PTC® IoT Academic Program

Set up your Raspberry Pi Board

Revision #	Date	ThingWorx Revision	Changes	Owner
1.0				DeAnna

2.0	10-12-14		Merged the two files DeAnna sent me Veronica MIHAI	Veronica MIHAI
3.0 - current	11-12-14		Reviewed Andy's comments	Veronica MIHAI
4.0	19-12-14		Modified Cover Page font, footer, review table and copyright paragraph position in the document at Andy's suggestion	Veronica MIHAI

What is a Raspberry Pi?

A Raspberry Pi is a small micro-processing board which has basic computing functionality (much like a desktop computer from 1997). Using the Raspberry Pi you can interact with different hardware (i.e. drive a motor) and software (i.e. web applications). To learn more about Raspberry Pi visit this site.

Necessary Hardware

Item	Quantity
Raspberry Pi Model B	1
USB Mouse	1
USB Keyboard	1
Ethernet Cable	1
HDMI or VGA Cable	1
HDMI or VGA adaptable Monitor	1
8GB (or larger) SD card	1
5 V, 1 A Power Supply or Equivalent USB Battery Pack	1
Am2302 Temperature and Humidity sensor	1

Raspberry Pi Setup

Before using in the Raspberry Pi, it is necessary to install the Raspbian image to the SD card. Raspbian is basically a flavor of the Linux operating system (OS) which has been developed for the Raspberry Pi. Other Raspberry Pi OS options include NOOBS, PIDORA, OPENELEC, RASPBMC, RISC OS…etc. However, this tutorial will use Raspbian.

To install the Raspbian image, you will first need to insert the SD card into your laptop/computer SD card reader. This SD card reader by default usually has a "dummy" SD in the slot that will have to be pushed in (activating the release mechanism on the "dummy" SD).

This tutorial will be done using a Windows OS, so the next step could change if you are using a computer that runs an OS other than Windows. Helpful tutorials for other operating systems are linked below:

Linux

[Mac](#)

Download the Win32DiskImager [here](#) by clicking:

sf Download
Download the unamed sequel here

This next window will pop up, you will want to click "Save File":

Opening Win32DiskImager-0.9.5-install.exe

You have chosen to open:

    Win32DiskImager-0.9.5-install.exe

    which is: Binary File (11.7 MB)
    from: http://softlayer-dal.dl.sourceforge.net

Would you like to save this file?

Save File   Cancel
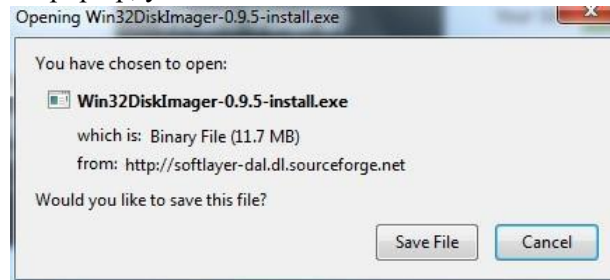
Once the download has completed, you will need to open the Win32DiskImager utility. Do this by opening your downloads (or wherever downloaded files from the internet are saved on your computer) and clicking on the "Win32DiskImager-0.9.5-install.exe":

sourceforge.net/projects/win32diskimager/files/latest/download

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Win32 Disk Imager

Win32DiskImager-0.9.5-install.exe
11.7 MB — sourceforge.net — 12:16 PM

How Smart, Connected Pro...vard Business Review.htm
30.5 KB — hbr.org — 10:38 AM

Show All Downloads

When the next window pops up, click "Run":

Open File - Security Warning

The publisher could not be verified. Are you sure you want to
run this software?

        Name: ...r\Downloads\Win32DiskImager-0.9.5-install.exe
    Publisher: **Unknown Publisher**
        Type: Application
        From: \\mielsvr3\profiles5\drobear\Downloads\Win32...

                    Run   Cancel

☑ Always ask before opening this file

        This file does not have a valid digital signature that verifies its
        publisher. You should only run software from publishers you trust.
        How can I decide what software to run?

