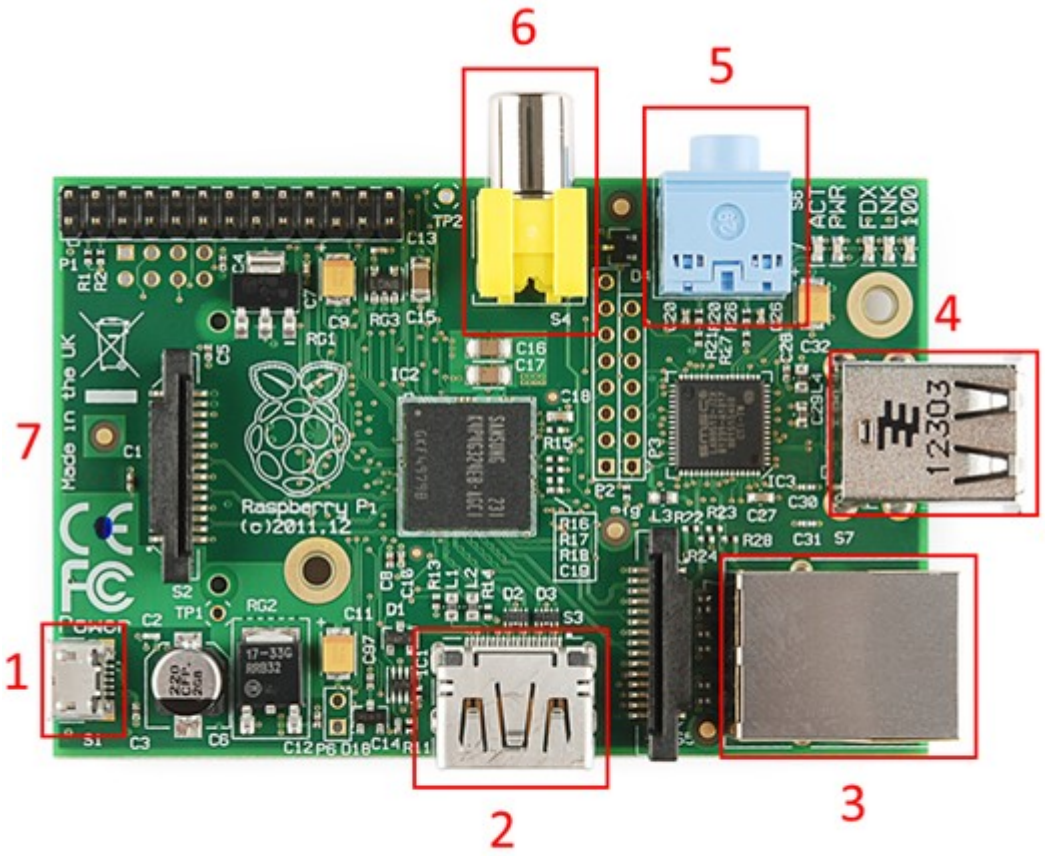
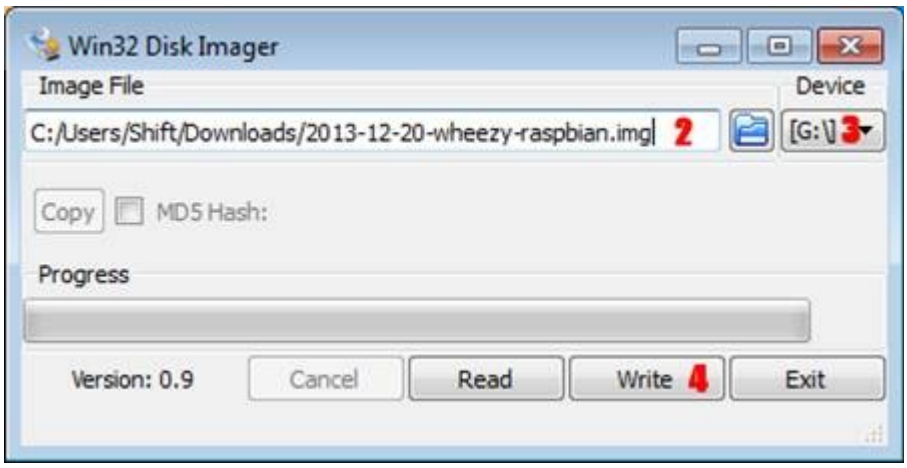
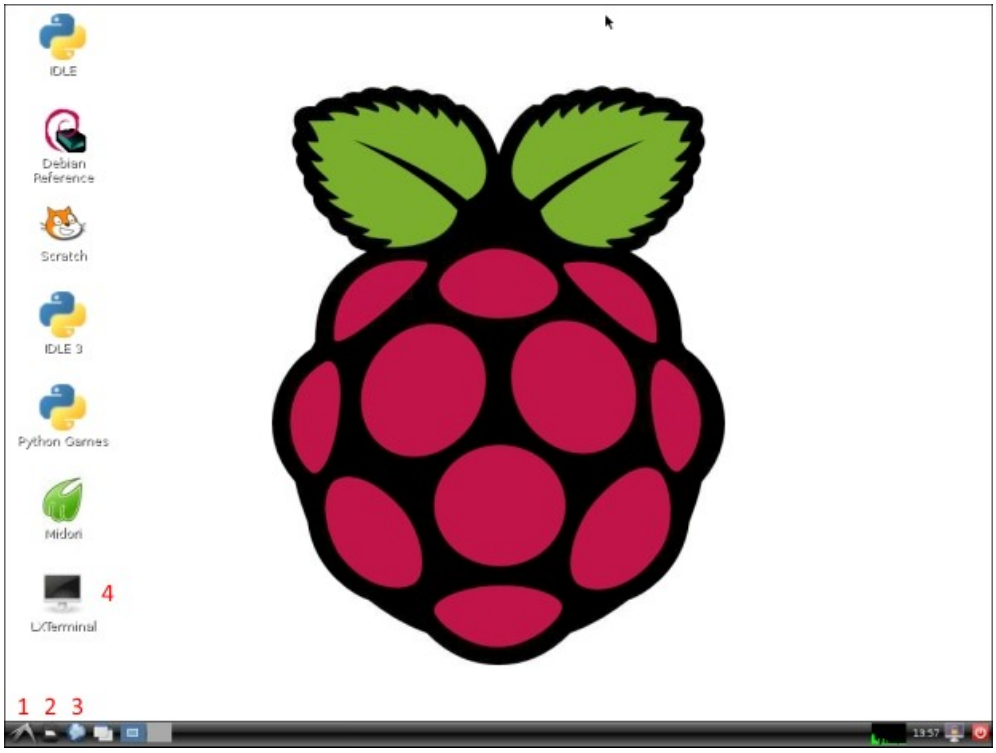
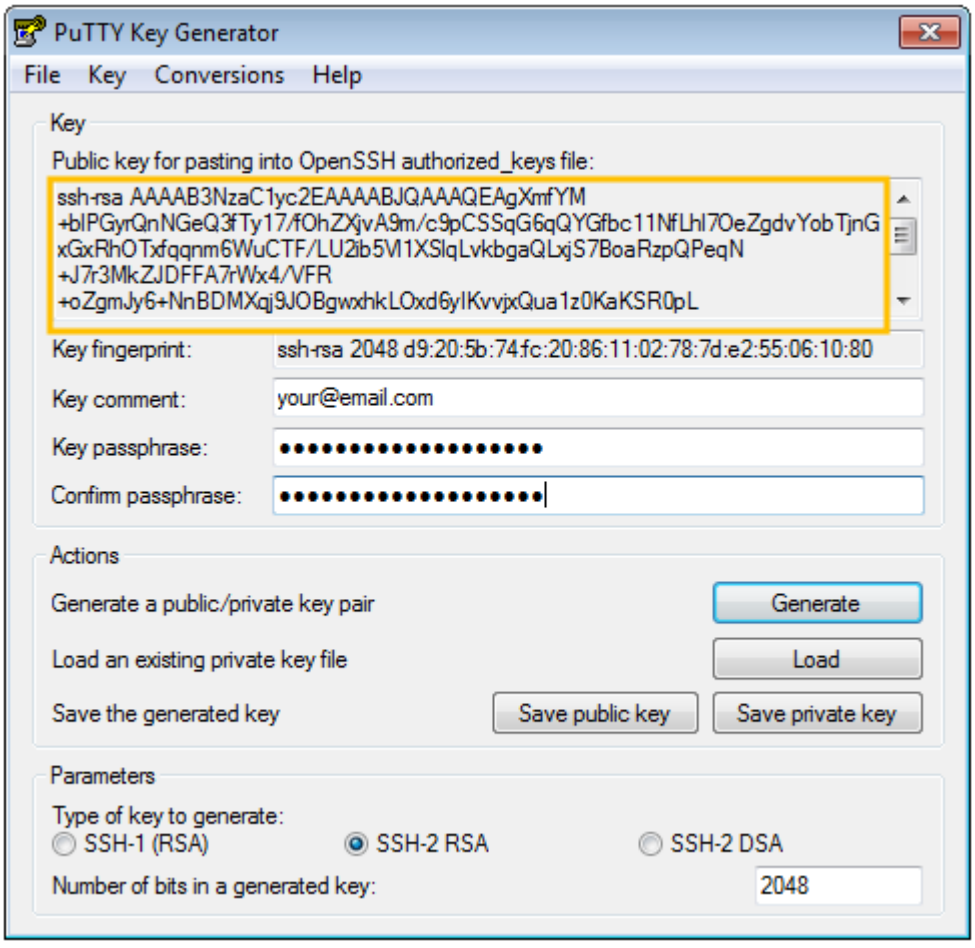
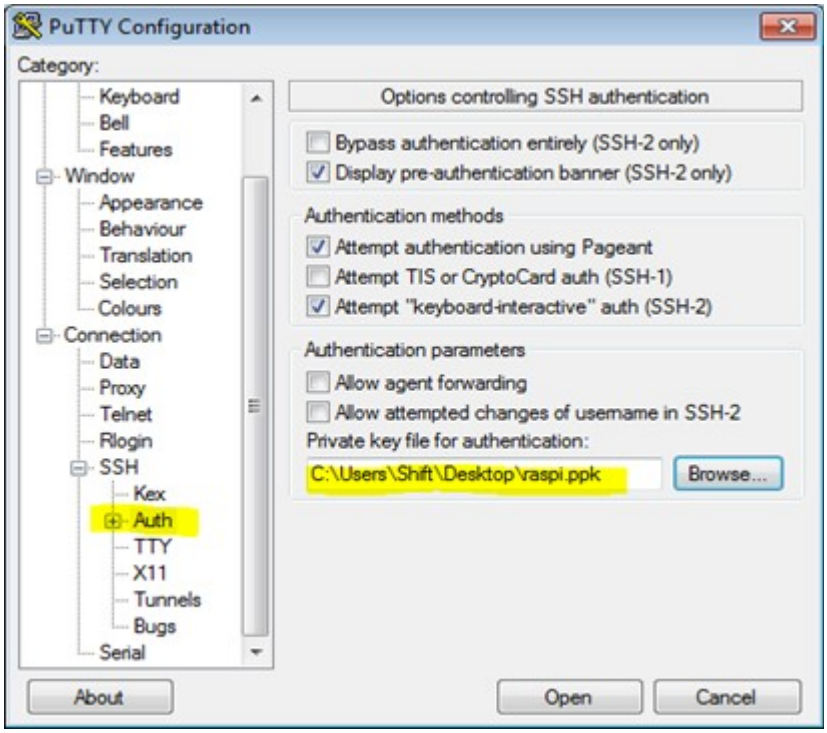
Chapter 1: Getting Started with Raspberry Pi



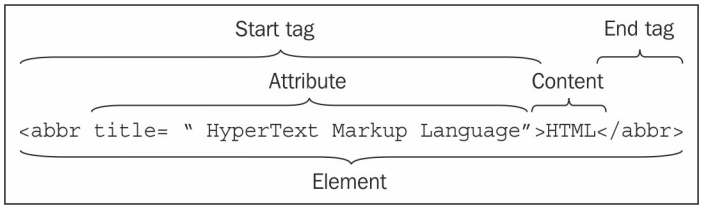


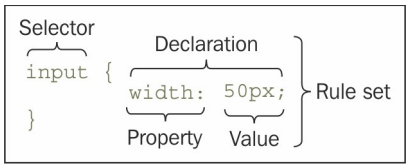

IDLE
Debian Reference
Scratch
IDLE 3
Python Games
Midori
4
LXTerminal
1 2 3

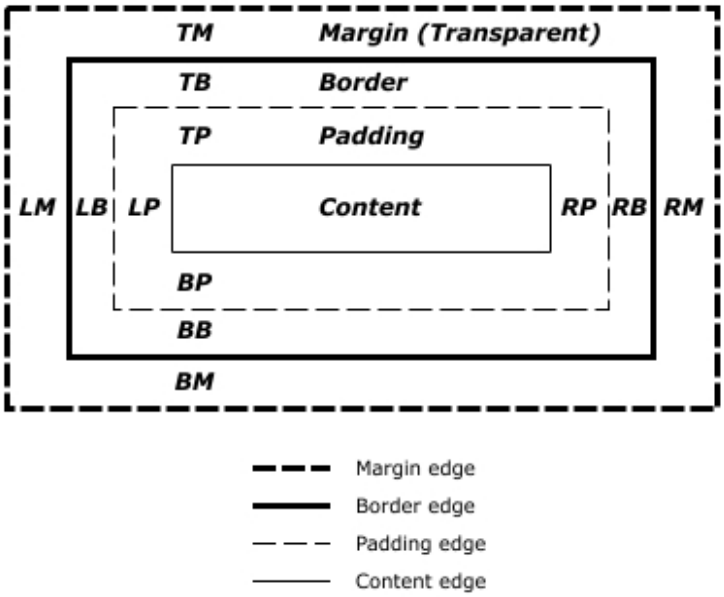

PuTTY Key Generator
File Key Conversions Help
Key
Public key for pasting into OpenSSH authorized_keys file:
ssh-rsa AAAAB3NzaC1yc2EAAAABJQAAAQEAgXmfYM
+blPGyrQnNGeQ3fTy17/fOhZXjvA9m/c9pCSSqG6qQYGfbc11NfLhl7OeZgdvYobTjnG
xGxRhOTxfqqnm6WuCTF/LU2ib5Vl1XSlqLvkbgaQLxjS7BoaRzpQPeqN
+J7r3MkZJDFFA7rWx4/VFR
+oZgmJy6+NnBDMXqj9JOBgwxhkLOxd6ylKvvjxQua1z0KaKSR0pL
Key fingerprint: ssh-rsa 2048 d9:20:5b:74:fc:20:86:11:02:78:7d:e2:55:06:10:80
Key comment: your@email.com
Key passphrase:
Confirm passphrase:
Actions
Generate a public/private key pair
Generate
Load an existing private key file
Load
Save the generated key
Save public key
Save private key
Parameters
Type of key to generate:
SSH-1 (RSA)
SSH-2 RSA
SSH-2 DSA
Number of bits in a generated key:
2048

