByte
self.ser.write(command)
self.ser.flush()
def close(self):
self.ser.close()
if __name__=="__main__":
robot = PololuMicroMaestro()
sensor=serial.Serial('/dev/ttyUSB0', 57600, timeout = 1)
robot.setAngle(8,65)
time.sleep(2.5)
range = sensor.read(100)
print(range)
robot.setAngle(8,90)
time.sleep(2.5)
range = sensor.read(100)
print(range)
robot.setAngle(8,115)
time.sleep(2.5)
range = sensor.read(100)
print(range)
-UUU:**--F1 sense.py All L16 (Python)

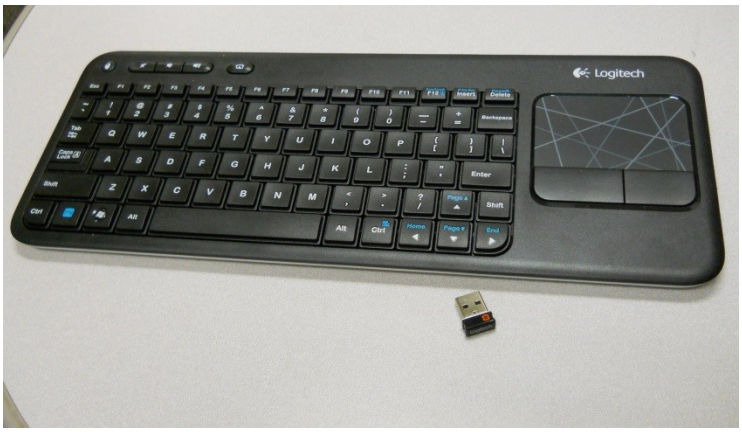

pi@raspberrypi: ~
pi@raspberrypi ~ $ python sonar.py
R111 P0
R032 P0
R016 P1
pi@raspberrypi ~ $

Chapter 8: Going Truly Mobile - The Remote Control of Your Robot


Python Games
Midori
Debian Reference
Wolfram
Mathematica
Pi Store
LXTerminal
IDLE
OCR Resources
Shutdown
IDLE 3
WiFi Config
Scratch
05:45
XXC-35-013 A3


Shutdown
Minecraft Pi
Mathematica
IDLE 3
IDLE
Sonic Pi
Python Games
Pi Store
OCR Resources
LXTerminal
Debian Reference
Wolfram
Scratch
Epiphany Web Brow...
WiFi Config
11:17
HIGH SPEED
amazon basics

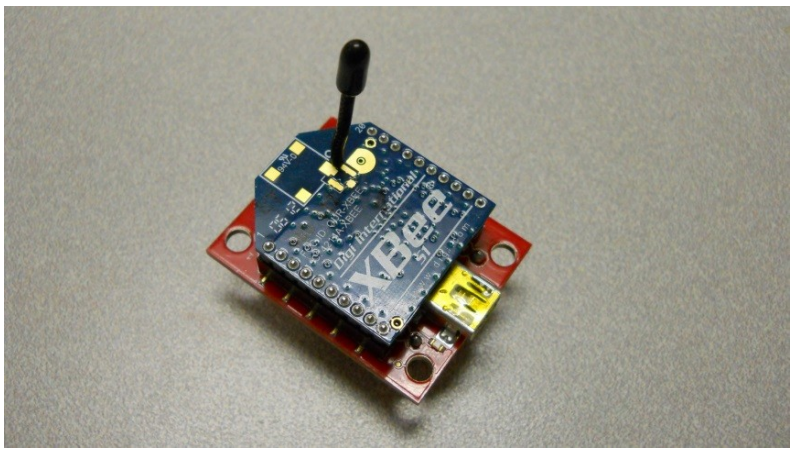
POWERTOCKS


Logitech

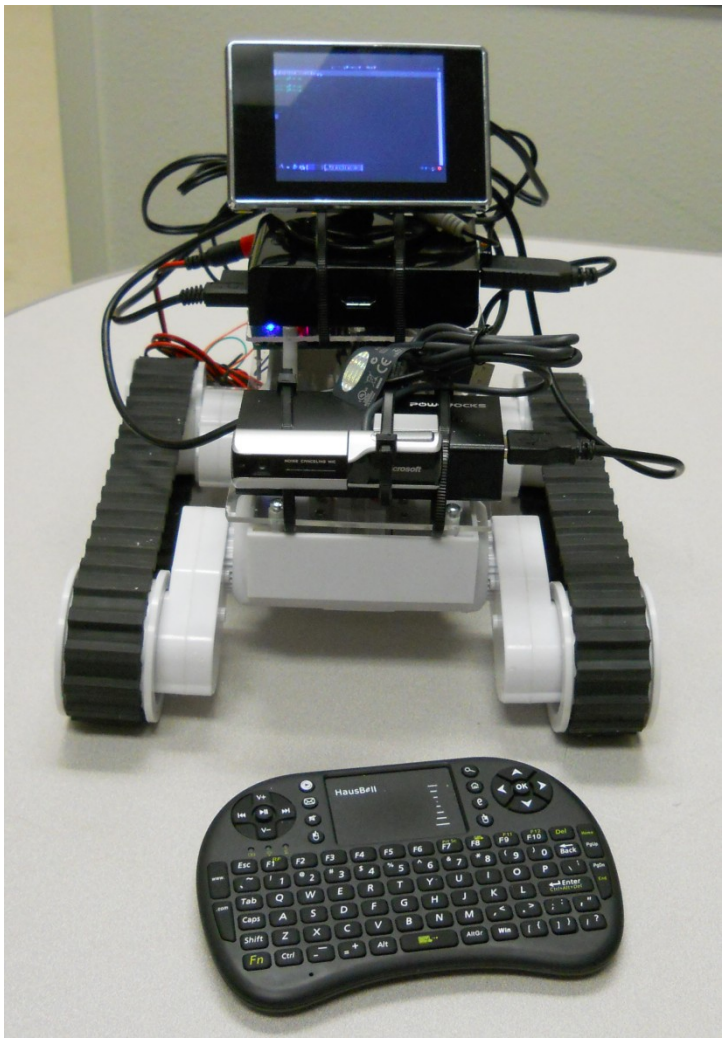
HausBell
V+
V-
OK
Esc
F1
F2
F3
F4
F5
F6
F7
F8
F9
F10
F11
F12
Del
Back
Tab
Caps
Enter
Shift
Fn
Ctrl
Alt
AltGr
Win

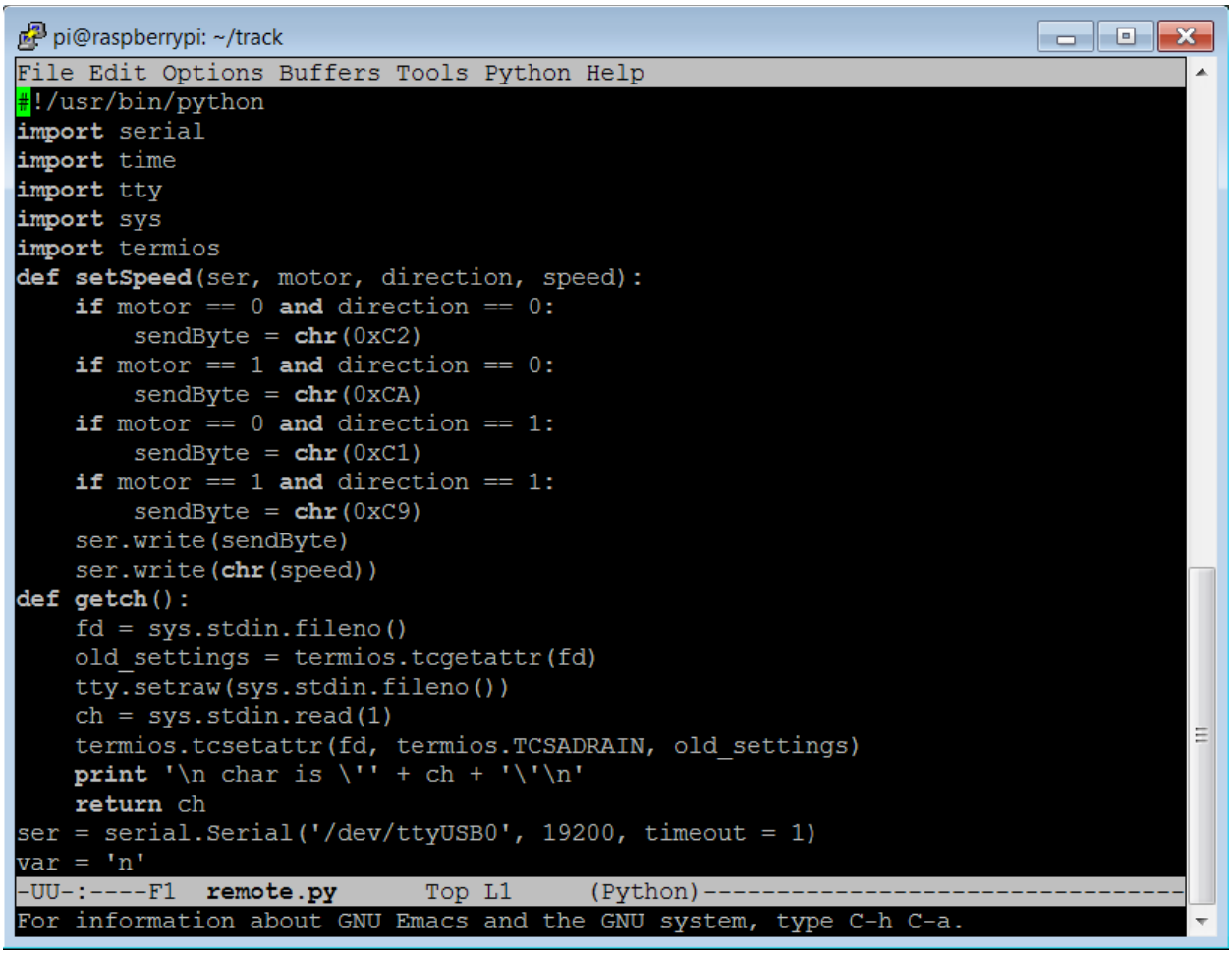
EDIMAX

adaptive modules

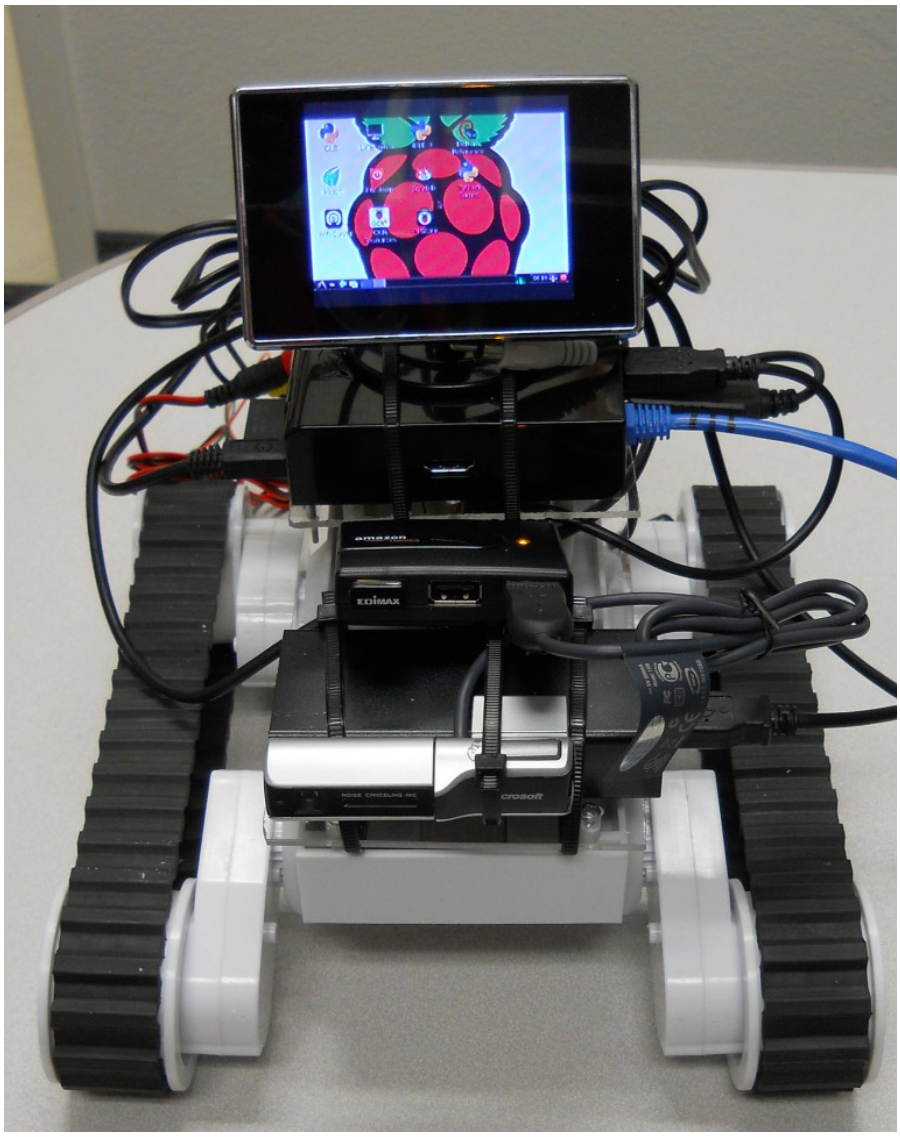

XBee

```
#!/usr/bin/python
import serial
import time
def setSpeed(ser, motor, direction, speed):
    if motor == 0 and direction == 0:
        sendByte = chr(0xC2)
    if motor == 1 and direction == 0:
        sendByte = chr(0xCA)
    if motor == 0 and direction == 1:
        sendByte = chr(0xC1)
    if motor == 1 and direction == 1:
        sendByte = chr(0xC9)
    ser.write(sendByte)
    ser.write(chr(speed))
ser = serial.Serial('/dev/ttyUSB0', 19200, timeout = 1)
var = 'n'
while var != 'q':
    var = raw_input(">")
    if var == '<':
        setSpeed(ser, 0, 0, 100)
        setSpeed(ser, 1, 0, 100)
        time.sleep(.5)
        setSpeed(ser, 0, 0, 0)
        setSpeed(ser, 1, 0, 0)
    if var == '>':
        setSpeed(ser, 0, 1, 100)
        setSpeed(ser, 1, 1, 100)
        time.sleep(.5)
        setSpeed(ser, 0, 0, 0)
        setSpeed(ser, 1, 0, 0)
    if var == 'f':
        setSpeed(ser, 0, 0, 100)
        setSpeed(ser, 1, 1, 100)
        time.sleep(.5)
        setSpeed(ser, 0, 0, 0)
        setSpeed(ser, 1, 0, 0)
    if var == 'r':
        setSpeed(ser, 0, 1, 100)
        setSpeed(ser, 1, 0, 100)
        time.sleep(.5)
        setSpeed(ser, 0, 0, 0)
        setSpeed(ser, 1, 0, 0)
ser.close()
-UU-:**--F1  remote.py      All L43    (Python)----------------------------------
```

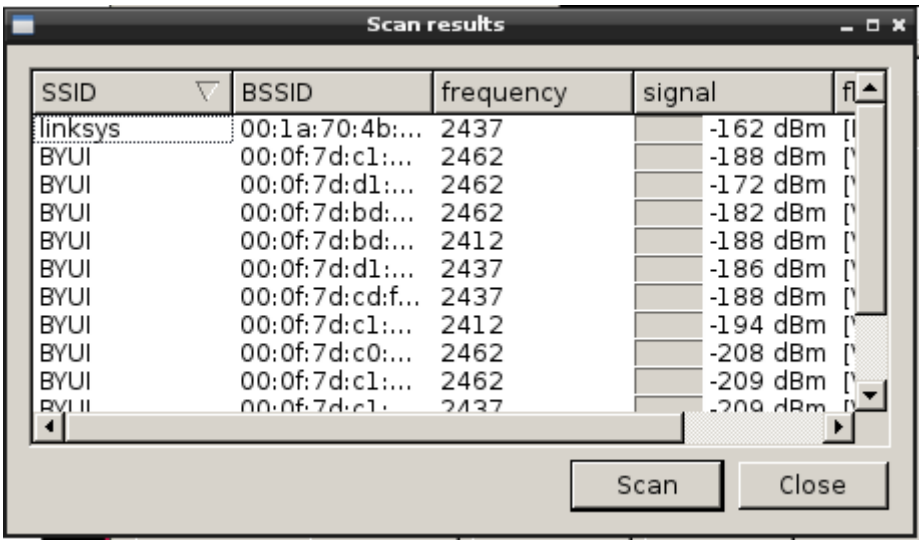

HausBell
OK

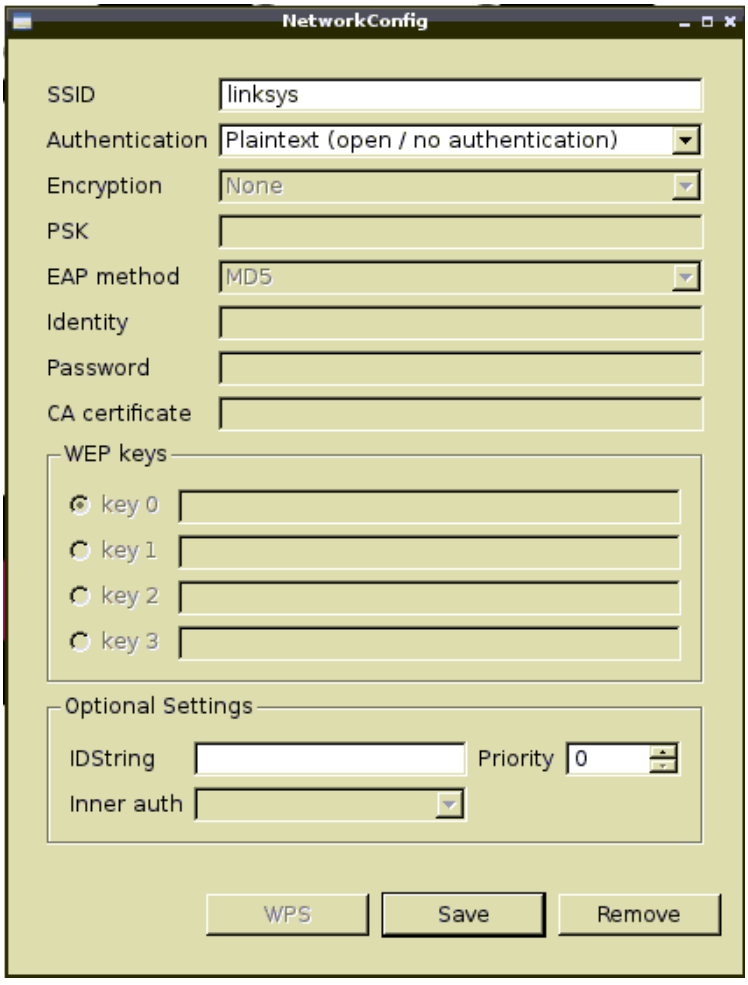

pi@raspberrypi: ~/track
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
import serial
import time
import tty
import sys
import termios
def setSpeed(ser, motor, direction, speed):
if motor == 0 and direction == 0:
sendByte = chr(0xC2)
if motor == 1 and direction == 0:
sendByte = chr(0xCA)
if motor == 0 and direction == 1:
sendByte = chr(0xC1)
if motor == 1 and direction == 1:
sendByte = chr(0xC9)
ser.write(sendByte)
ser.write(chr(speed))
def getch():
fd = sys.stdin.fileno()
old_settings = termios.tcgetattr(fd)
tty.setraw(sys.stdin.fileno())
ch = sys.stdin.read(1)
termios.tcsetattr(fd, termios.TCSADRAIN, old_settings)
print '\n char is \'' + ch + '\'\n'
return ch
ser = serial.Serial('/dev/ttyUSB0', 19200, timeout = 1)
var = 'n'
-UU-:----F1 remote.py Top L1 (Python)
For information about GNU Emacs and the GNU system, type C-h C-a.

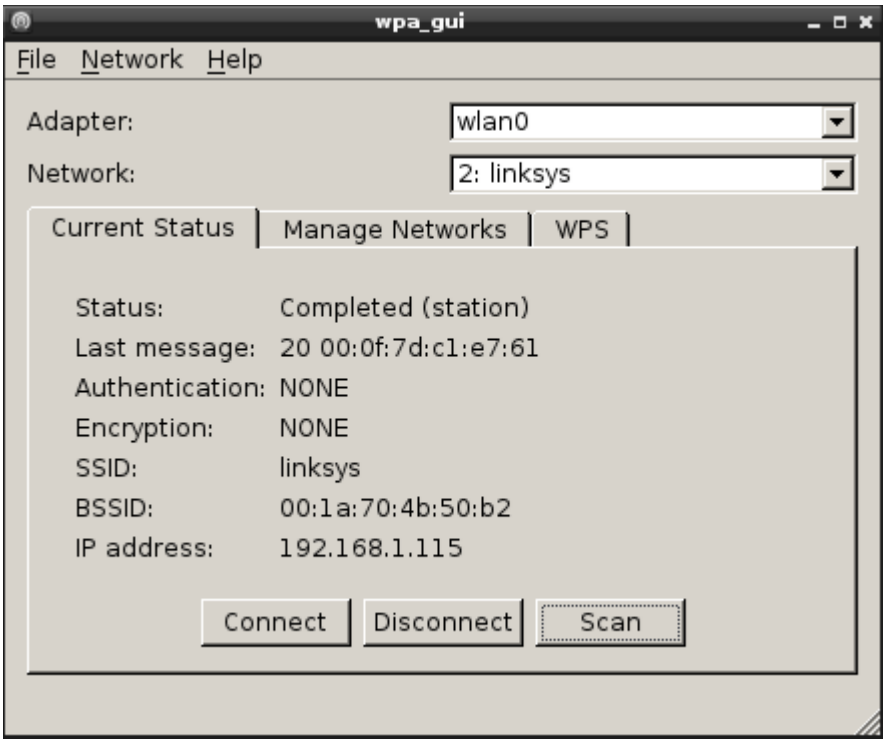
```
File Edit Options Buffers Tools Python Help
    ser.write(chr(speed))
def getch():
    fd = sys.stdin.fileno()
    old_settings = termios.tcgetattr(fd)
    tty.setraw(sys.stdin.fileno())
    ch = sys.stdin.read(1)
    termios.tcsetattr(fd, termios.TCSADRAIN, old_settings)
    print '\n char is \'' + ch + '\'\n'
    return ch
ser = serial.Serial('/dev/ttyUSB0', 19200, timeout = 1)
var = 'n'
print 'starting up'
while var != 'q':
    print 'getting character'
    var = getch()
    if var == '<':
        setSpeed(ser, 0, 0, 100)
        setSpeed(ser, 1, 0, 100)
        time.sleep(.5)
        setSpeed(ser, 0, 0, 0)
        setSpeed(ser, 1, 0, 0)
    if var == '>':
        setSpeed(ser, 0, 1, 100)
        setSpeed(ser, 1, 1, 100)
        time.sleep(.5)
        setSpeed(ser, 0, 0, 0)
        setSpeed(ser, 1, 0, 0)
    if var == 'f':
        setSpeed(ser, 0, 0, 100)
        setSpeed(ser, 1, 1, 100)
        time.sleep(.5)
        setSpeed(ser, 0, 0, 0)
        setSpeed(ser, 1, 0, 0)
    if var == 'r':
        setSpeed(ser, 0, 1, 100)
        setSpeed(ser, 1, 0, 100)
        time.sleep(.5)
        setSpeed(ser, 0, 0, 0)
        setSpeed(ser, 1, 0, 0)
ser.close()

-UU-:----F1  remote.py      Bot L27    (Python)----------------------------------
```

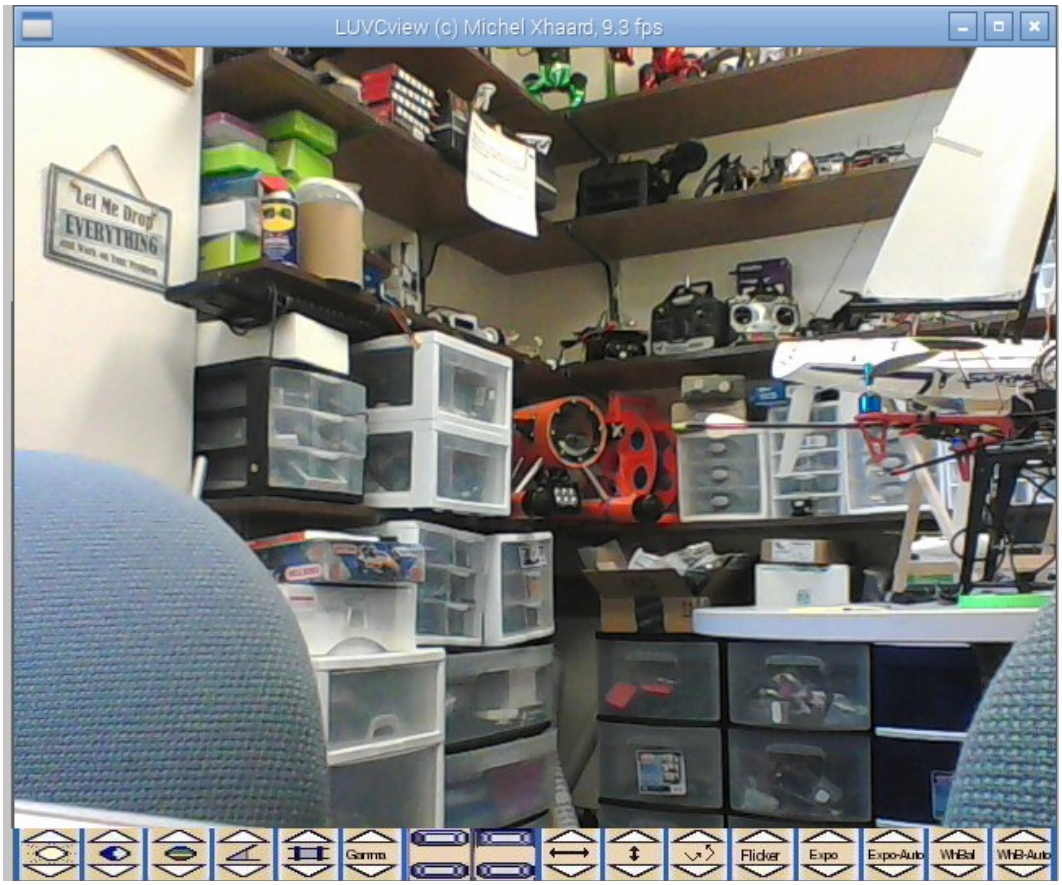

amazon
EDIMAX

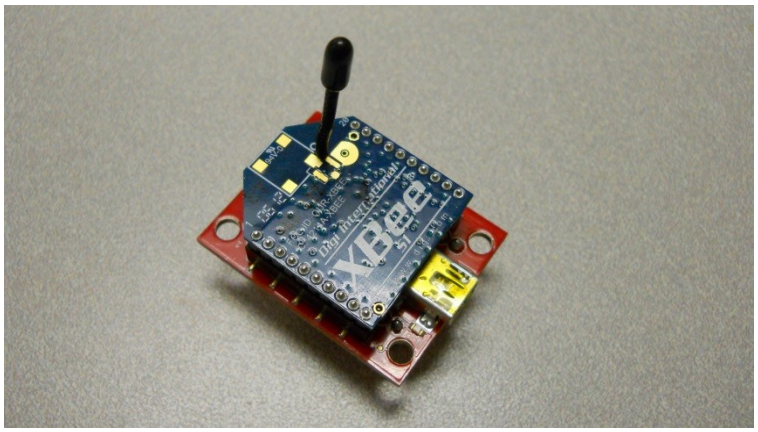
LINKSYS


Scan results
SSID
BSSID
frequency
signal
linksys 00:1a:70:4b:... 2437 -162 dBm
BYUI 00:0f:7d:c1:... 2462 -188 dBm
BYUI 00:0f:7d:d1:... 2462 -172 dBm
BYUI 00:0f:7d:bd:... 2462 -182 dBm
BYUI 00:0f:7d:bd:... 2412 -188 dBm
BYUI 00:0f:7d:d1:... 2437 -186 dBm
BYUI 00:0f:7d:cd:f... 2437 -188 dBm
BYUI 00:0f:7d:c1:... 2412 -194 dBm
BYUI 00:0f:7d:c0:... 2462 -208 dBm
BYUI 00:0f:7d:c1:... 2462 -209 dBm
Scan
Close

