HCS connected to Raspberry Pi demonstration scenario

*NOTE : You should have basic knowledge on Raspberry Pi operation so that you can understand terms using in this document.

Demonstration idea
The idea of the demonstration is to connect two HCS power supply to Raspberry Pi. A driver is installed into Raspberry Pi to connect USB device to Ethernet. The driver will map each USB port to TCP connect port. For example USB 1 is mapped to TCP port 4001. Then remote control software can connect to HCS power supply by using IP address of Raspberry Pi and port number for USB.

E.g. Raspberry Pi IP address : 192.168.1.100
     USB port 1 map to TCP port 4001
   The connection setup is 192.168.1.100:4001

A load, which can be LED or DC FAN, is used to connect to power supply output so that the voltage and current reading can be recorded. We can use programming feature in our application to program different voltage and current for the output. Then the application can record variation of voltage and current.

The demonstration will use application on iPad which can set HCS output, get reading from it, has 20 steps programed output and monitoring the output.

Demonstration setup
Equipments list
1. HCS power supply x 2
2. Raspberry Pi B+ model
3. 12V DC Fan

4. 12 LED (around 5W)5. iPad with iOS 7 or above
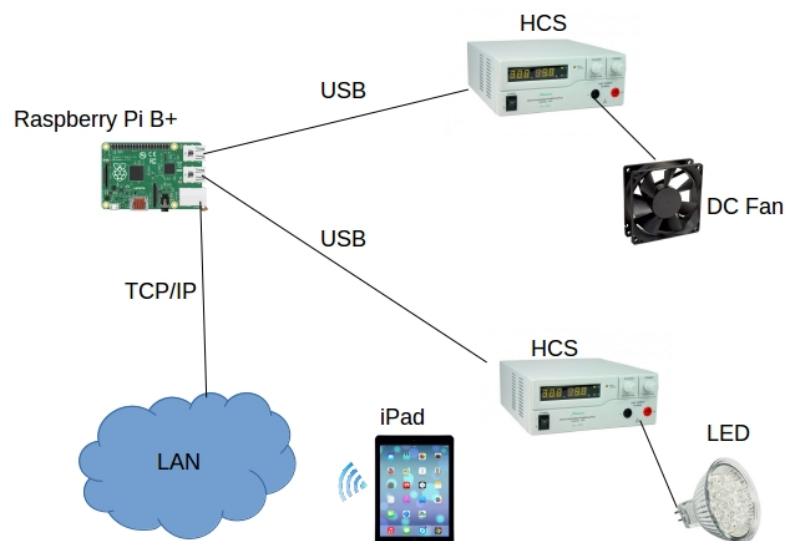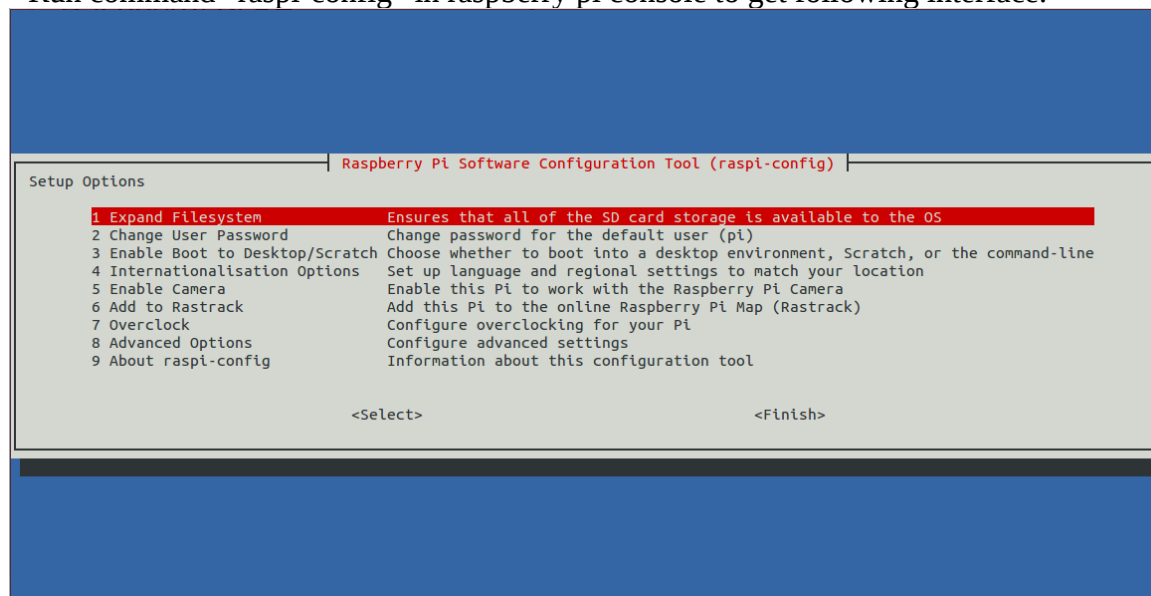
Setup Raspberry Pi B+
Software required :
    i. Raspbian – OS for Raspberry Pi
    ii. Manson driver for Raspberry Pi
    iii. Winscp – File transfer tools to transfer driver to Raspberry Pi