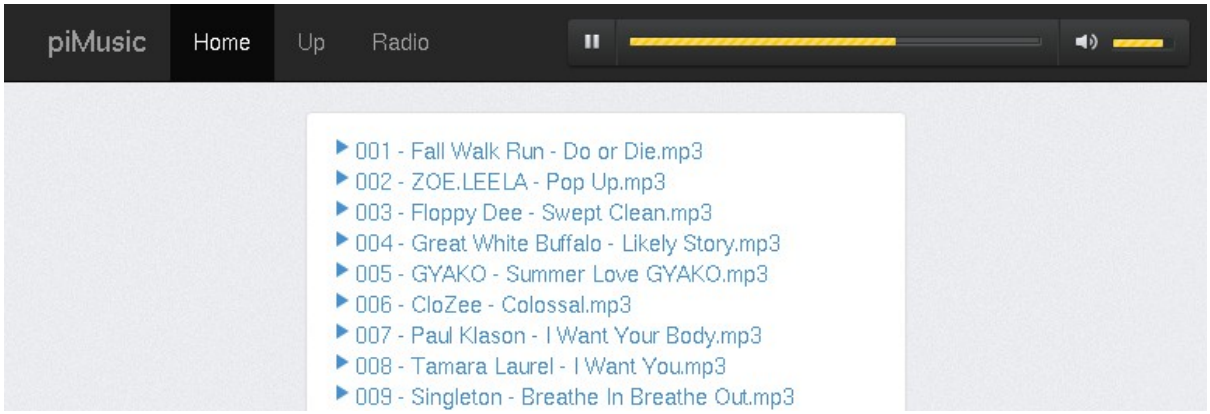


Chapter 2: Developing Web Applications

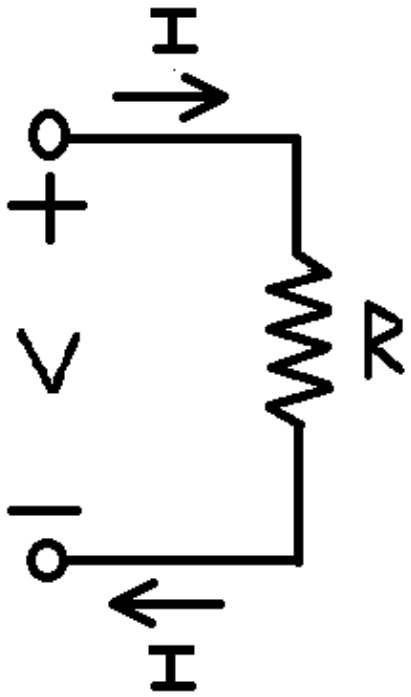


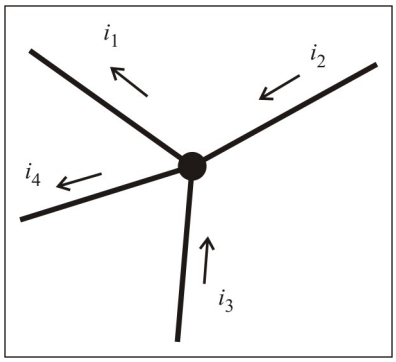



TM
Margin (Transparent)
TB
Border
TP
Padding
LM
LB
LP
Content
RP
RB
RM
BP
BB
BM
Margin edge
Border edge
Padding edge
Content edge

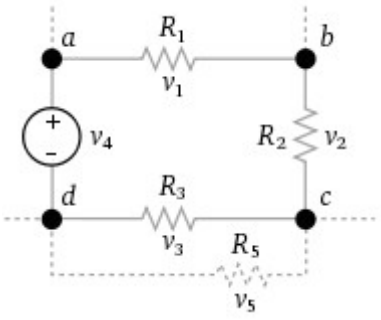

piMusic
Home
Up
Radio
001 - Fall Walk Run - Do or Die.mp3
002 - ZOE.LEELA - Pop Up.mp3
003 - Floppy Dee - Swept Clean.mp3
004 - Great White Buffalo - Likely Story.mp3
005 - GYAKO - Summer Love GYAKO.mp3
006 - CloZee - Colossal.mp3
007 - Paul Klason - I Want Your Body.mp3
008 - Tamara Laurel - I Want You.mp3
009 - Singleton - Breathe In Breathe Out.mp3