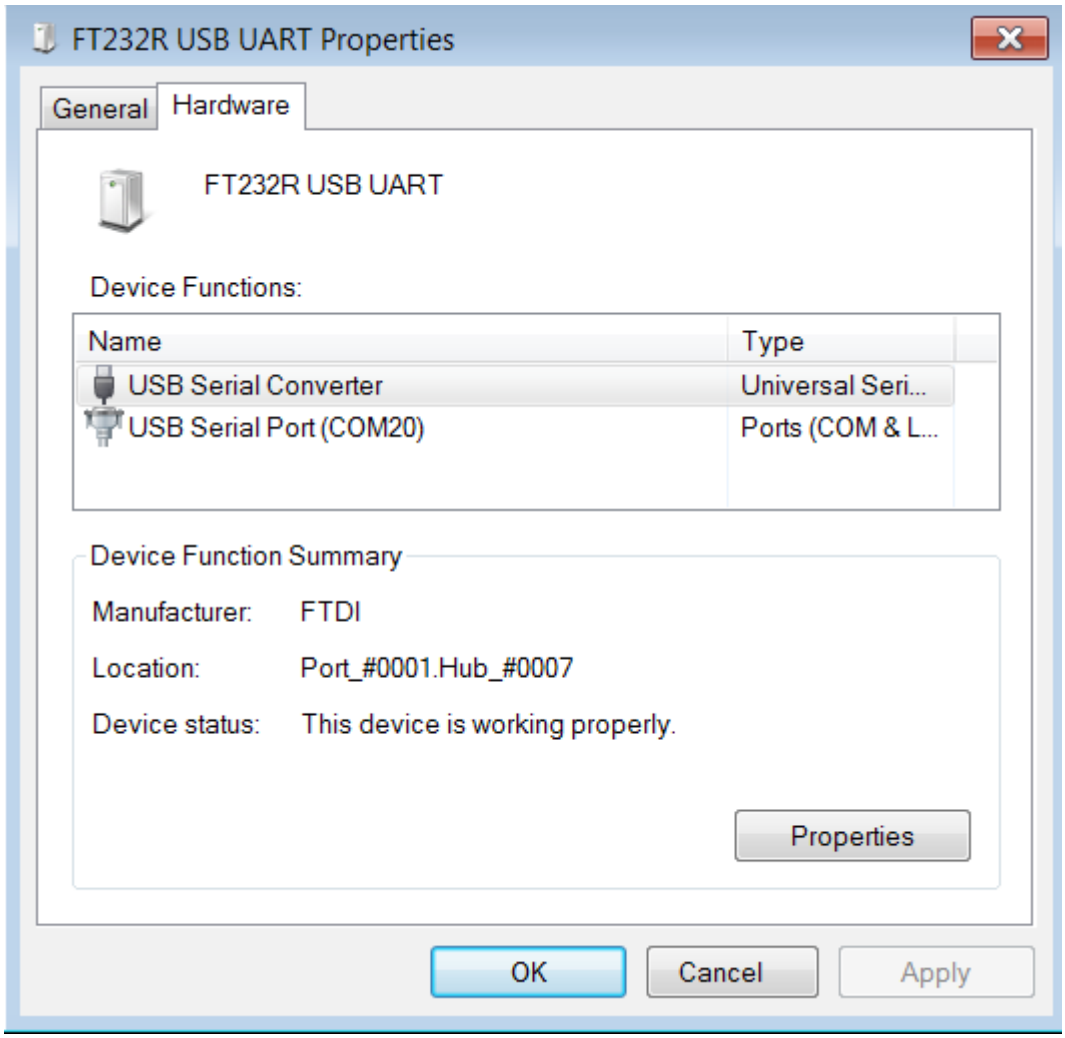

NetworkConfig
SSID
linksys
Authentication
Plaintext (open / no authentication)
Encryption
None
PSK
EAP method
MD5
Identity
Password
CA certificate
WEP keys
key 0
key 1
key 2
key 3
Optional Settings
IDString
Priority
0
Inner auth
WPS
Save
Remove

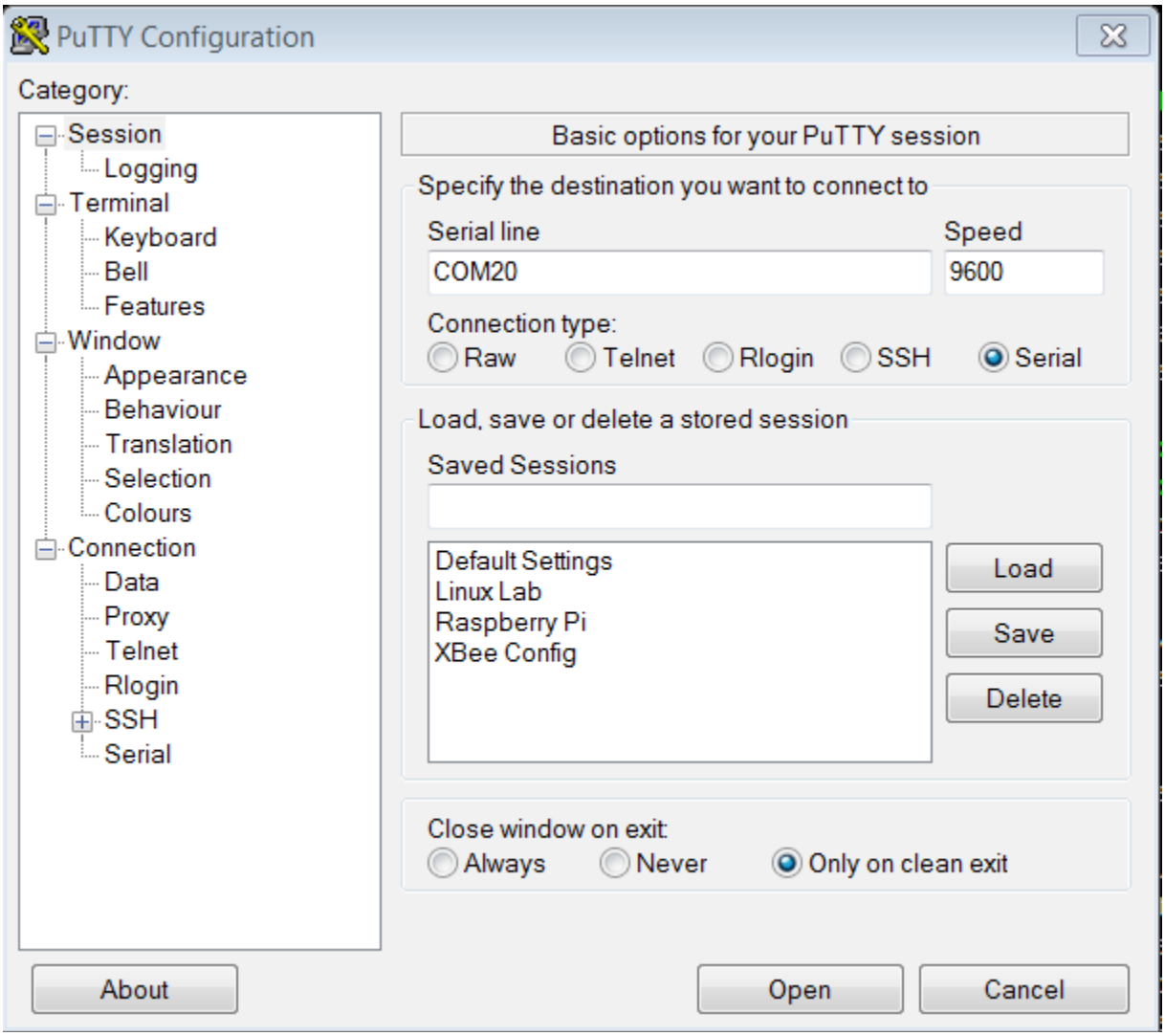

wpa_gui
File Network Help
Adapter: wlan0
Network: 2: linksys
Current Status
Manage Networks
WPS
Status: Completed (station)
Last message: 20 00:0f:7d:c1:e7:61
Authentication: NONE
Encryption: NONE
SSID: linksys
BSSID: 00:1a:70:4b:50:b2
IP address: 192.168.1.115
Connect
Disconnect
Scan

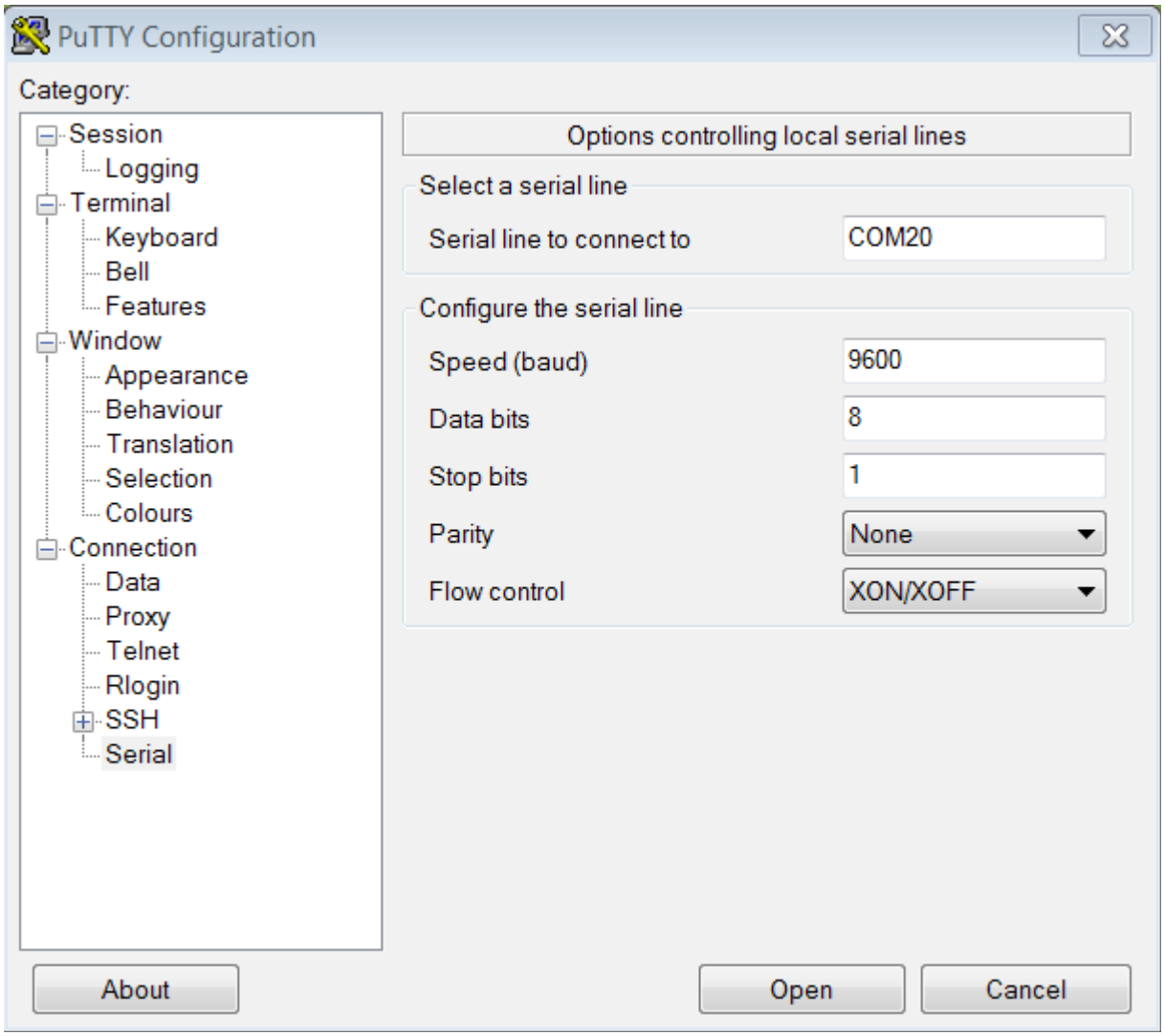

LUVCview (c) Michel Xhaard, 9.3 fps
Let Me Drop EVERYTHING
Gamma
Flicker
Expo
Expo-Auto
WhBal
WhB-Auto

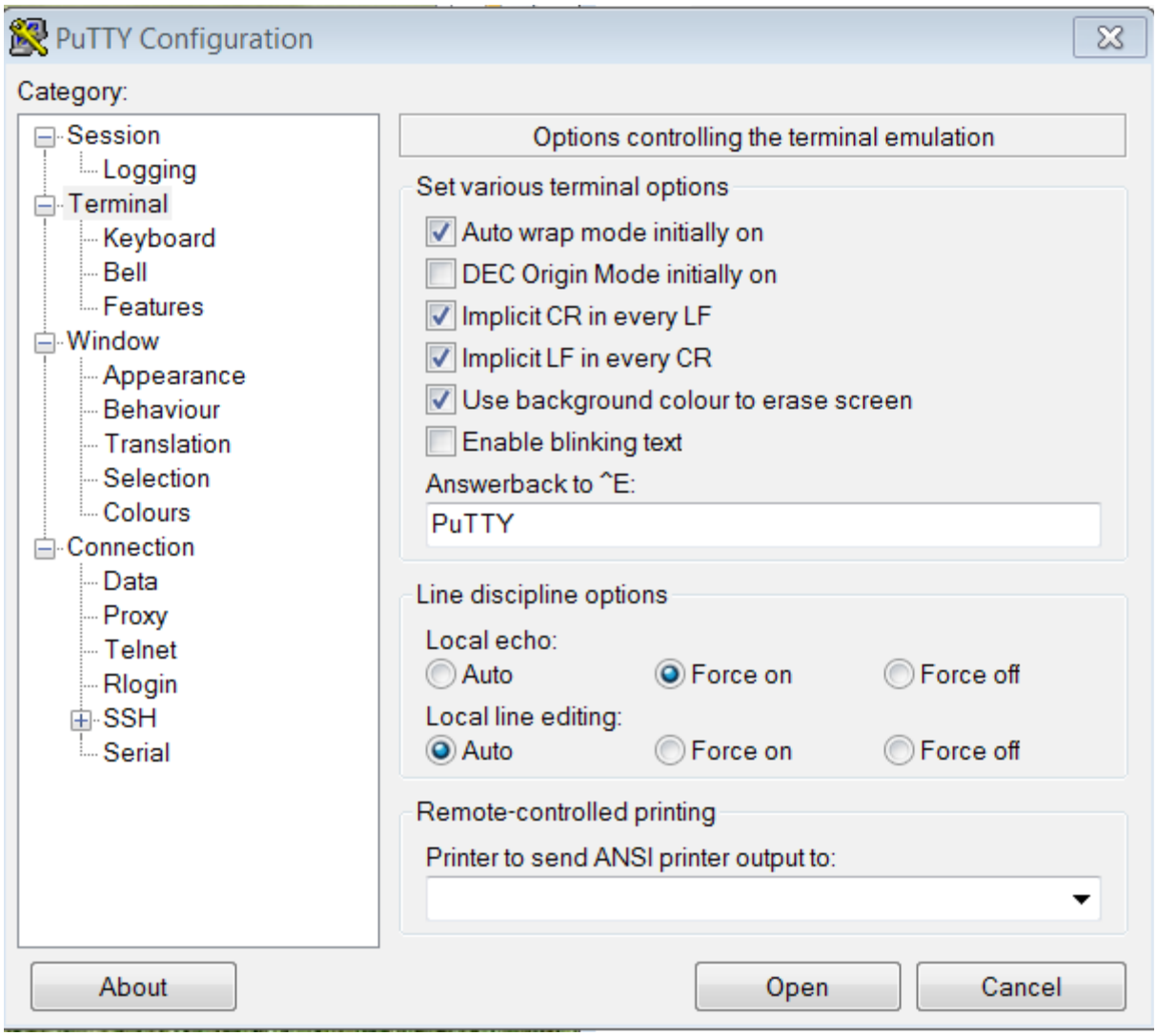

XBee

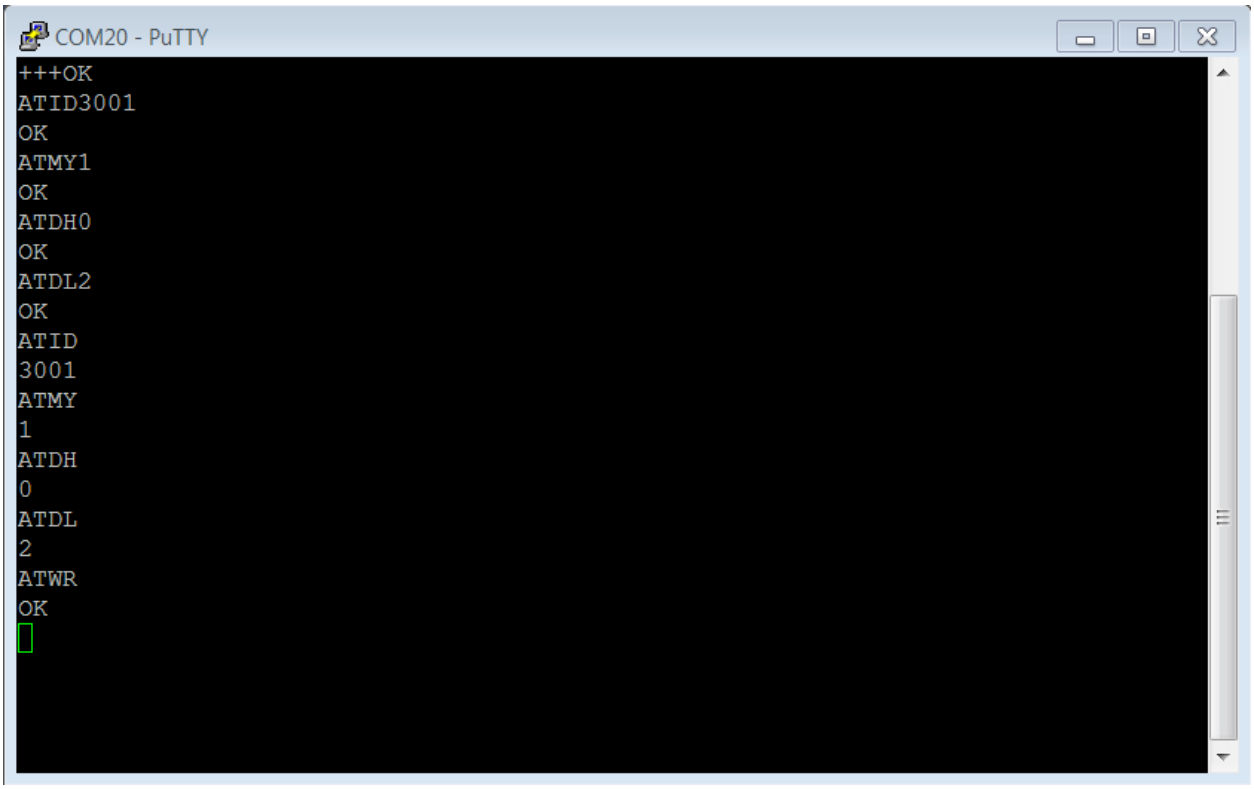
Unspecified (1)
FT232R USB
UART
10 items

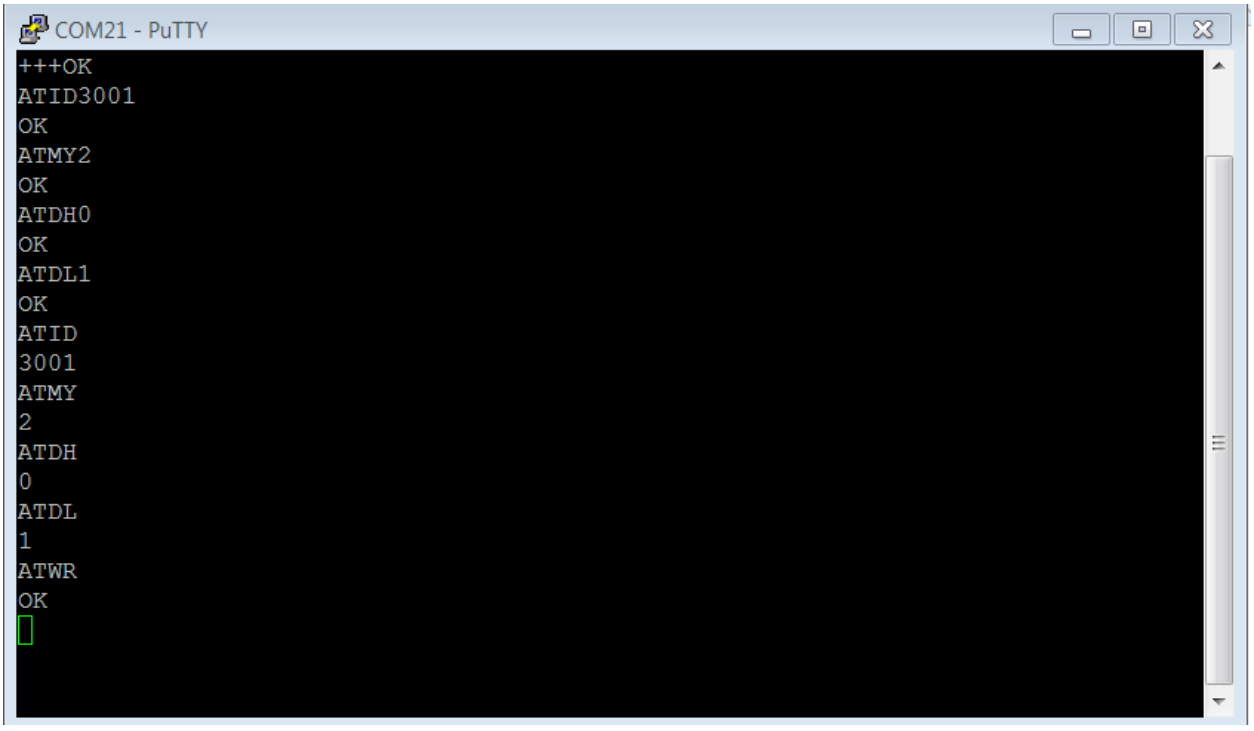

FT232R USB UART Properties
General
Hardware
FT232R USB UART
Device Functions:
Name
Type
USB Serial Converter
Universal Seri...
USB Serial Port (COM20)
Ports (COM & L...
Device Function Summary
Manufacturer:
FTDI
Location:
Port_#0001.Hub_#0007
Device status:
This device is working properly.
Properties
OK
Cancel
Apply

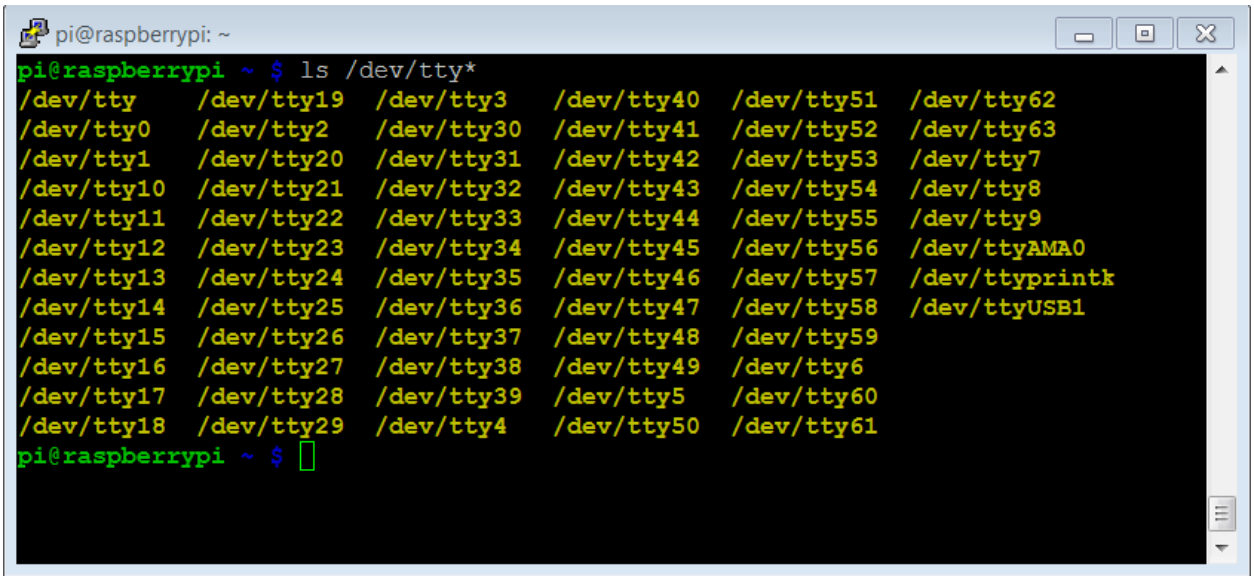

PuTTY Configuration
Category:
Session
Logging
Terminal
Keyboard
Bell
Features
Window
Appearance
Behaviour
Translation
Selection
Colours
Connection
Data
Proxy
Telnet
Rlogin
SSH
Serial
Basic options for your PuTTY session
Specify the destination you want to connect to
Serial line
Speed
COM20
9600
Connection type:
Raw
Telnet
Rlogin
SSH
Serial
Load, save or delete a stored session
Saved Sessions
Default Settings
Linux Lab
Raspberry Pi
XBee Config
Load
Save
Delete
Close window on exit:
Always
Never
Only on clean exit
About
Open
Cancel

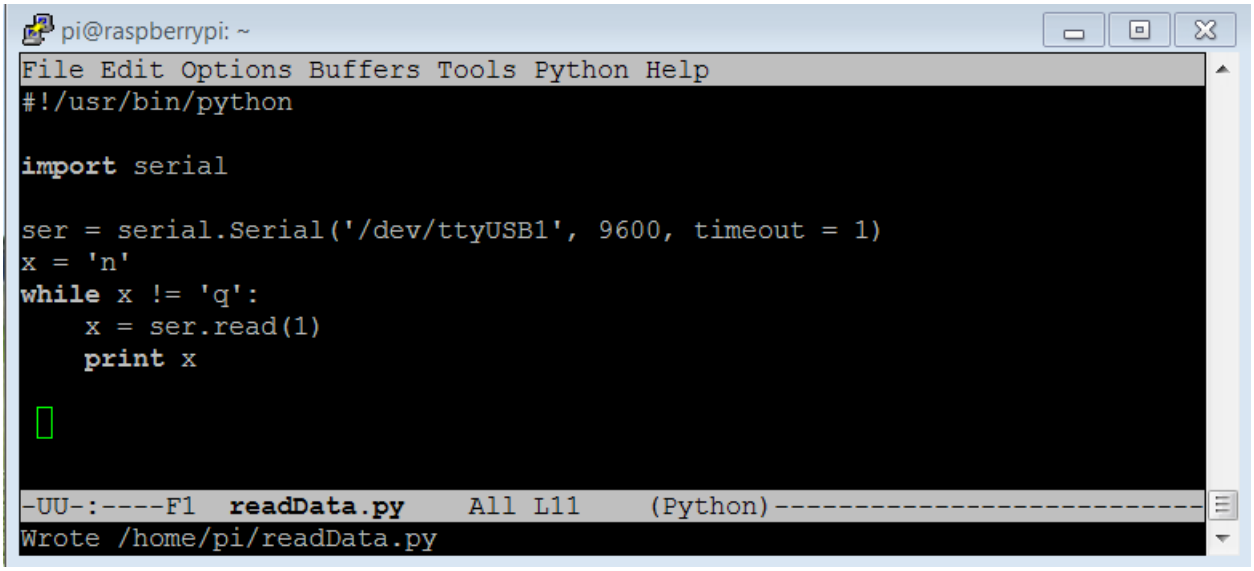

PuTTY Configuration
Category:
Session
Logging
Terminal
Keyboard
Bell
Features
Window
Appearance
Behaviour
Translation
Selection
Colours
Connection
Data
Proxy
Telnet
Rlogin
SSH
Serial
Options controlling local serial lines
Select a serial line
Serial line to connect to
COM20
Configure the serial line
Speed (baud)
9600
Data bits
8
Stop bits
1
Parity
None
Flow control
XON/XOFF
About
Open
Cancel