1. It is recommended to buy SD card with pre-installed Raspbian directly from shop to simplify the installation.
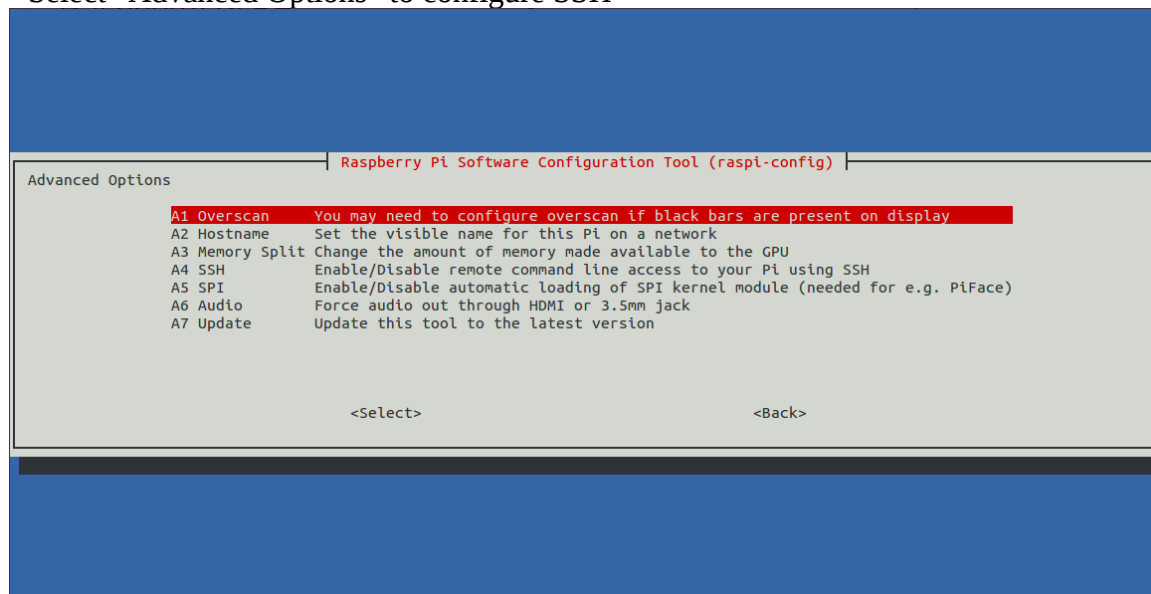
2. Configure SSH server in Raspberry Pi for file transfer from Windows.
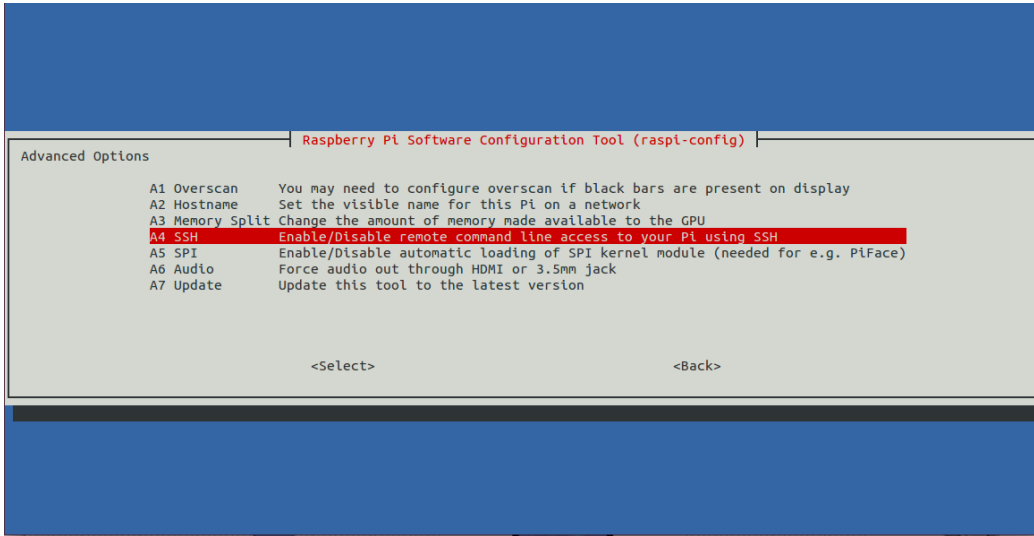- Open terminal in Raspberry Pi.
- Run command "raspi-config" in raspberry pi console to get following interface.

```
                         ┤ Raspberry Pi Software Configuration Tool (raspi-config) ├
 Setup Options

        1 Expand Filesystem           Ensures that all of the SD card storage is available to the OS
        2 Change User Password        Change password for the default user (pi)
        3 Enable Boot to Desktop/Scratch Choose whether to boot into a desktop environment, Scratch, or the command-line
        4 Internationalisation Options Set up language and regional settings to match your location
        5 Enable Camera               Enable this Pi to work with the Raspberry Pi Camera
        6 Add to Rastrack             Add this Pi to the online Raspberry Pi Map (Rastrack)
        7 Overclock                   Configure overclocking for your Pi
        8 Advanced Options            Configure advanced settings
        9 About raspi-config          Information about this configuration tool


                        <Select>                                    <Finish>
```

