Raspberry Pi Inital Setup

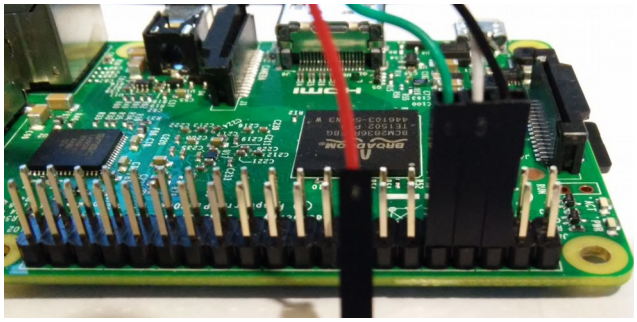
These instructions take you thru the initial setup of the Raspberry Pi on the PiBot.

1. What you will need:
   a) Raspberry Pi and Micro SD card with OS image loaded.
   b) Console cable
   c) USB WiFi Adapter installed in USB on PI
   d) USB webcam or Raspberry Pi camera module installed on Pi
   e) USB Charger
   f) Assembled PiBot
      - You can do the install on just a Pi with out the motor driver or PowerBoost1000 connected. Power the Pi directly from the USB charger and ignore the instructions to use the power & shutdown switchs and test the motors.

Steps:

1. Plug the console cable into your computer and install the drivers.

2. Hookup console cable to Raspberry Pi. BE VERY CAREFULL!!!
   a) Note: Do NOT connect the red wire from the cable to the Raspberry Pi!



3. Open up a serial terminal program, we recomend Teraterm, but you can use whatever works for you. Select cable port and set to 11500,8,n,1

4. Power up the PiBot by pluging the USB supply into the PowerBoost1000 and turning on the power switch.

5. Once the Pi boots up, at the prompt, login. Account: pi, password: raspberry

6. Change your password
   a) Enter the command: passwd
   b) You will be prompted for the current password, raspberry
   c) The enter your new password twice.

7. Run the config util
   a) Enter the command: sudo raspi-config
   b) Select "Expand Filesystem" then "OK"
      - This allows access to all the space on your micro SD card.
   c) Select "Advanced options" then "SSH" then "Enable"
      - This lets you log in over the network.
   d) If you are using the Raspberry Pi camera module select "Enable Camera", then "Enable"
   e) Select "Finish" and reboot

8. WiFi config
   a) Edit the WiFi supplicant config file: sudo nano /etc/wpa_supplicant/wpa_supplicant.conf
   b) Add the following at the end of the file:

```
network={
   ssid="<Network Name>"
   scan_ssid=1
   psk="<Password>"
}
```

   (Replace <Network Name> and <Password> in the above text with your network name and password)

   c) Save the file and exit nano

9. Reboot: sudo reboot
   a) After login try: ifconfig
      - Should show IP address in wlan0 data. (inet addr: xxx.xxx.xxx.xxx)

10. Get latest updates
    a) Enter the following commands (This may take a while)

```
sudo apt-get update
sudo apt-get upgrade
```

11. Install the FTP server (This lets you access files on the Pi over the network)
    a) Enter the command: sudo apt-get install vsftpd
    b) Edit the ftp config file: sudo nano /etc/vsftpd.conf
    c) Uncomment the following options – local_enable=YES, write_enable=YES
    d) Enter the command: sudo service vsftpd restart

12. Install espeak (This lets your Pi talk to you)
    a) Enter the command: sudo apt-get install espeak

13. Install MJPG-streamer build dependencies (Stuff we need to build the program)
    a) Enter the command: sudo apt-get install libjpeg8-dev imagemagick libv4l-dev

14. Download the PiBot files, this includes the MJPG-Streamer and ServoBlaster source code
    a) Enter the following commands:

```
cd ~
wget http://jsconsulting.com/explorers/pibot/code/pibot-files.zip
unzip pibot-files.zip
chmod +x pibot-install
```

15. Install the PiBot software
    a) For a webcam setup enter the following command:

```
./pibot-install webcam
```

    b) For a Pi camera module setup enter the following command:

```
./pibot-install picam
```

    c) Once the install is done plug an amplified speaker or headphones/ear buds into the Pi
    d) Hit any ket to restart the Pi, and proceed to the next step.