Download Raspbian image onto your computer from [here](#). Extract the downloaded image by simply right clicking on the zip file:

Go back to the Win32DiskImager Utility. Fill the "Image File" field by clicking on the blue folder and finding the Raspbian image you just extracted. Make sure that your "device" field is filled by selecting the drive letter which corresponds to the SD card inserted into your computer (in my case it is G:):
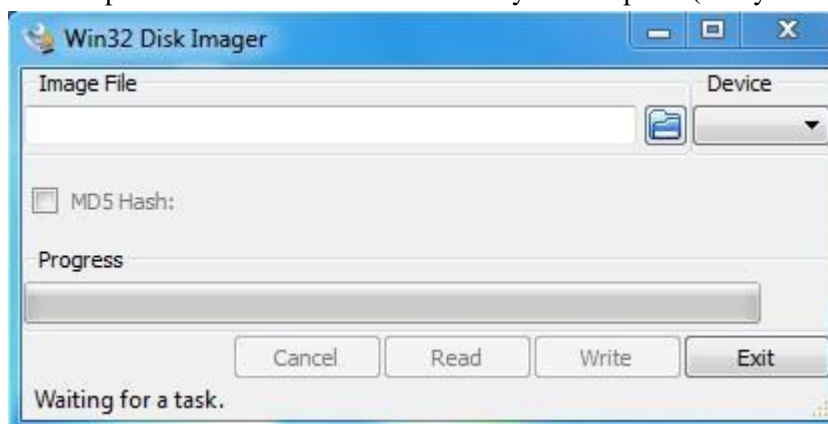
Note: You can find on which Device Name (E: , G:, H: etc.) your SD card is on by going to My Computer. You SD card will appear under Devices with Removable Storage.
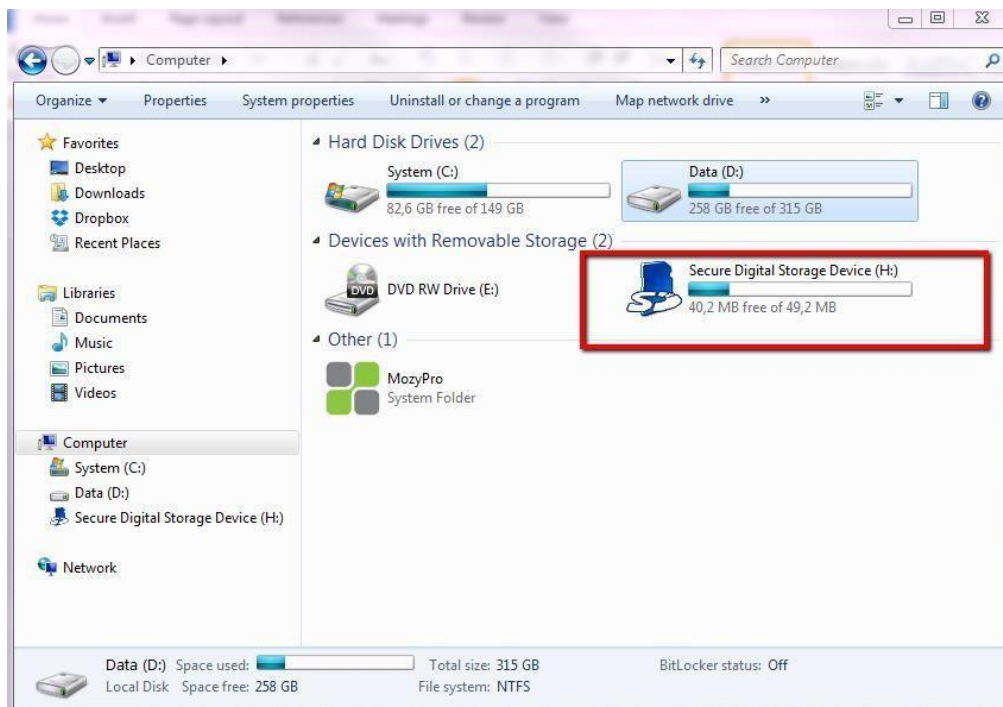
Finally click "Write and wait for the image to complete. When it has finished you may exit the imager and eject the SD card.