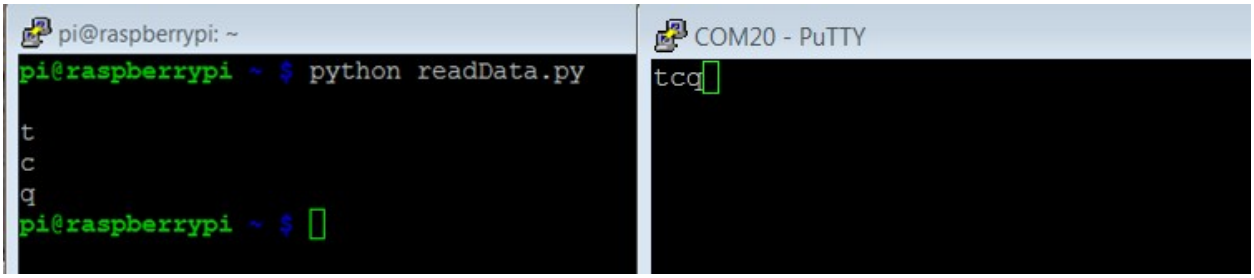

PuTTY Configuration
Category:
Session
Logging
Terminal
Keyboard
Bell
Features
Window
Appearance
Behaviour
Translation
Selection
Colours
Connection
Data
Proxy
Telnet
Rlogin
SSH
Serial
Options controlling the terminal emulation
Set various terminal options
Auto wrap mode initially on
DEC Origin Mode initially on
Implicit CR in every LF
Implicit LF in every CR
Use background colour to erase screen
Enable blinking text
Answerback to ^E:
PuTTY
Line discipline options
Local echo:
Auto
Force on
Force off
Local line editing:
Auto
Force on
Force off
Remote-controlled printing
Printer to send ANSI printer output to:
About
Open
Cancel


COM20 - PuTTY
+++OK
ATID3001
OK
ATMY1
OK
ATDH0
OK
ATDL2
OK
ATID
3001
ATMY
1
ATDH
0
ATDL
2
ATWR
OK


COM21 - PuTTY
+++OK
ATID3001
OK
ATMY2
OK
ATDH0
OK
ATDL1
OK
ATID
3001
ATMY
2
ATDH
0
ATDL
1
ATWR
OK


pi@raspberrypi: ~
pi@raspberrypi ~ $ ls /dev/tty*
/dev/tty /dev/tty19 /dev/tty3 /dev/tty40 /dev/tty51 /dev/tty62
/dev/tty0 /dev/tty2 /dev/tty30 /dev/tty41 /dev/tty52 /dev/tty63
/dev/tty1 /dev/tty20 /dev/tty31 /dev/tty42 /dev/tty53 /dev/tty7
/dev/tty10 /dev/tty21 /dev/tty32 /dev/tty43 /dev/tty54 /dev/tty8
/dev/tty11 /dev/tty22 /dev/tty33 /dev/tty44 /dev/tty55 /dev/tty9
/dev/tty12 /dev/tty23 /dev/tty34 /dev/tty45 /dev/tty56 /dev/ttyAMA0
/dev/tty13 /dev/tty24 /dev/tty35 /dev/tty46 /dev/tty57 /dev/ttyprintk
/dev/tty14 /dev/tty25 /dev/tty36 /dev/tty47 /dev/tty58 /dev/ttyUSB1
/dev/tty15 /dev/tty26 /dev/tty37 /dev/tty48 /dev/tty59
/dev/tty16 /dev/tty27 /dev/tty38 /dev/tty49 /dev/tty6
/dev/tty17 /dev/tty28 /dev/tty39 /dev/tty5 /dev/tty60
/dev/tty18 /dev/tty29 /dev/tty4 /dev/tty50 /dev/tty61
pi@raspberrypi ~ $

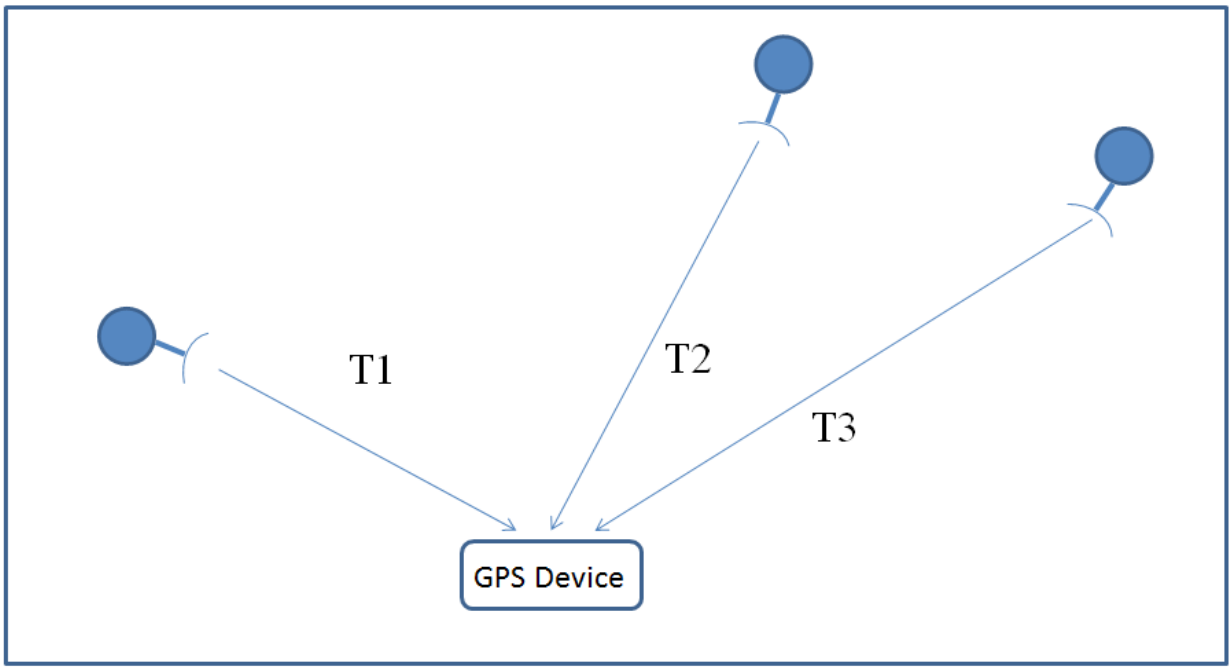

pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
import serial
ser = serial.Serial('/dev/ttyUSB1', 9600, timeout = 1)
x = 'n'
while x != 'q':
x = ser.read(1)
print x
-UU-:----F1 readData.py All L11 (Python)----------
Wrote /home/pi/readData.py

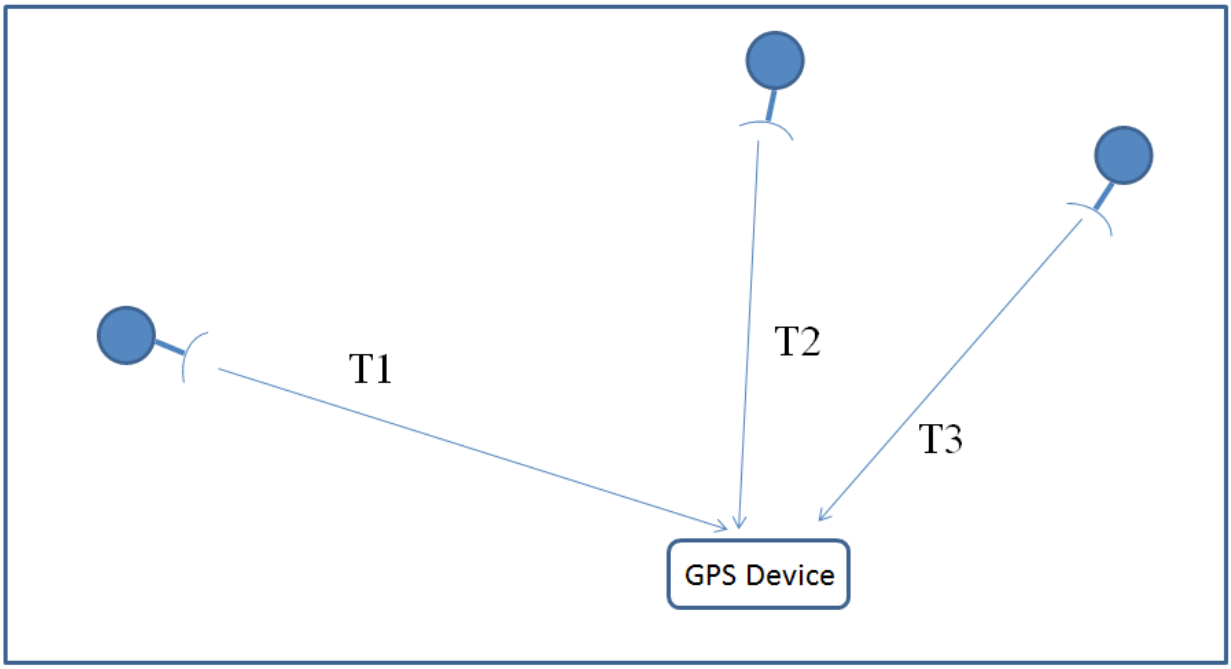

pi@raspberrypi: ~
pi@raspberrypi ~ $ python readData.py
t
c
q
pi@raspberrypi ~ $
COM20 - PuTTY
tcq

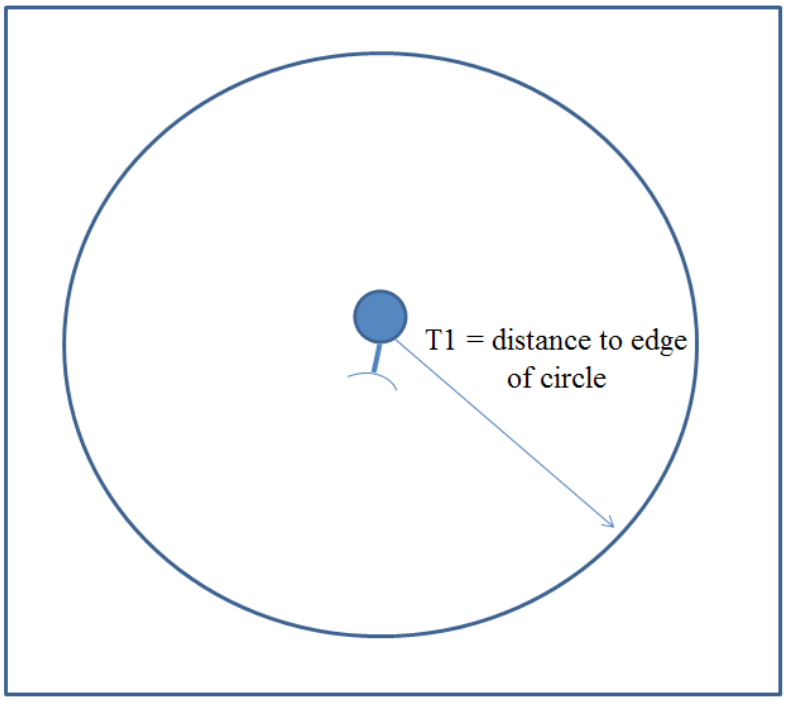
pi@raspberrypi: ~/track

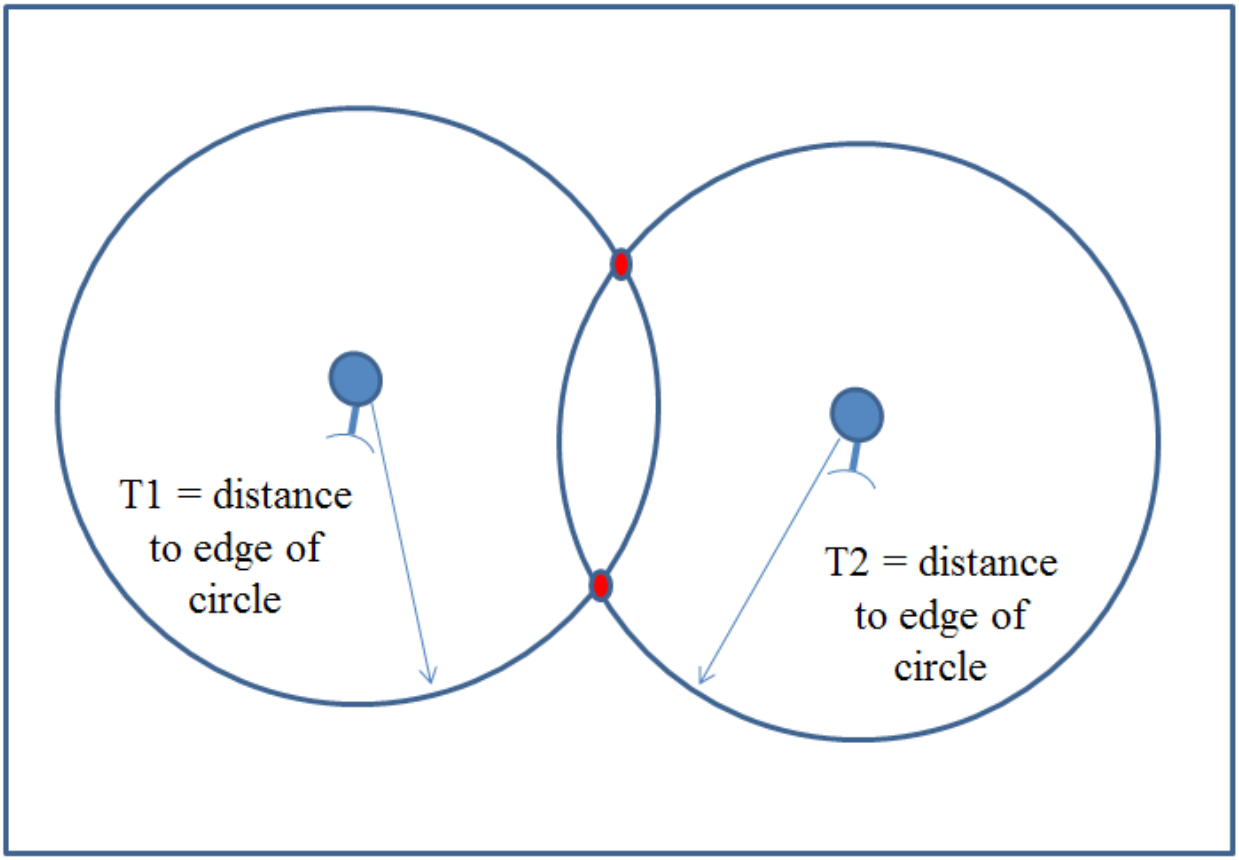
```
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
import serial, time
def setSpeed(ser, motor, direction, speed):
    if motor == 0 and direction == 0:
        sendByte = chr(0xC2)
    if motor == 1 and direction == 0:
        sendByte = chr(0xCA)
    if motor == 0 and direction == 1:
        sendByte = chr(0xC1)
    if motor == 1 and direction == 1:
        sendByte = chr(0xC9)
    ser.write(sendByte)
    ser.write(chr(speed))
serInput = serial.Serial('/dev/ttyUSB0', 9600, timeout = 1)
ser = serial.Serial('/dev/ttyUSB1', 19200, timeout = 1)
var = 'n'
while var != 'q':
    var = serInput.read(1)
    if var == '<':
        setSpeed(ser, 0, 0, 100)
        setSpeed(ser, 1, 0, 100)
        time.sleep(.5)
        setSpeed(ser, 0, 0, 0)
        setSpeed(ser, 1, 0, 0)
    if var == '>':
        setSpeed(ser, 0, 1, 100)
        setSpeed(ser, 1, 1, 100)
        time.sleep(.5)
        setSpeed(ser, 0, 0, 0)
        setSpeed(ser, 1, 0, 0)
    if var == 'f':
        setSpeed(ser, 0, 0, 100)
        setSpeed(ser, 1, 1, 100)
        time.sleep(.5)
        setSpeed(ser, 0, 0, 0)
        setSpeed(ser, 1, 0, 0)
    if var == 'r':
        setSpeed(ser, 0, 1, 100)
        setSpeed(ser, 1, 0, 100)
        time.sleep(.5)
        setSpeed(ser, 0, 0, 0)
        setSpeed(ser, 1, 0, 0)
ser.close()
serInput.close()
-UU-:----F1  xbee.py        All L13     (Python)----------------------------------
Wrote /home/pi/track/xbee.py
```

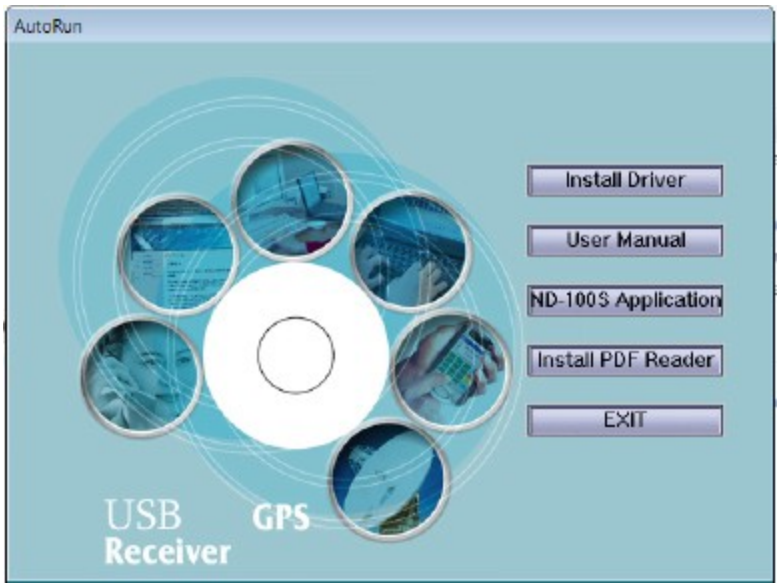
Chapter 9: Using a GPS Receiver to Locate Your Robot


T1
T2
T3
GPS Device

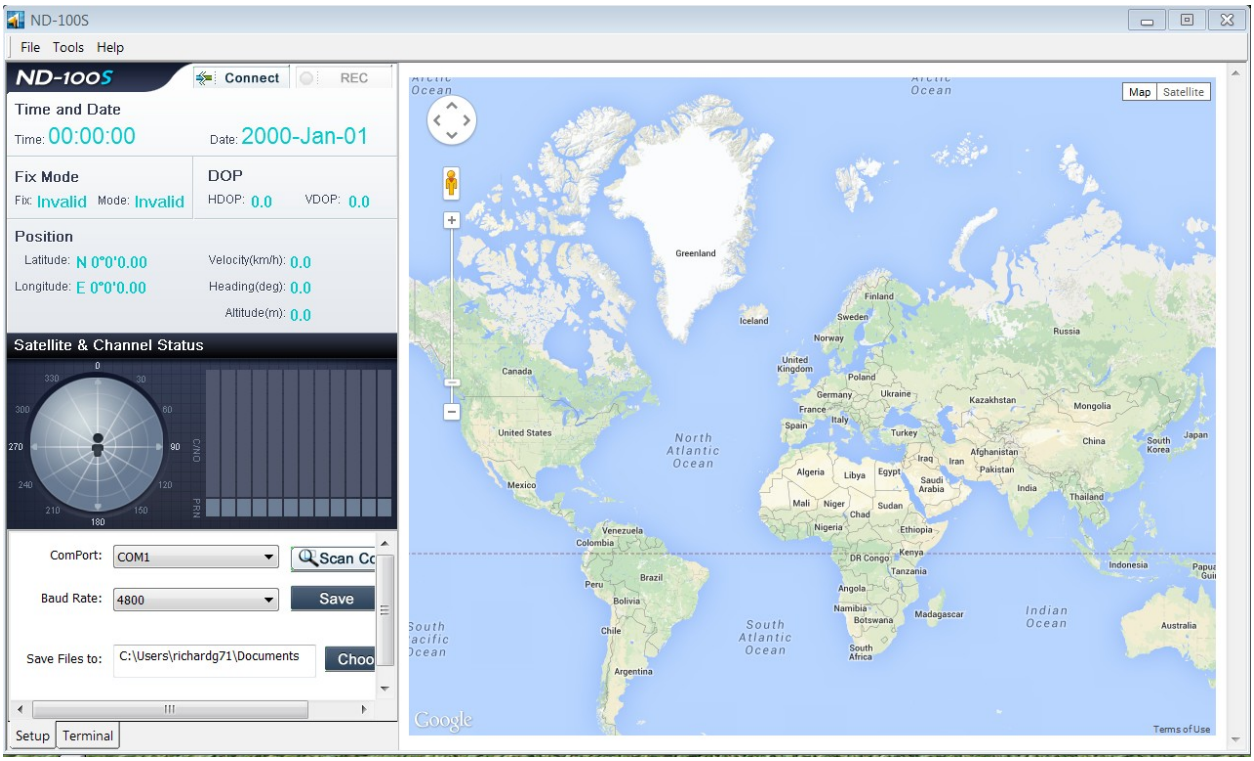

T1
T2
T3
GPS Device

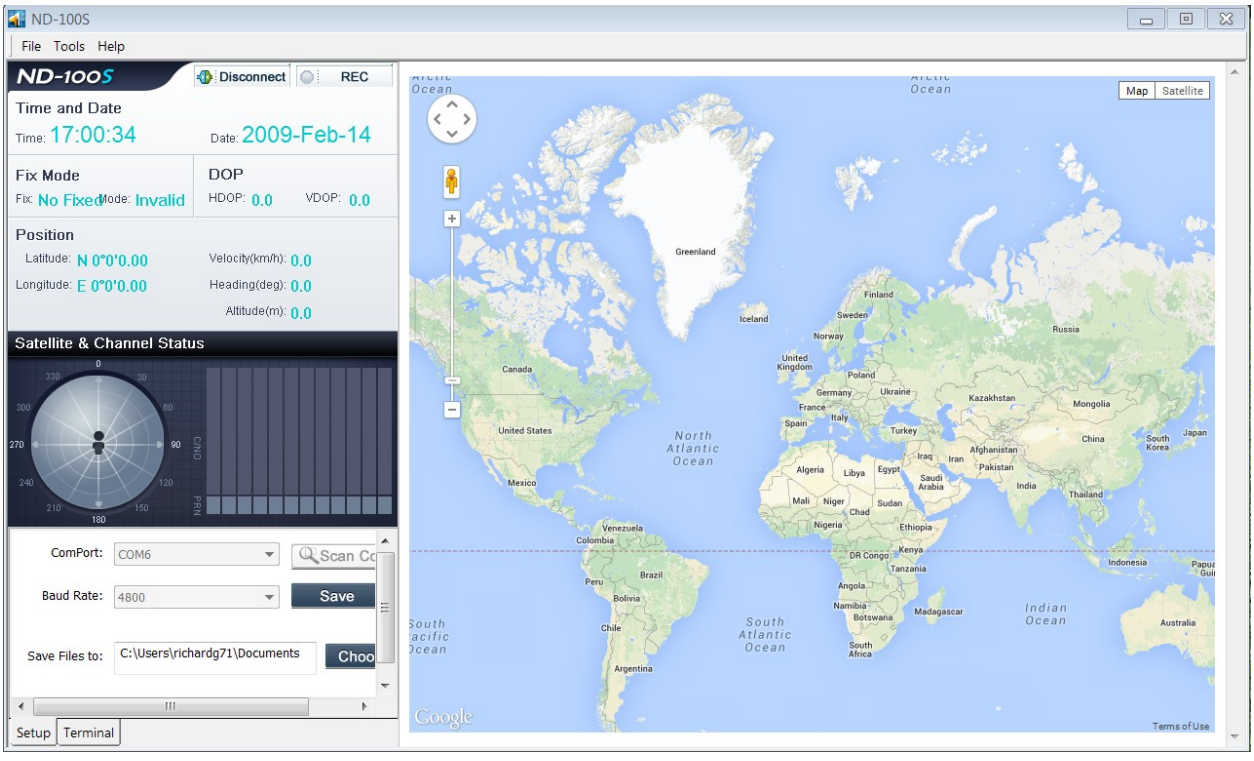

T1 = distance to edge of circle

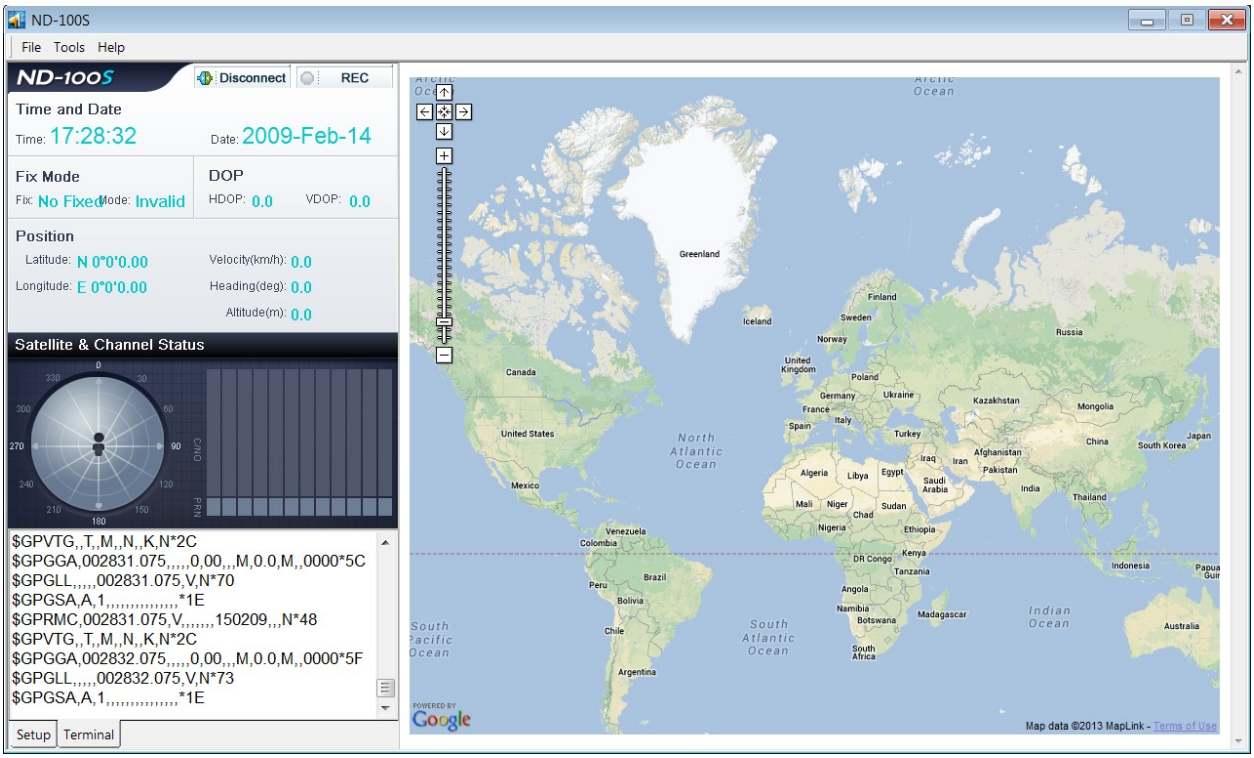

T1 = distance to edge of circle
T2 = distance to edge of circle

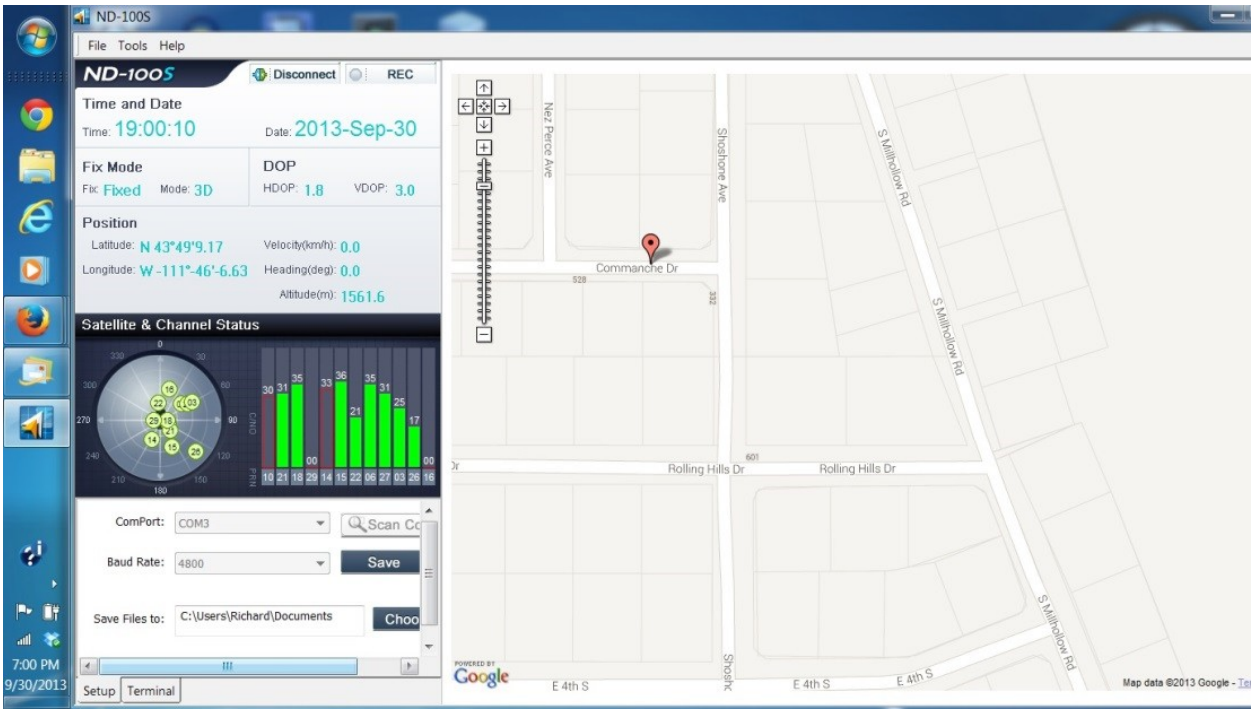

AutoRun
Install Driver
User Manual
ND-100S Application
Install PDF Reader
EXIT
USB GPS
Receiver

