**Steps**

1. Download the Raspbian (ZIP) from the raspberrypi website.

<https://www.raspberrypi.org/downloads/>

1. Download the Win32DiskImager to help with installing the raspbian image in the SD Card.

<http://liquidtelecom.dl.sourceforge.net/project/win32diskimager/Archive/Win32DiskImager-0.9.5-install.exe>

1. Insert the SD Card (at least 8 GB in size) into the SD card adapter and insert the adapter into the SD card port of your laptop.
2. Now with the RASPBIAN image in your computer run Win32DiskImager to install the image in the SD Card.
3. Select the image file which is the RASPBIAN image which you downloaded and is saved in your computer.
4. Select the device. Check the left part of your window explorer and see the label on the SD card e.g. D, C, E, F, etc and select it appropriately.
5. Click write to write the code of the image onto the SD card.
6. When the process is complete click exit.
7. Now you can move the SD card into the Raspberry PI module and insert it in its place on the module.
8. Connect other peripherals on the module like WIFI dongle, mouse, earphone or speaker, Ethernet cable, microphone, and HDMI cable if you have a screen to use as monitor (optional).
9. Power the module using a USB charger. NB: It is preferable to power directly from the mains using a charger than to do so from a USB port of a computer since the module is not designed for the latter.

**Setting up internet access**

1. The file names 10proxy should be created in the directory /etc/apt/apt.conf.d/  using the following code

         cd /etc/apt/apt.conf.d/

         sudo nano 10proxy

1. The following line should be added in this fil

Acquire::http::Proxy "<http://username:password@proxy_address:port>";

   At DeKUT type

          Acquire::http::Proxy "<http://192.168.96.1:8080>";

1. Save the file and exit- Type Ctrl-X and type Y when asked whether to save changes
2. In the terminal type sudo apt-get update

You should now have access to the internet

**Octave and SoX installation**

1. To install Octave, ensure the internet is connected and then type

sudo apt-get install octave

1. The signals package is also installed by typing

sudo apt-get install octave-signal

1. Install SoX by typing

sudo apt-get install sox

**Working within the Raspberry PI**

Remote access of the Raspberry PI (accessing the module from your laptop)

First ensure that your laptop is connected to the same network as the Raspberry PI (may be the same WIFI)

With your laptop, download putty.exe from the website:

<http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html>

**Configuring WIFI access**

Type the following commands in the terminal

sudo iwlist wlan0 scan

Then

sudo nano /etc/wpa\_supplicant/wpa\_supplicant.conf

Add the following lines in the window file

network={

ssid="home"

scan\_ssid=1

key\_mgmt=WPA-PSK

psk="very secret passphrase"

}

## For an unsecured network use:

sudo iwlist wlan0 scan

Then

sudo nano /etc/wpa\_supplicant/wpa\_supplicant.conf

Add the following lines in the file

network={

key\_mgmt=NONE

priority=-999

}

## Installation & Configuration of Xming

### 1) Download & install XMing

* http://www.straightrunning.com/XmingNotes/
* You can get free Xming from sourceforge site by searching Xming download
* You can install it to a location with no space in it's path, for instance as C:\Apps

Or simply go to the link below and get it;

<http://sourceforge.net/projects/xming/files/?source=navbar>

### 3) Download & install XMing Fonts

* http://www.straightrunning.com/XmingNotes/

Or simply;

<http://sourceforge.net/projects/xming/files/?source=navbar>

### 4) Configure XMing

* **Click** on **XLaunch.exe** in your install directory:

**5) Select *Mulitple Windows* and enter the number 0 for *Display number*. Click on Next.**

**6) Select *Start no client* then click Next.**

### 7) Click Next. Do not change anything.

**8) Click on *Save Configuration*.**

### 9) Save configuration to the same directory as config.xlaunch.

**10) Configure XMing to start at login (Optional step).**

* **If you want XMing to start automatically when you login then do this:**
* **Put a shortcut to the config.xlaunch file in All Users startup directory:**
  + **Windows 7:**
  + **C:\ProgramData\Microsoft\Windows\Start Menu\Programs\Startup**

\*Note: ProgramData may be a hidden folder and may not be listed under C:\

* + if this is the case go to the Start Menu search bar and type:
    - C:\ProgramData\Microsoft\Windows\StartMenu\Programs\Startup
    - Press “Enter.”
  + The proper folder should open up.
  + Copy over to this location a shortcut to config.xlaunch.

**PuTTY Configuration**

1. **Configure Putty by following the steps below:**

* **Open putty.exe**.
* Open the PuTTY software and on the hostname put the IP address of the network being used.

1. **In the box under *Saved Sessions* type a name for your session.**

* Then click on the Save button to the right.

1. **Click on the saved session that you just created. Then click on the button Load.**
2. **Configure X11 Forwarding.**

* On the left hand side, find the X11 configuration category by double-clicking on **SSH** and then clicking on **X11**.
* In this window, make sure the box label *Enable X11 forwarding* is **checked**.
* Make sure *MIT-Magic-Cookie-1* is **selected**.
* On the X display location type *localhost:0*
* Once complete, **click Open** at the bottom of the window.

1. **Login**

* You will now see a command line screen that will prompt you to enter your username.
* Log in with your UCI username.

1. **Enter a password.**

* Your password will be the same password used to log in to your UCI student account.
  + You will quickly notice as you type your password, no characters appear on the screen.
  + This is completely normal
* Once you are finished typing your password, **press Enter**.
* In our case the username is: pi
* And the password is: raspberry

**Audio Input**

In order to record audio, we need to connect a microphone to the Pi. If you connect a USB mic, you can ensure that the Pi recognizes it by typing lsusb at the command line

pi@raspberrypi ~ $ lsusb

You can obtain the device details by typing arecord -l

**Installing SoX for audio recording**

SoX is a program for recording and manipulating audio. You can install it by typing

sudo apt-get install sox

at the command line. There are two functions play and rec which can then be used for recording and playback. To record some speech, follow the following steps

1. set the audio driver by typing export AUDIODRIVER=alsa
2. set the recoding device by typing export AUDIODEV=hw:<card number>,<device number>. The card and device numbers of the recording device are obtained from arecord -l. Using the result above we type export AUDIODEV=hw:1,0
3. Record some audio by typing rec -c 1 -r 8000 speech.wav trim 0 2 and pressing Enter. This command will record a single channel at 8kHz and save the resulting speech in speech.wav. The recording will last 2 seconds.

**Audio Output**

To playback the audio recorded, we follow the following steps

1. Plug in a set of head phones in the audio jack.
2. Set the audio output to the headphones by typing amixer cset numid=3 1 at the command line .
3. Determine the playback device details using aplay -l
4. Set the audio device using  AUDIODEV=hw:<card number>,<device number>.
5. Type play speech.wav
6. If the volume is too low type alsamixer and adjust the volume using the arrow keys.

The entire code should look like this.

export AUDIODRIVER=alsa

export AUDIODEV=hw:1,0

arecord –l

rec –c 1 –r 8000 signal\_name.wav trim 0 2

amixer cset numid = 3 1

aplay –l

AUDIODEV=hw:0,1

play signal\_name.wav

Alternatively, you can record an audio signal and interrupt the recording manually by typing control+c. The code for this is as shown below.

sudo modprobe snd\_bcm2835

alsamixer

arecord –D plughw:1,0 signal\_name.wav

aplay signal\_name.wav

arecord –l