- Select "Advanced Options" to configure SSH

```
                         ┤ Raspberry Pi Software Configuration Tool (raspi-config) ├
 Advanced Options

        A1 Overscan        You may need to configure overscan if black bars are present on display
        A2 Hostname        Set the visible name for this Pi on a network
        A3 Memory Split    Change the amount of memory made available to the GPU
        A4 SSH             Enable/Disable remote command line access to your Pi using SSH
        A5 SPI             Enable/Disable automatic loading of SPI kernel module (needed for e.g. PiFace)
        A6 Audio           Force audio out through HDMI or 3.5mm jack
        A7 Update          Update this tool to the latest version



                        <Select>                                    <Back>
```
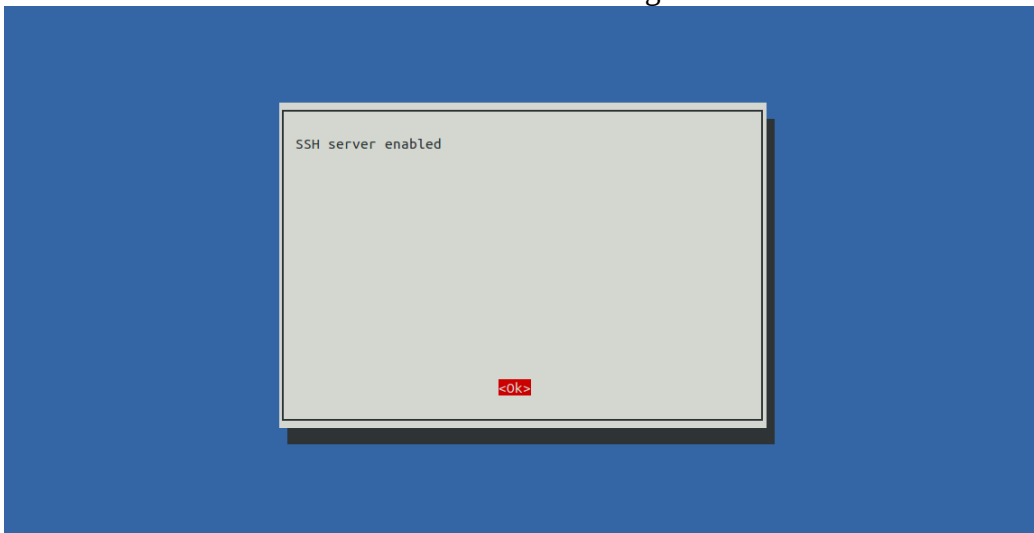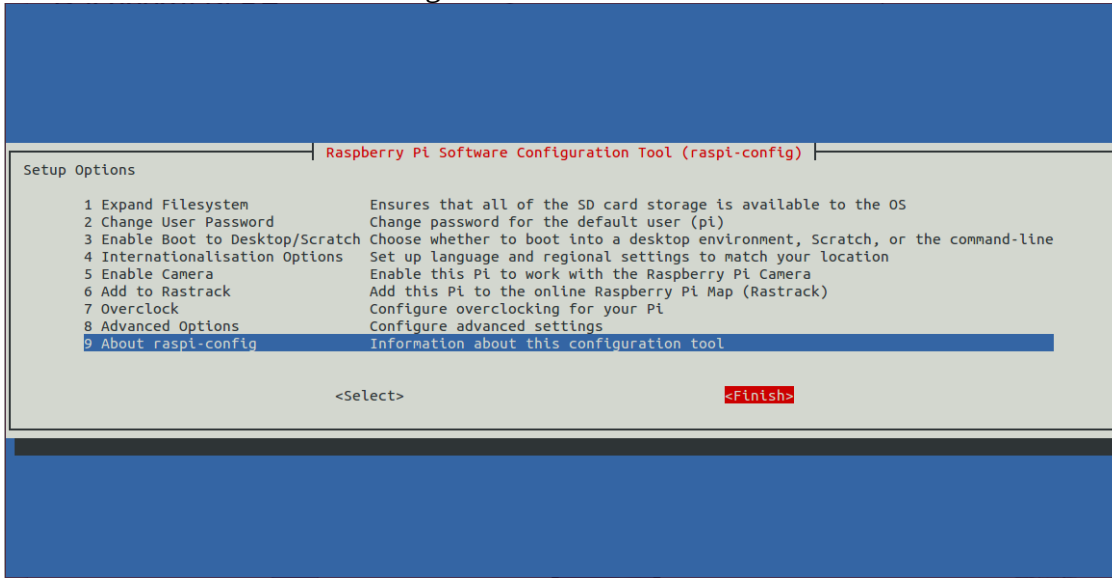
- Select "A4 SSH" to set SSH server

- Select "Enable" to enable SSH server
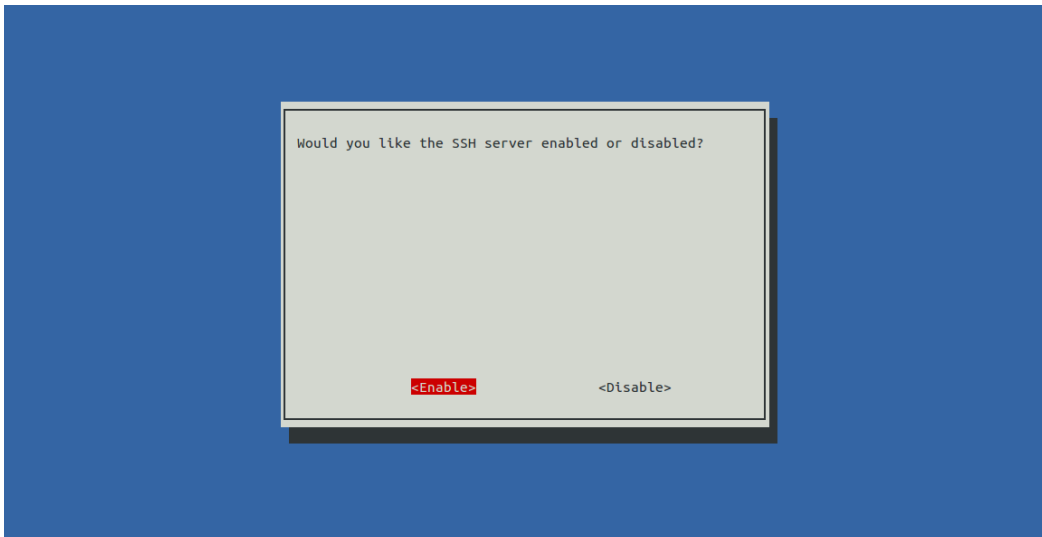
- Press enter to exit the SSH server enabled message screen