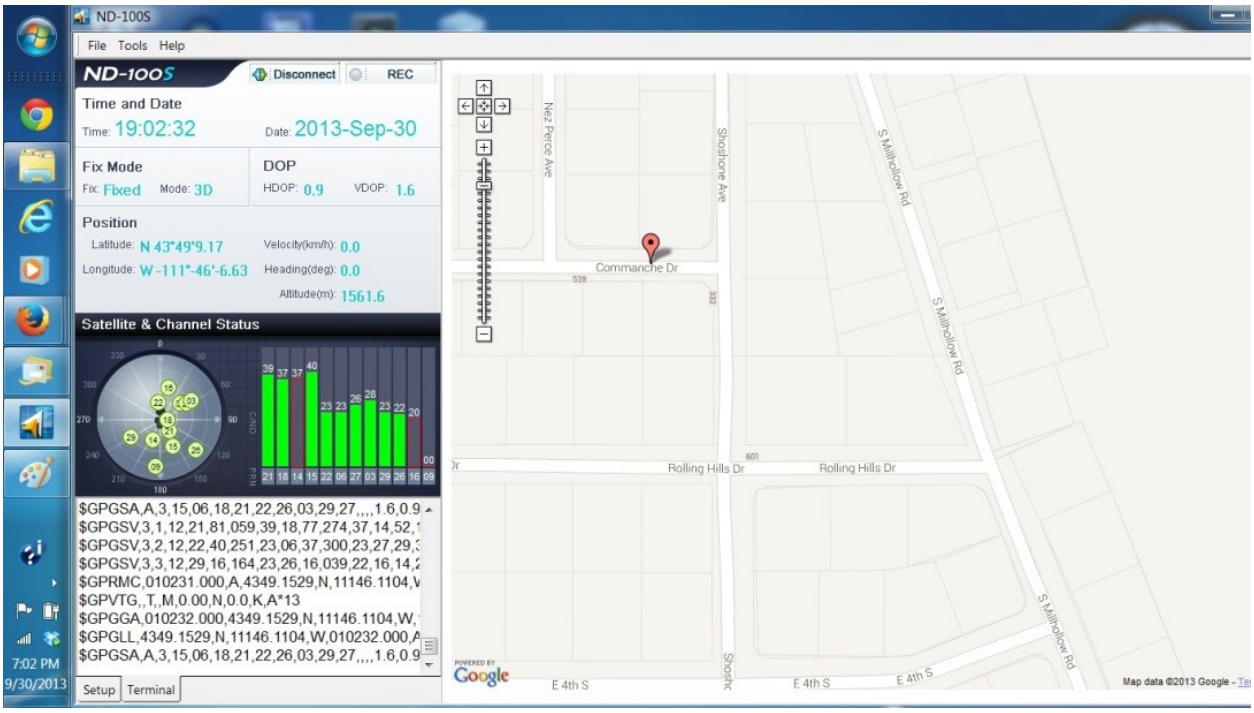
Unspecified (1)
Prolific USB-to-Serial Comm Port (COM6)
Prolific USB-to-Serial Comm Port (COM...
Model: USB-Serial Controller D
Category: Unknown

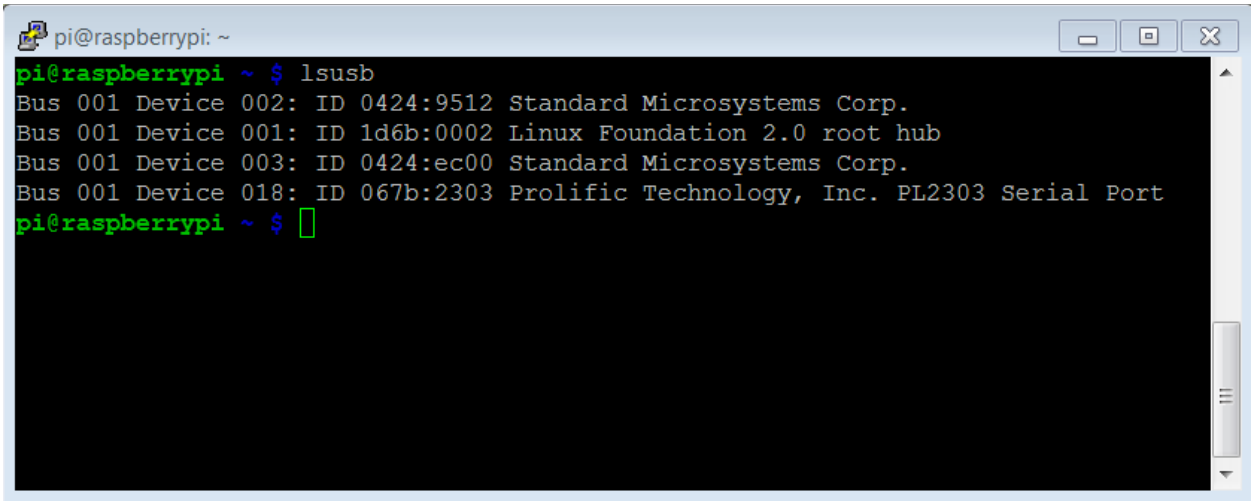

ND-100S
File Tools Help
ND-100S
Connect
REC
Time and Date
Time: 00:00:00
Date: 2000-Jan-01
Fix Mode
Fix: Invalid Mode: Invalid
DOP
HDOP: 0.0 VDOP: 0.0
Position
Latitude: N 0°0'0.00
Longitude: E 0°0'0.00
Velocity(km/h): 0.0
Heading(deg): 0.0
Altitude(m): 0.0
Satellite & Channel Status
C/NO
PRN
ComPort: COM1
Scan Co
Baud Rate: 4800
Save
Save Files to: C:\Users\richardg71\Documents
Choo
Setup
Terminal
Map
Satellite
Google
Terms of Use

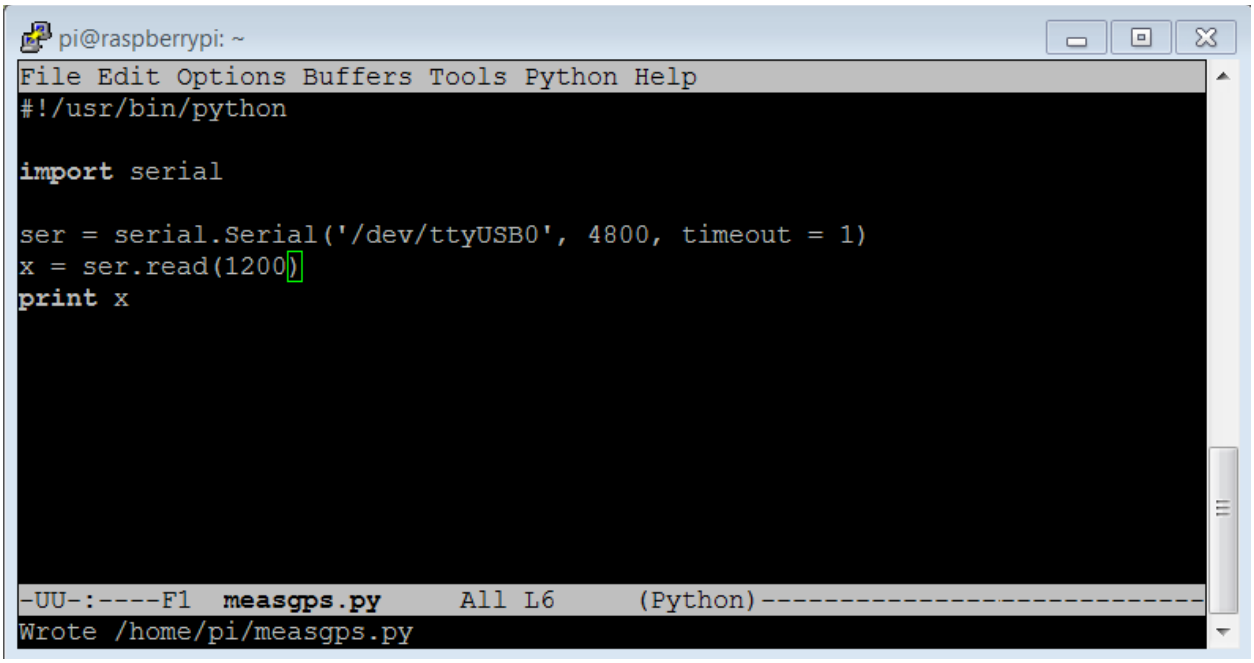

ND-100S
File Tools Help
ND-100S
Disconnect
REC
Time and Date
Time: 17:00:34
Date: 2009-Feb-14
Fix Mode
Fix: No Fixed Mode: Invalid
DOP
HDOP: 0.0 VDOP: 0.0
Position
Latitude: N 0°0'0.00
Longitude: E 0°0'0.00
Velocity(km/h): 0.0
Heading(deg): 0.0
Altitude(m): 0.0
Satellite & Channel Status
C/NO
PRN
ComPort: COM6
Scan Co
Baud Rate: 4800
Save
Save Files to: C:\Users\richardg71\Documents
Choo
Setup
Terminal
Map
Satellite
Google
Terms of Use

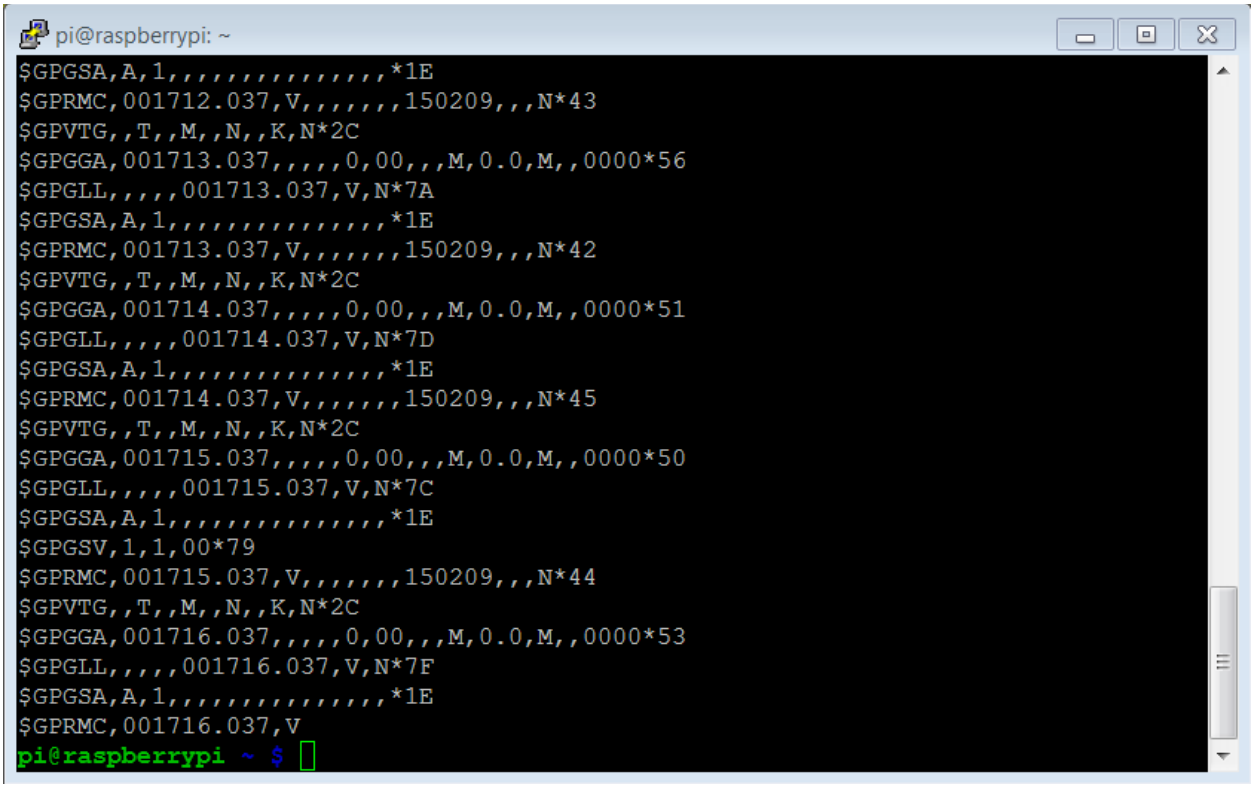

ND-100S
File Tools Help
ND-100S
Disconnect
REC
Time and Date
Time: 17:28:32
Date: 2009-Feb-14
Fix Mode
Fix: No Fixed
Mode: Invalid
DOP
HDOP: 0.0
VDOP: 0.0
Position
Latitude: N 0°0'0.00
Longitude: E 0°0'0.00
Velocity(km/h): 0.0
Heading(deg): 0.0
Altitude(m): 0.0
Satellite & Channel Status
$GPVTG,,T,,M,,N,,K,N*2C
$GPGGA,002831.075,,,,,,0,00,,,M,0.0,M,,0000*5C
$GPGLL,,,,,,002831.075,V,N*70
$GPGSA,A,1,,,,,,,,,,,,,,,*1E
$GPRMC,002831.075,V,,,,,,,150209,,,N*48
$GPVTG,,T,,M,,N,,K,N*2C
$GPGGA,002832.075,,,,,,0,00,,,M,0.0,M,,0000*5F
$GPGLL,,,,,,002832.075,V,N*73
$GPGSA,A,1,,,,,,,,,,,,,,,*1E
Setup
Terminal
Map data ©2013 MapLink - Terms of Use

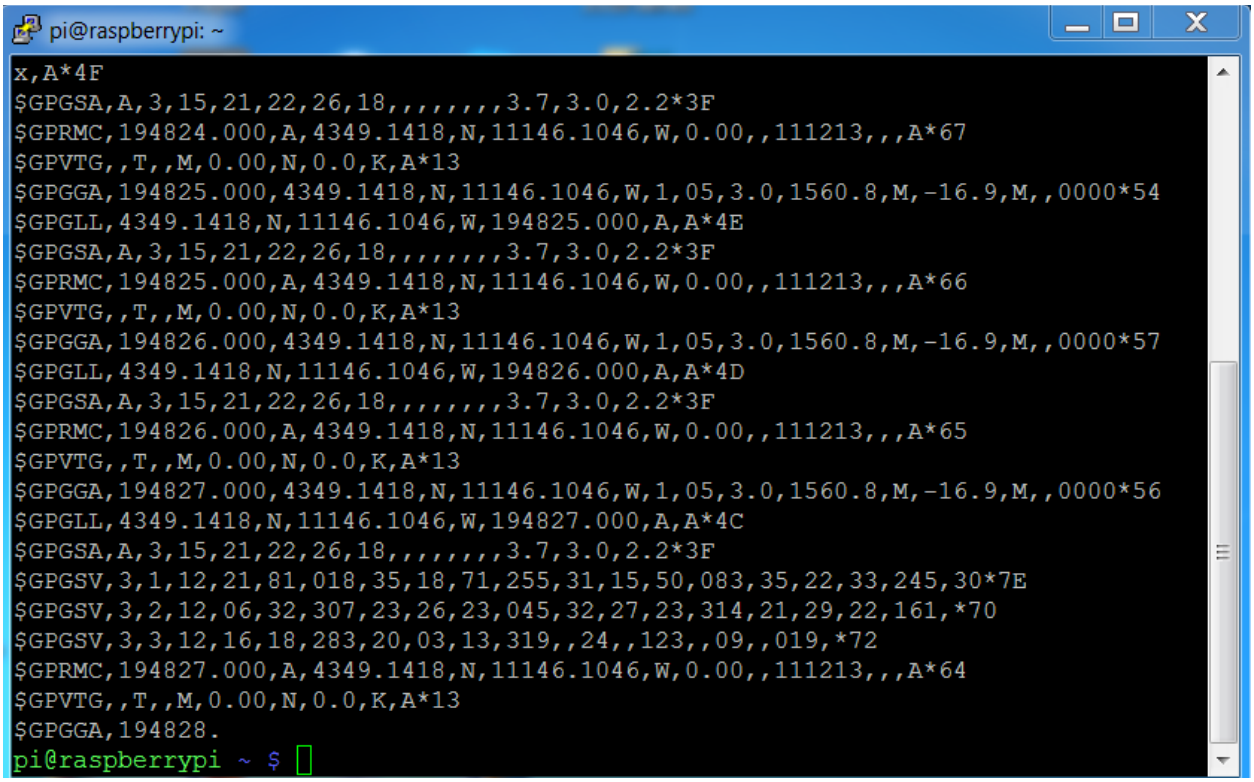

ND-100S
File Tools Help
ND-100S
Disconnect
REC
Time and Date
Time: 19:00:10
Date: 2013-Sep-30
Fix Mode
Fix: Fixed
Mode: 3D
DOP
HDOP: 1.8
VDOP: 3.0
Position
Latitude: N 43°49'9.17
Longitude: W -111°-46'-6.63
Velocity(km/h): 0.0
Heading(deg): 0.0
Altitude(m): 1561.6
Satellite & Channel Status
ComPort: COM3
Baud Rate: 4800
Save
Save Files to: C:\Users\Richard\Documents
Setup
Terminal
7:00 PM
9/30/2013
Commanche Dr
Rolling Hills Dr
Shoshone Ave
Nez Perce Ave
S Millhollow Rd
E 4th S
Map data ©2013 Google

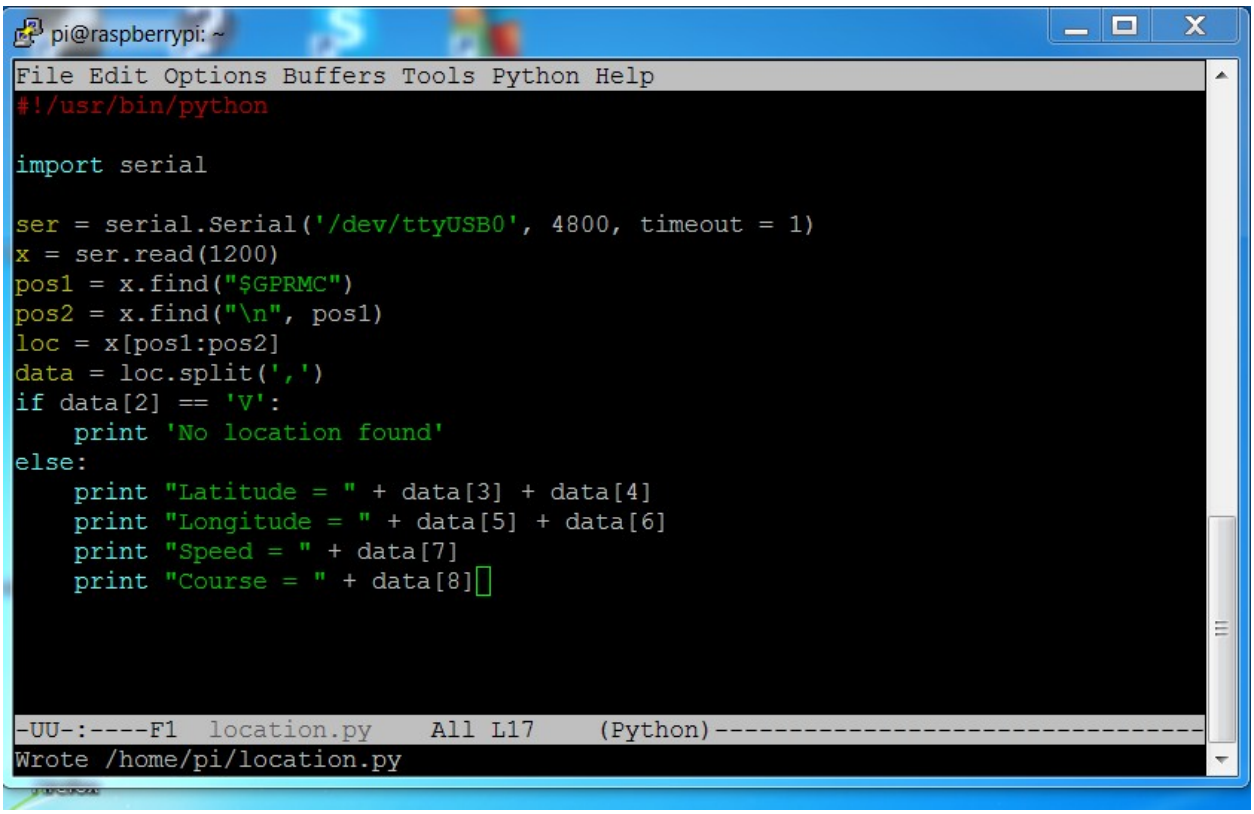

ND-100S
File Tools Help
ND-100S
Disconnect
REC
Time and Date
Time: 19:02:32
Date: 2013-Sep-30
Fix Mode
Fix: Fixed
Mode: 3D
DOP
HDOP: 0.9
VDOP: 1.6
Position
Latitude: N 43°49'9.17
Longitude: W -111°-46'-6.63
Velocity(km/h): 0.0
Heading(deg): 0.0
Altitude(m): 1561.6
Satellite & Channel Status
$GPGSA,A,3,15,06,18,21,22,26,03,29,27,,,,1.6,0.9
$GPGSV,3,1,12,21,81,059,39,18,77,274,37,14,52,1
$GPGSV,3,2,12,22,40,251,23,06,37,300,23,27,29,3
$GPGSV,3,3,12,29,16,164,23,26,16,039,22,16,14,2
$GPRMC,010231.000,A,4349.1529,N,11146.1104,W
$GPVTG,,T,,M,0.00,N,0.0,K,A*13
$GPGGA,010232.000,4349.1529,N,11146.1104,W,
$GPGLL,4349.1529,N,11146.1104,W,010232.000,A
$GPGSA,A,3,15,06,18,21,22,26,03,29,27,,,,1.6,0.9
Setup
Terminal
7:02 PM
9/30/2013
Nez Perce Ave
Shoshone Ave
S Millhollow Rd
Commanche Dr
Rolling Hills Dr
E 4th S
Google
Map data ©2013 Google

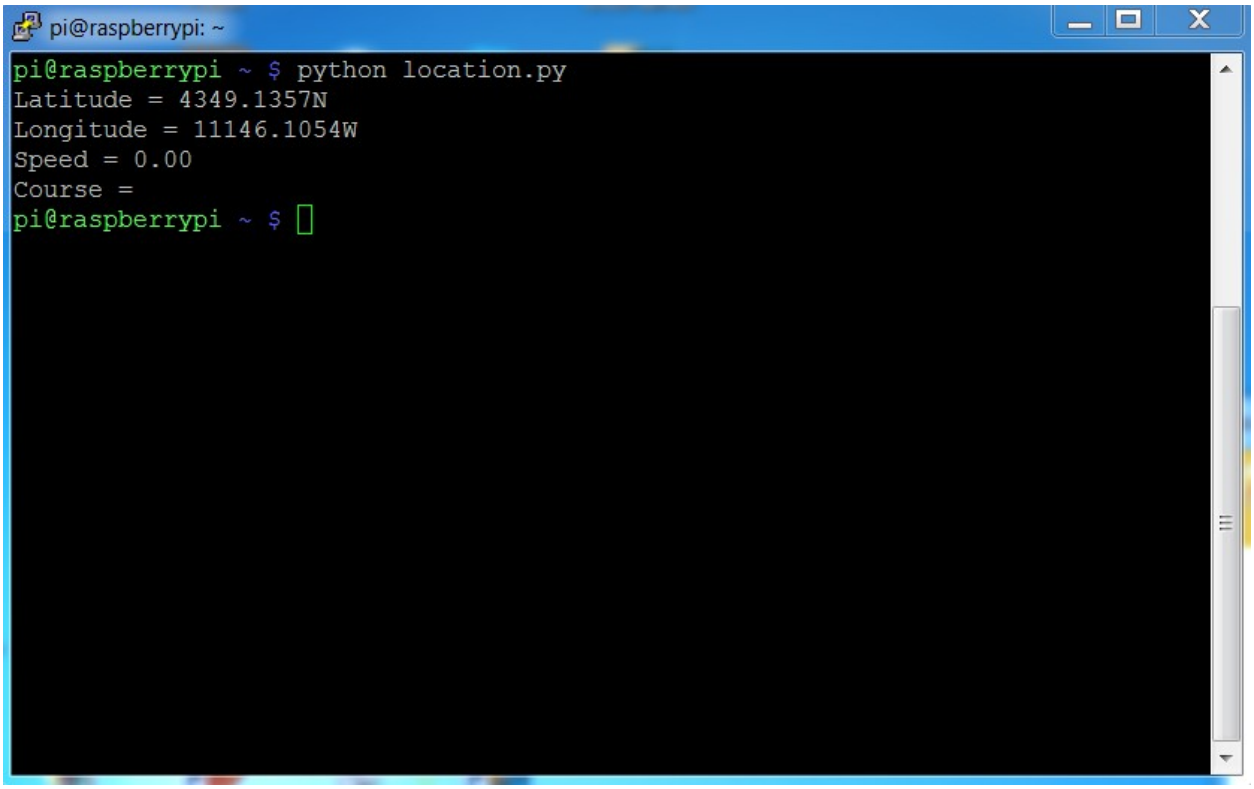

pi@raspberrypi: ~
pi@raspberrypi ~ $ lsusb
Bus 001 Device 002: ID 0424:9512 Standard Microsystems Corp.
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 001 Device 003: ID 0424:ec00 Standard Microsystems Corp.
Bus 001 Device 018: ID 067b:2303 Prolific Technology, Inc. PL2303 Serial Port
pi@raspberrypi ~ $