Using the Raspberry Pi

To begin using the Raspberry Pi, you will have to insert the SD card with the Raspbian image. It is important that this be done correctly so the SD card is not damaged, it should be facing upwards with the contact points from the SD card touching the contact points on the Raspberry Pi:

Hardware Set-up

There are several different ways you can communicate with the Pi; however, the easiest way is by setting it up like a computer. To do this, you will need to plug in a mouse (either wireless or wired will work) and a keyboard into the two USB ports, no configuration is necessary.

The final two hardware plugins are for the HDMI cable running from the port on your Raspberry

Pi to a computer monitor and an Ethernet cable running from your Pi to the Local Area Network (LAN). Be advised that whichever place you plug in your Ethernet cable, you must also be on that same connection with your laptop in order to communicate with the Pi via SSH (discussed in a separate tutorial). Also note that some older computer monitors might not have an HDMI port, instead they will have a VGA port. The good news is that this monitor can still be used if you purchase an HDMI to VGA adapter and follow the configuration procedure provided in a separate tutorial. Here is a good depiction of where each port is on your Raspberry Pi :
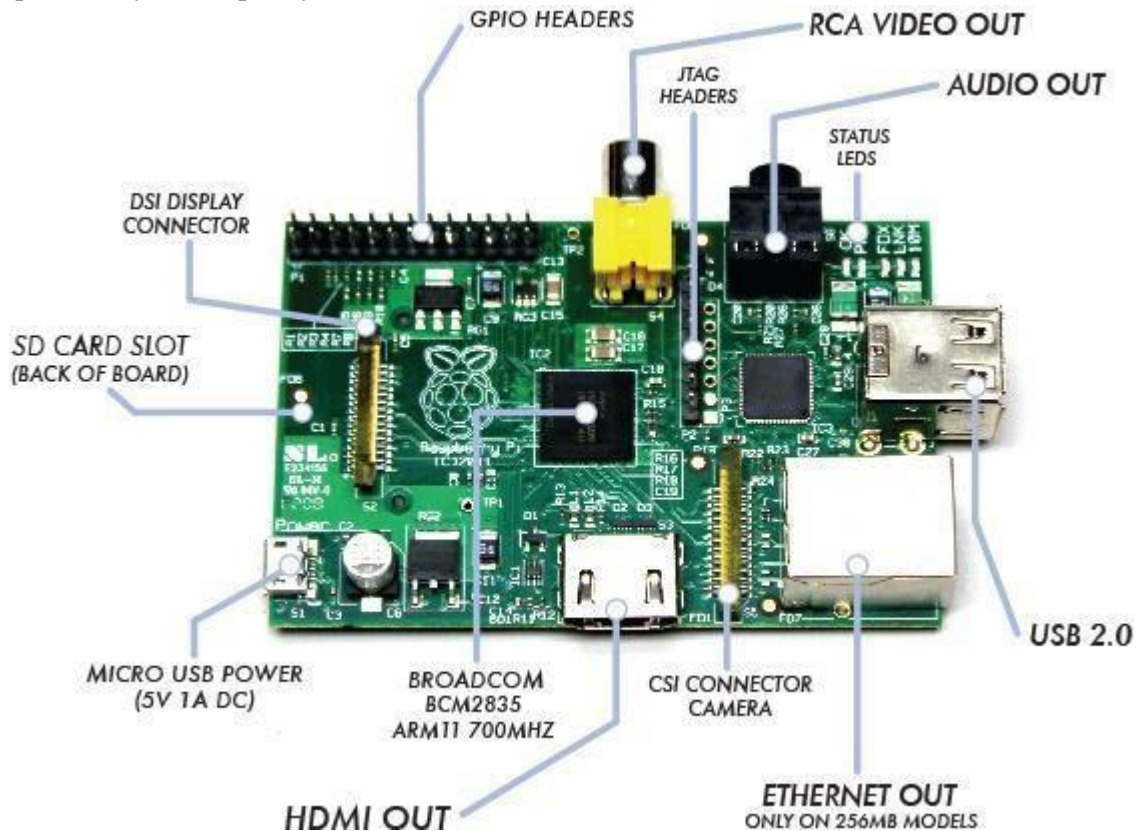
Logging on