Chapter 3: Introduction to Electronics



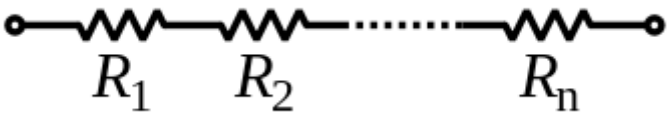


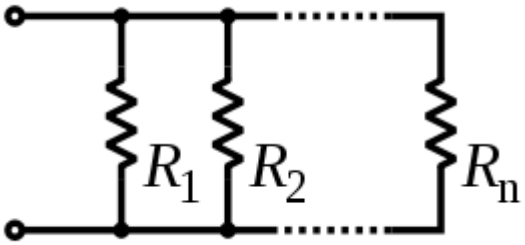
$$i_2 + i_3 = i_1 + i_4$$

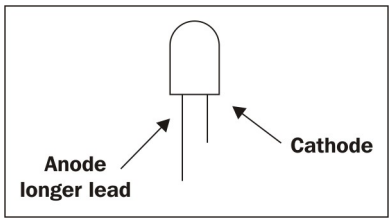


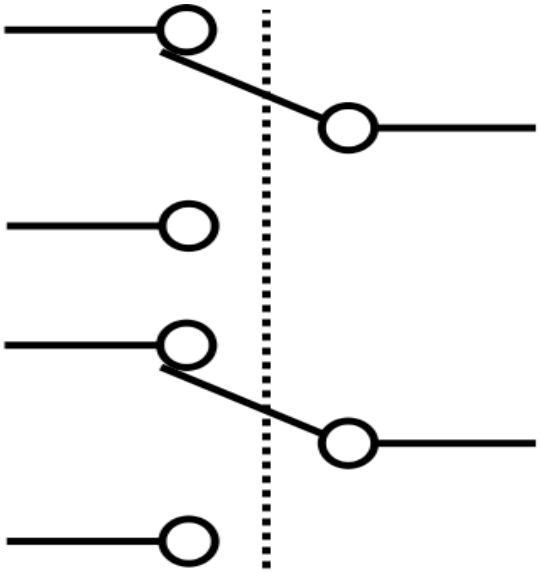
$$v_1 + v_2 + v_3 - v_4 = 0$$

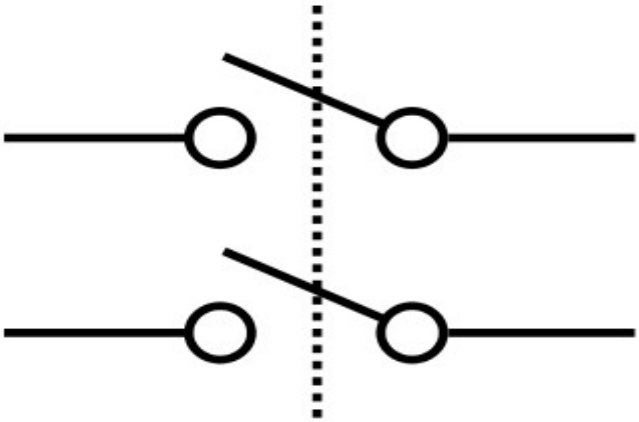
$$v_1 + v_2 + v_3 = v_4$$

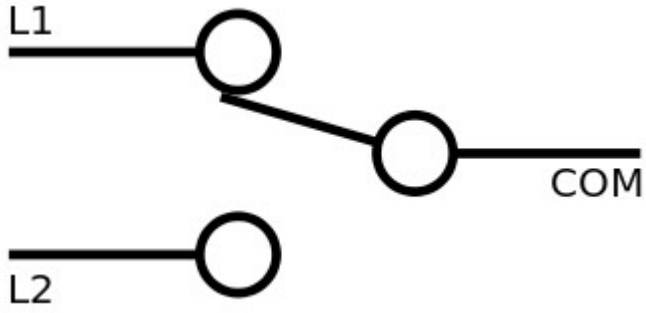


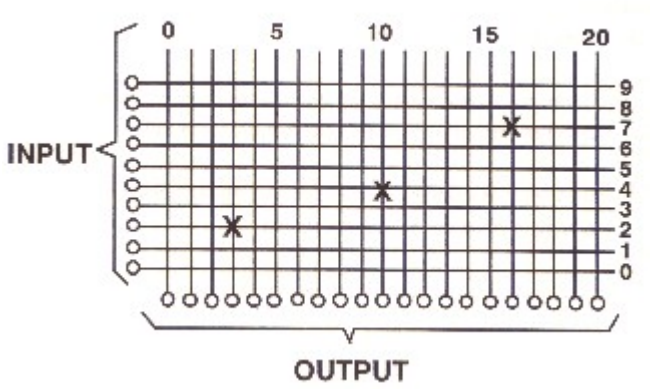


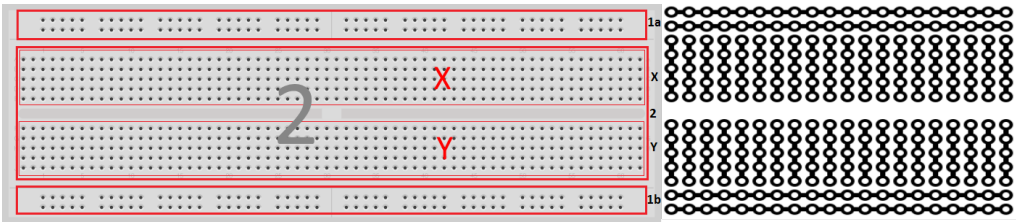


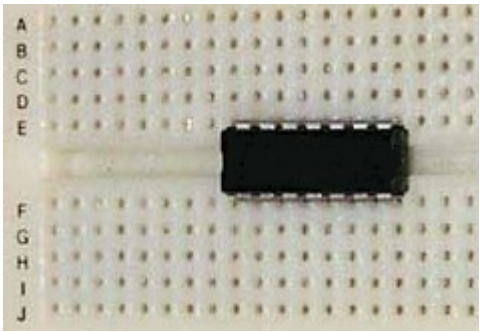


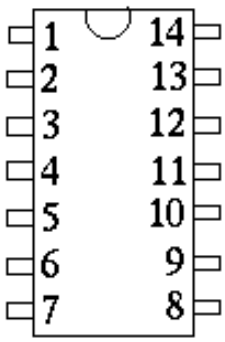


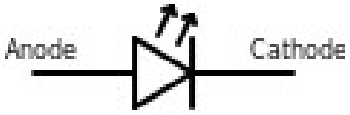

L1
COM
L2

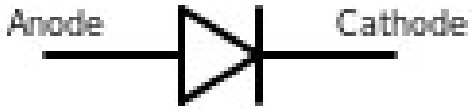

0
5
10
15
20
9
8
7
6
5
4
3
2
1
0
INPUT
OUTPUT

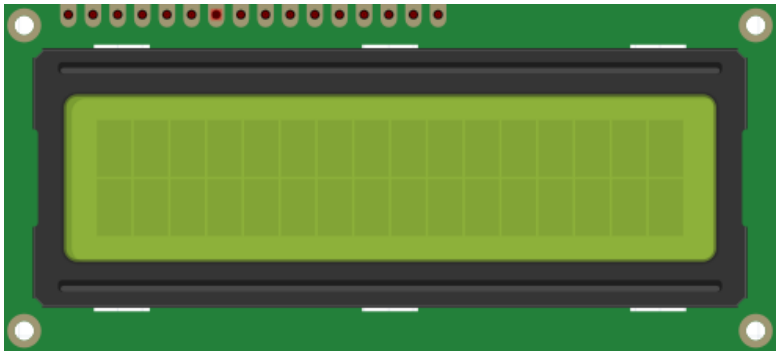

1a
X
2
Y
1b

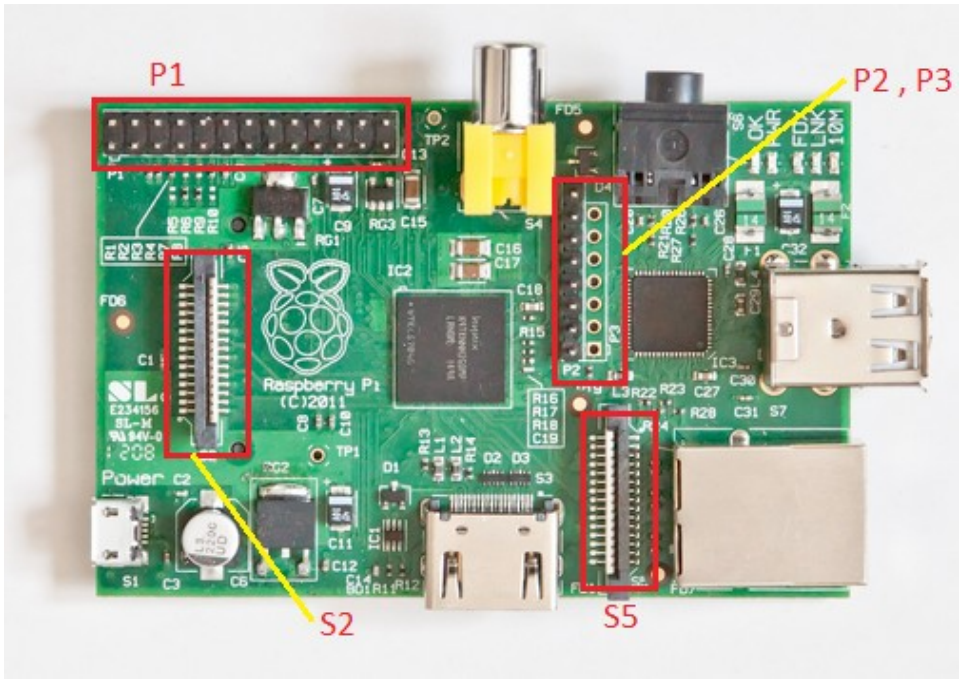

A
B
C
D
E
F
G
H
I
J

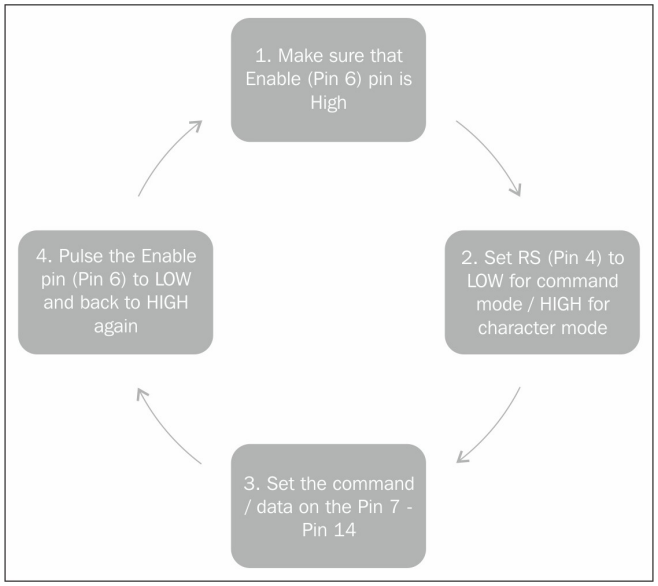

1
2
3
4
5
6
7
14
13
12
11
10
9
8

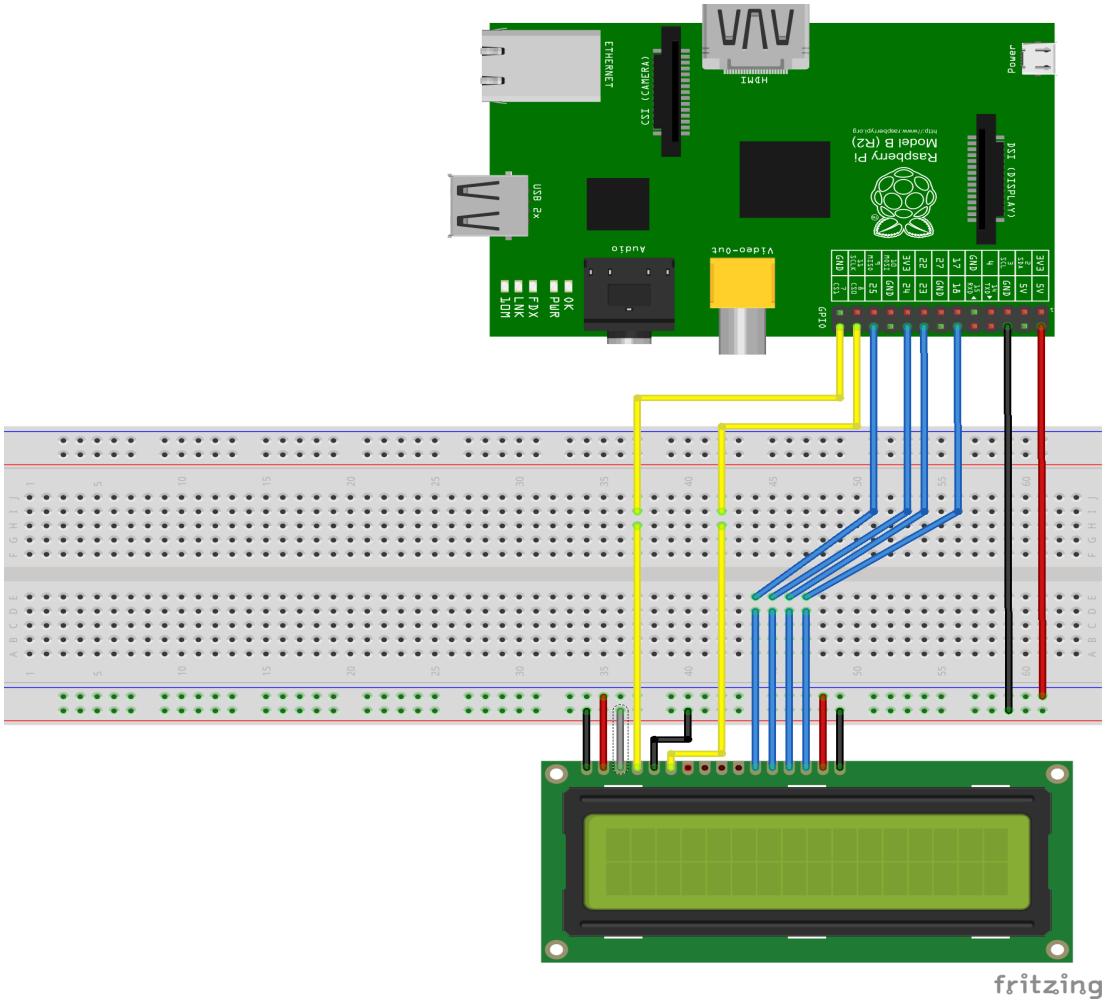

Anode
Cathode

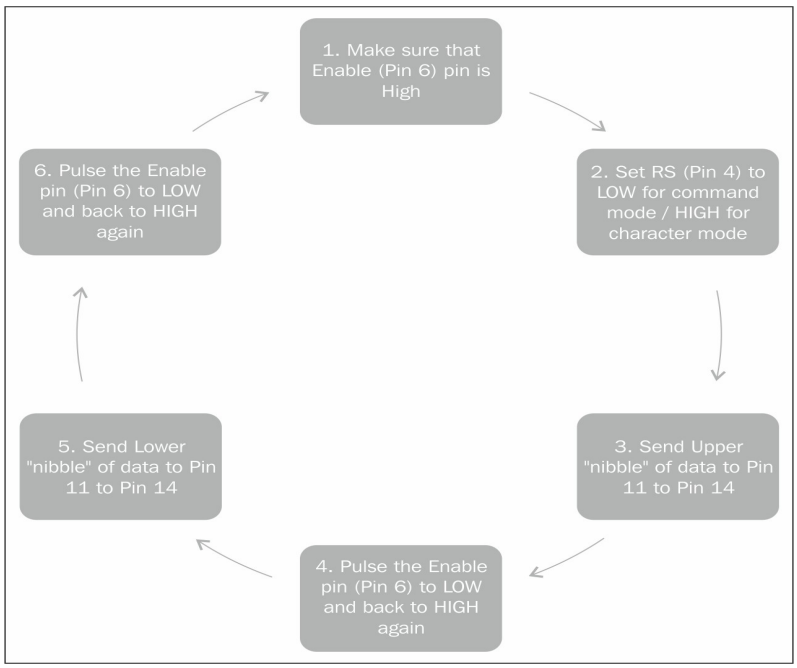

Anode
Cathode

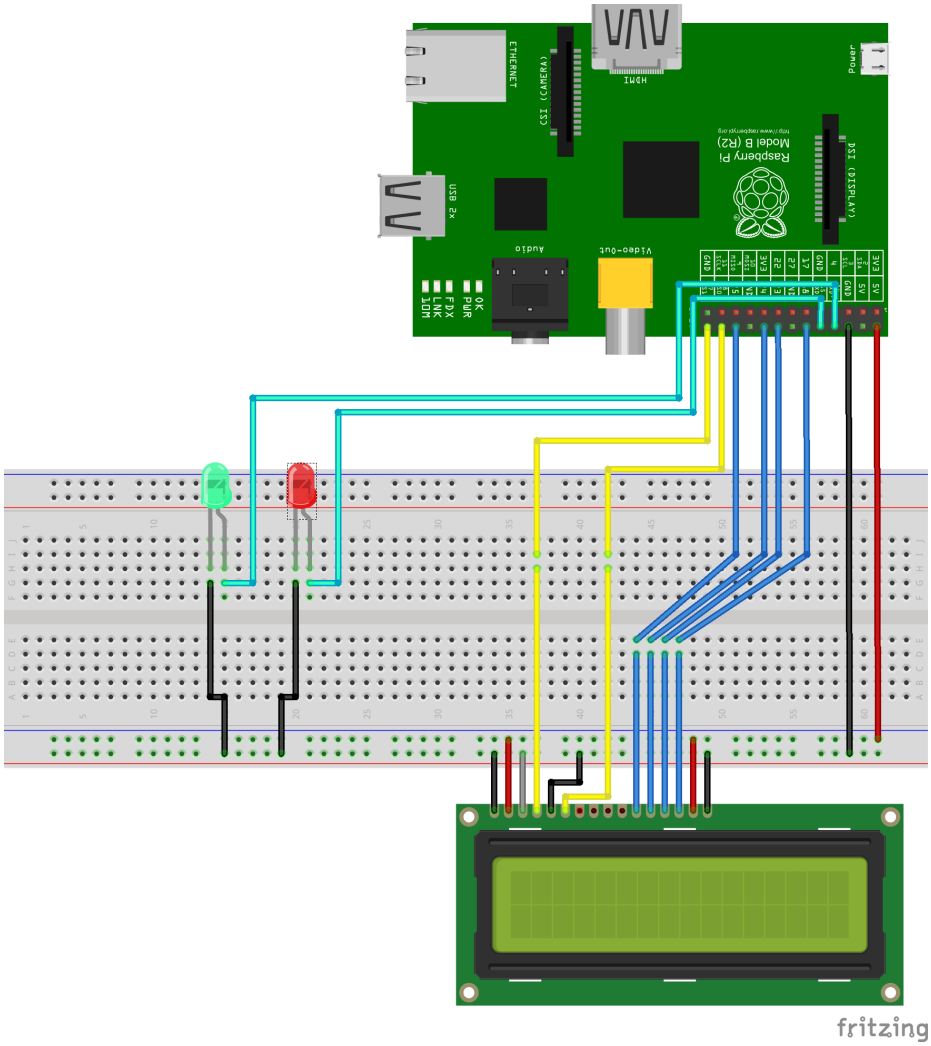


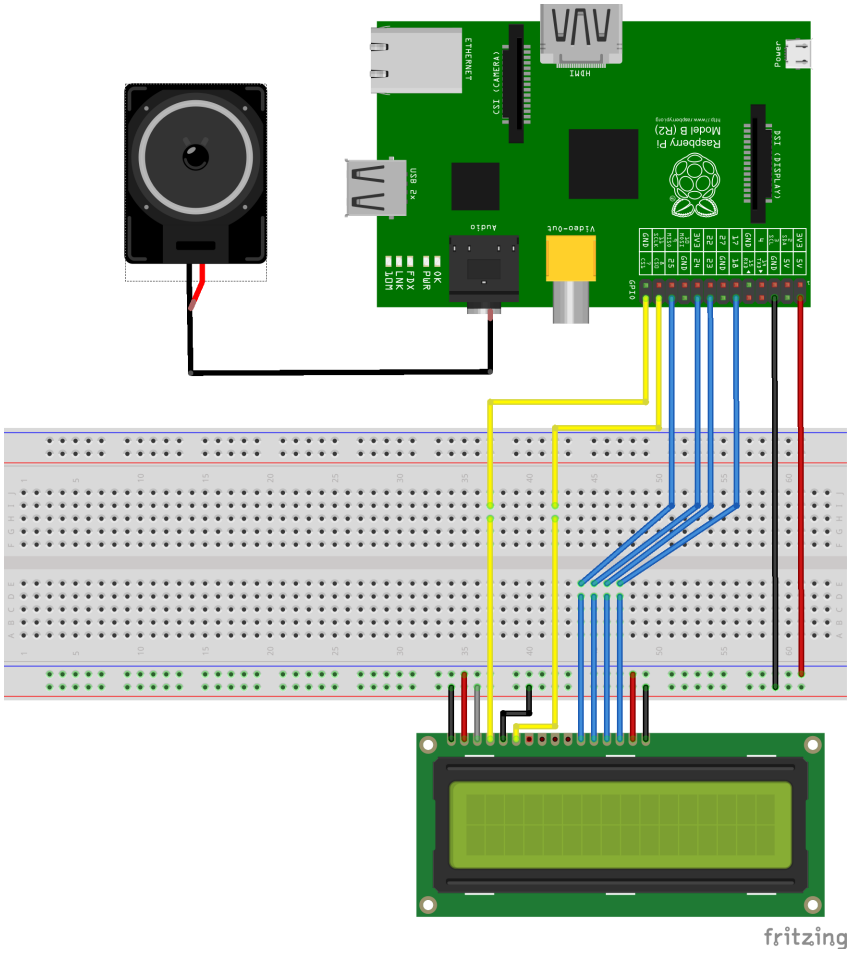

P1
P2 , P3
S2
S5
Raspberry Pi
(C)2011
Power


1. Make sure that Enable (Pin 6) pin is High
2. Set RS (Pin 4) to LOW for command mode / HIGH for character mode
3. Set the command / data on the Pin 7 - Pin 14
4. Pulse the Enable pin (Pin 6) to LOW and back to HIGH again


ETHERNET
CSI (CAMERA)
HDMI
Power
Raspberry Pi
Model B (R2)
DSI (DISPLAY)
USB 2x
Audio
Video-out
GPIO
OK
PWR
FDX
LNK
10M
fritzing


1. Make sure that Enable (Pin 6) pin is High
2. Set RS (Pin 4) to LOW for command mode / HIGH for character mode
3. Send Upper "nibble" of data to Pin 11 to Pin 14
4. Pulse the Enable pin (Pin 6) to LOW and back to HIGH again
5. Send Lower "nibble" of data to Pin 11 to Pin 14
6. Pulse the Enable pin (Pin 6) to LOW and back to HIGH again

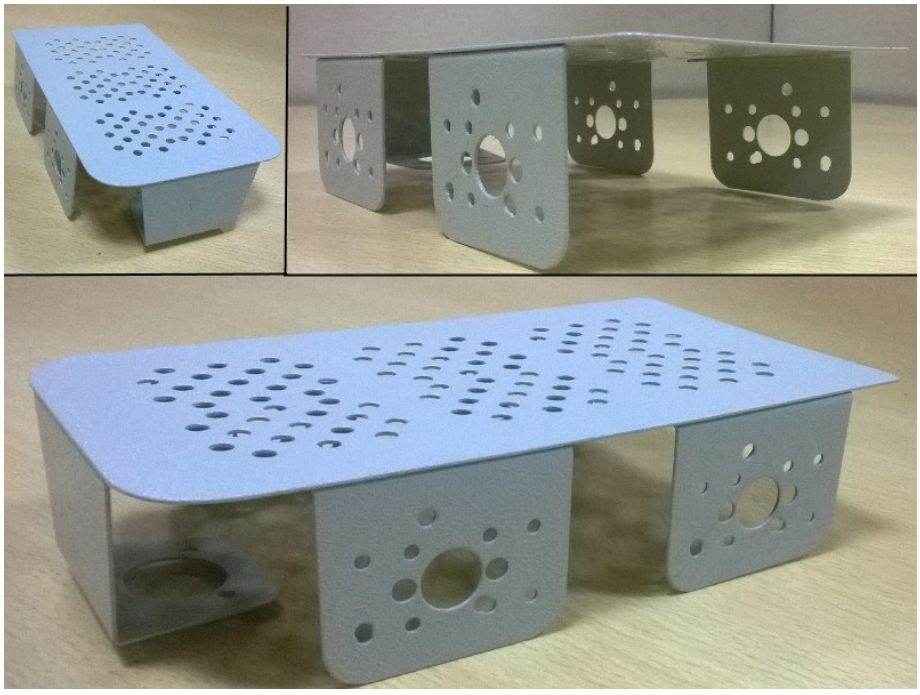

ETHERNET
CSI (CAMERA)
HDMI
Power
DSI (DISPLAY)
USB x2
Audio
Video-out
Raspberry Pi
Model B (R2)
GPIO
OK
PWR
FDX
LNK
10M
fritzing