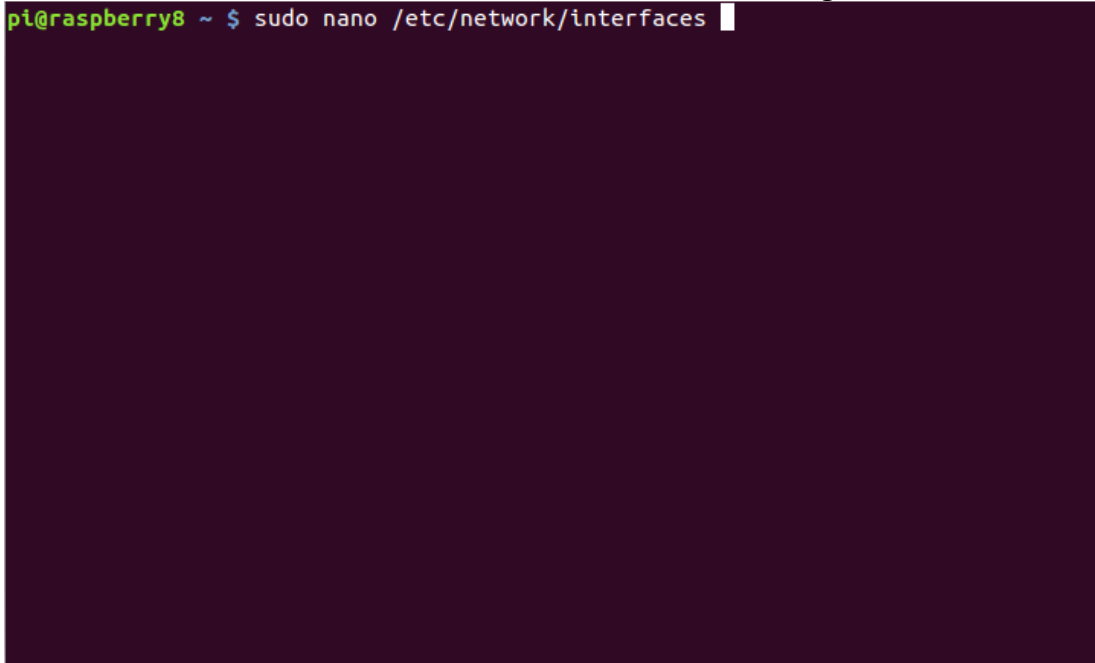- Click "Finish" to exit this configuration menu

3. Configure Raspberry Pi to use static IP (Optional)

Raspberry Pi default is using DHCP. It is better to set static IP for raspberry pi so that it is easy configure iPad application to connect.

Open terminal in Raspberry Pi

- Run "sudo nano /etc/network/interfaces" to edit network configure file.

- You get following screen. You need to edit line "iface eth0 inet dhcp" to become "iface eth0 inet static"

```
  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 manual
wpa-roam /etc/wpa_supplicant/wpa_supplicant.conf
iface default inet dhcp




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

- Add IP address information. Change IP address match to your network.
address 192.168.1.156
netmask 255.255.255.0
network 192.168.1.0
broadcast 192.168.1.255
gateway 192.168.1.1

```
  GNU nano 2.2.6          File: /etc/network/interfaces          Modified

auto lo

iface lo inet loopback
iface eth0 inet static
address 192.168.1.156
netmask 255.255.255.0
network 192.168.1.0
broadcast 192.168.1.255
gateway 192.168.1.1

allow-hotplug wlan0
iface wlan0 inet manual
wpa-roam /etc/wpa_supplicant/wpa_supplicant.conf
iface default inet dhcp