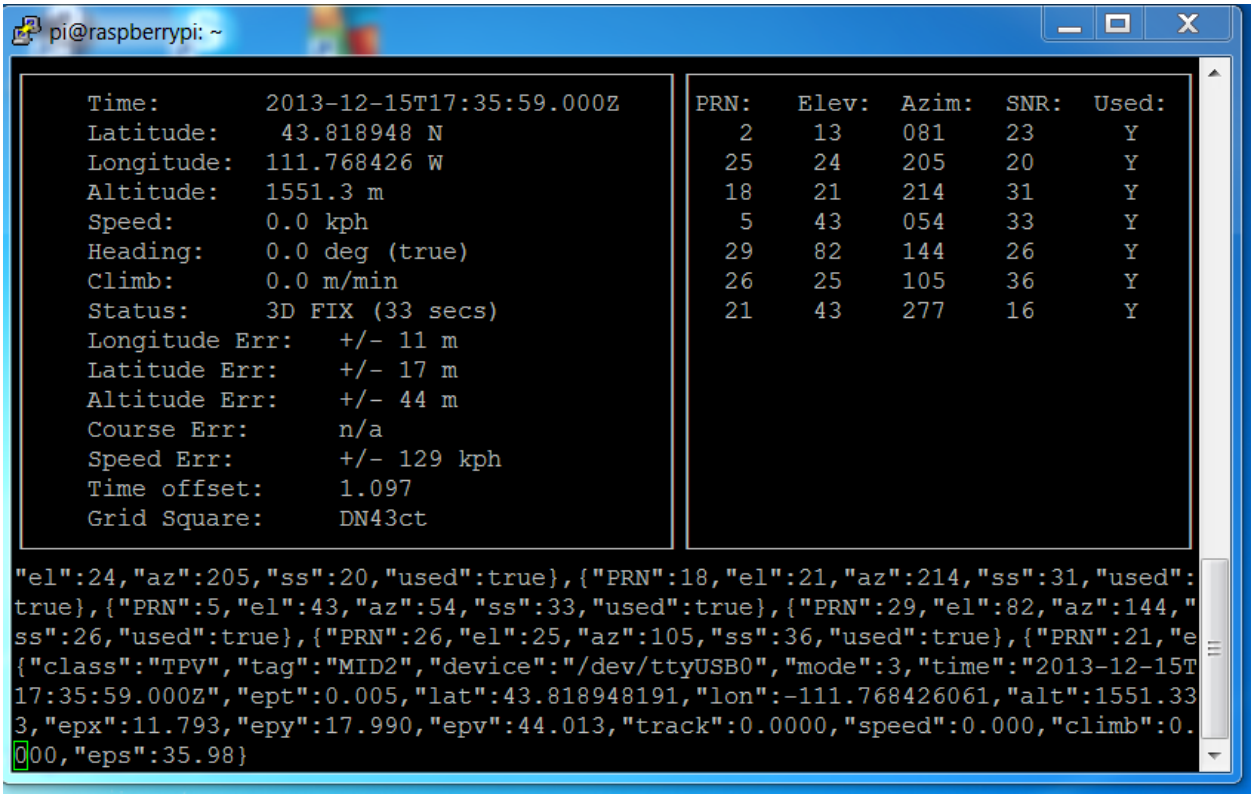

pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
import serial
ser = serial.Serial('/dev/ttyUSB0', 4800, timeout = 1)
x = ser.read(1200)
print x
-UU-:----F1 measgps.py All L6 (Python)
Wrote /home/pi/measgps.py

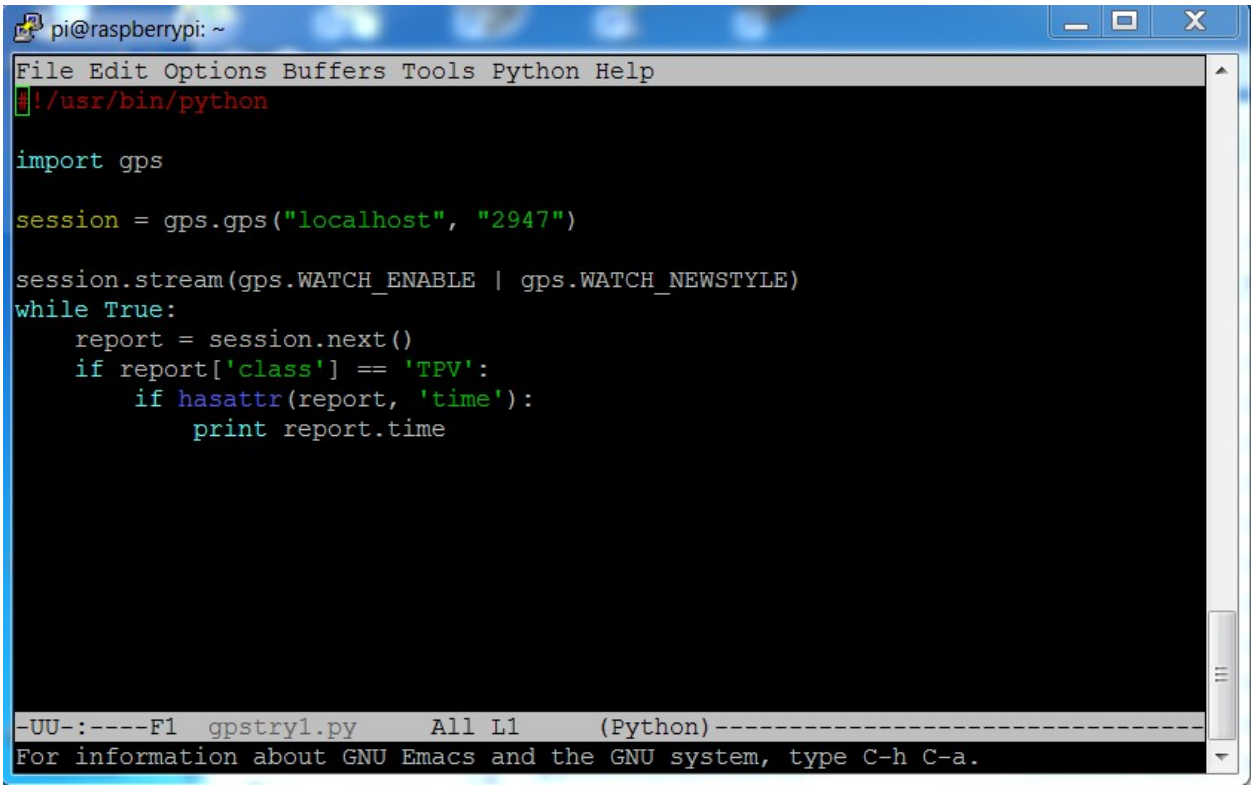

pi@raspberrypi: ~
$GPGSA,A,1,,,,,,,,,,,,,*1E
$GPRMC,001712.037,V,,,,,,,150209,,,N*43
$GPVTG,,T,,M,,N,,K,N*2C
$GPGGA,001713.037,,,,,0,00,,,M,0.0,M,,0000*56
$GPGLL,,,,,001713.037,V,N*7A
$GPGSA,A,1,,,,,,,,,,,,,*1E
$GPRMC,001713.037,V,,,,,,,150209,,,N*42
$GPVTG,,T,,M,,N,,K,N*2C
$GPGGA,001714.037,,,,,0,00,,,M,0.0,M,,0000*51
$GPGLL,,,,,001714.037,V,N*7D
$GPGSA,A,1,,,,,,,,,,,,,*1E
$GPRMC,001714.037,V,,,,,,,150209,,,N*45
$GPVTG,,T,,M,,N,,K,N*2C
$GPGGA,001715.037,,,,,0,00,,,M,0.0,M,,0000*50
$GPGLL,,,,,001715.037,V,N*7C
$GPGSA,A,1,,,,,,,,,,,,,*1E
$GPGSV,1,1,00*79
$GPRMC,001715.037,V,,,,,,,150209,,,N*44
$GPVTG,,T,,M,,N,,K,N*2C
$GPGGA,001716.037,,,,,0,00,,,M,0.0,M,,0000*53
$GPGLL,,,,,001716.037,V,N*7F
$GPGSA,A,1,,,,,,,,,,,,,*1E
$GPRMC,001716.037,V
pi@raspberrypi ~ $

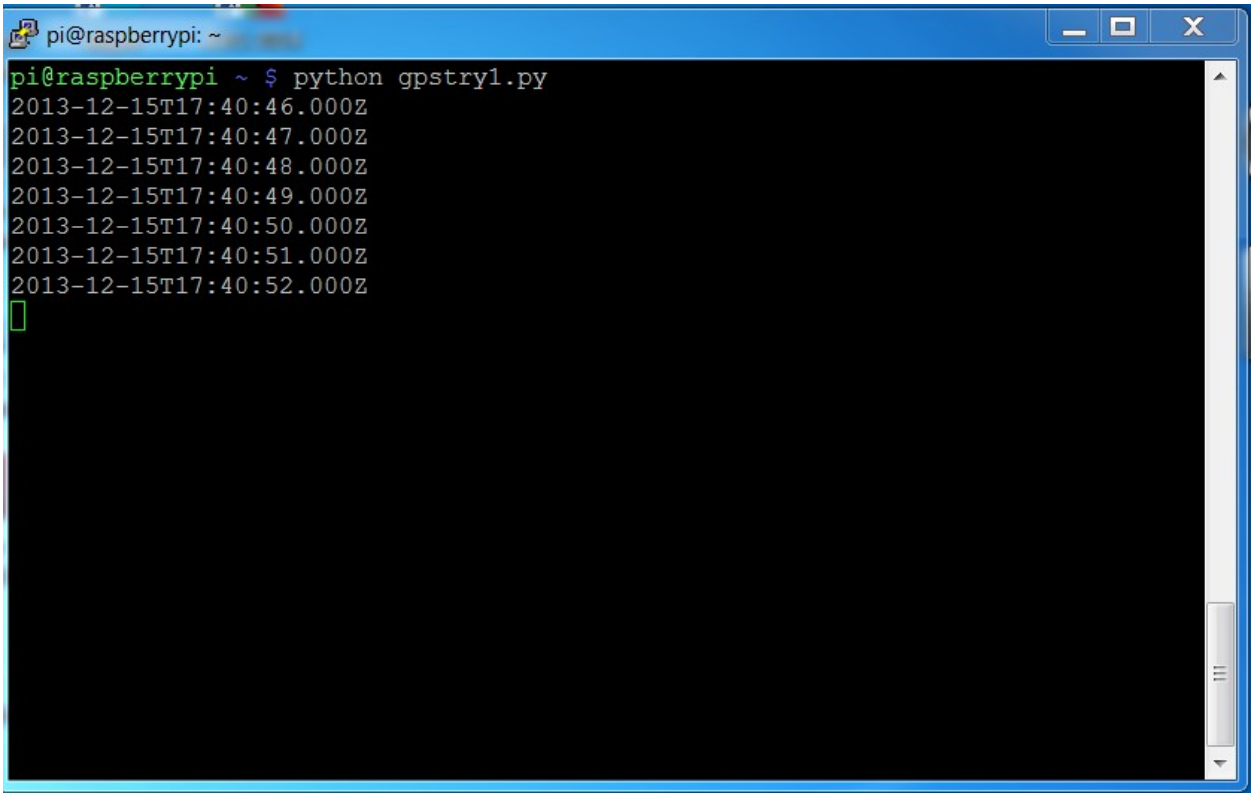

pi@raspberrypi: ~
x,A*4F
$GPGSA,A,3,15,21,22,26,18,,,,,,,,3.7,3.0,2.2*3F
$GPRMC,194824.000,A,4349.1418,N,11146.1046,W,0.00,,111213,,,A*67
$GPVTG,,T,,M,0.00,N,0.0,K,A*13
$GPGGA,194825.000,4349.1418,N,11146.1046,W,1,05,3.0,1560.8,M,-16.9,M,,0000*54
$GPGLL,4349.1418,N,11146.1046,W,194825.000,A,A*4E
$GPGSA,A,3,15,21,22,26,18,,,,,,,,3.7,3.0,2.2*3F
$GPRMC,194825.000,A,4349.1418,N,11146.1046,W,0.00,,111213,,,A*66
$GPVTG,,T,,M,0.00,N,0.0,K,A*13
$GPGGA,194826.000,4349.1418,N,11146.1046,W,1,05,3.0,1560.8,M,-16.9,M,,0000*57
$GPGLL,4349.1418,N,11146.1046,W,194826.000,A,A*4D
$GPGSA,A,3,15,21,22,26,18,,,,,,,,3.7,3.0,2.2*3F
$GPRMC,194826.000,A,4349.1418,N,11146.1046,W,0.00,,111213,,,A*65
$GPVTG,,T,,M,0.00,N,0.0,K,A*13
$GPGGA,194827.000,4349.1418,N,11146.1046,W,1,05,3.0,1560.8,M,-16.9,M,,0000*56
$GPGLL,4349.1418,N,11146.1046,W,194827.000,A,A*4C
$GPGSA,A,3,15,21,22,26,18,,,,,,,,3.7,3.0,2.2*3F
$GPGSV,3,1,12,21,81,018,35,18,71,255,31,15,50,083,35,22,33,245,30*7E
$GPGSV,3,2,12,06,32,307,23,26,23,045,32,27,23,314,21,29,22,161,*70
$GPGSV,3,3,12,16,18,283,20,03,13,319,,24,,123,,09,,019,*72
$GPRMC,194827.000,A,4349.1418,N,11146.1046,W,0.00,,111213,,,A*64
$GPVTG,,T,,M,0.00,N,0.0,K,A*13
$GPGGA,194828.
pi@raspberrypi ~ $

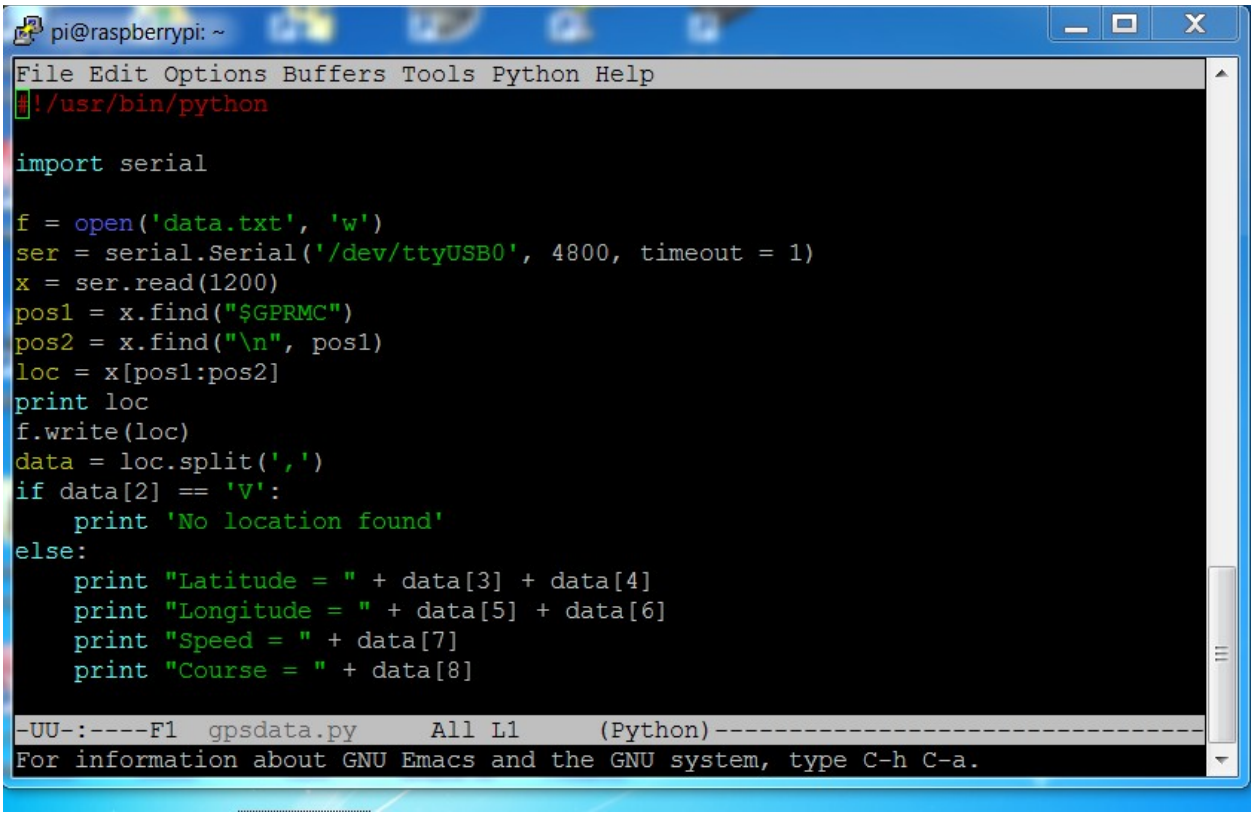

pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
import serial
ser = serial.Serial('/dev/ttyUSB0', 4800, timeout = 1)
x = ser.read(1200)
pos1 = x.find("$GPRMC")
pos2 = x.find("\n", pos1)
loc = x[pos1:pos2]
data = loc.split(',')
if data[2] == 'V':
print 'No location found'
else:
print "Latitude = " + data[3] + data[4]
print "Longitude = " + data[5] + data[6]
print "Speed = " + data[7]
print "Course = " + data[8]
-UU-:----F1 location.py All L17 (Python)
Wrote /home/pi/location.py

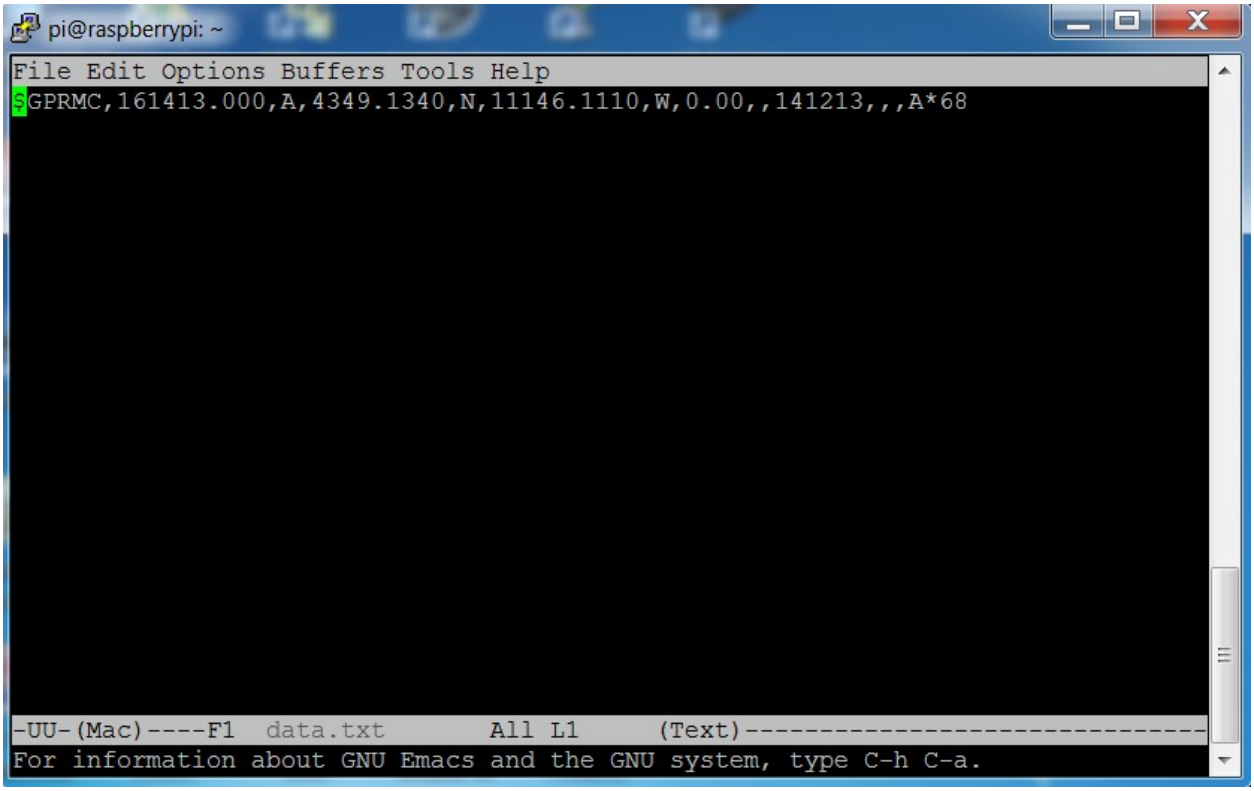

pi@raspberrypi: ~
pi@raspberrypi ~ $ python location.py
Latitude = 4349.1357N
Longitude = 11146.1054W
Speed = 0.00
Course =
pi@raspberrypi ~ $

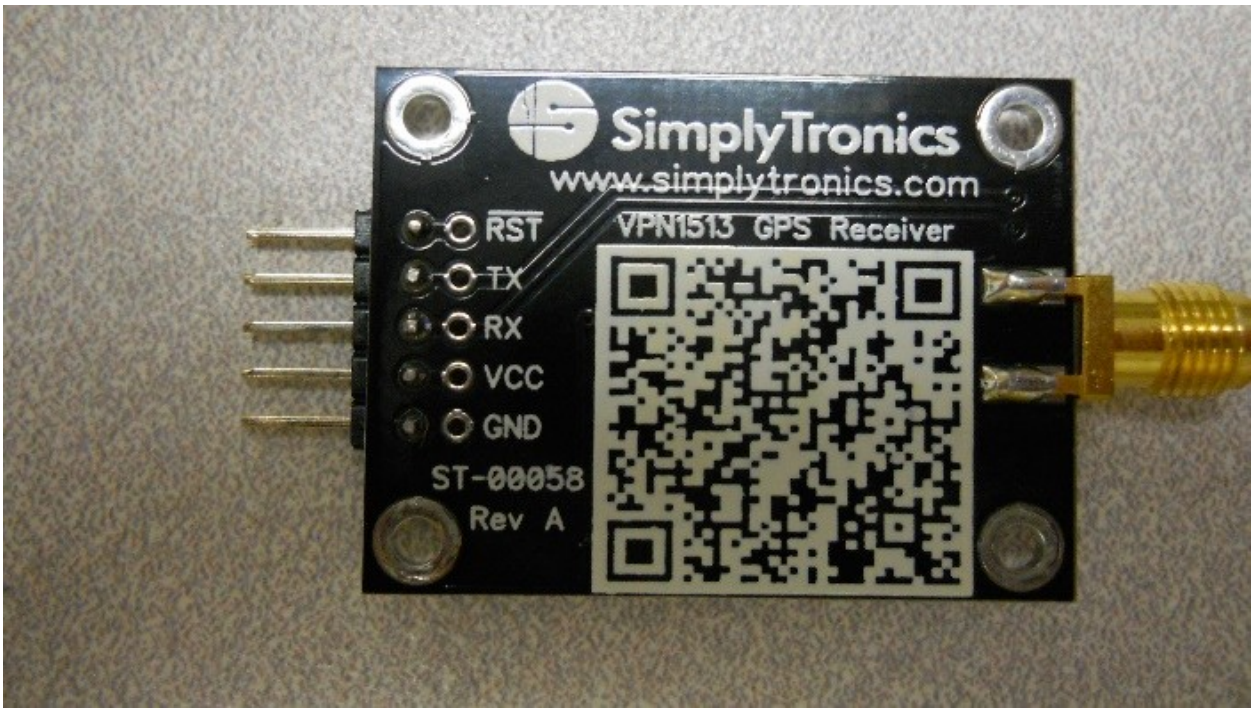

pi@raspberrypi: ~
Time: 2013-12-15T17:35:59.000Z
Latitude: 43.818948 N
Longitude: 111.768426 W
Altitude: 1551.3 m
Speed: 0.0 kph
Heading: 0.0 deg (true)
Climb: 0.0 m/min
Status: 3D FIX (33 secs)
Longitude Err: +/- 11 m
Latitude Err: +/- 17 m
Altitude Err: +/- 44 m
Course Err: n/a
Speed Err: +/- 129 kph
Time offset: 1.097
Grid Square: DN43ct
PRN: Elev: Azim: SNR: Used:
2 13 081 23 Y
25 24 205 20 Y
18 21 214 31 Y
5 43 054 33 Y
29 82 144 26 Y
26 25 105 36 Y
21 43 277 16 Y
"el":24,"az":205,"ss":20,"used":true},{"PRN":18,"el":21,"az":214,"ss":31,"used":
true},{"PRN":5,"el":43,"az":54,"ss":33,"used":true},{"PRN":29,"el":82,"az":144,"
ss":26,"used":true},{"PRN":26,"el":25,"az":105,"ss":36,"used":true},{"PRN":21,"e
{"class":"TPV","tag":"MID2","device":"/dev/ttyUSB0","mode":3,"time":"2013-12-15T
17:35:59.000Z","ept":0.005,"lat":43.818948191,"lon":-111.768426061,"alt":1551.33
3,"epx":11.793,"epy":17.990,"epv":44.013,"track":0.0000,"speed":0.000,"climb":0.
000,"eps":35.98}

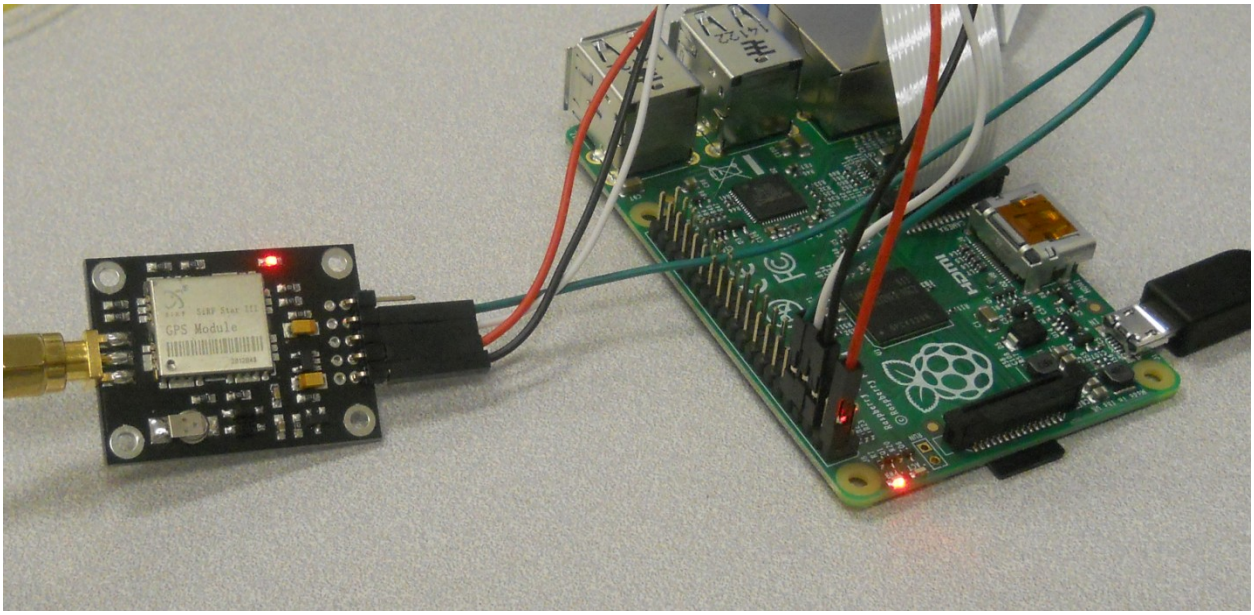

pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
import gps
session = gps.gps("localhost", "2947")
session.stream(gps.WATCH_ENABLE | gps.WATCH_NEWSTYLE)
while True:
report = session.next()
if report['class'] == 'TPV':
if hasattr(report, 'time'):
print report.time
-UU-:----F1 gpstry1.py All L1 (Python)
For information about GNU Emacs and the GNU system, type C-h C-a.