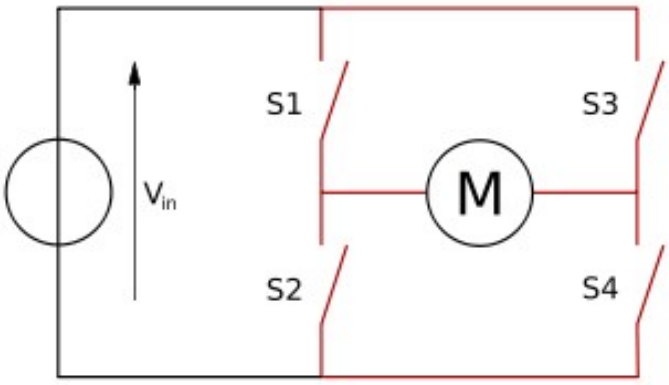


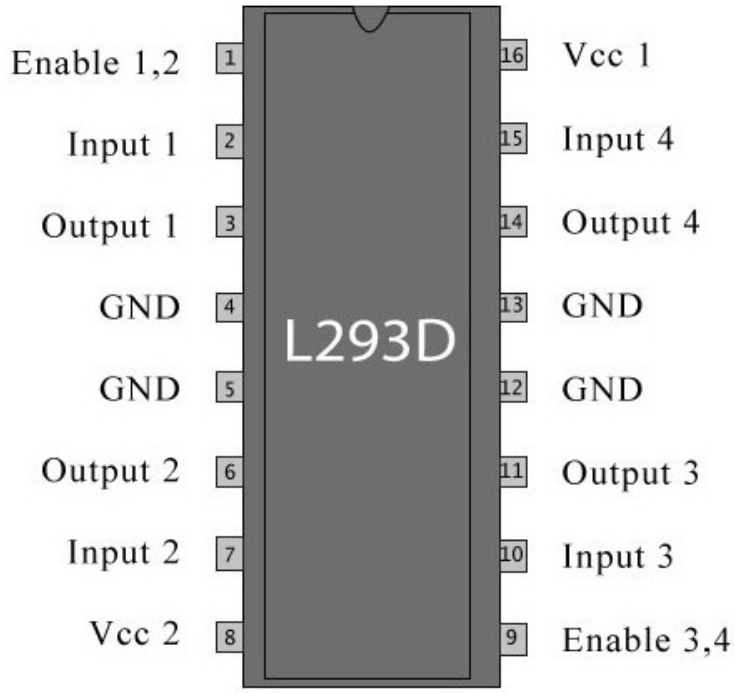
Chapter 4: Getting into Robotics


sanwa
AX-303TR
0Ω ADJ
POLARITY
DCV
ACV
DCmA
DC12A+
BATT+
-COM
X10k
X1k
X10
X1
BATT
1.5V

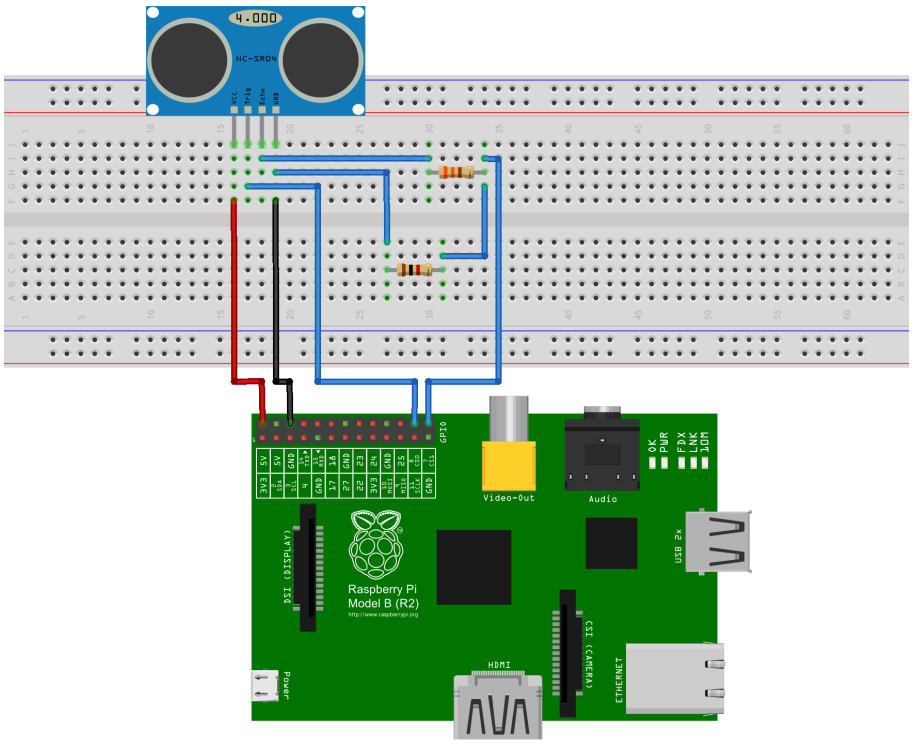

024
OFF
1000
750
200
20
2000
m
200
m
2000k
200k
20k
2000
200
Ω
V
A
2000µ
20m
200
m
10
OUT
TEMP
°C
10A DC
UNI-T

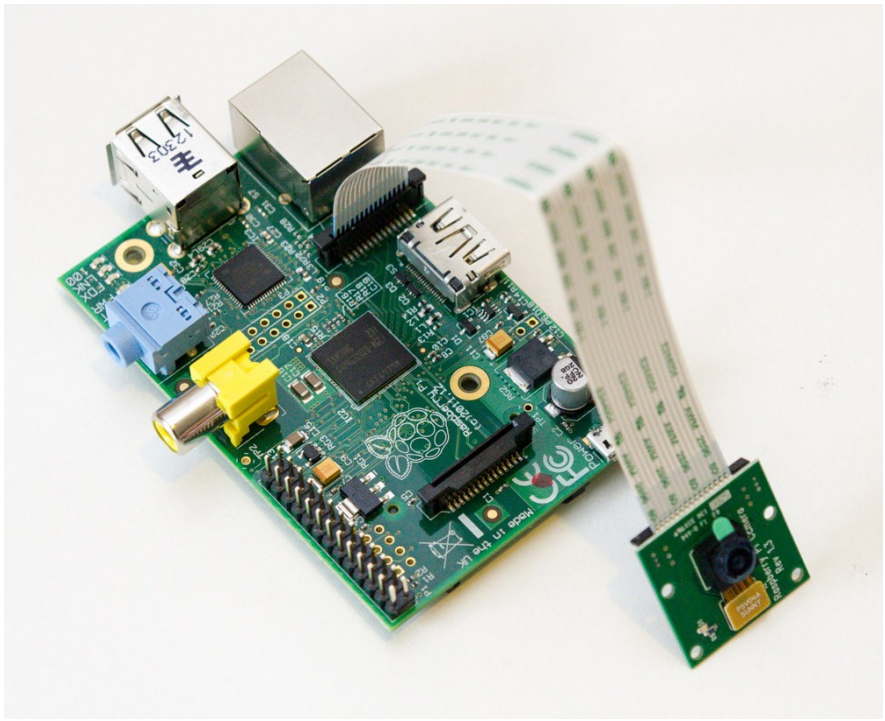


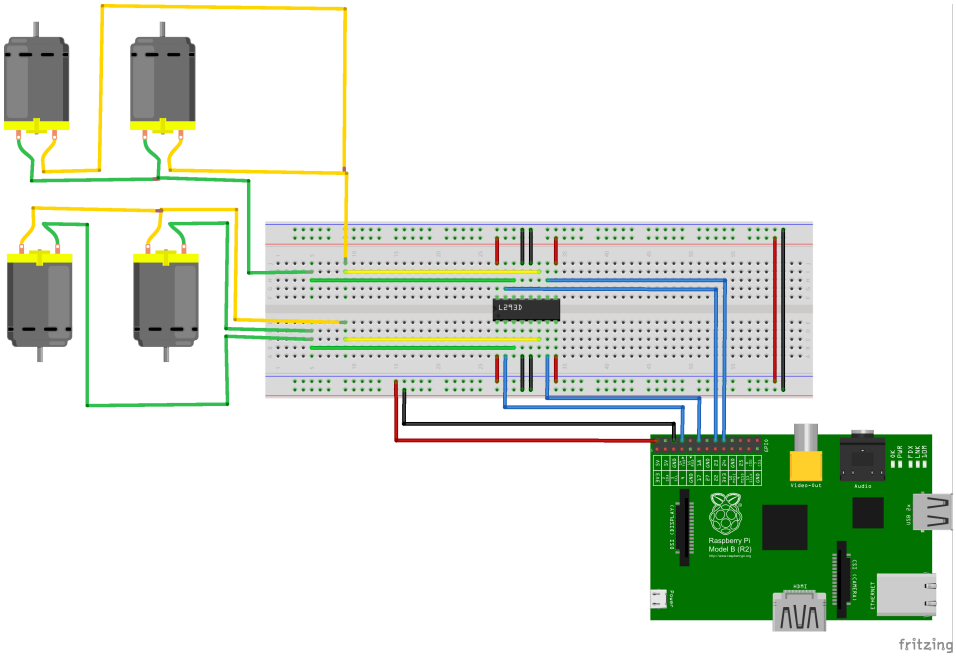

S1
S3
M
V_{in}
S2
S4


Enable 1,2
1
Input 1
2
Output 1
3
GND
4
GND
5
Output 2
6
Input 2
7
Vcc 2
8
L293D
16
Vcc 1
15
Input 4
14
Output 4
13
GND
12
GND
11
Output 3
10
Input 3
9
Enable 3,4


Y1
HC-SR04
Vcc
Trig
Echo
GND
J1
T
R


4.000
HC-SR04
Vcc
Trig
Echo
Gnd
Video-Out
Audio
Raspberry Pi
Model B (R2)
http://www.raspberry-pi.org
HDMI
ETHERNET
USB 2x
Power
fritzing





Connect to Engine

HTML Tag

Left Margin

Width

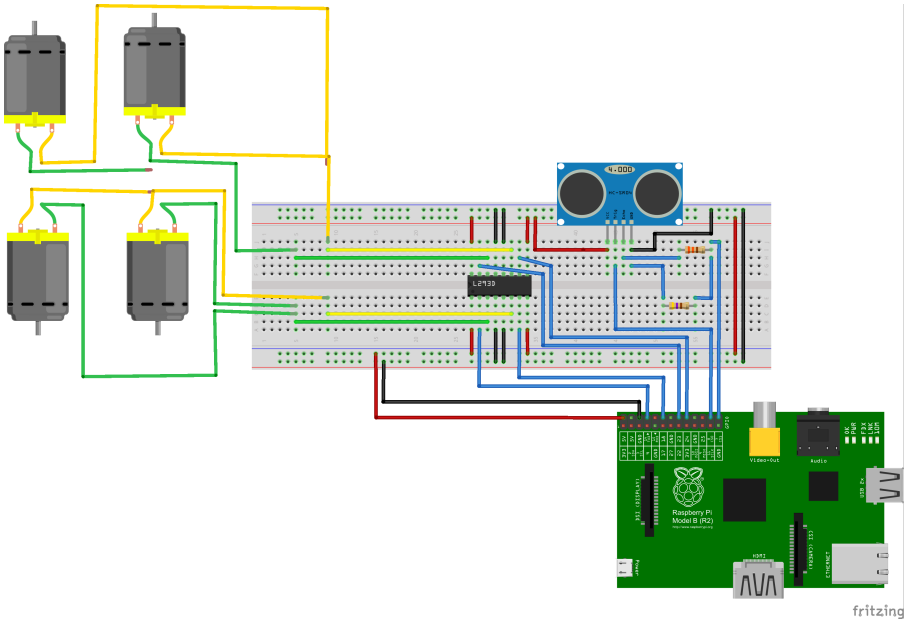
Tag Attribute

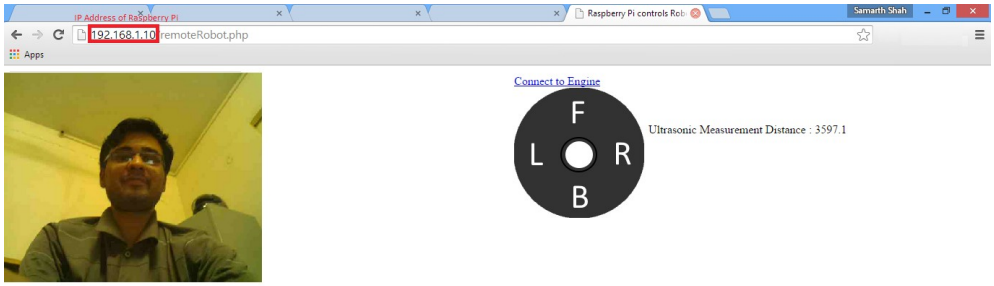
```
<area shape="rect" coords="30,1,120,60"
href="remoteRobot.php?GO=FORWARD" alt="Forward" title="Forward">
```

Hyperlink Reference

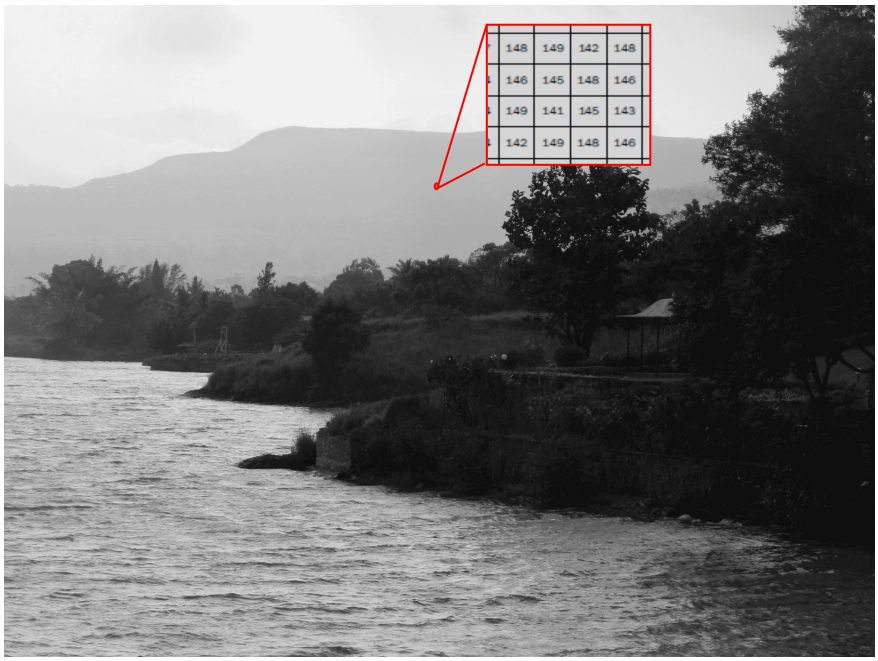
Top Margin

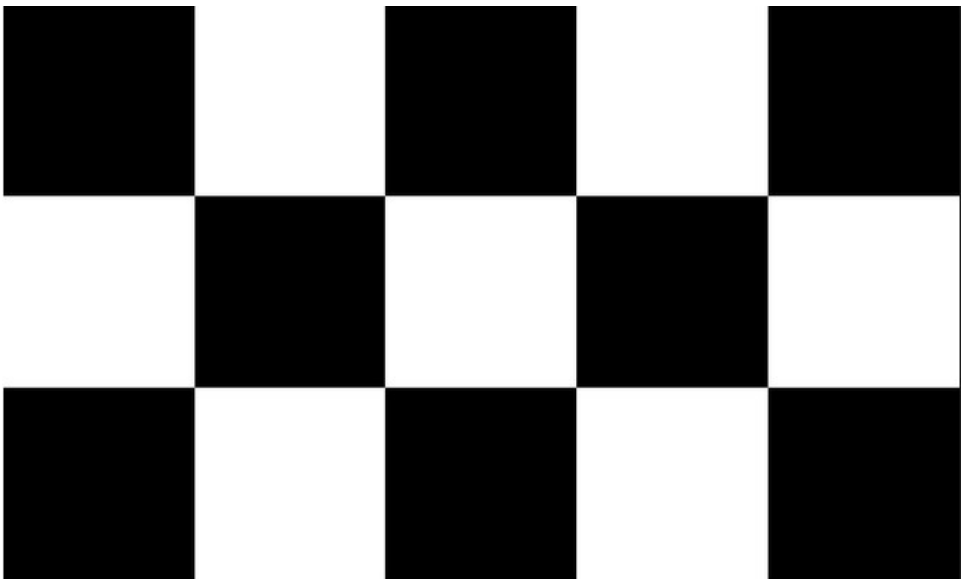
Height

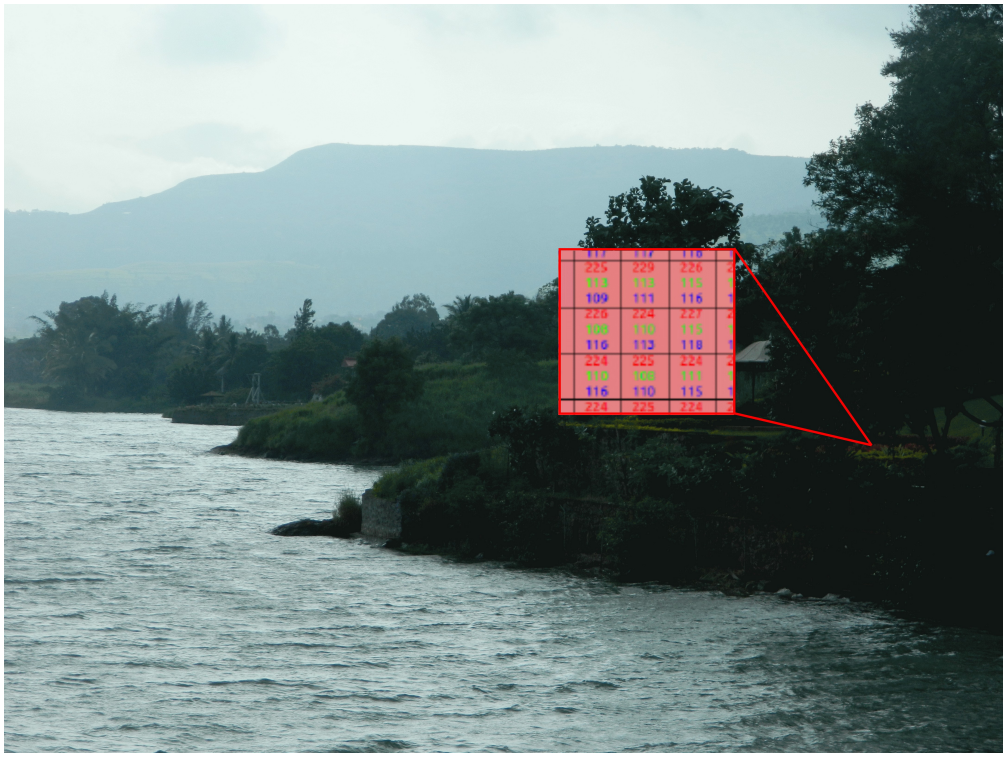

L293D
Raspberry Pi
Model B (R2)
fritzing


IP Address of Raspberry Pi
192.168.1.10/remoteRobot.php
Raspberry Pi controls Rob
Samarth Shah
Apps
Connect to Engine
F
L
R
B
Ultrasonic Measurement Distance : 3597.1