^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
```

- Press "Ctrl+x" to exit editor. Press "y" to save modified file.

4. Restart Raspberry Pi

5. Download driver from your Windows system
- Go to Manson HCS-3100 website
http://www.manson.com.hk/products/detail/148

- Click tab "Apps for Raspberry Pi". Then download "manson_driver" from this web site

6. Upload driver to Raspberry Pi
- Use Winscp to transfer manson_driver to raspberry pi. Open Winscp and select SCP for file protocol.
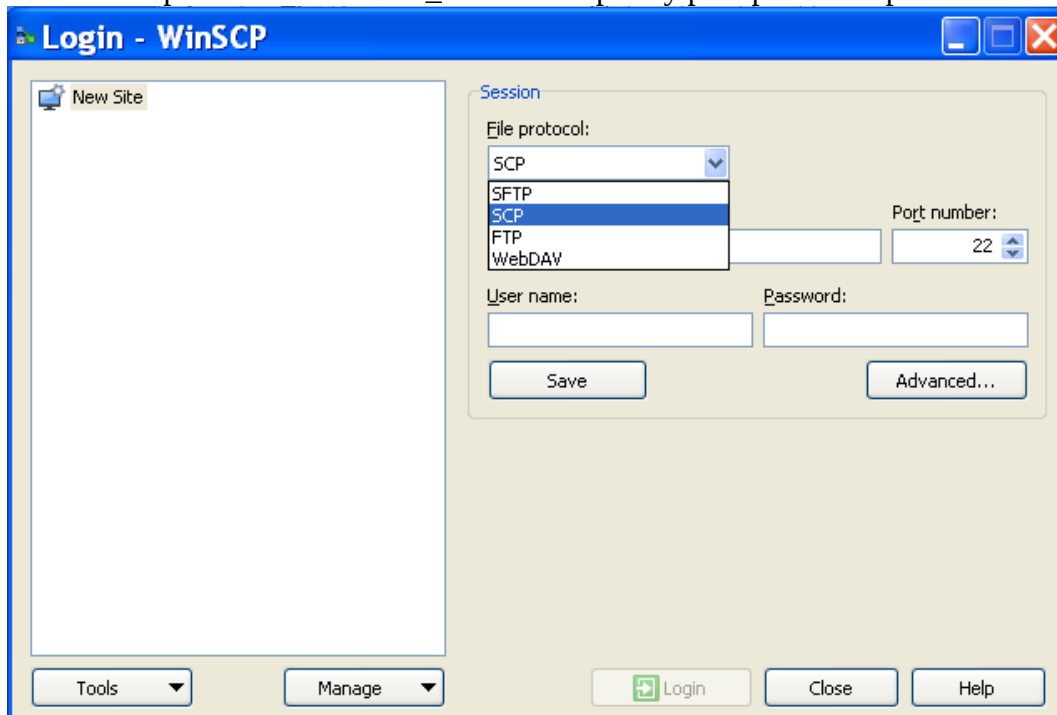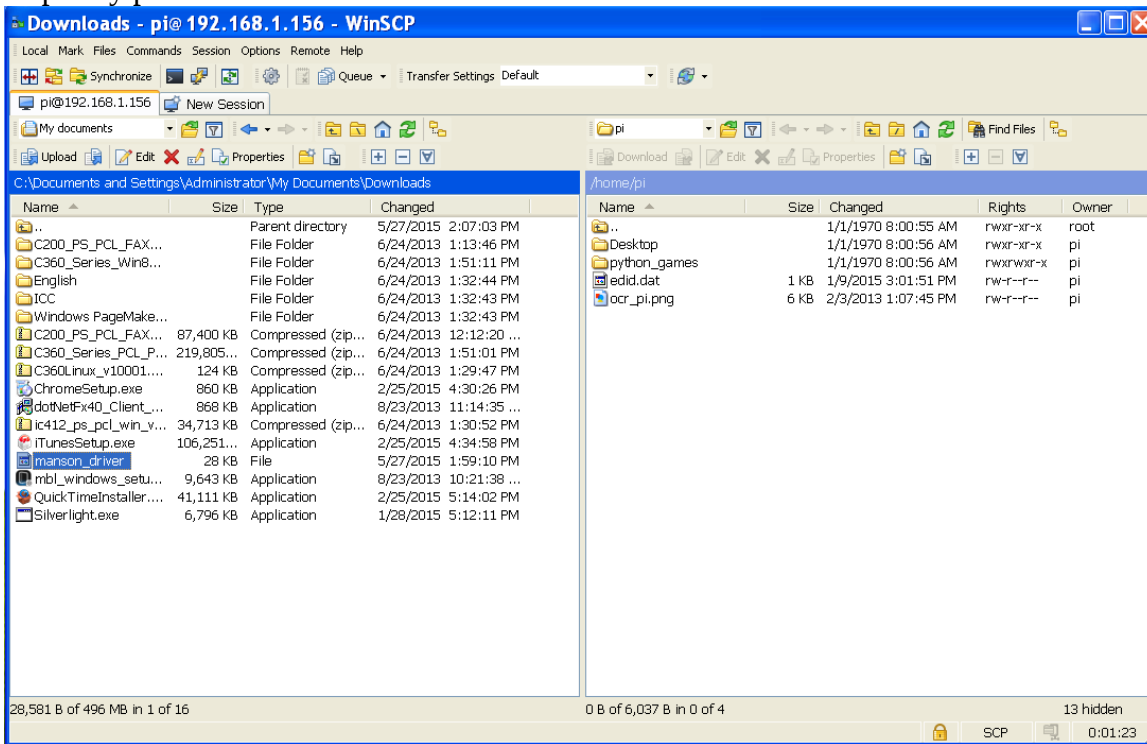