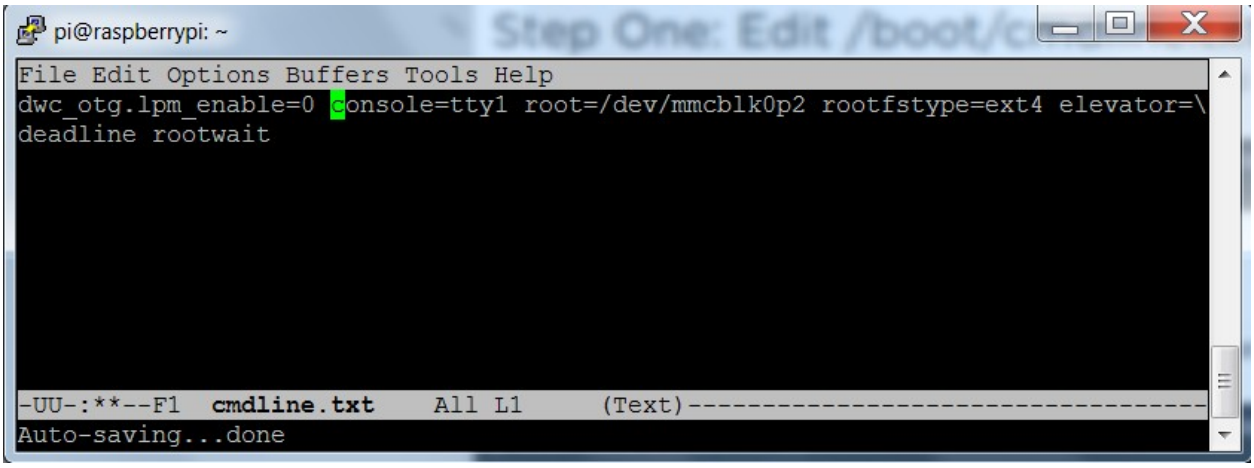

pi@raspberrypi: ~
pi@raspberrypi ~ $ python gpstry1.py
2013-12-15T17:40:46.000Z
2013-12-15T17:40:47.000Z
2013-12-15T17:40:48.000Z
2013-12-15T17:40:49.000Z
2013-12-15T17:40:50.000Z
2013-12-15T17:40:51.000Z
2013-12-15T17:40:52.000Z

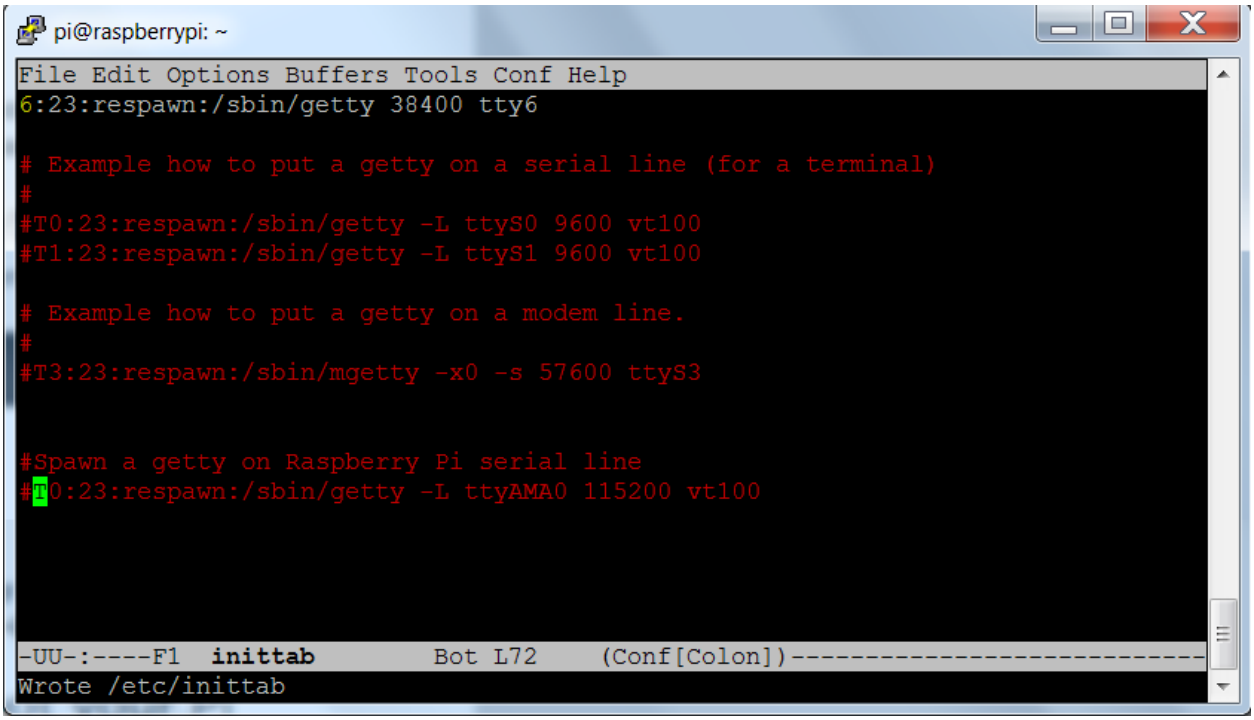

pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
import serial
f = open('data.txt', 'w')
ser = serial.Serial('/dev/ttyUSB0', 4800, timeout = 1)
x = ser.read(1200)
pos1 = x.find("$GPRMC")
pos2 = x.find("\n", pos1)
loc = x[pos1:pos2]
print loc
f.write(loc)
data = loc.split(',')
if data[2] == 'V':
print 'No location found'
else:
print "Latitude = " + data[3] + data[4]
print "Longitude = " + data[5] + data[6]
print "Speed = " + data[7]
print "Course = " + data[8]
-UU-:----F1 gpsdata.py All L1 (Python)
For information about GNU Emacs and the GNU system, type C-h C-a.

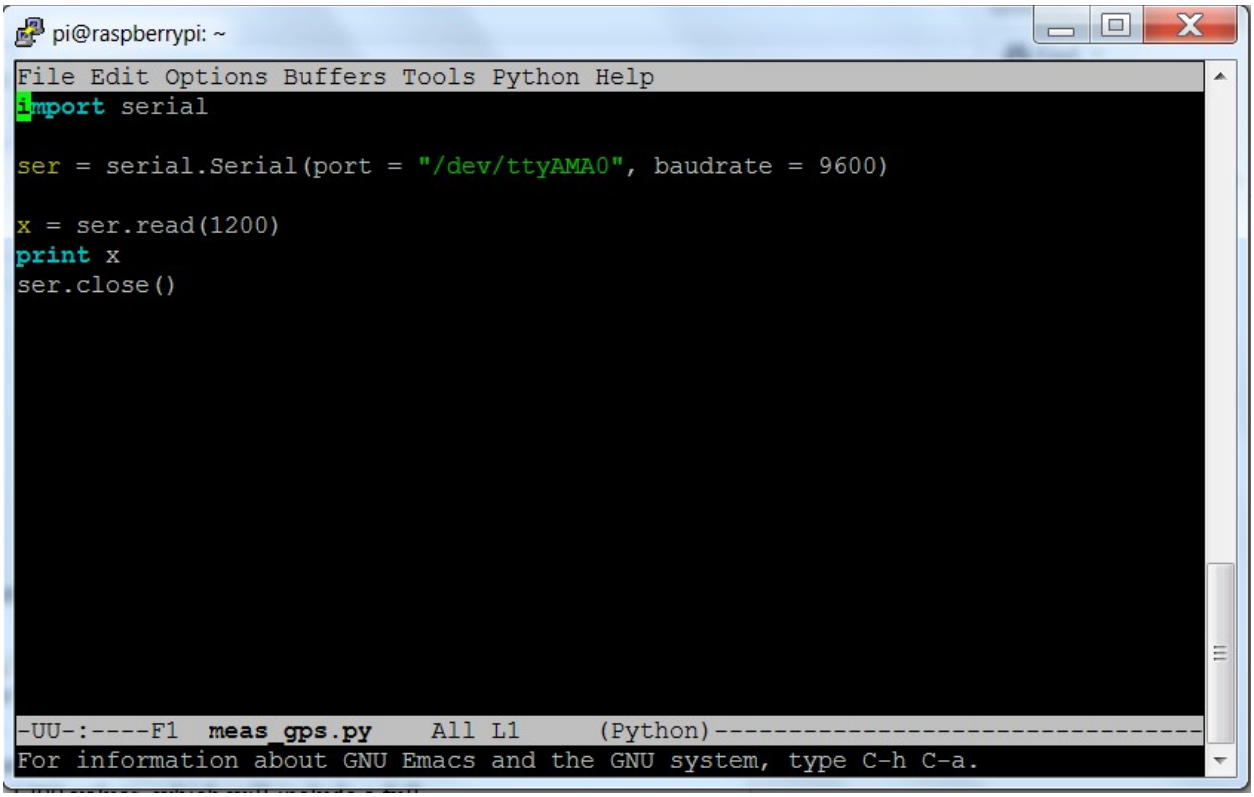

pi@raspberrypi: ~
File Edit Options Buffers Tools Help
$GPRMC,161413.000,A,4349.1340,N,11146.1110,W,0.00,,141213,,,A*68
-UU-(Mac)----F1 data.txt All L1 (Text)
For information about GNU Emacs and the GNU system, type C-h C-a.

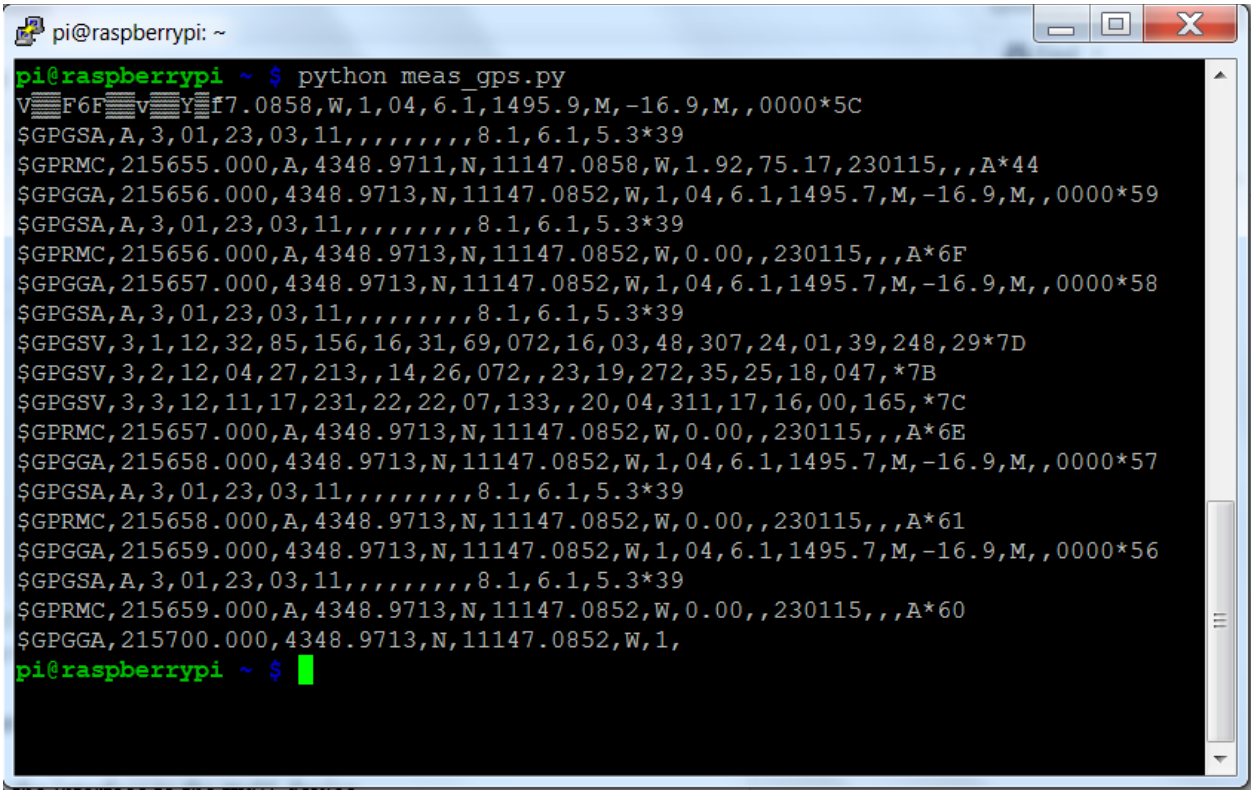

SimplyTronics
www.simplytronics.com
VPN1513 GPS Receiver
RST
TX
RX
VCC
GND
ST-00058
Rev A


GPS Module


pi@raspberrypi: ~
File Edit Options Buffers Tools Help
dwc_otg.lpm_enable=0 console=tty1 root=/dev/mmcblk0p2 rootfstype=ext4 elevator=\
deadline rootwait
-UU-:**--F1 cmdline.txt All L1 (Text)
Auto-saving...done


pi@raspberrypi: ~
File Edit Options Buffers Tools Conf Help
6:23:respawn:/sbin/getty 38400 tty6
Example how to put a getty on a serial line (for a terminal)
#
#T0:23:respawn:/sbin/getty -L ttyS0 9600 vt100
#T1:23:respawn:/sbin/getty -L ttyS1 9600 vt100
Example how to put a getty on a modem line.
#
#T3:23:respawn:/sbin/mgetty -x0 -s 57600 ttyS3
#Spawn a getty on Raspberry Pi serial line
#T0:23:respawn:/sbin/getty -L ttyAMA0 115200 vt100
-UU-:----F1 inittab Bot L72 (Conf[Colon])
Wrote /etc/inittab


pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
import serial
ser = serial.Serial(port = "/dev/ttyAMA0", baudrate = 9600)
x = ser.read(1200)
print x
ser.close()
-UU-:----F1 meas_gps.py All L1 (Python)
For information about GNU Emacs and the GNU system, type C-h C-a.


pi@raspberrypi: ~
pi@raspberrypi ~ $ python meas_gps.py
V▒▒F6F▒▒v▒▒Y▒f7.0858,W,1,04,6.1,1495.9,M,-16.9,M,,0000*5C
$GPGSA,A,3,01,23,03,11,,,,,,,,,8.1,6.1,5.3*39
$GPRMC,215655.000,A,4348.9711,N,11147.0858,W,1.92,75.17,230115,,,A*44
$GPGGA,215656.000,4348.9713,N,11147.0852,W,1,04,6.1,1495.7,M,-16.9,M,,0000*59
$GPGSA,A,3,01,23,03,11,,,,,,,,,8.1,6.1,5.3*39
$GPRMC,215656.000,A,4348.9713,N,11147.0852,W,0.00,,230115,,,A*6F
$GPGGA,215657.000,4348.9713,N,11147.0852,W,1,04,6.1,1495.7,M,-16.9,M,,0000*58
$GPGSA,A,3,01,23,03,11,,,,,,,,,8.1,6.1,5.3*39
$GPGSV,3,1,12,32,85,156,16,31,69,072,16,03,48,307,24,01,39,248,29*7D
$GPGSV,3,2,12,04,27,213,,14,26,072,,23,19,272,35,25,18,047,*7B
$GPGSV,3,3,12,11,17,231,22,22,07,133,,20,04,311,17,16,00,165,*7C
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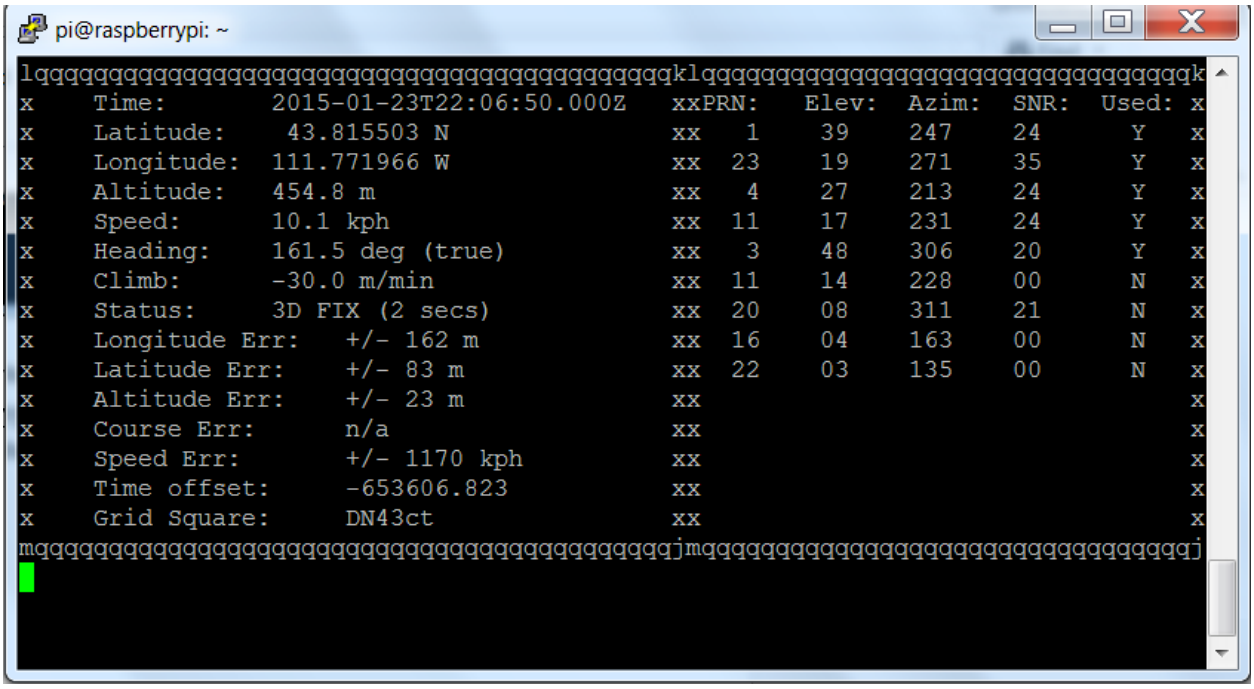
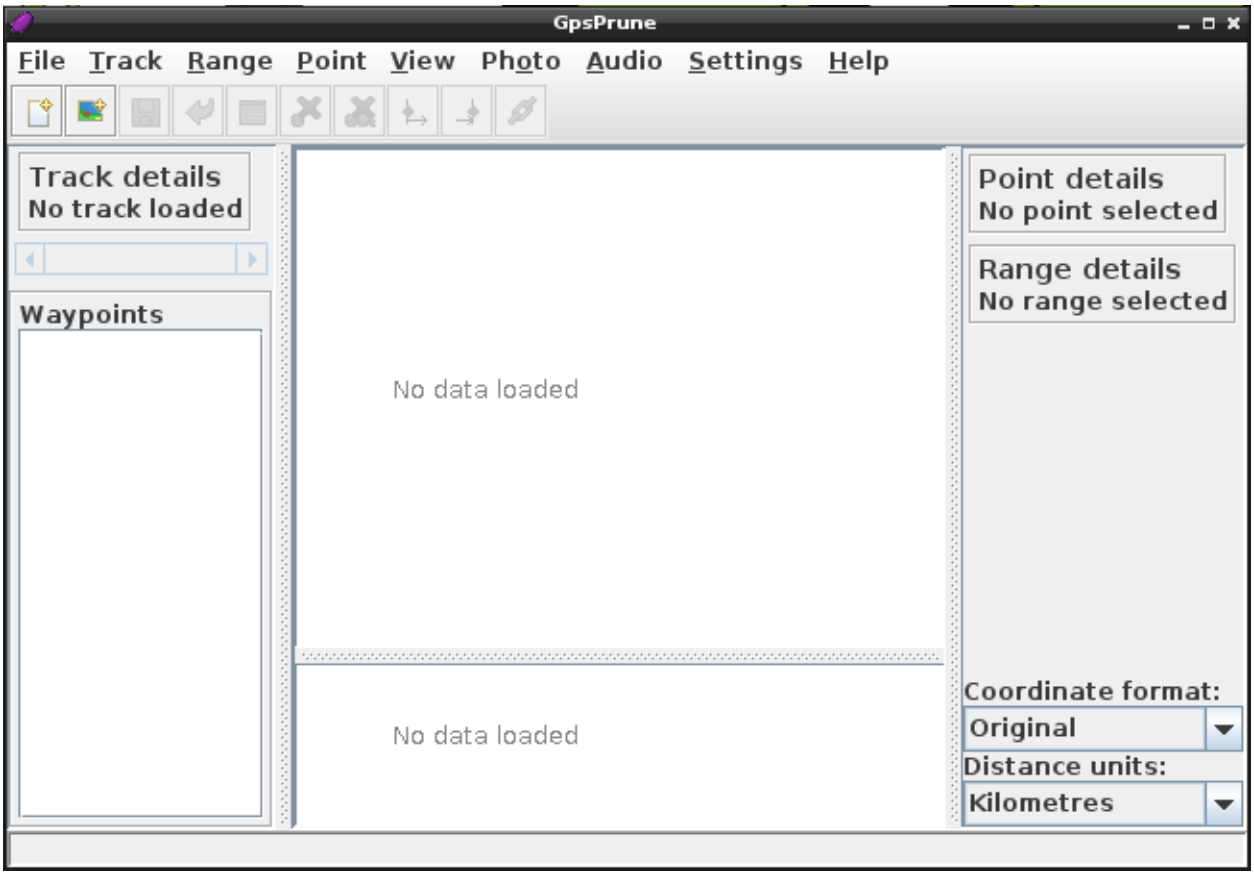
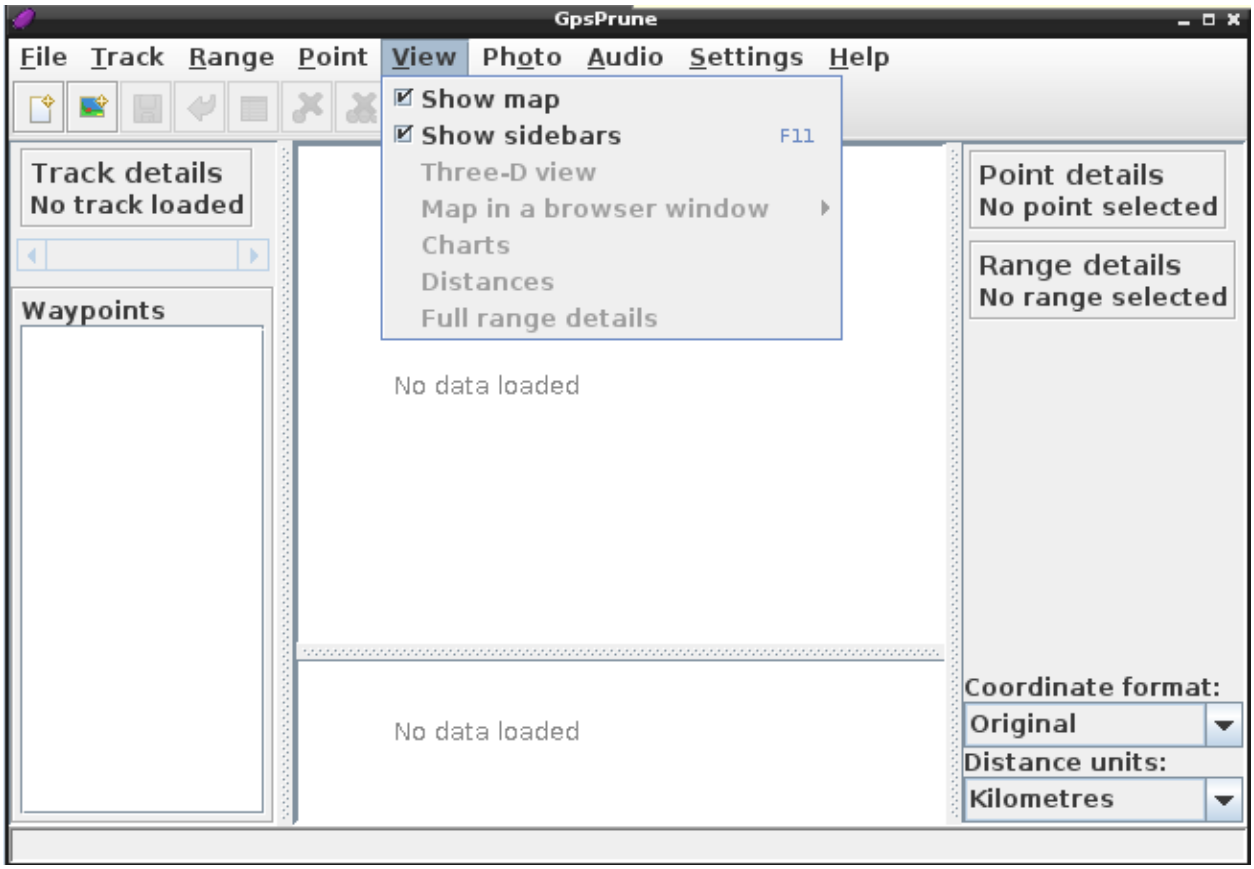
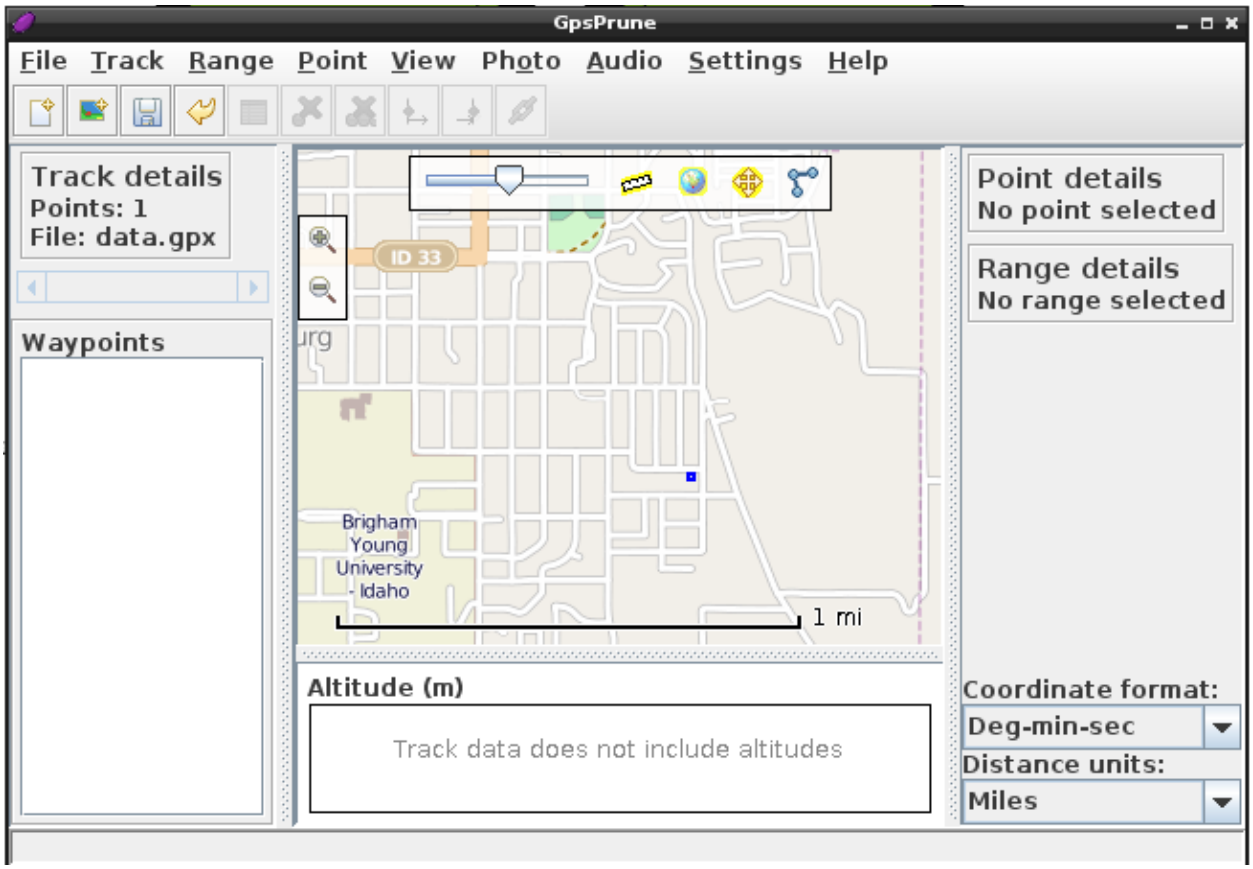
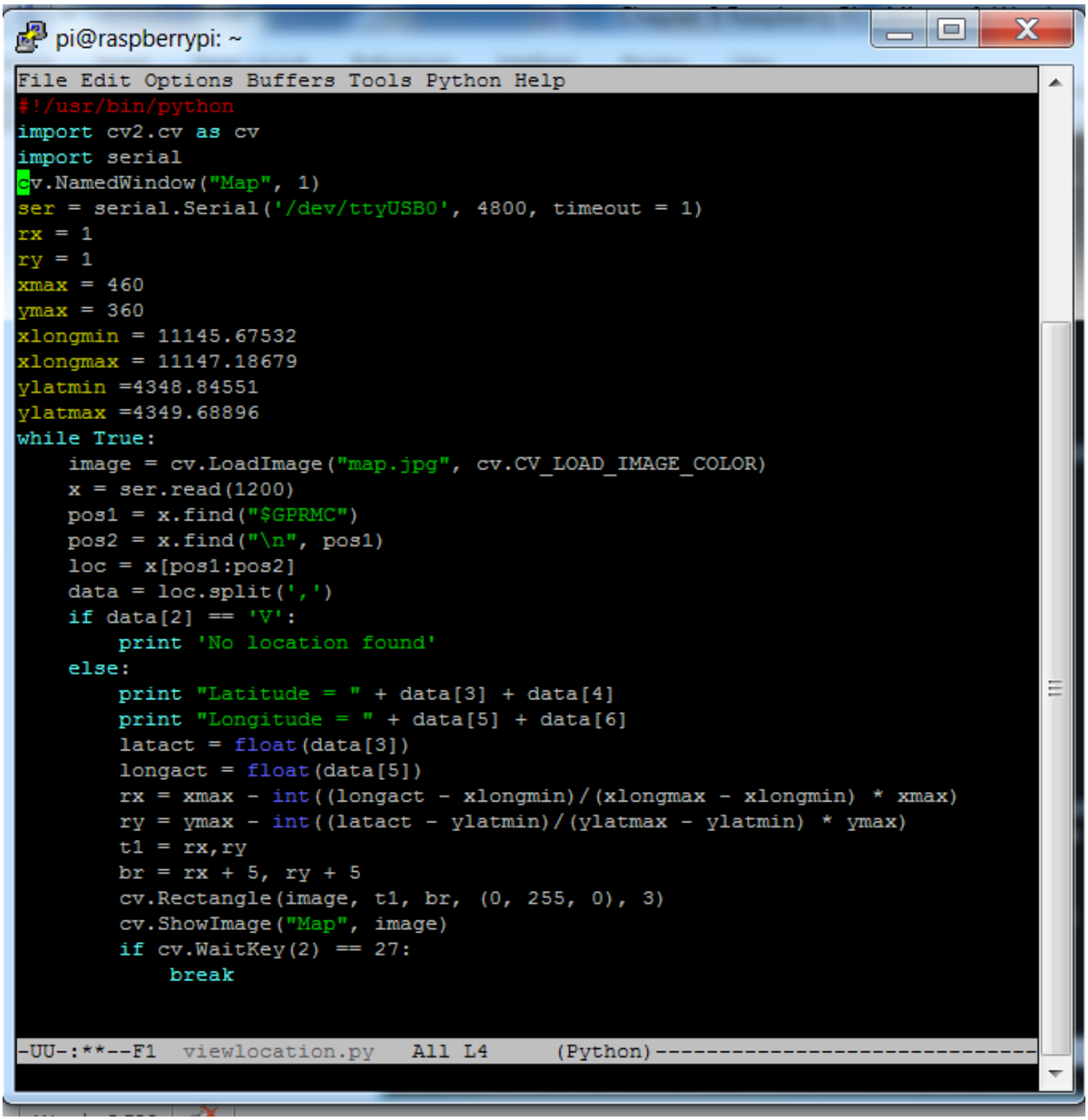
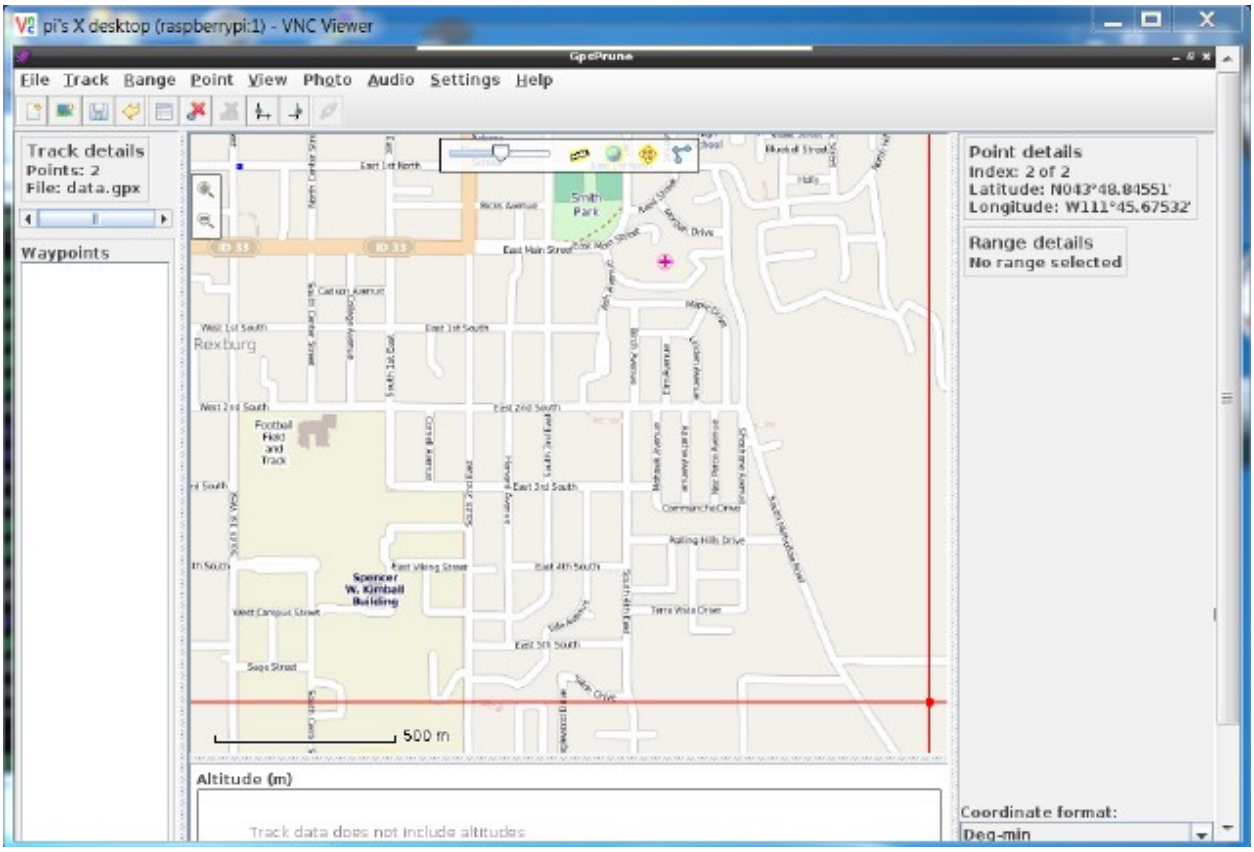