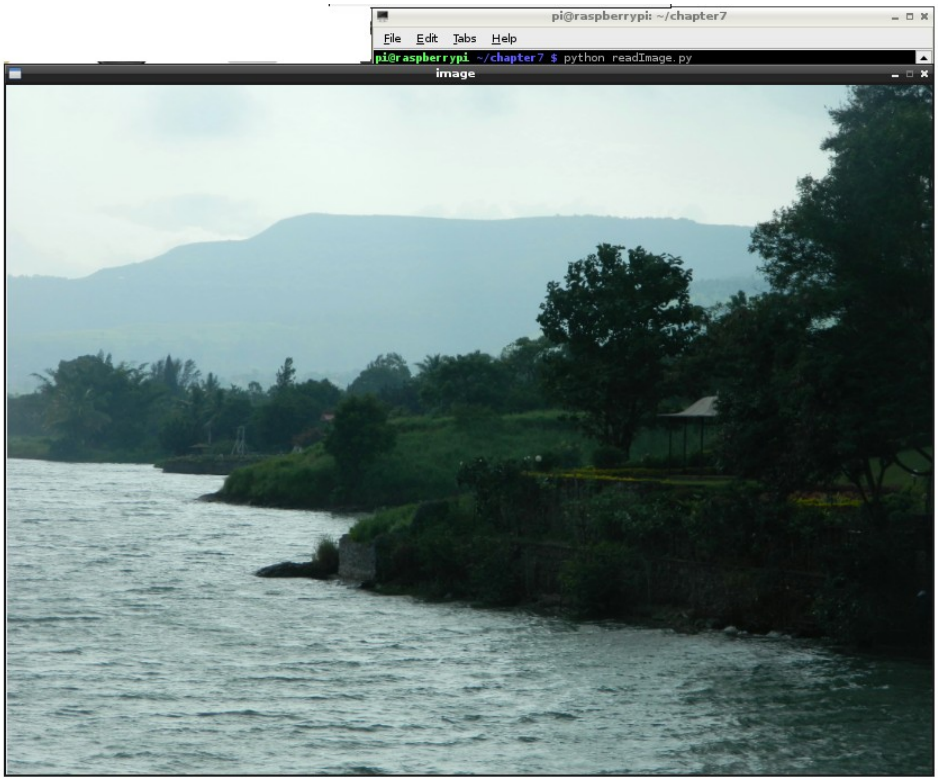
Chapter 5: Introduction to Image Processing






225 229 226
113 115 115
109 111 116
226 224 227
108 110 115
110 113 118
224 225 224
110 108 111
116 110 115
224 225 224

:

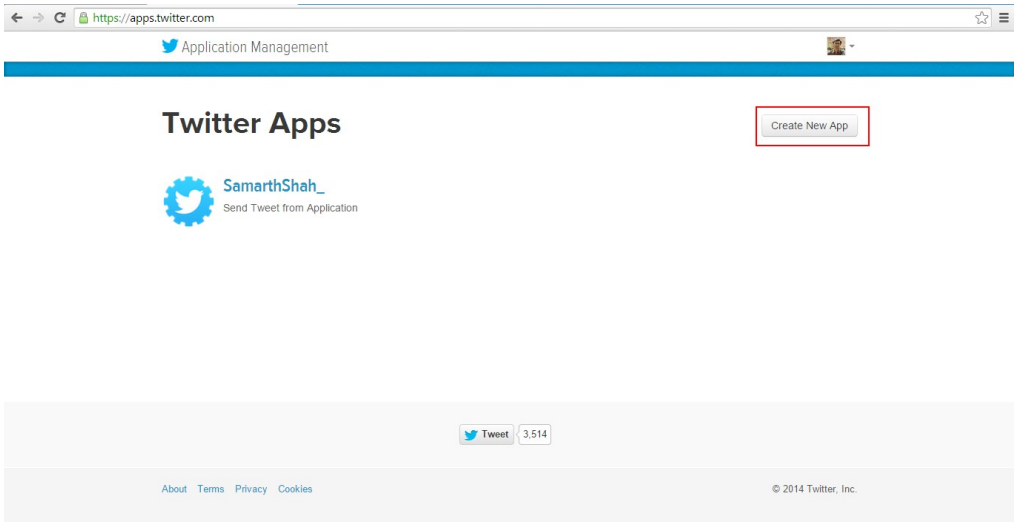

pi@raspberrypi: ~/chapter7
File Edit Tabs Help
pi@raspberrypi ~/chapter7 $ python readImage.py
image

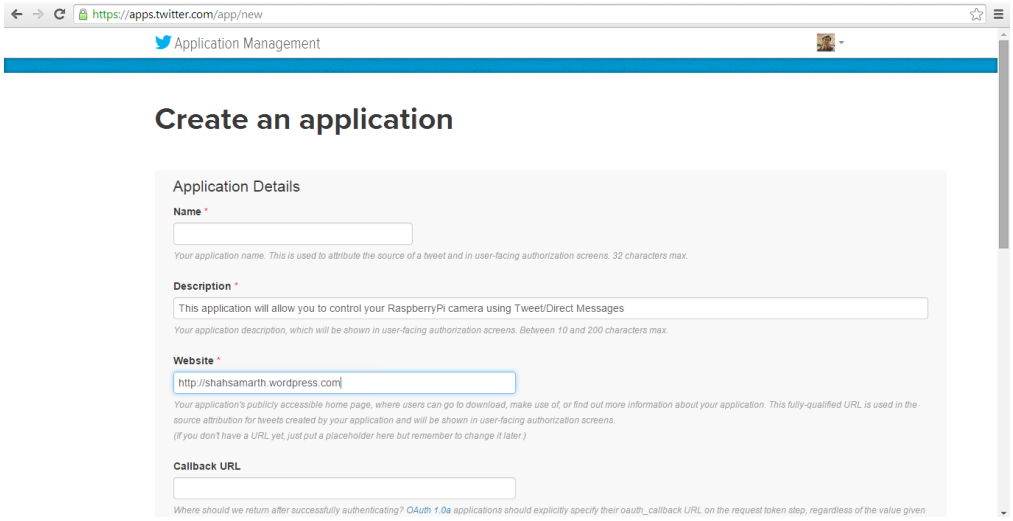
```
pi@raspberrypi: ~/chapter7
File  Edit  Tabs  Help

In [2]: img=cv2.imread('/home/pi/chapter7/test.PNG')

In [3]: img.
img.T               img.data            img.nbytes          img.size
img.all             img.diagonal        img.ndim            img.sort
img.any             img.dot             img.newbyteorder    img.squeeze
img.argmax          img.dtype           img.nonzero         img.std
img.argmin          img.dump            img.prod            img.strides
img.argsort         img.dumps           img.ptp             img.sum
img.astype          img.fill            img.put             img.swapaxes
img.base            img.flags           img.ravel           img.take
img.byteswap        img.flat            img.real            img.tofile
img.choose          img.flatten         img.repeat          img.tolist
img.clip            img.getfield        img.reshape         img.tostring
img.compress        img.imag            img.resize          img.trace
img.conj            img.item            img.round           img.transpose
img.conjugate       img.itemset         img.searchsorted    img.var
img.copy            img.itemsize        img.setasflat       img.view
img.ctypes          img.max             img.setfield
img.cumprod         img.mean            img.setflags
img.cumsum          img.min             img.shape

In [3]: img.
```

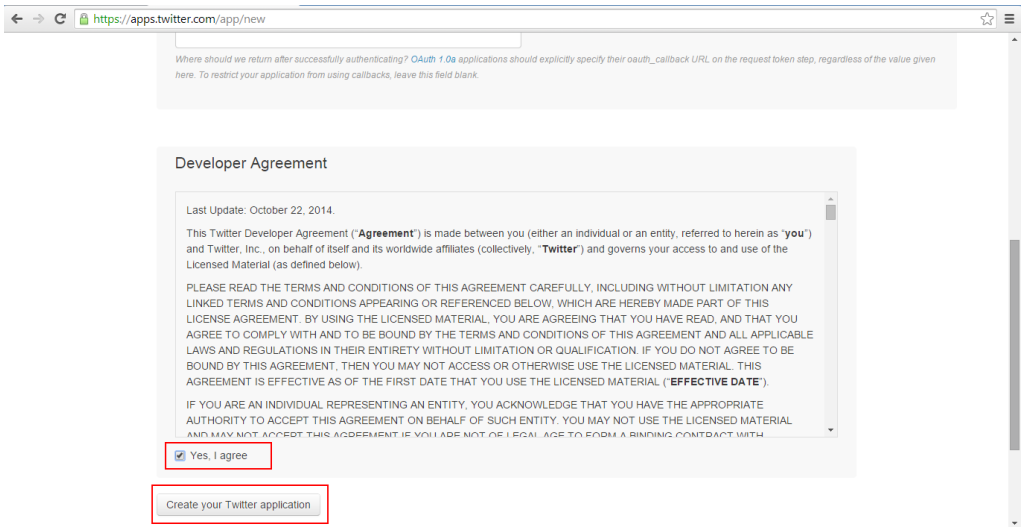

OpenCV Image Addition

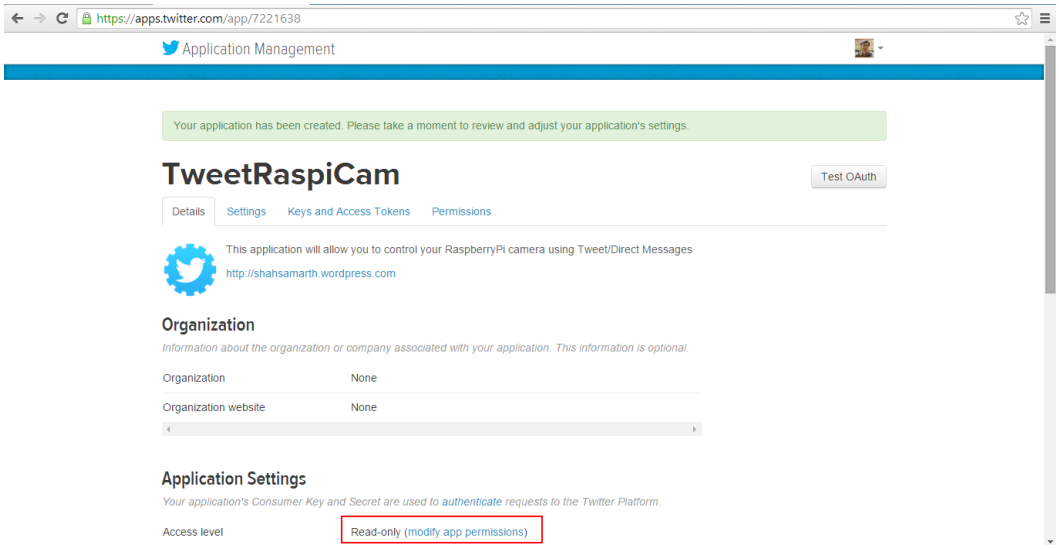

NumPy Image Addition

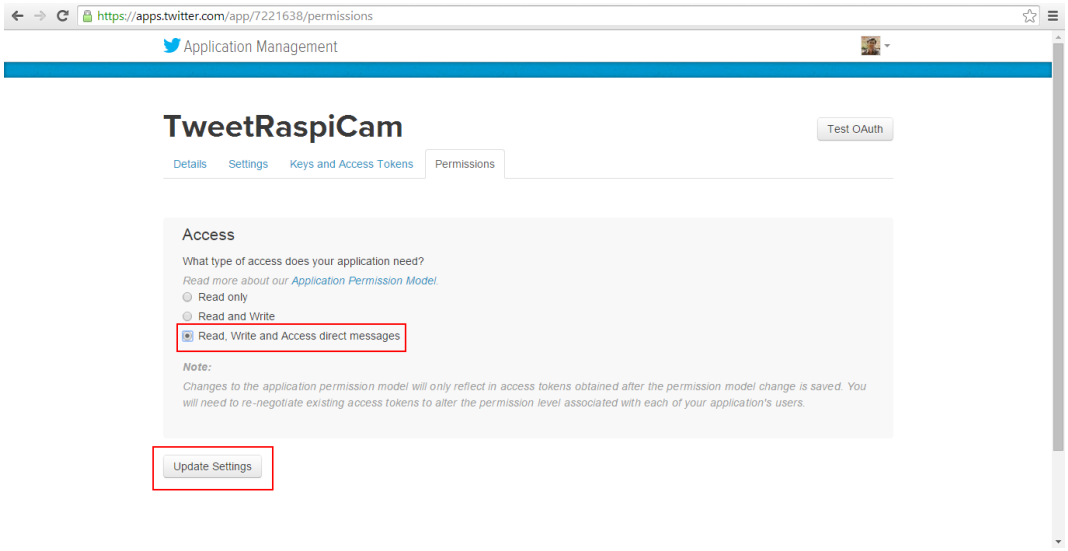

img

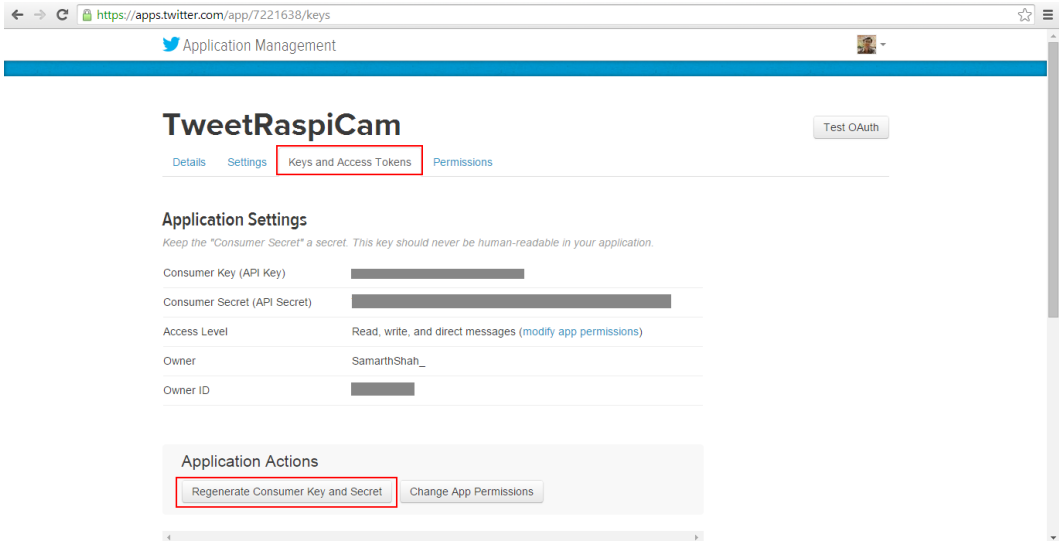

https://apps.twitter.com
Application Management
Twitter Apps
Create New App
SamarthShah_
Send Tweet from Application
Tweet
3,514
About
Terms
Privacy
Cookies
© 2014 Twitter, Inc.