- Enter IP address for your raspberry pi. Enter User name and password as well. The default user name for raspberry pi is "pi"
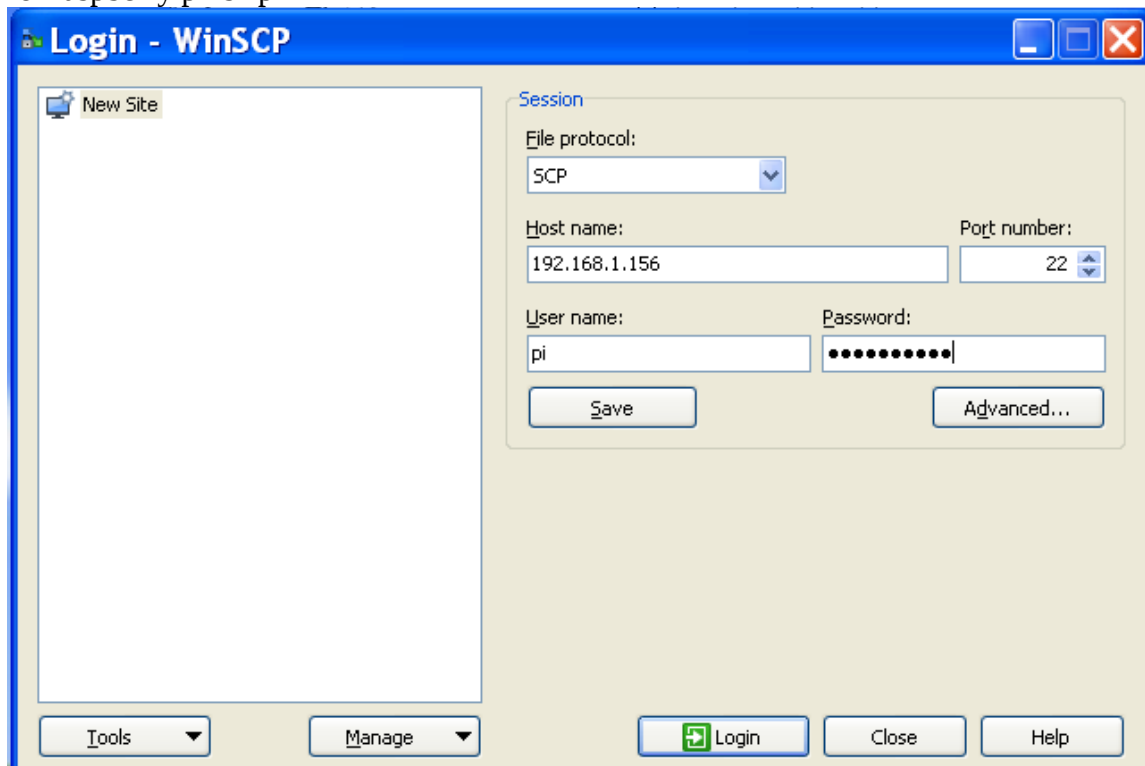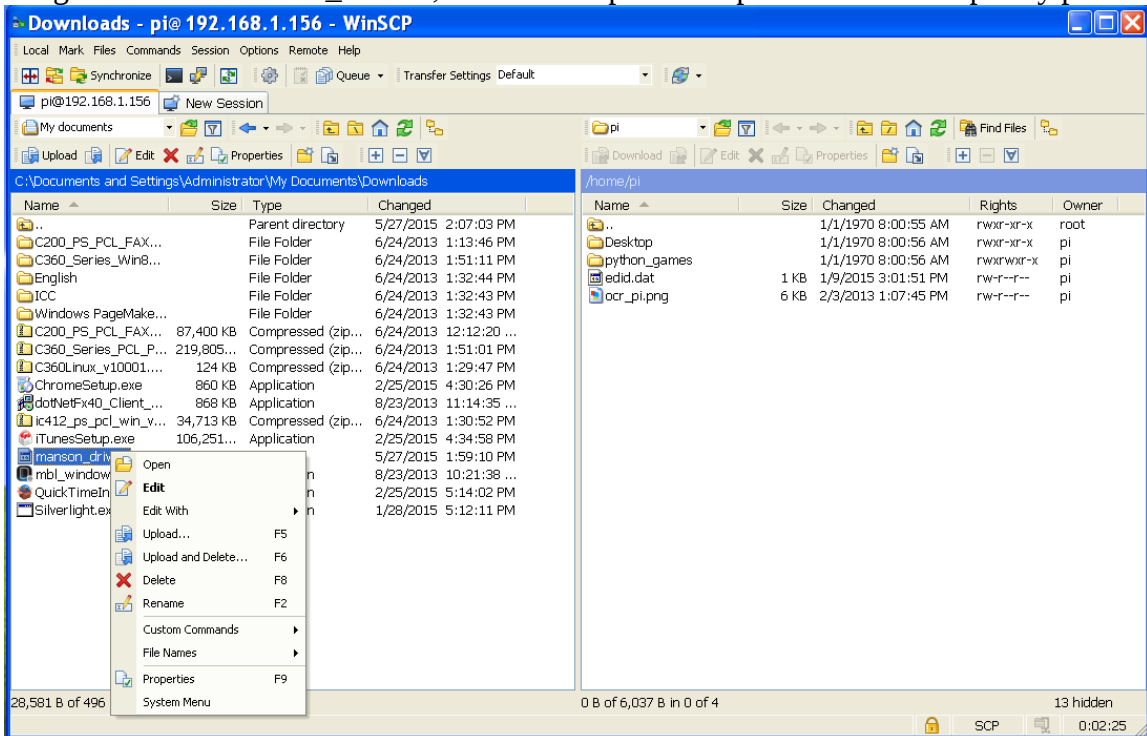

- Click "Login" to connect to raspberry pi

- The left hand side in following screen is files in your Windows PC and right hand side is file in raspberry pi
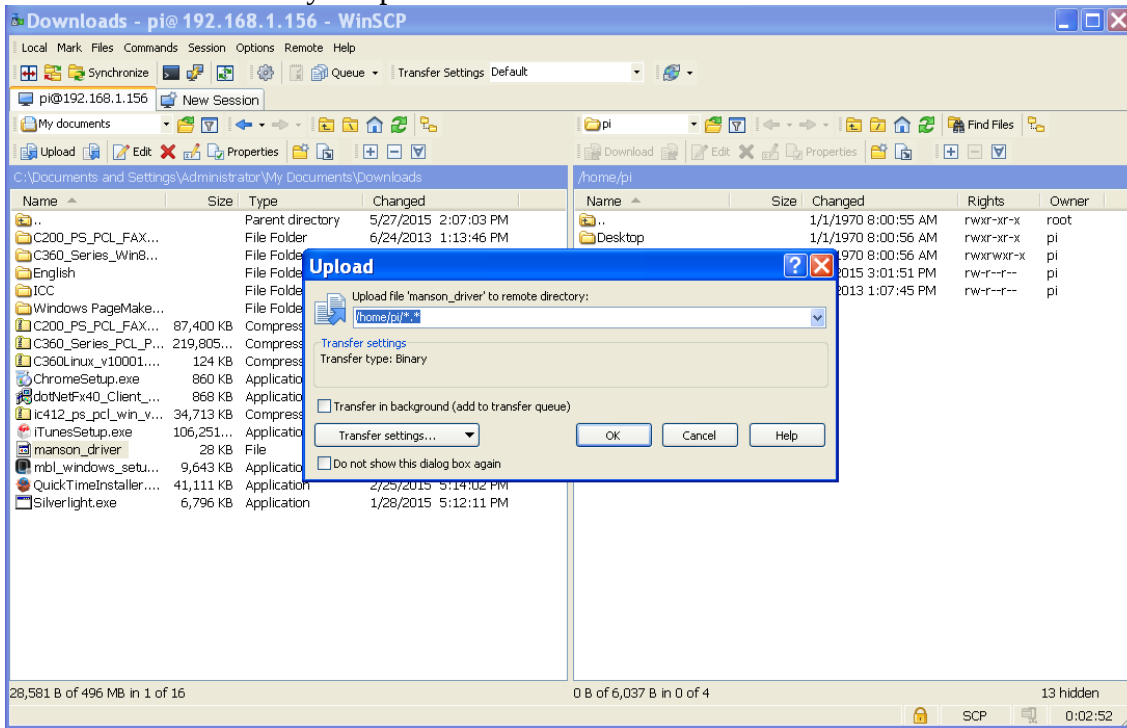

- Right click on "manson_driver", then select upload to upload driver to raspberry pi
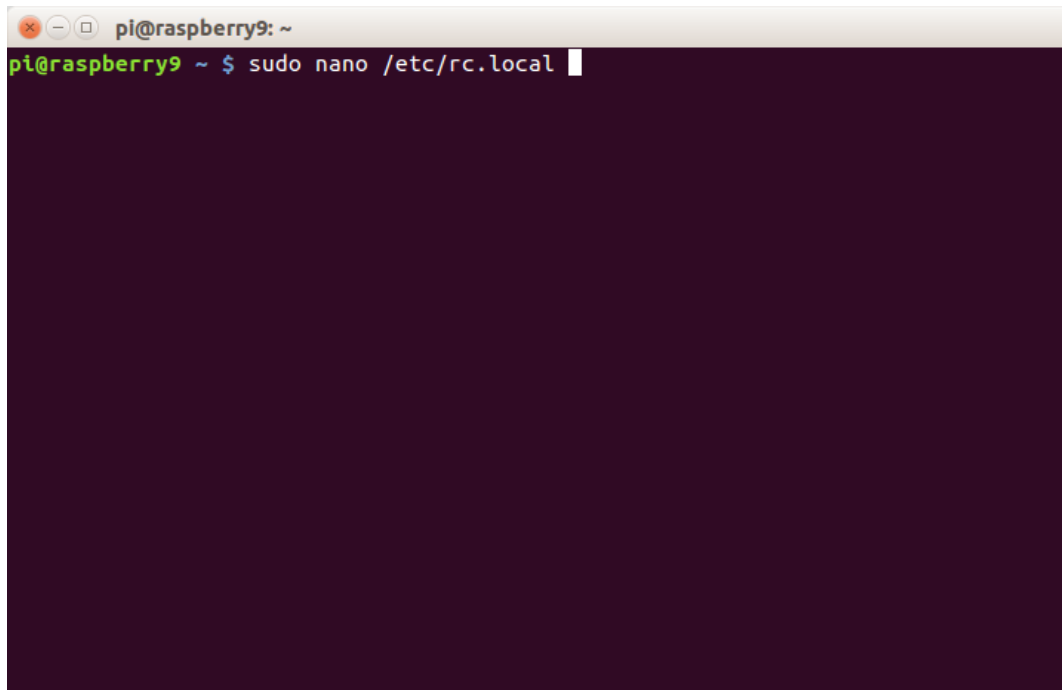
- Select default directory to upload

7. Change Manson driver to be executable
- The manson_driver should be changed to executable before it can be run.