pi@raspberrypi: ~
lqqq

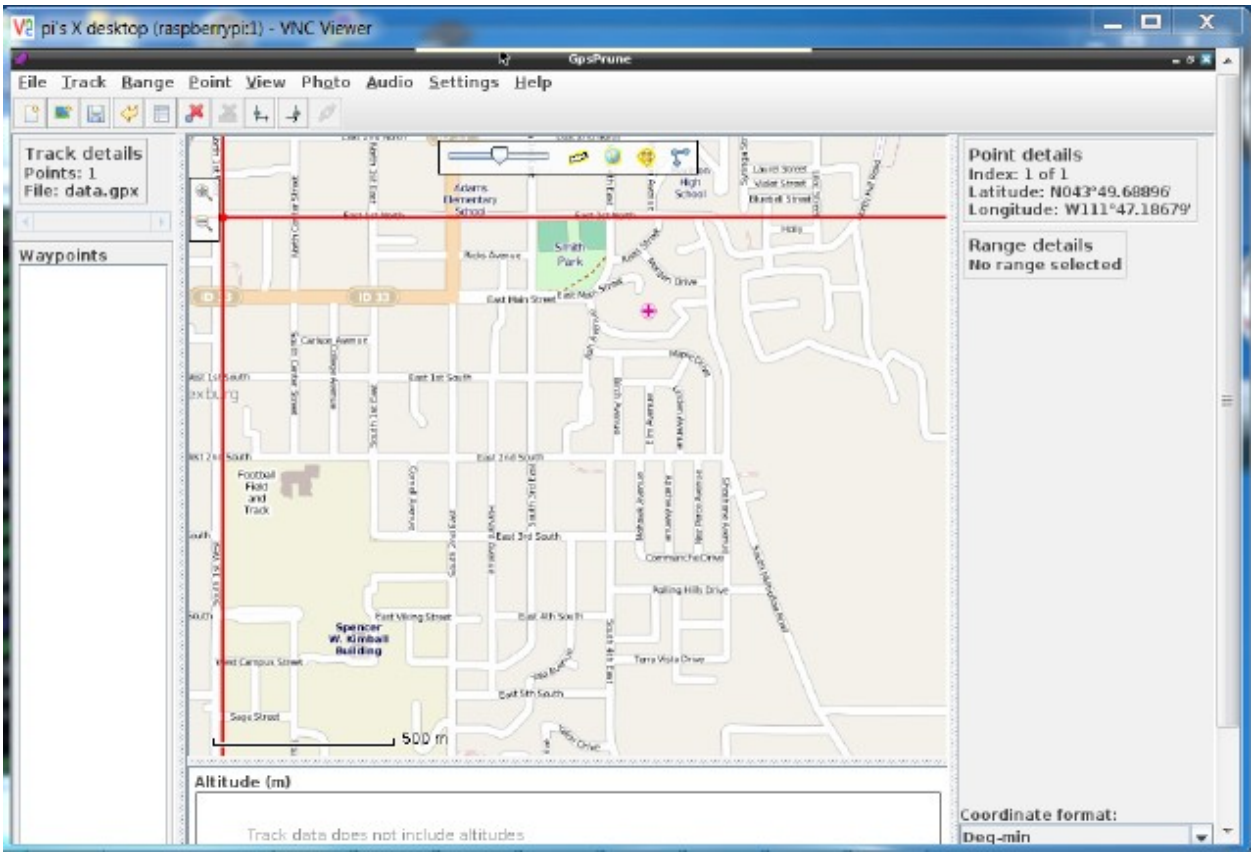

GpsPrune
File Track Range Point View Photo Audio Settings Help
Track details
No track loaded
Waypoints
No data loaded
No data loaded
Point details
No point selected
Range details
No range selected
Coordinate format:
Original
Distance units:
Kilometres

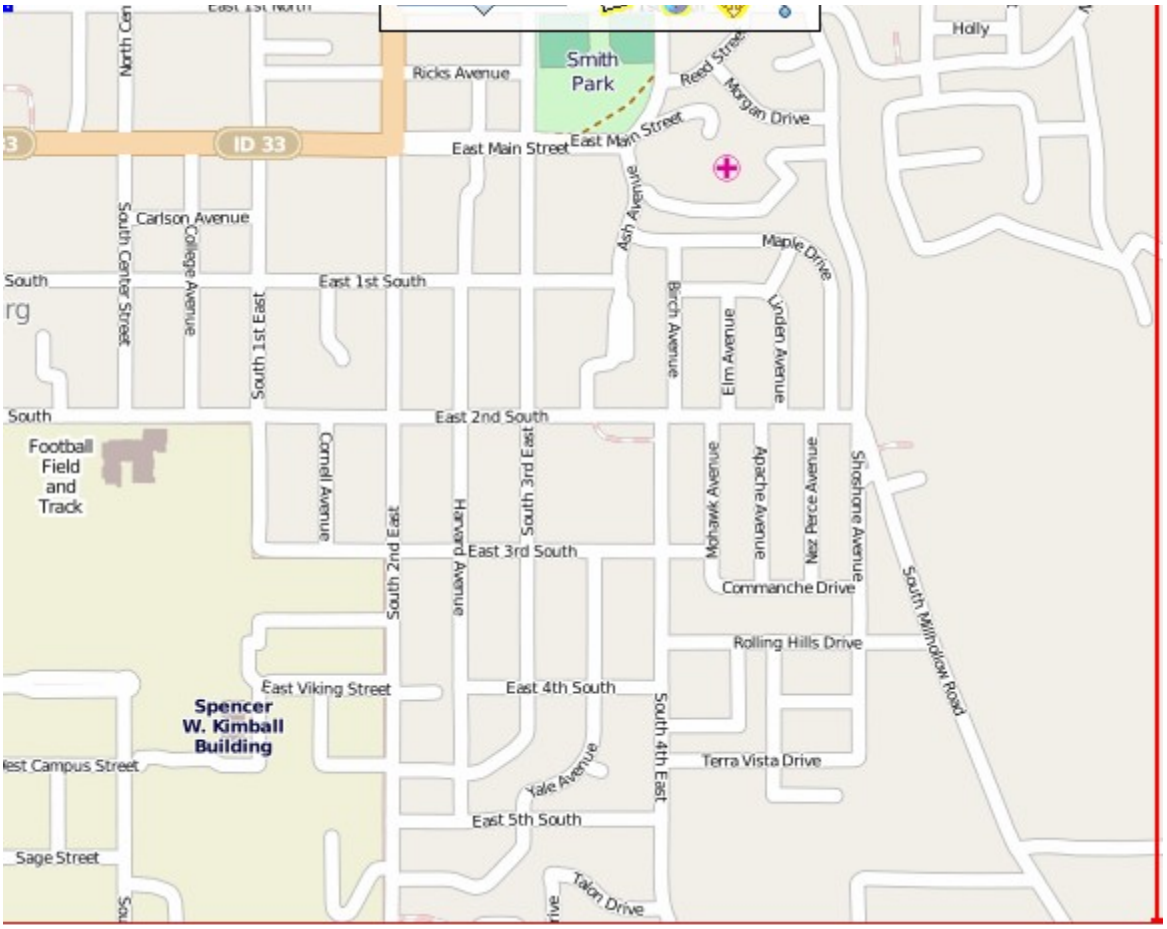

GpsPrune
File Track Range Point View Photo Audio Settings Help
Show map
Show sidebars F11
Three-D view
Map in a browser window
Charts
Distances
Full range details
Track details
No track loaded
Waypoints
No data loaded
No data loaded
Point details
No point selected
Range details
No range selected
Coordinate format:
Original
Distance units:
Kilometres

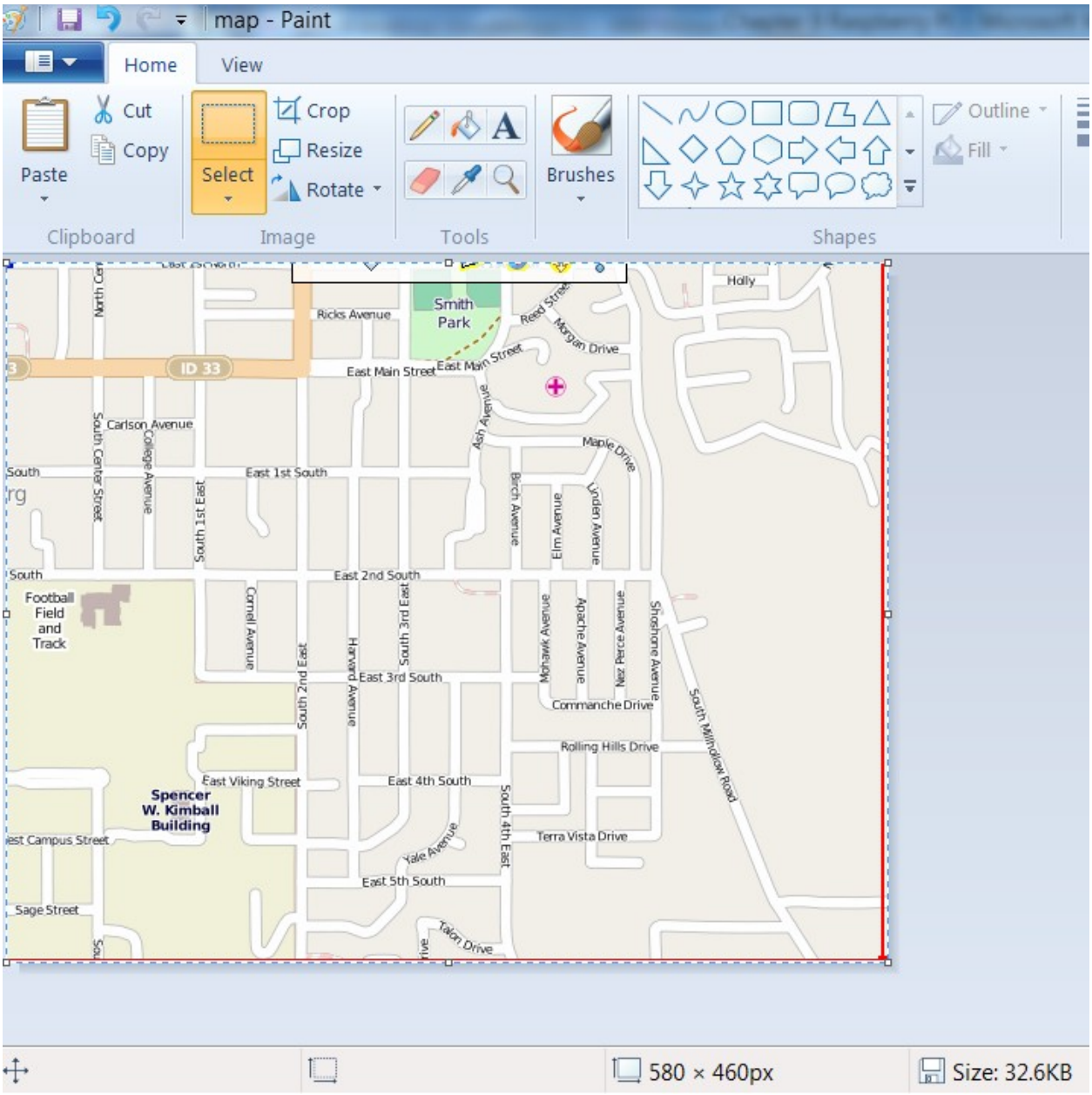

GpsPrune
File Track Range Point View Photo Audio Settings Help
Track details
Points: 1
File: data.gpx
Waypoints
ID 33
Brigham Young University - Idaho
1 mi
Altitude (m)
Track data does not include altitudes
Point details
No point selected
Range details
No range selected
Coordinate format:
Deg-min-sec
Distance units:
Miles

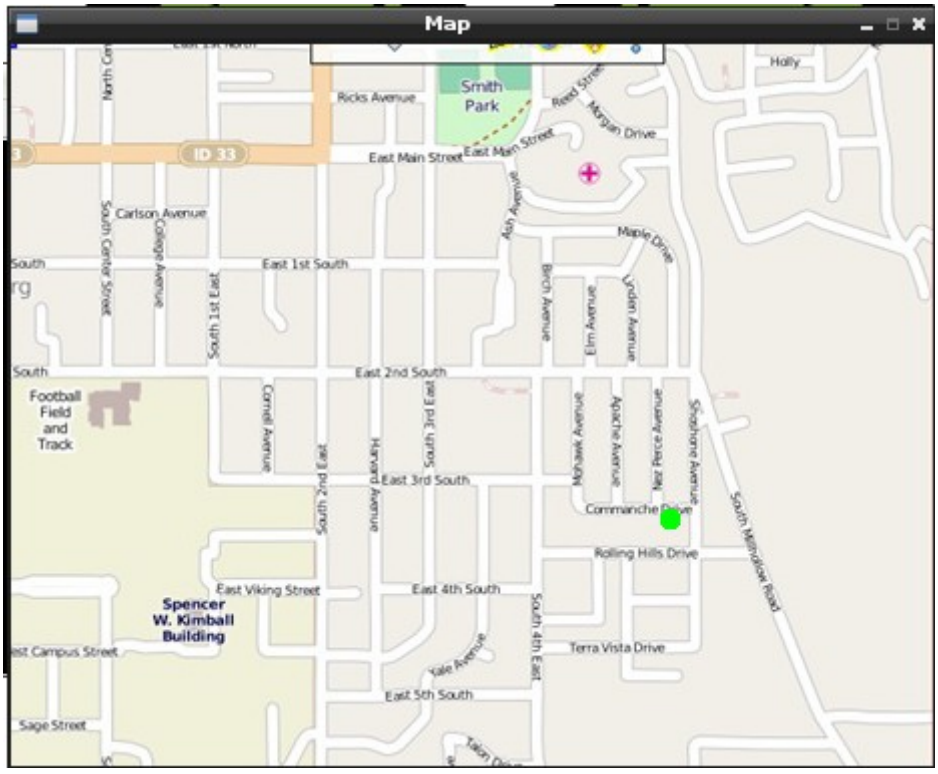

pi@raspberrypi: ~
File Edit Options Buffers Tools Python Help
#!/usr/bin/python
import cv2.cv as cv
import serial
cv.NamedWindow("Map", 1)
ser = serial.Serial('/dev/ttyUSB0', 4800, timeout = 1)
rx = 1
ry = 1
xmax = 460
ymax = 360
xlongmin = 11145.67532
xlongmax = 11147.18679
ylatmin =4348.84551
ylatmax =4349.68896
while True:
image = cv.LoadImage("map.jpg", cv.CV_LOAD_IMAGE_COLOR)
x = ser.read(1200)
pos1 = x.find("$GPRMC")
pos2 = x.find("\n", pos1)
loc = x[pos1:pos2]
data = loc.split(',')
if data[2] == 'V':
print 'No location found'
else:
print "Latitude = " + data[3] + data[4]
print "Longitude = " + data[5] + data[6]
latact = float(data[3])
longact = float(data[5])
rx = xmax - int((longact - xlongmin)/(xlongmax - xlongmin) * xmax)
ry = ymax - int((latact - ylatmin)/(ylatmax - ylatmin) * ymax)
t1 = rx,ry
br = rx + 5, ry + 5
cv.Rectangle(image, t1, br, (0, 255, 0), 3)
cv.ShowImage("Map", image)
if cv.WaitKey(2) == 27:
break
-UU-:**--F1 viewlocation.py All L4 (Python)


pi's X desktop (raspberrypi:1) - VNC Viewer
GpsPrune
File Track Range Point View Photo Audio Settings Help
Track details
Points: 2
File: data.gpx
Waypoints
Point details
Index: 2 of 2
Latitude: N043°48.84551'
Longitude: W111°45.67532'
Range details
No range selected
Rexburg
Smith Park
Spencer W. Kimball Building
Football Field and Track
500 m
Altitude (m)
Track data does not include altitudes
Coordinate format:
Deg-min

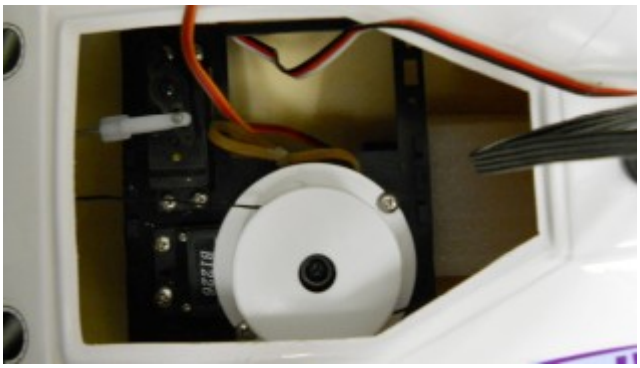

pi's X desktop (raspberrypi:1) - VNC Viewer
GpsPrune
File Track Range Point View Photo Audio Settings Help
Track details
Points: 1
File: data.gpx
Waypoints
Point details
Index: 1 of 1
Latitude: N043°49.68896'
Longitude: W111°47.18679'
Range details
No range selected
Altitude (m)
Track data does not include altitudes
Coordinate format:
Deg-min
Adams Elementary School
Smith Park
Football Field and Track
Spencer W. Kimball Building
500 m

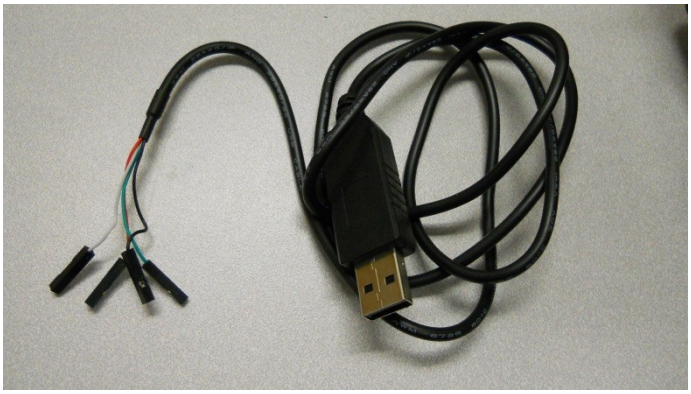

Smith Park
Ricks Avenue
ID 33
East Main Street
Carlson Avenue
South Center Street
College Avenue
South 1st East
East 1st South
Ash Avenue
Maple Drive
Birch Avenue
Elm Avenue
Linden Avenue
East 2nd South
Football Field and Track
Cornell Avenue
South 2nd East
Harvard Avenue
South 3rd East
East 3rd South
Mohawk Avenue
Apache Avenue
Navajo Avenue
Shoshone Avenue
Commanche Drive
Rolling Hills Drive
South Millpond Road
East Viking Street
East 4th South
Spencer W. Kimball Building
South 4th East
Terra Vista Drive
Yale Avenue
East 5th South
Sage Street
Talon Drive
Holly
Reed Street
Morgan Drive

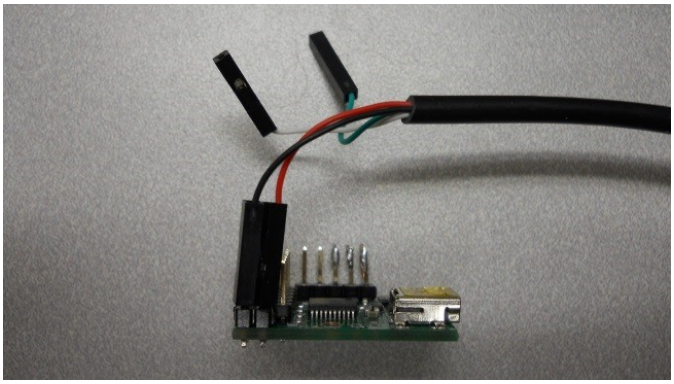

map - Paint
Home
View
Cut
Copy
Paste
Select
Crop
Resize
Rotate
Brushes
Outline
Fill
Clipboard
Image
Tools
Shapes
Smith Park
Ricks Avenue
East Main Street
ID 33
Carlson Avenue
South Center Street
College Avenue
South 1st East
East 1st South
East 2nd South
East 3rd South
East 4th South
East 5th South
South 2nd East
South 3rd East
Harvard Avenue
Cornell Avenue
Ash Avenue
Birch Avenue
Elm Avenue
Lyden Avenue
Maple Drive
Reed Street
Morgan Drive
Holly
Mohawk Avenue
Apache Avenue
Nez Perce Avenue
Shoshone Avenue
South Millington Road
Commanche Drive
Rolling Hills Drive
Terra Vista Drive
South 4th East
Yale Avenue
Talon Drive
Football Field and Track
Spencer W. Kimball Building
East Viking Street
Sage Street
580 × 460px
Size: 32.6KB