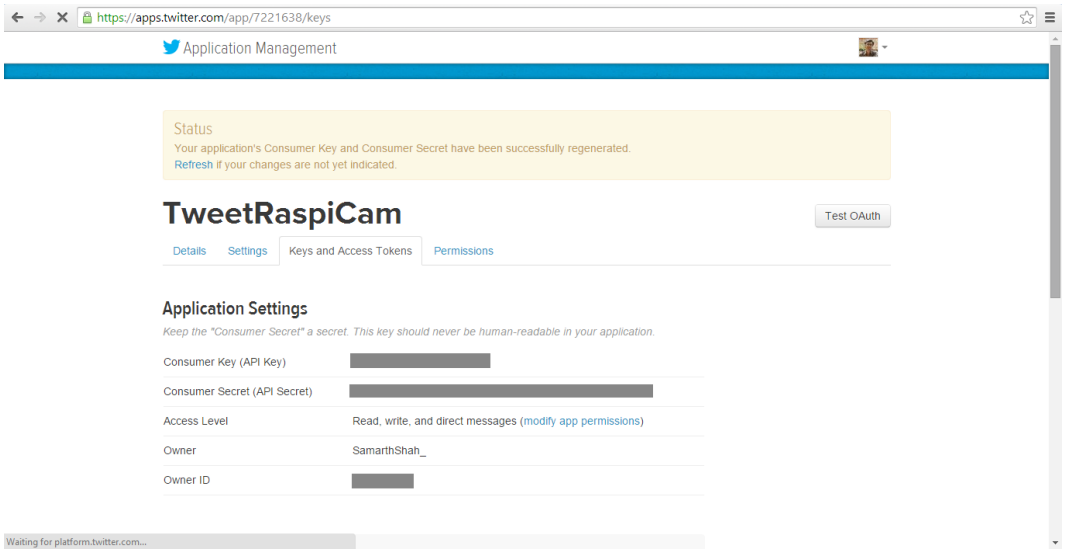

https://apps.twitter.com/app/new
Application Management
Create an application
Application Details
Name *
Your application name. This is used to attribute the source of a tweet and in user-facing authorization screens. 32 characters max.
Description *
This application will allow you to control your RaspberryPi camera using Tweet/Direct Messages
Your application description, which will be shown in user-facing authorization screens. Between 10 and 200 characters max.
Website *
http://shahsamarth.wordpress.com
Your application's publicly accessible home page, where users can go to download, make use of, or find out more information about your application. This fully-qualified URL is used in the source attribution for tweets created by your application and will be shown in user-facing authorization screens.
(If you don't have a URL yet, just put a placeholder here but remember to change it later.)
Callback URL
Where should we return after successfully authenticating? OAuth 1.0a applications should explicitly specify their oauth_callback URL on the request token step, regardless of the value given

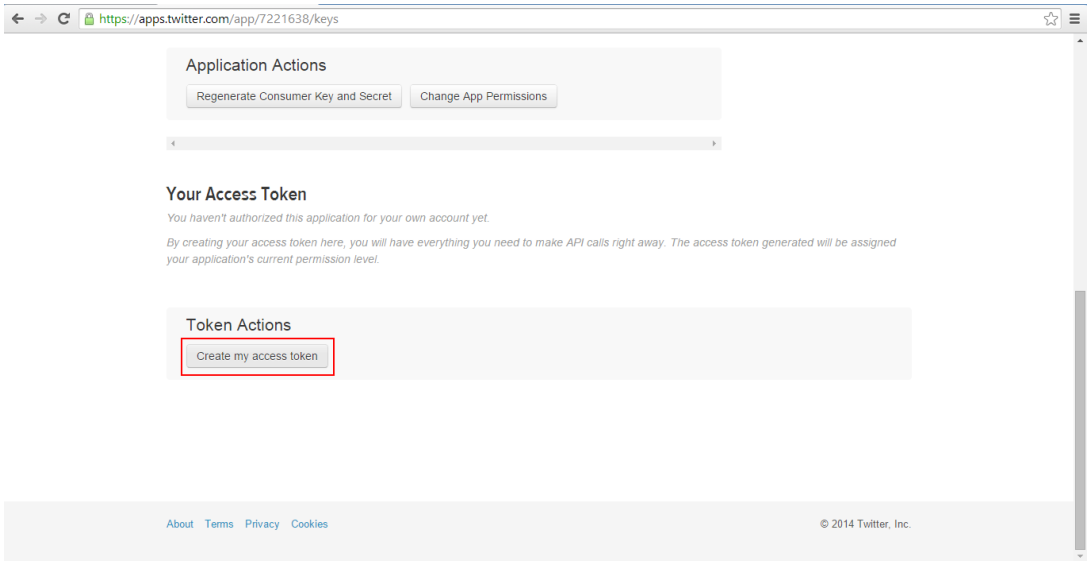

https://apps.twitter.com/app/new
Where should we return after successfully authenticating? OAuth 1.0a applications should explicitly specify their oauth_callback URL on the request token step, regardless of the value given here. To restrict your application from using callbacks, leave this field blank.
Developer Agreement
Last Update: October 22, 2014.
This Twitter Developer Agreement ("Agreement") is made between you (either an individual or an entity, referred to herein as "you") and Twitter, Inc., on behalf of itself and its worldwide affiliates (collectively, "Twitter") and governs your access to and use of the Licensed Material (as defined below).
PLEASE READ THE TERMS AND CONDITIONS OF THIS AGREEMENT CAREFULLY, INCLUDING WITHOUT LIMITATION ANY LINKED TERMS AND CONDITIONS APPEARING OR REFERENCED BELOW, WHICH ARE HEREBY MADE PART OF THIS LICENSE AGREEMENT. BY USING THE LICENSED MATERIAL, YOU ARE AGREEING THAT YOU HAVE READ, AND THAT YOU AGREE TO COMPLY WITH AND TO BE BOUND BY THE TERMS AND CONDITIONS OF THIS AGREEMENT AND ALL APPLICABLE LAWS AND REGULATIONS IN THEIR ENTIRETY WITHOUT LIMITATION OR QUALIFICATION. IF YOU DO NOT AGREE TO BE BOUND BY THIS AGREEMENT, THEN YOU MAY NOT ACCESS OR OTHERWISE USE THE LICENSED MATERIAL. THIS AGREEMENT IS EFFECTIVE AS OF THE FIRST DATE THAT YOU USE THE LICENSED MATERIAL ("EFFECTIVE DATE").
IF YOU ARE AN INDIVIDUAL REPRESENTING AN ENTITY, YOU ACKNOWLEDGE THAT YOU HAVE THE APPROPRIATE AUTHORITY TO ACCEPT THIS AGREEMENT ON BEHALF OF SUCH ENTITY. YOU MAY NOT USE THE LICENSED MATERIAL
Yes, I agree
Create your Twitter application

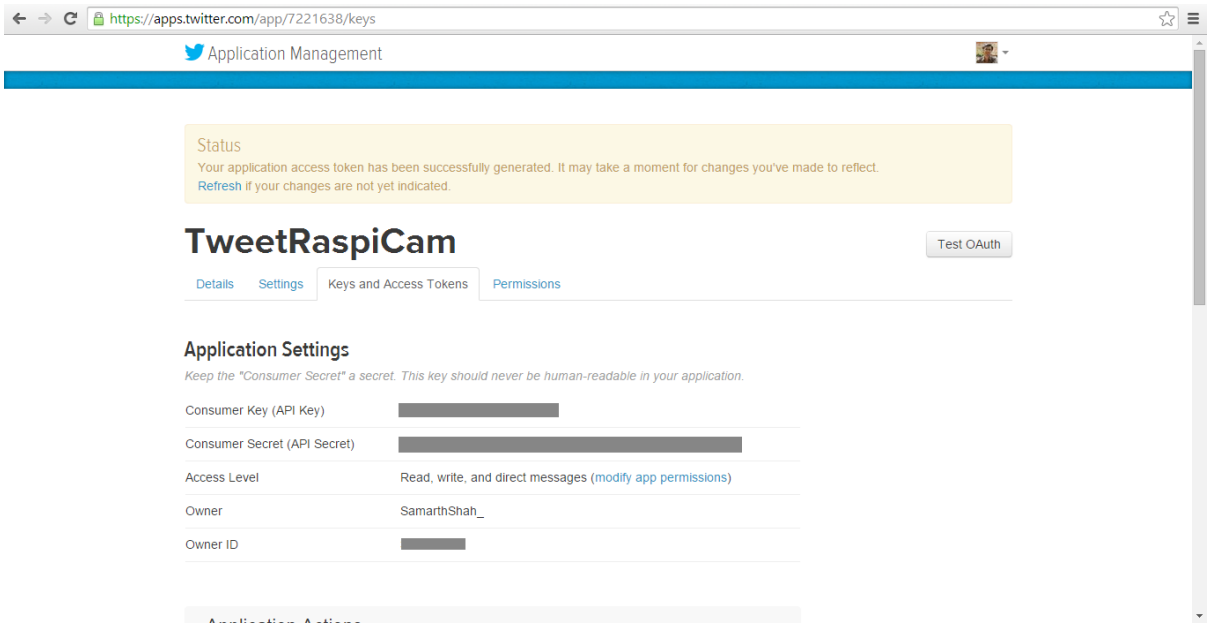

https://apps.twitter.com/app/7221638
Application Management
Your application has been created. Please take a moment to review and adjust your application's settings.
TweetRaspiCam
Test OAuth
Details
Settings
Keys and Access Tokens
Permissions
This application will allow you to control your RaspberryPi camera using Tweet/Direct Messages
http://shahsamarth.wordpress.com
Organization
Information about the organization or company associated with your application. This information is optional.
Organization
None
Organization website
None
Application Settings
Your application's Consumer Key and Secret are used to authenticate requests to the Twitter Platform.
Access level
Read-only (modify app permissions)


https://apps.twitter.com/app/7221638/permissions
Application Management
TweetRaspiCam
Test OAuth
Details
Settings
Keys and Access Tokens
Permissions
Access
What type of access does your application need?
Read more about our Application Permission Model.
Read only
Read and Write
Read, Write and Access direct messages
Note:
Changes to the application permission model will only reflect in access tokens obtained after the permission model change is saved. You will need to re-negotiate existing access tokens to alter the permission level associated with each of your application's users.
Update Settings

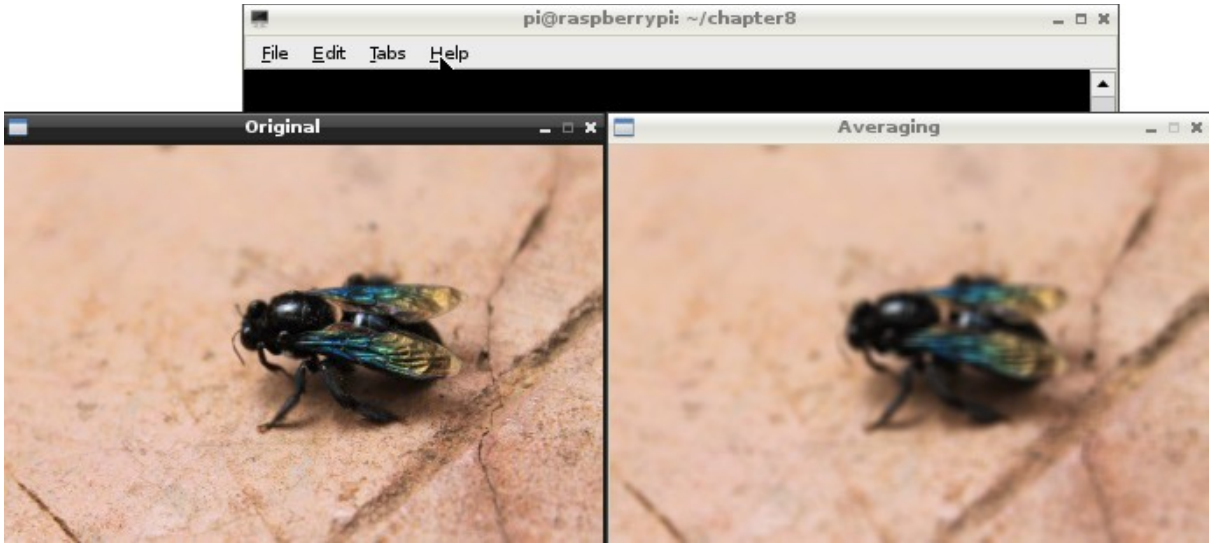

https://apps.twitter.com/app/7221638/keys
Application Management
TweetRaspiCam
Test OAuth
Details
Settings
Keys and Access Tokens
Permissions
Application Settings
Keep the "Consumer Secret" a secret. This key should never be human-readable in your application.
Consumer Key (API Key)
Consumer Secret (API Secret)
Access Level
Read, write, and direct messages (modify app permissions)
Owner
SamarthShah_
Owner ID
Application Actions
Regenerate Consumer Key and Secret
Change App Permissions

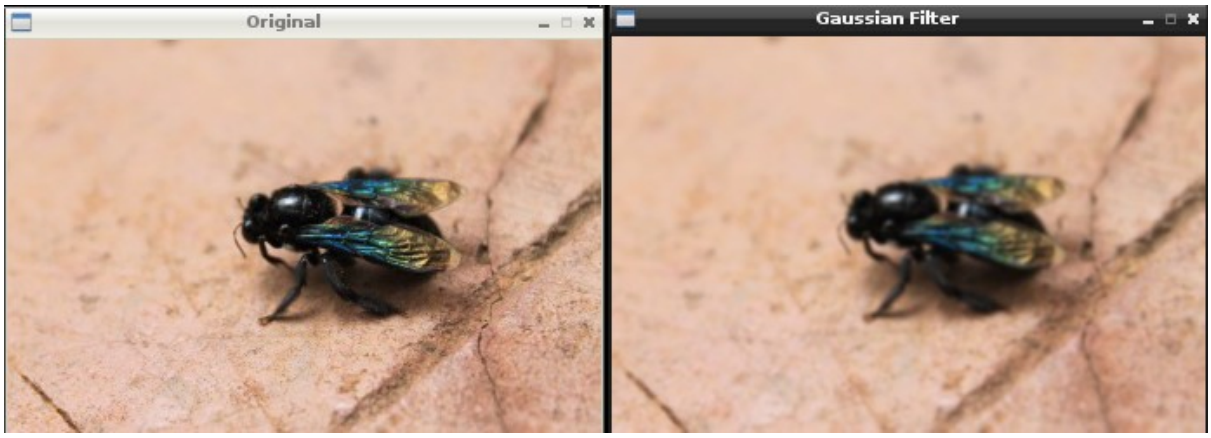

https://apps.twitter.com/app/7221638/keys
Application Management
Status
Your application's Consumer Key and Consumer Secret have been successfully regenerated.
Refresh if your changes are not yet indicated.
TweetRaspiCam
Test OAuth
Details
Settings
Keys and Access Tokens
Permissions
Application Settings
Keep the "Consumer Secret" a secret. This key should never be human-readable in your application.
Consumer Key (API Key)
Consumer Secret (API Secret)
Access Level
Read, write, and direct messages (modify app permissions)
Owner
SamarthShah_
Owner ID
Waiting for platform.twitter.com...

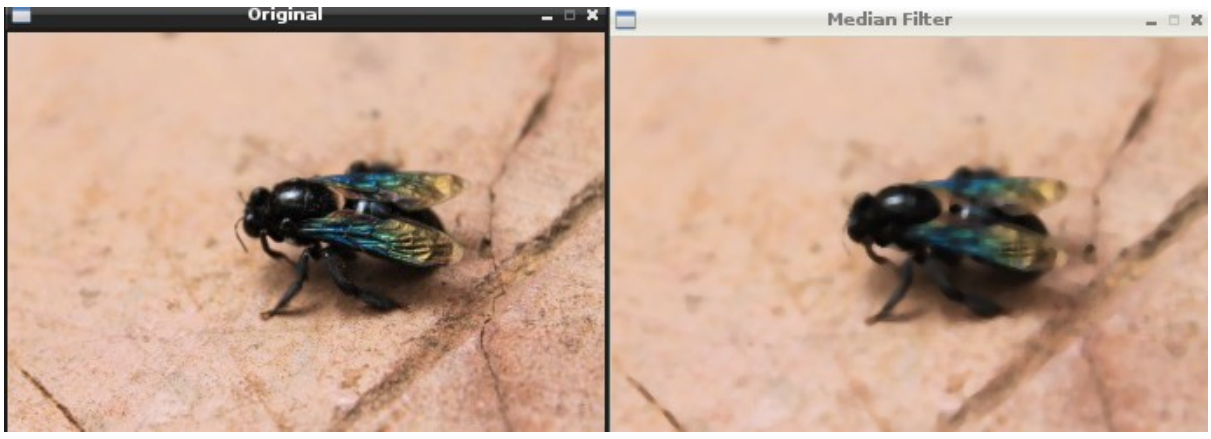

https://apps.twitter.com/app/7221638/keys
Application Actions
Regenerate Consumer Key and Secret
Change App Permissions
Your Access Token
You haven't authorized this application for your own account yet.
By creating your access token here, you will have everything you need to make API calls right away. The access token generated will be assigned your application's current permission level.
Token Actions
Create my access token
About
Terms
Privacy
Cookies
© 2014 Twitter, Inc.