16. Restart and test
    a) After runing the install script the Pi will reboot and you should hear the following:
        - Starting servoblaster
        - Starting web server
        - PiBot ready
    b) Login to the Pi and use the ifconfig command to get the IP address of wlan0
    c) Open a web browser on a PC and enter the ip address followed by port number 8080 into the address bar
        - Example:192.168.1.100:8080
    d) You should see the PiBot control page
        - The video stream should show a live camera image
        - Use the buttons on the bottom to test the motors
        - Enter text into the box and hit ENTER, espeak will say the text
    e) If all goes well remove the install script
        - Enter the command: rm pibot-install

17. Shutting off the PiBot
    a) First shutdown the Pi
        - Method 1: Enter the command: sudo shutdown -h now
        - Method 2: Hold down the shutdown button until you hear "PiBot shutting down"
    b) Wait for the Pi to finished shutting down
        - The green LED should stop blinking.
        - Wait at least 10-20 seconds to be sure it's stopped.
    c) Turn off the power switch

18. If you want to use access point mode for the WiFi, restart the Pi and do the following:
    a) Install the DHCP server
        - Enter the command: sudo apt-get install hostapd isc-dhcp-server
    b) Configure the DHCP server
        - Enter the command: sudo nano /etc/dhcp/dhcpd.conf
        - Comment out the following lines: (Add # in front)
            option domain-name "example.org";
            option domain-name-servers ns1.example.org, ns2.example.org;
        - Uncomment line that says "#authoritative;" (Remove the #)
        - Add the following at the bottom of the file:

```
subnet 192.168.42.0 netmask 255.255.255.0 {
    range 192.168.42.10 192.168.42.50;
    option broadcast-address 192.168.42.255;
    option routers 192.168.42.1;
    default-lease-time 600;
    max-lease-time 7200;
    option domain-name "local";
    option domain-name-servers 8.8.8.8, 8.8.4.4;
}
```

        - Save and close the file
        - Enter the command: sudo nano /etc/default/isc-dhcp-server
        - Scroll down to INTERFACES="" and update it to say INTERFACES="wlan0"
        - Save & close the file.
    c) Copy/setup the interfaces file
        - Enter the following commands:
        - sudo cp /etc/network/interfaces ~/bin/interfaces_client
        - sudo cp /etc/network/interfaces ~/bin/interfaces_ap
    d) Edit the ap interfaces file
        - Enter the command: sudo nano ~/bin/interfaces_ap
        - Make the "wlan0" stuff look like this:

```
allow-hotplug wlan0
iface wlan0 inet static
```

address 192.168.42.1
netmask 255.255.255.0

- Save and close the file

e) Configure the AP
- Enter the command: sudo nano /etc/hostapd/hostapd.conf
- Add the following: (Note, set ssid, channel, and wpa_passphrase to your own values)

```
interface=wlan0
driver=nl80211
ssid=Pi_AP
hw_mode=g
channel=6
macaddr_acl=0
auth_algs=1
ignore_broadcast_ssid=0
wpa=2
wpa_passphrase=Raspberry
wpa_key_mgmt=WPA-PSK
wpa_pairwise=TKIP
rsn_pairwise=CCMP
```

- Note: Your value for the driver string may differ depending on your WiFi adapter
- Save and close the file

f) Tell system where to find the config file:
- Enter the command: sudo nano /etc/default/hostapd
- Find line that says: #DAEMON_CONF=""
- Change to: DAEMON_CONF="/etc/hostapd/hostapd.conf"
- Save and close the file

g) Set the WiFi mode
- To check WiFi mode and IP address: ~/bin/wifi-mode
- For AP mode enter the command: ~/bin/wifi-mode ap
- For client mode enter the command: ~/bin/wifi-mode client
- To switch modes: ~/bin/wifi-mode switch
- Once the mode is set it will stay until you change it, including across restarts and shutdowns.
- NOTE: The above setup is specific to the PiBot which does not normally have an Ethernet connection, so no NAT translation is used. Because of this when in AP mode the Pi will not forward packets to/from the Ethernet connector. (Switching NAT on/off for mode changes is on my "to do" list.)