- Goto directory you save manson_driver in. (/home/pi in this example)
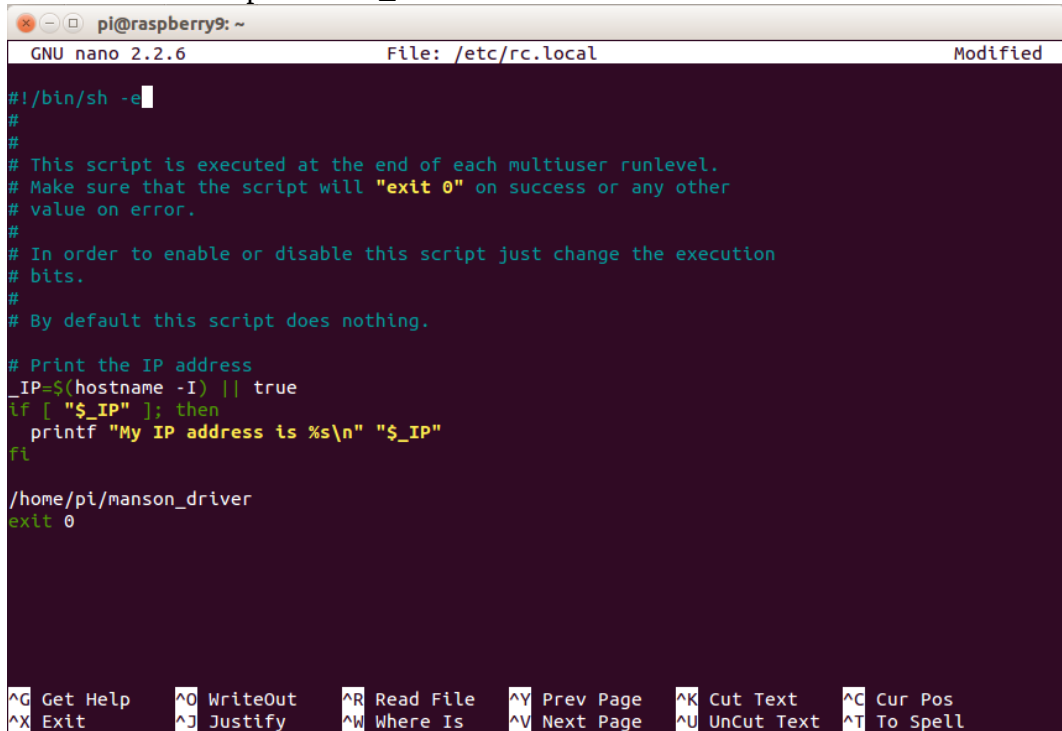- Run "chmod a+x manson_driver" in terminal to change manson_driver to executable"
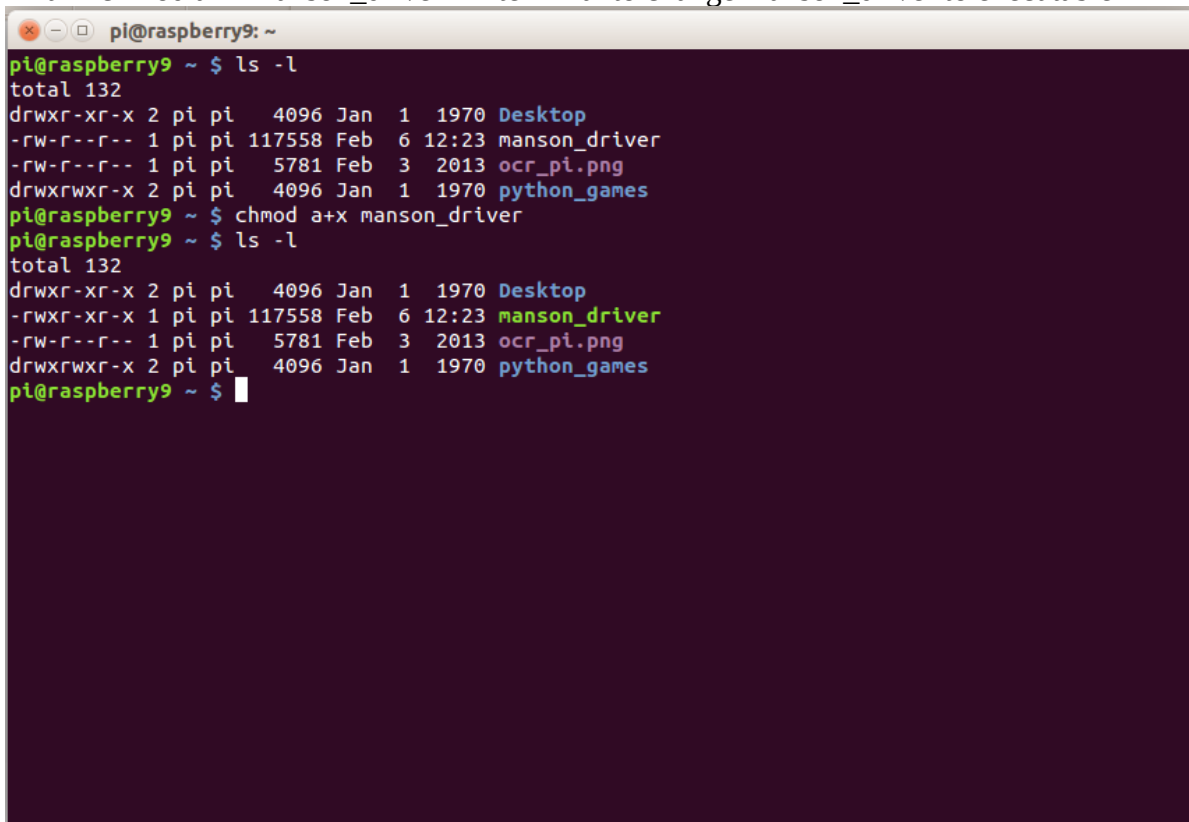
8. Run Manson driver as service in Raspberry Pi
- Add /home/pi/manson_driver into /etc/rc.local
- Run "sudo nano /etc/rc.local" in terminal.

```
pi@raspberry9: ~
pi@raspberry9 ~ $ sudo nano /etc/rc.local
```

- Add line "/home/pi/manson_driver" before exit 0

```
pi@raspberry9: ~
  GNU nano 2.2.6              File: /etc/rc.local                    Modified

#!/bin/sh -e
#
#
# This script is executed at the end of each multiuser runlevel.
# Make sure that the script will "exit 0" on success or any other
# value on error.
#
# In order to enable or disable this script just change the execution
# bits.
#
# By default this script does nothing.

# Print the IP address
_IP=$(hostname -I) || true
if [ "$_IP" ]; then
  printf "My IP address is %s\n" "$_IP"
fi

/home/pi/manson_driver
exit 0




^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
```

- Press "Ctrl+x" to exit editor. Press "y" to save modified file.
- Restart Raspberry Pi.

Date: 18-Jun-2015