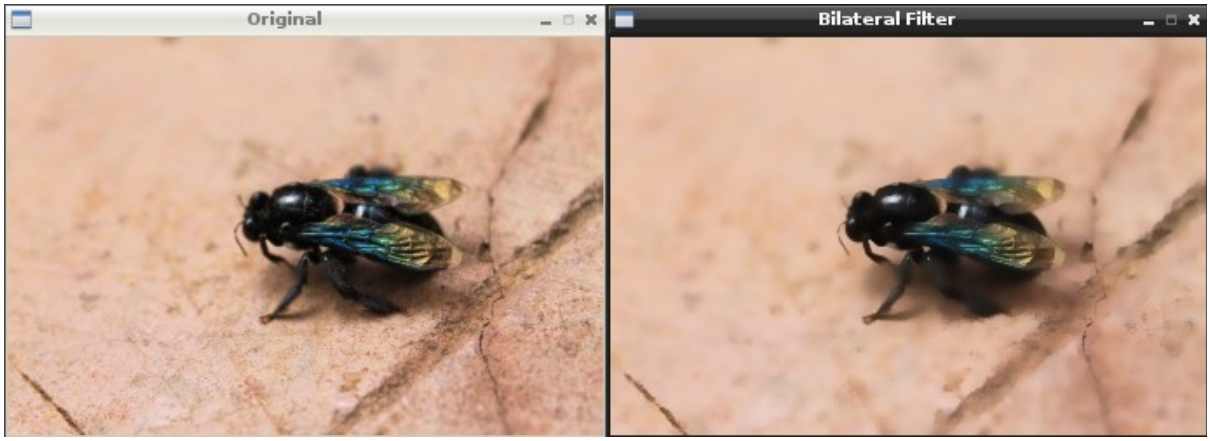

https://apps.twitter.com/app/7221638/keys
Application Management
Status
Your application access token has been successfully generated. It may take a moment for changes you've made to reflect.
Refresh if your changes are not yet indicated.
TweetRaspiCam
Test OAuth
Details
Settings
Keys and Access Tokens
Permissions
Application Settings
Keep the "Consumer Secret" a secret. This key should never be human-readable in your application.
Consumer Key (API Key)
Consumer Secret (API Secret)
Access Level
Read, write, and direct messages (modify app permissions)
Owner
SamarthShah_
Owner ID