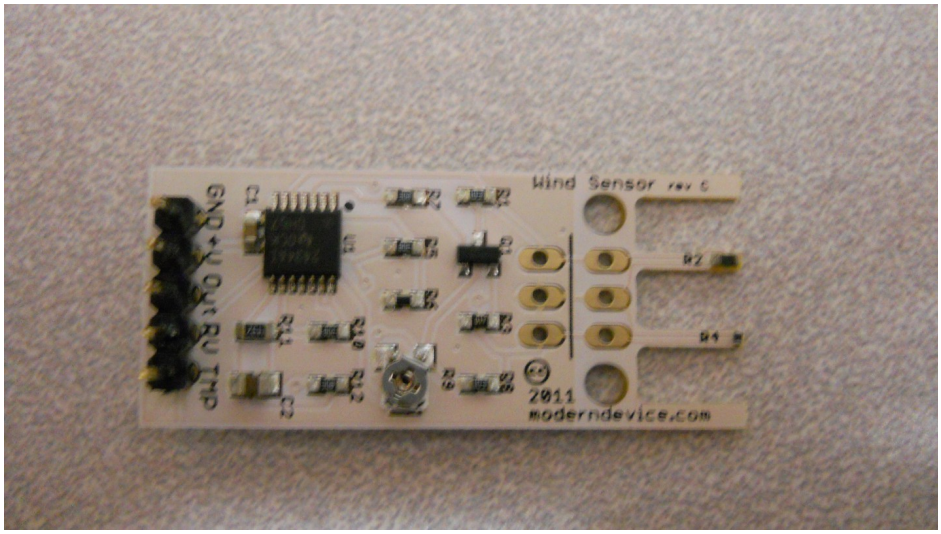

Map
Smith Park
Ricks Avenue
Reed Street
Morgan Drive
East Main Street
East Main Street
ID 33
Carlson Avenue
South Center Street
College Avenue
South 1st East
East 1st South
Ash Avenue
Birch Avenue
Elm Avenue
Lyndon Avenue
Maple Drive
East 2nd South
Football Field and Track
Cornell Avenue
South 2nd East
Hayes Avenue
South 3rd East
East 3rd South
Mohawk Avenue
Apache Avenue
Nez Perce Avenue
Shoshone Avenue
South Millbrook Road
Commanche Drive
Rolling Hills Drive
East Viking Street
East 4th South
Spencer W. Kimball Building
South 4th East
Terra Vista Drive
Yale Avenue
East 5th South
Sage Street
Holly

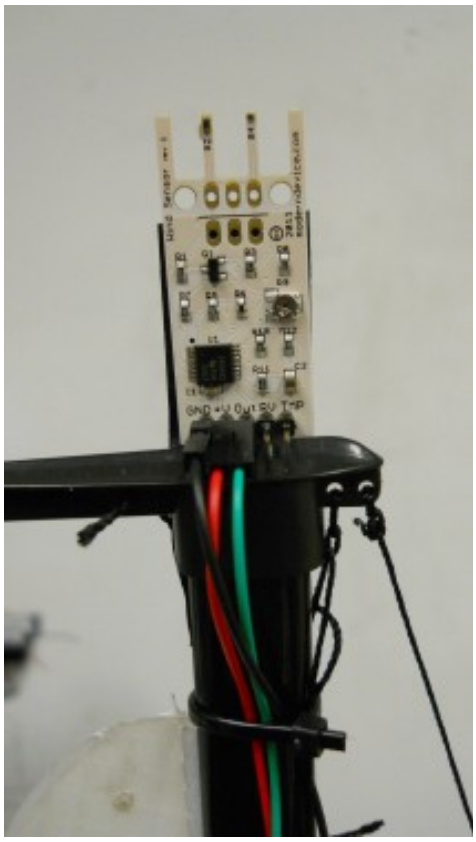
Chapter 11: By Land, Sea, and Air

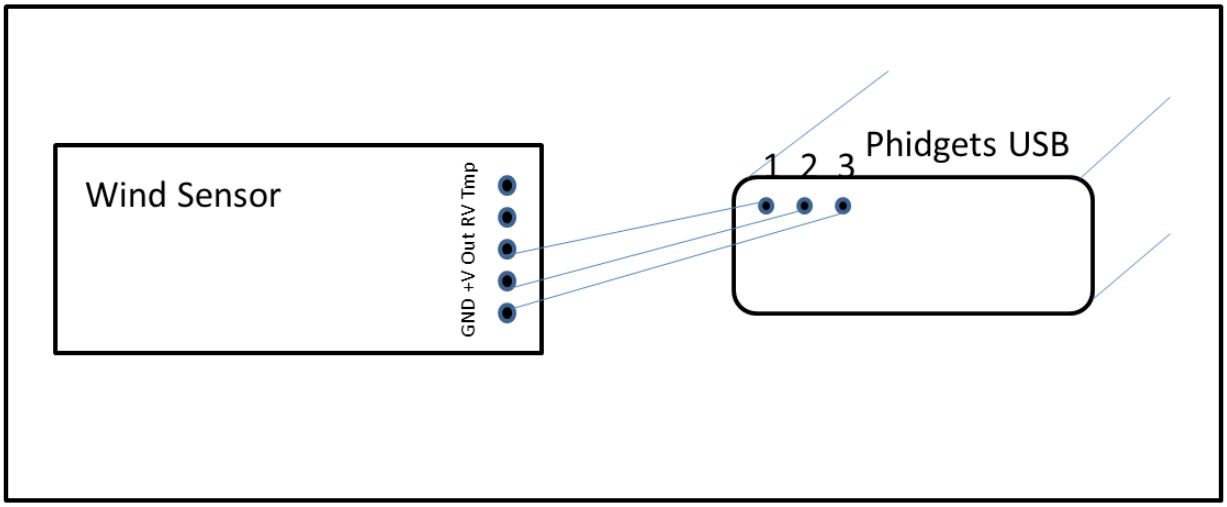


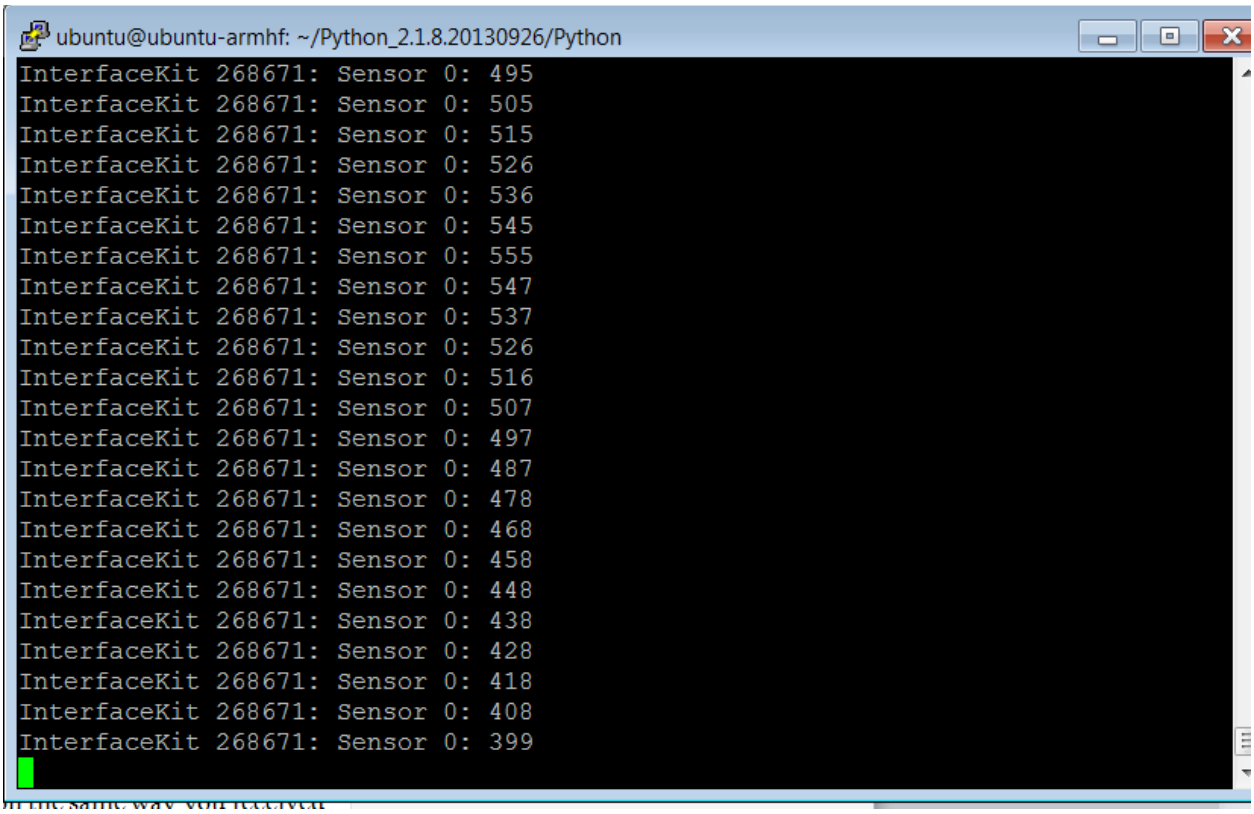


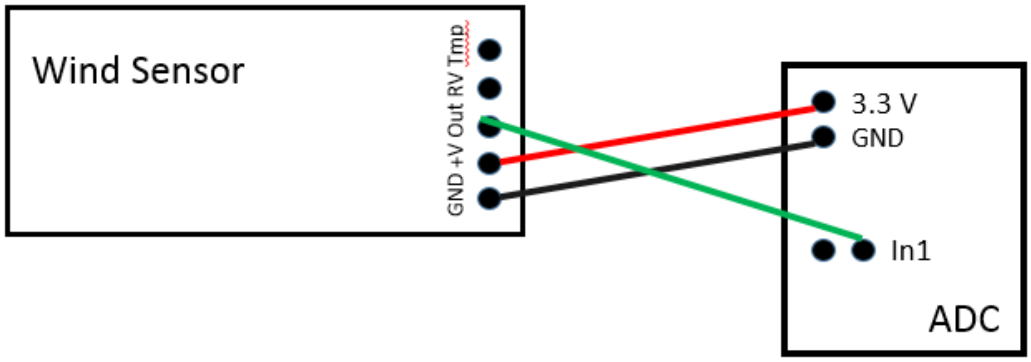


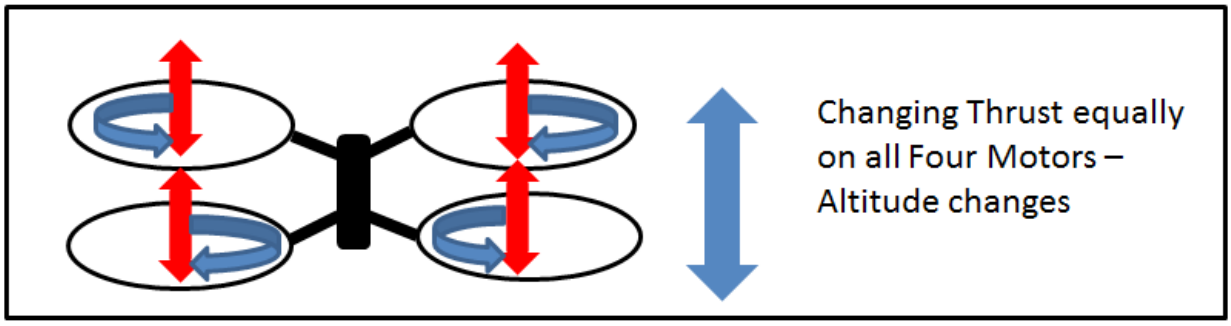

Wind Sensor rev c
GND +V OUT RV TMP
2011
moderndevice.com



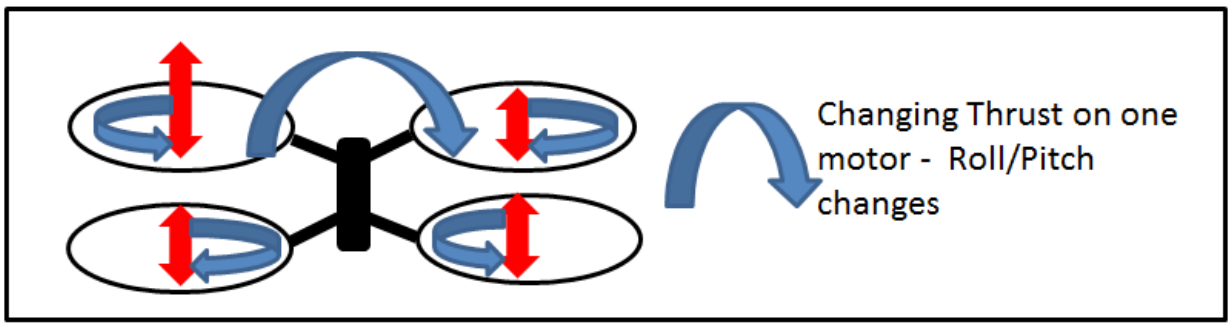

Wind Sensor
GND +V Out RV Tmp
1 2 3
Phidgets USB


ubuntu@ubuntu-armhf: ~/Python_2.1.8.20130926/Python
InterfaceKit 268671: Sensor 0: 495
InterfaceKit 268671: Sensor 0: 505
InterfaceKit 268671: Sensor 0: 515
InterfaceKit 268671: Sensor 0: 526
InterfaceKit 268671: Sensor 0: 536
InterfaceKit 268671: Sensor 0: 545
InterfaceKit 268671: Sensor 0: 555
InterfaceKit 268671: Sensor 0: 547
InterfaceKit 268671: Sensor 0: 537
InterfaceKit 268671: Sensor 0: 526
InterfaceKit 268671: Sensor 0: 516
InterfaceKit 268671: Sensor 0: 507
InterfaceKit 268671: Sensor 0: 497
InterfaceKit 268671: Sensor 0: 487
InterfaceKit 268671: Sensor 0: 478
InterfaceKit 268671: Sensor 0: 468
InterfaceKit 268671: Sensor 0: 458
InterfaceKit 268671: Sensor 0: 448
InterfaceKit 268671: Sensor 0: 438
InterfaceKit 268671: Sensor 0: 428
InterfaceKit 268671: Sensor 0: 418
InterfaceKit 268671: Sensor 0: 408
InterfaceKit 268671: Sensor 0: 399

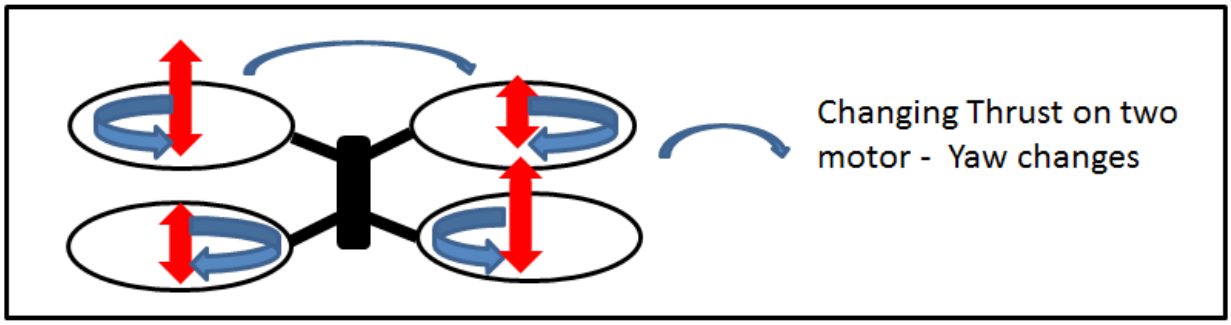

Wind Sensor
GND +V Out RV Tmp
3.3 V
GND
In1
ADC



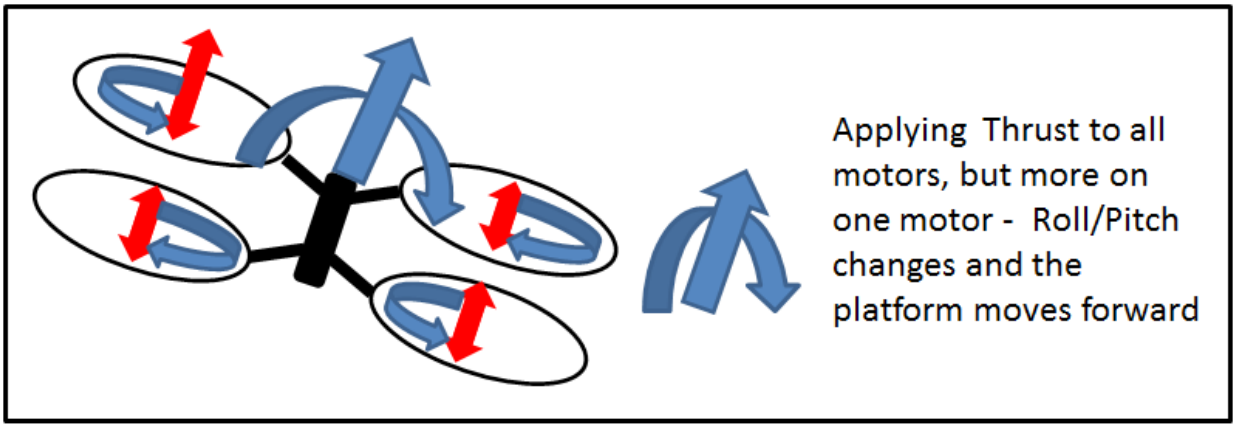
Changing Thrust equally on all Four Motors – Altitude changes



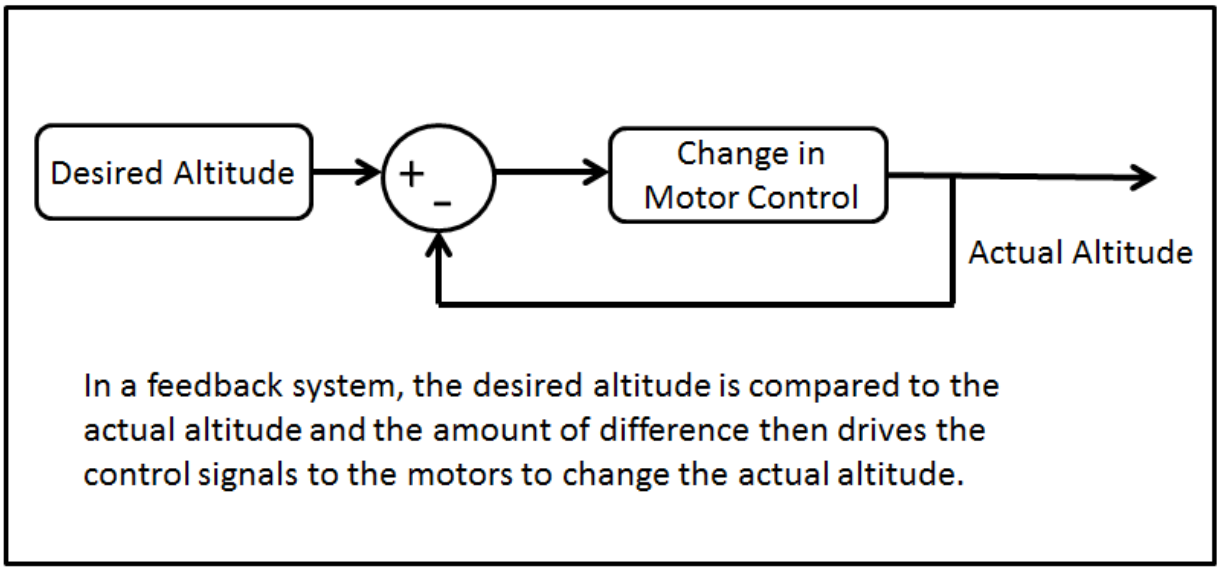
Changing Thrust on one motor - Roll/Pitch changes



Changing Thrust on two motor - Yaw changes

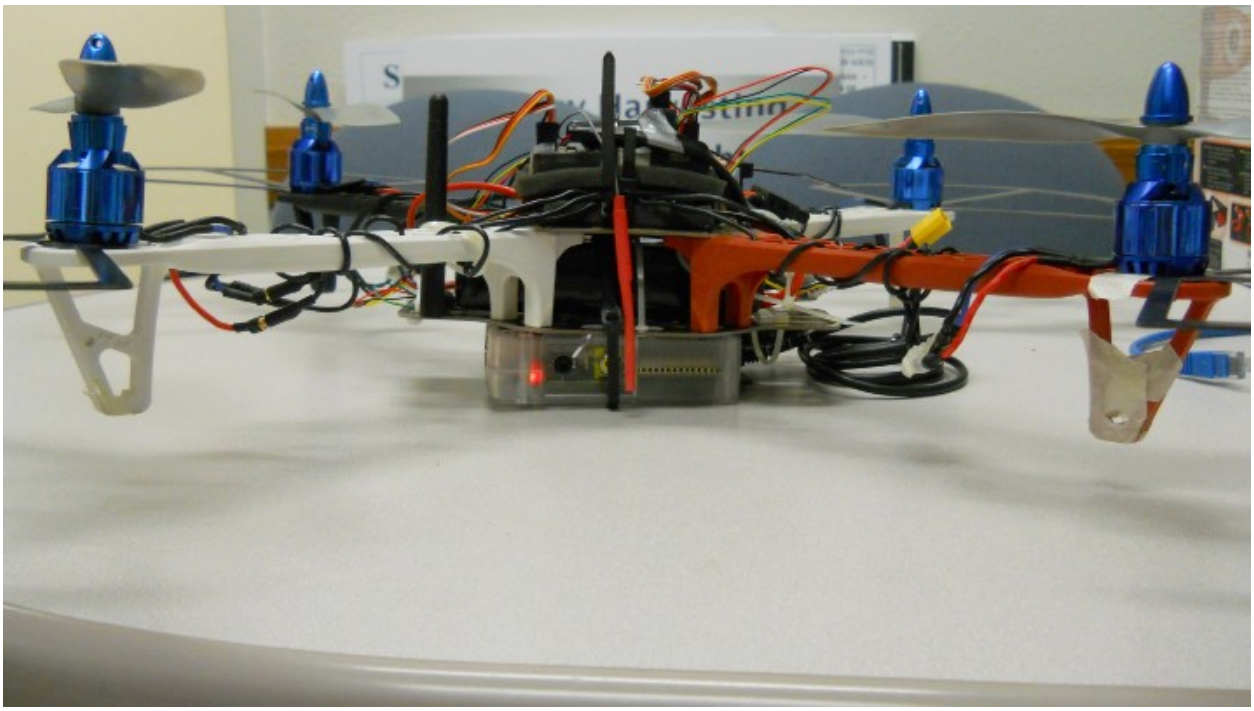


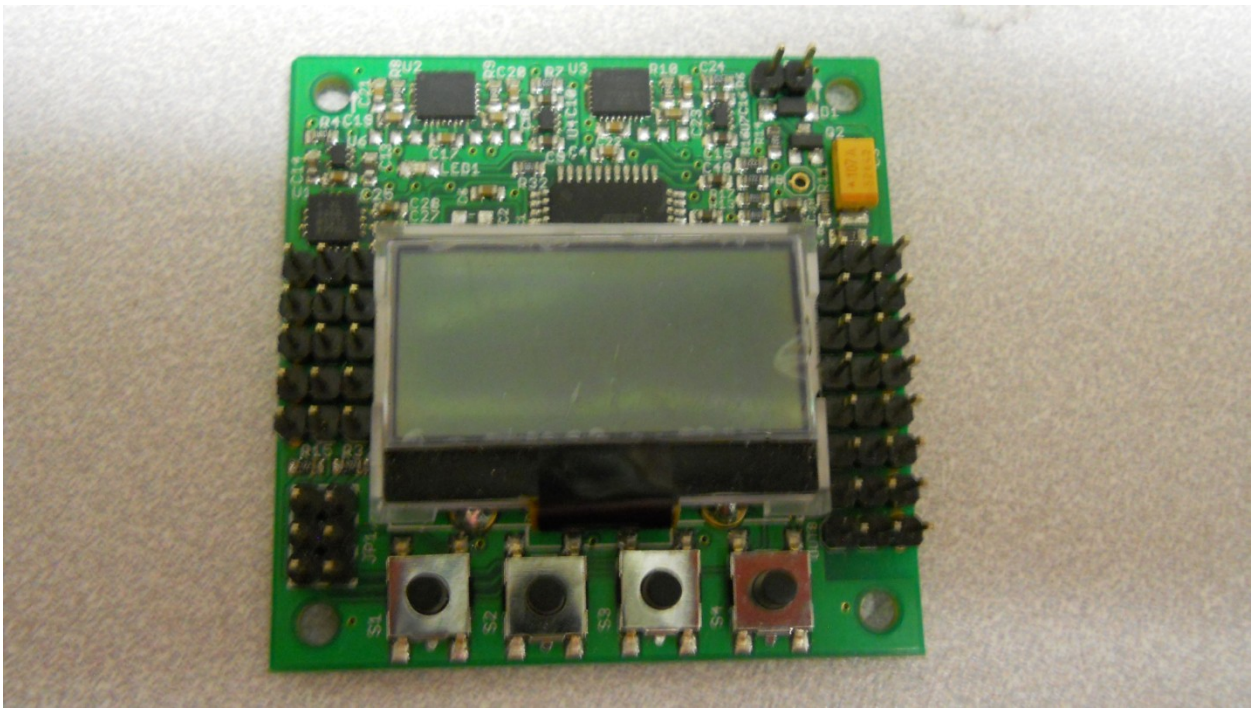
Applying Thrust to all motors, but more on one motor - Roll/Pitch changes and the platform moves forward

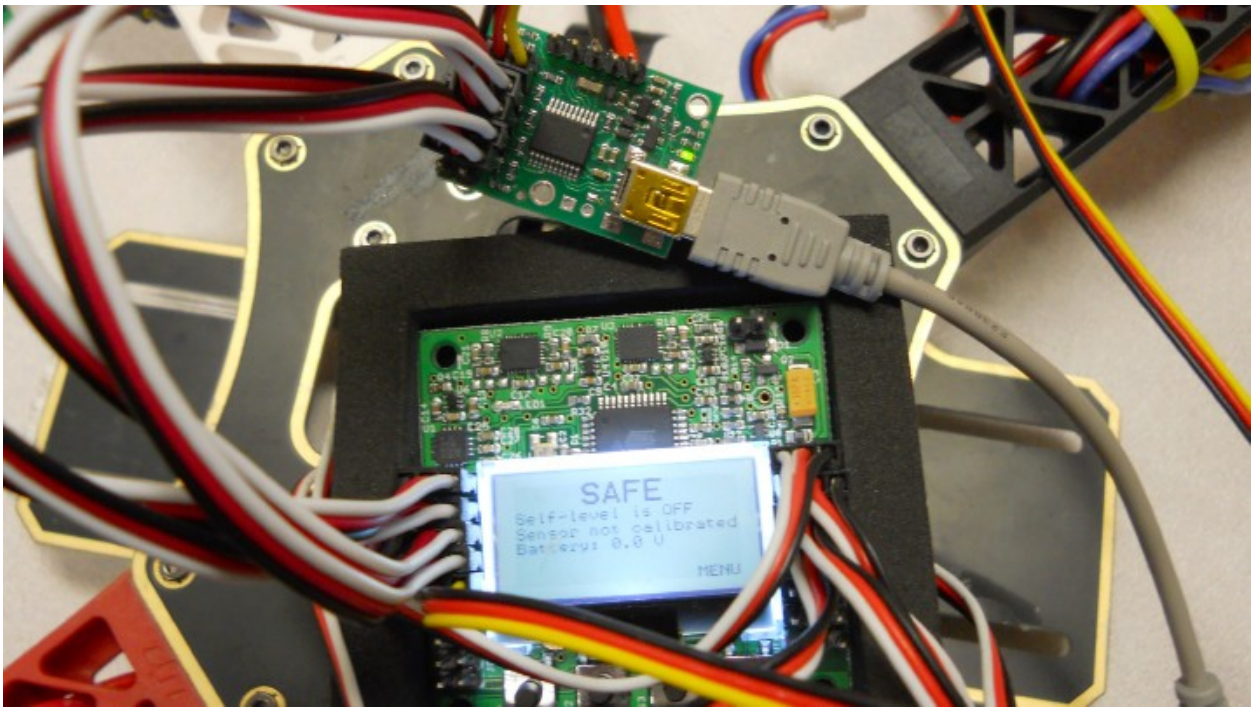


In a feedback system, the desired altitude is compared to the actual altitude and the amount of difference then drives the control signals to the motors to change the actual altitude.

Mission Planner 1.2.83 build 1.1.5036.12264
FLIGHT DATA
FLIGHT PLAN
INITIAL SETUP
CONFIG/TUNING
SIMULATION
TERMINAL
HELP
DISCONNECT
DISARMED
GPS: No GPS
Dir: 0
Vel: 0
Dist to Home: 12321520
hdop: 0.0
Sats: 0
Current Heading
Direct to current WP
Target Heading
GPS Track (Black)
Quick
Actions
Gauges
Status
Servo
Altitude (m)
0.86
GroundSpeed (m
0.00
Dist to WP (m)
0.00
Yaw (deg)
233.64






SAFE
Self-level is OFF
Sensor not calibrated
Battery: 0.0 V
MENU