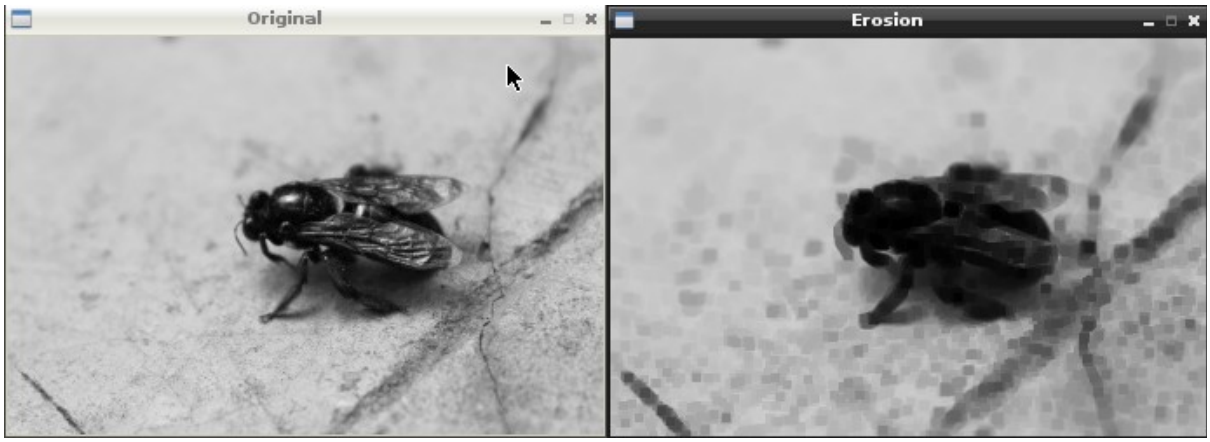
Chapter 6: Image Processing Algorithms

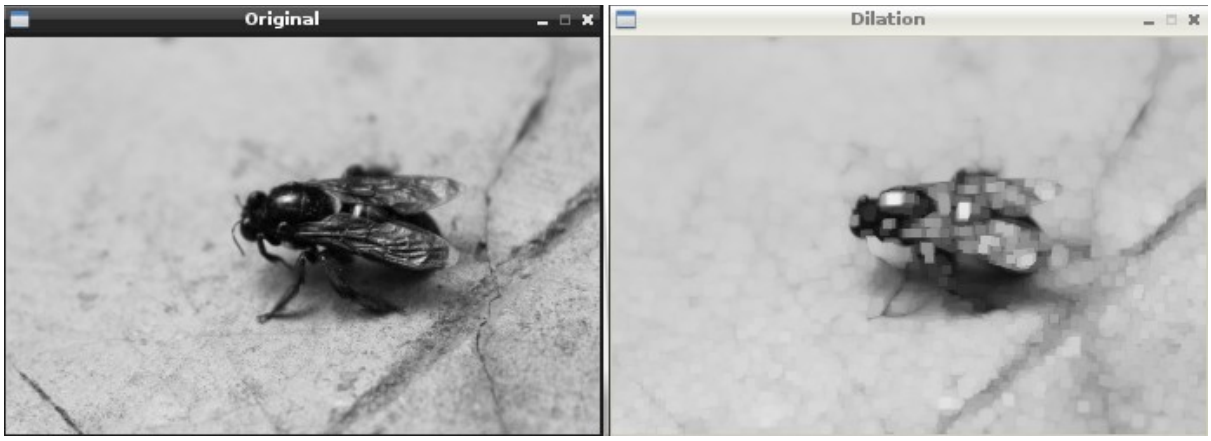


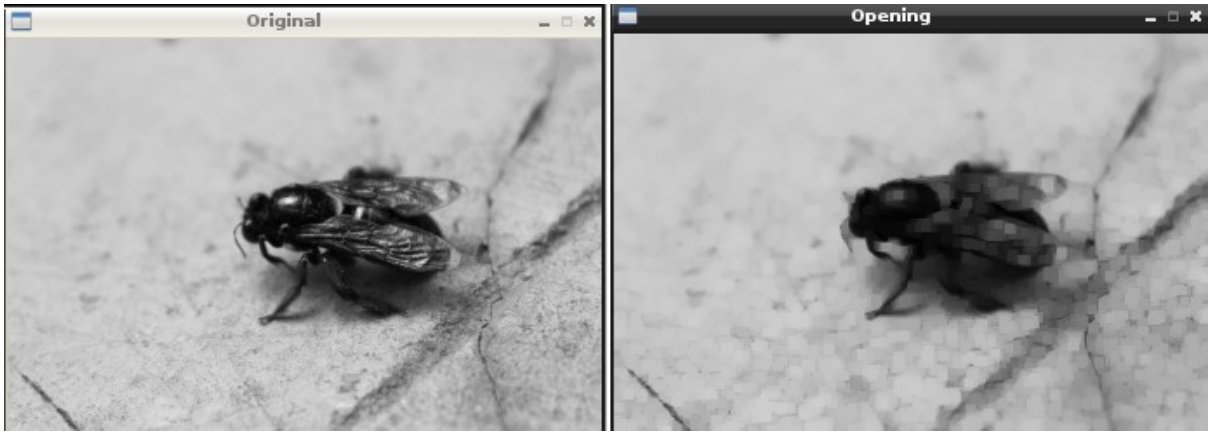


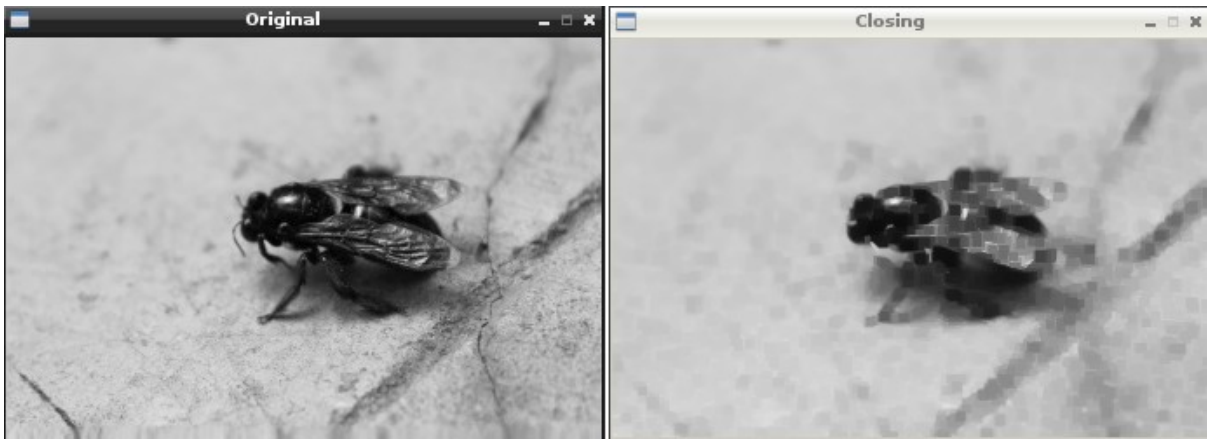


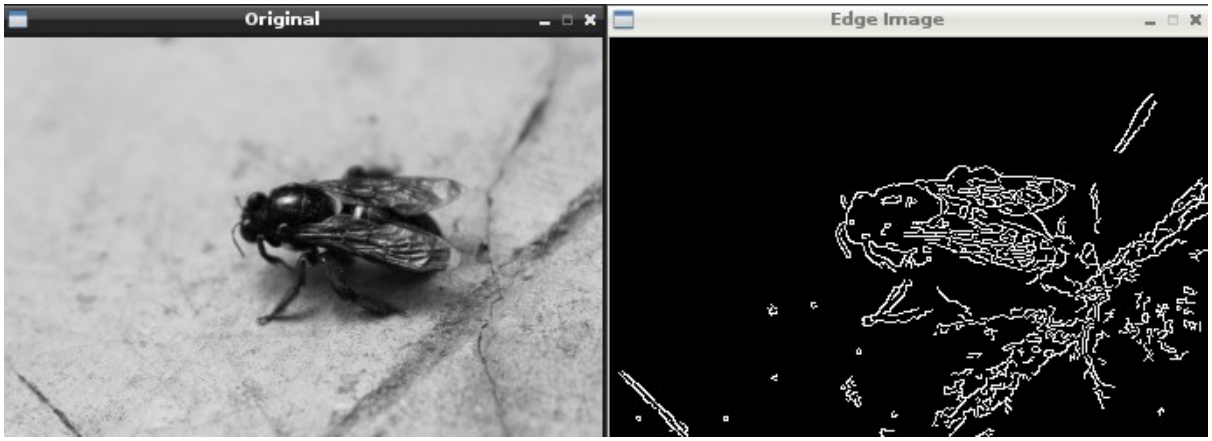

Original
Bilateral Filter


Original
Erosion


Original
Dilation


Original
Opening


Original
Closing

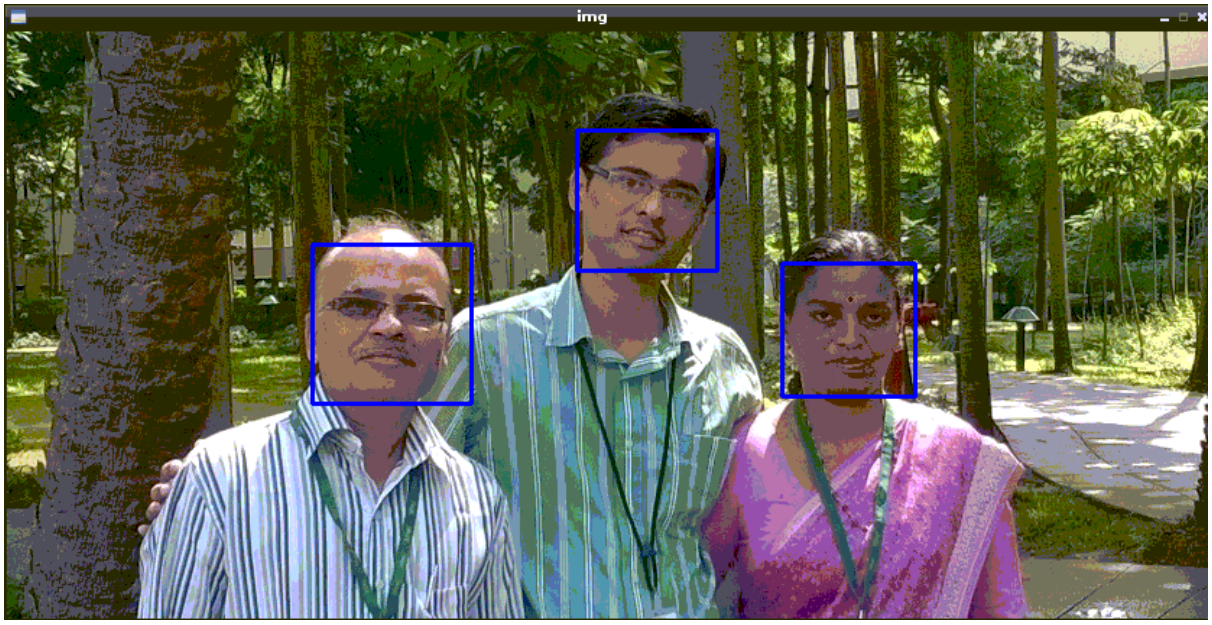

Original
Edge Image

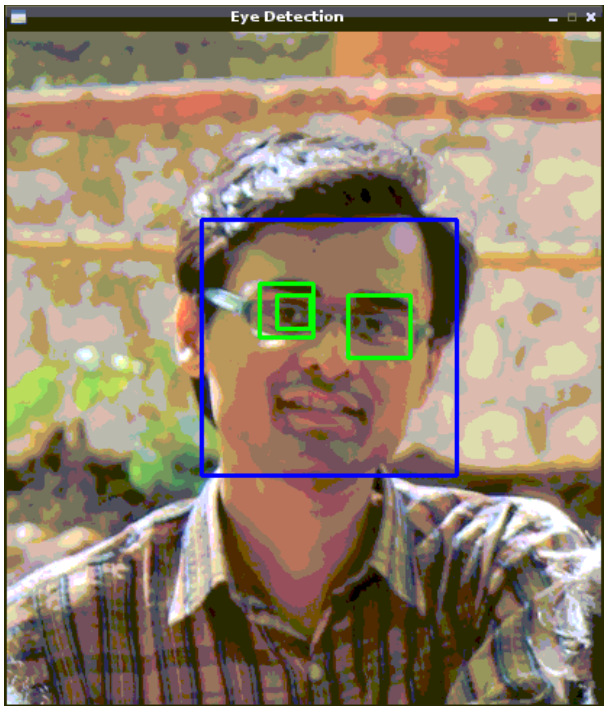

frame

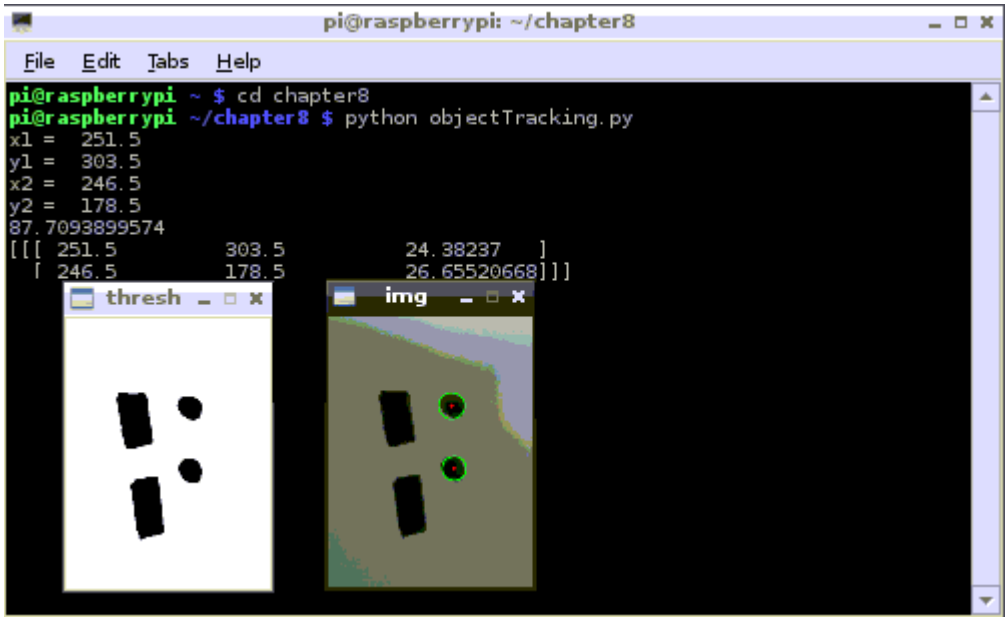

orginial

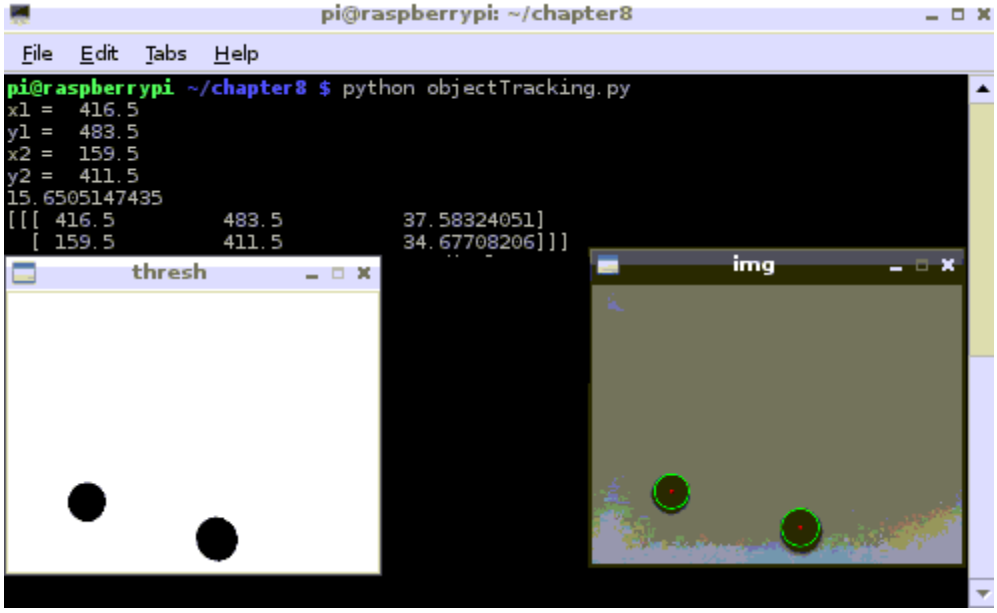

frame

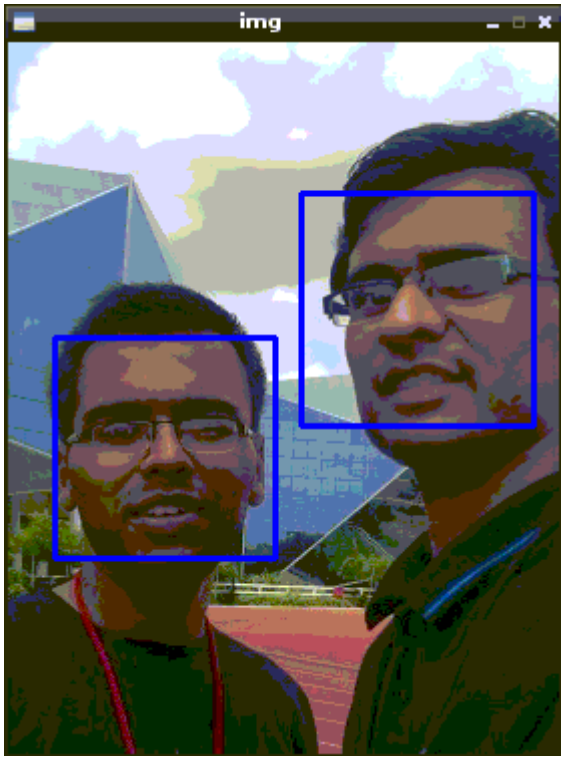

orginial


img

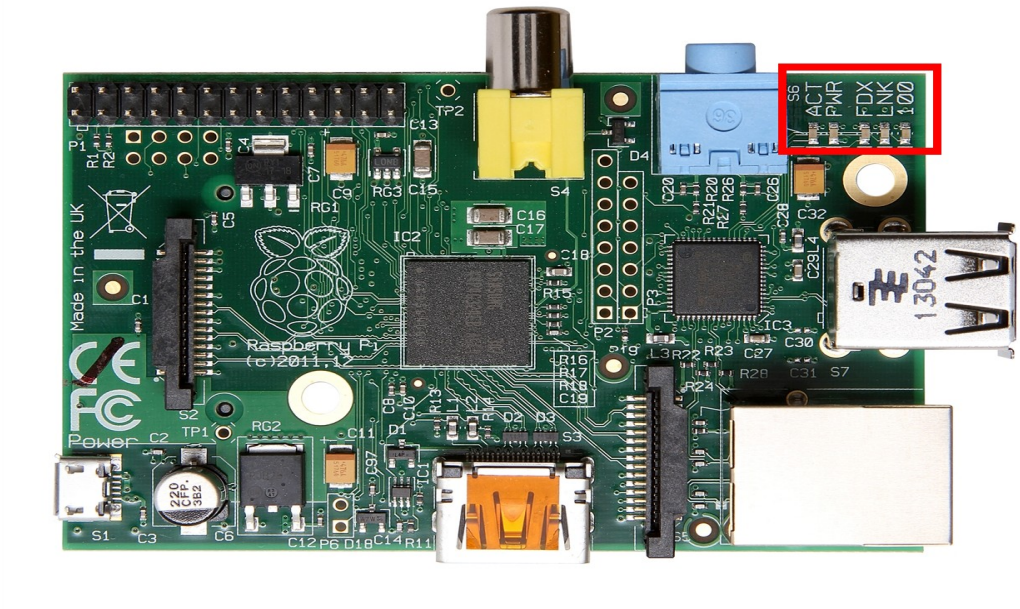

Eye Detection


pi@raspberrypi: ~/chapter8
File Edit Tabs Help
pi@raspberrypi ~ $ cd chapter8
pi@raspberrypi ~/chapter8 $ python objectTracking.py
x1 = 251.5
y1 = 303.5
x2 = 246.5
y2 = 178.5
87.7093899574
[[[251.5 303.5 24.38237]
[246.5 178.5 26.65520668]]]
thresh
img


pi@raspberrypi: ~/chapter8
File Edit Tabs Help
pi@raspberrypi ~/chapter8 $ python objectTracking.py
x1 = 416.5
y1 = 483.5
x2 = 159.5
y2 = 411.5
15.6505147435
[[[416.5 483.5 37.58324051]
[159.5 411.5 34.67708206]]]
thresh
img

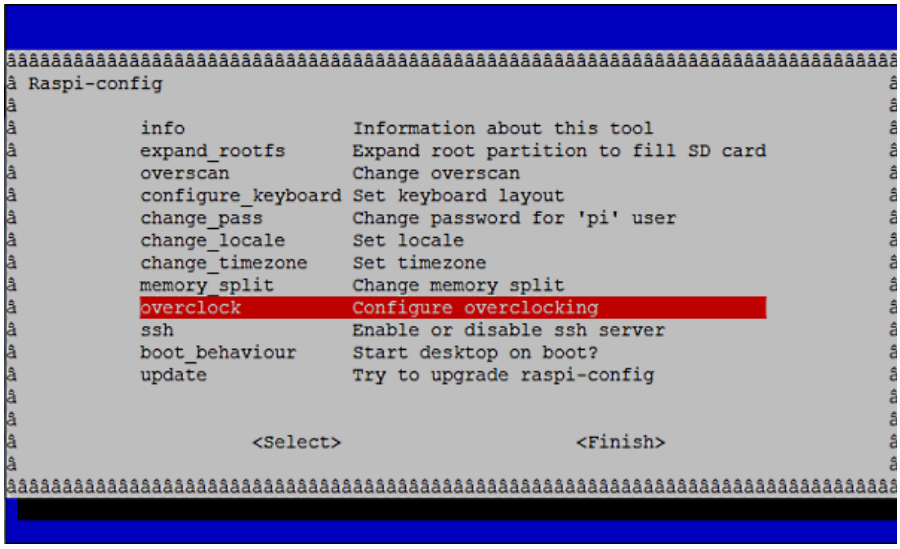

img

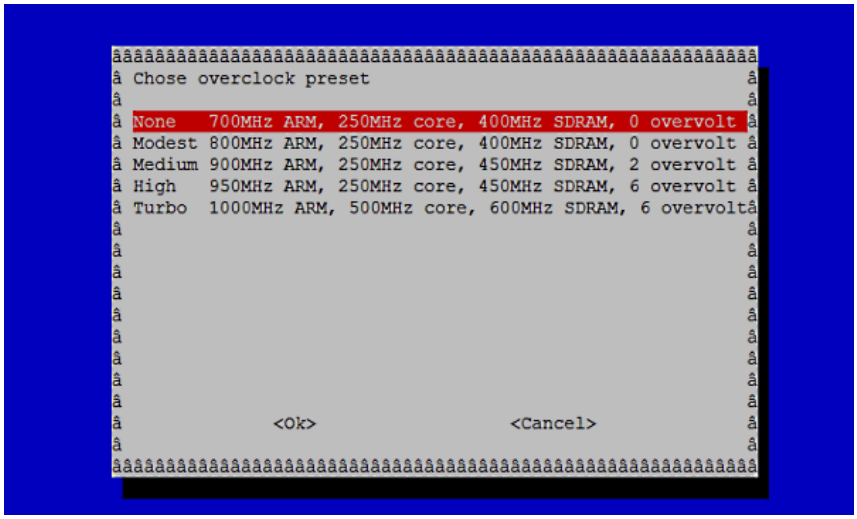
Chapter 7: Troubleshooting, Tips/Tricks, Resources for Advanced Users

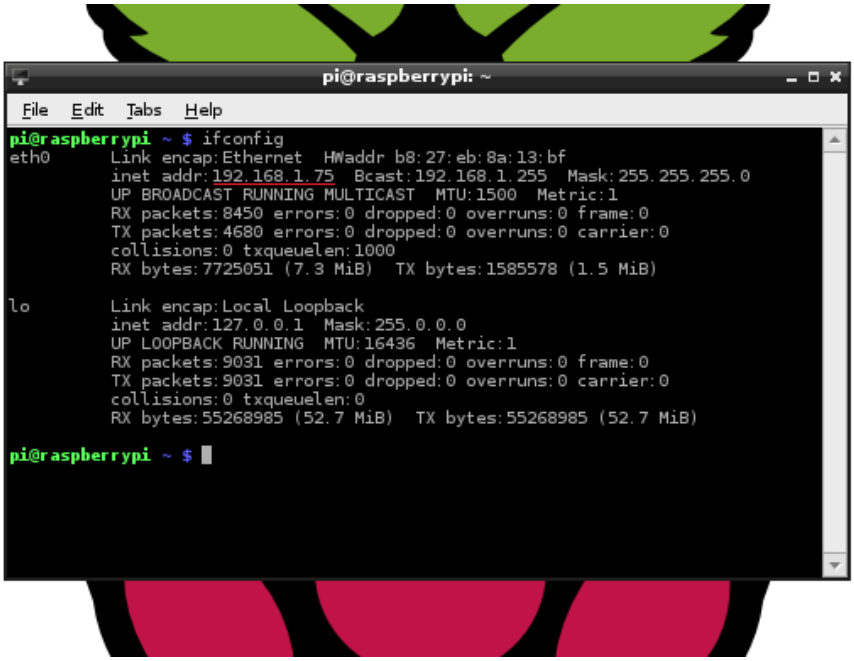


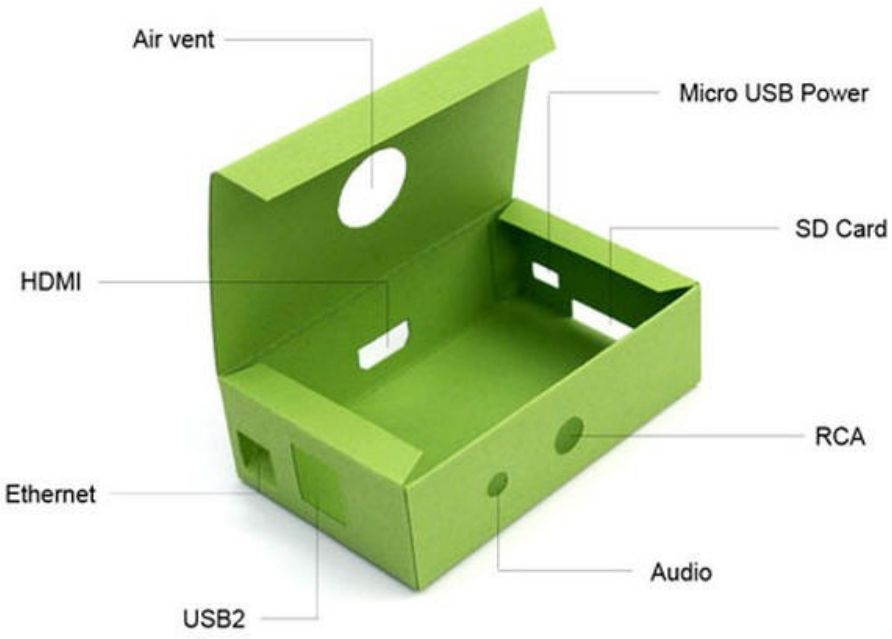

```
Raspi-config

          info                 Information about this tool
          expand_rootfs        Expand root partition to fill SD card
          overscan             Change overscan
          configure_keyboard   Set keyboard layout
          change_pass          Change password for 'pi' user
          change_locale        Set locale
          change_timezone      Set timezone
          memory_split         Change memory split
          overclock            Configure overclocking
          ssh                  Enable or disable ssh server
          boot_behaviour       Start desktop on boot?
          update               Try to upgrade raspi-config

                    <Select>                        <Finish>
```

```
pi@raspberrypi ~ $ cat /proc/cpuinfo
Processor       : ARMv6-compatible processor rev 7 (v6l)
BogoMIPS        : 697.95
Features        : swp half thumb fastmult vfp edsp java tls
CPU implementer : 0x41
CPU architecture: 7
CPU variant     : 0x0
CPU part        : 0xb76
CPU revision    : 7

Hardware        : BCM2708
Revision        : 000f
Serial          : 00000000[illegible]
pi@raspberrypi ~ $
```


Raspi-config
info Information about this tool
expand_rootfs Expand root partition to fill SD card
overscan Change overscan
configure_keyboard Set keyboard layout
change_pass Change password for 'pi' user
change_locale Set locale
change_timezone Set timezone
memory_split Change memory split
overclock Configure overclocking
ssh Enable or disable ssh server
boot_behaviour Start desktop on boot?
update Try to upgrade raspi-config
<Select>
<Finish>


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@raspberrypi: ~
File Edit Tabs Help
pi@raspberrypi ~ $ ifconfig
eth0 Link encap:Ethernet HWaddr b8:27:eb:8a:13:bf
inet addr:192.168.1.75 Bcast:192.168.1.255 Mask:255.255.255.0
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:8450 errors:0 dropped:0 overruns:0 frame:0
TX packets:4680 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:7725051 (7.3 MiB) TX bytes:1585578 (1.5 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:9031 errors:0 dropped:0 overruns:0 frame:0
TX packets:9031 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:55268985 (52.7 MiB) TX bytes:55268985 (52.7 MiB)
pi@raspberrypi ~ $


Air vent
Micro USB Power
SD Card
HDMI
RCA
Ethernet
Audio
USB2

Punnet