Once all hardware is plugged in, you are ready to begin interacting with the Raspberry Pi. Start by plugging the power cable (micro USB) into a power source (i.e. wall outlet or USB Battery). Once given power, the Raspberry Pi will start loading information from the SD card to boot up, you will see a scrolling screen of text as the Pi performs each boot-up task. Eventually you will see the following screen appear:
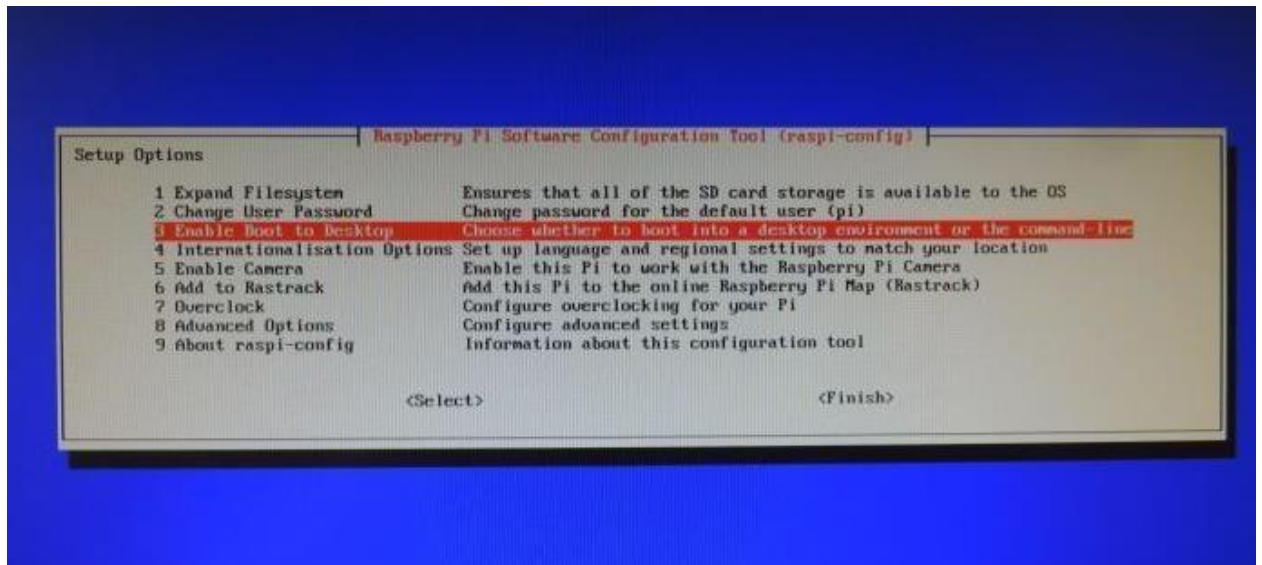
A good overview of which configuration settings (i.e. password, time, date…etc) is given here
If you would like to bypass some of these configuration settings, you can simply select
"<Finish>" and move forward with the boot up process.
When the Pi is finished booting, it will prompt you for a username and password.
Assuming you have not changed this already, the default username is "pi" and the password is
"raspberry". Note that when you type the password, no text will appear; this is simply a Linux security
feature.

Raspberry Pi HDMI to VGA

Introduction:

So you have acquired your new Raspberry Pi, but have noticed that your old monitor doesn't
have an HDMI port that will connect to the Raspberry Pi. Most likely, the port on your old monitor is VGA.
See pictures below:

HDMI Port on Raspberry Pi   **VGA Port on Monitor**

Materials:

In order to be able to use your Raspberry Pi, you're going to need to purchase a few additional items:

1)   HDMI to VGA adapter. Adafruit sells this product here price: $18.95

Set up your Raspberry Pi

2)   VGA cable (if you don't already have one). Adafruit also sells this product here price: $2.95

3)   Notepad++. Download here and click on the "Notepad++ Installer" price: FREE

Procedure:

The first thing you're going to need to do is locate the SD card slot on your computer:

SD Card Port

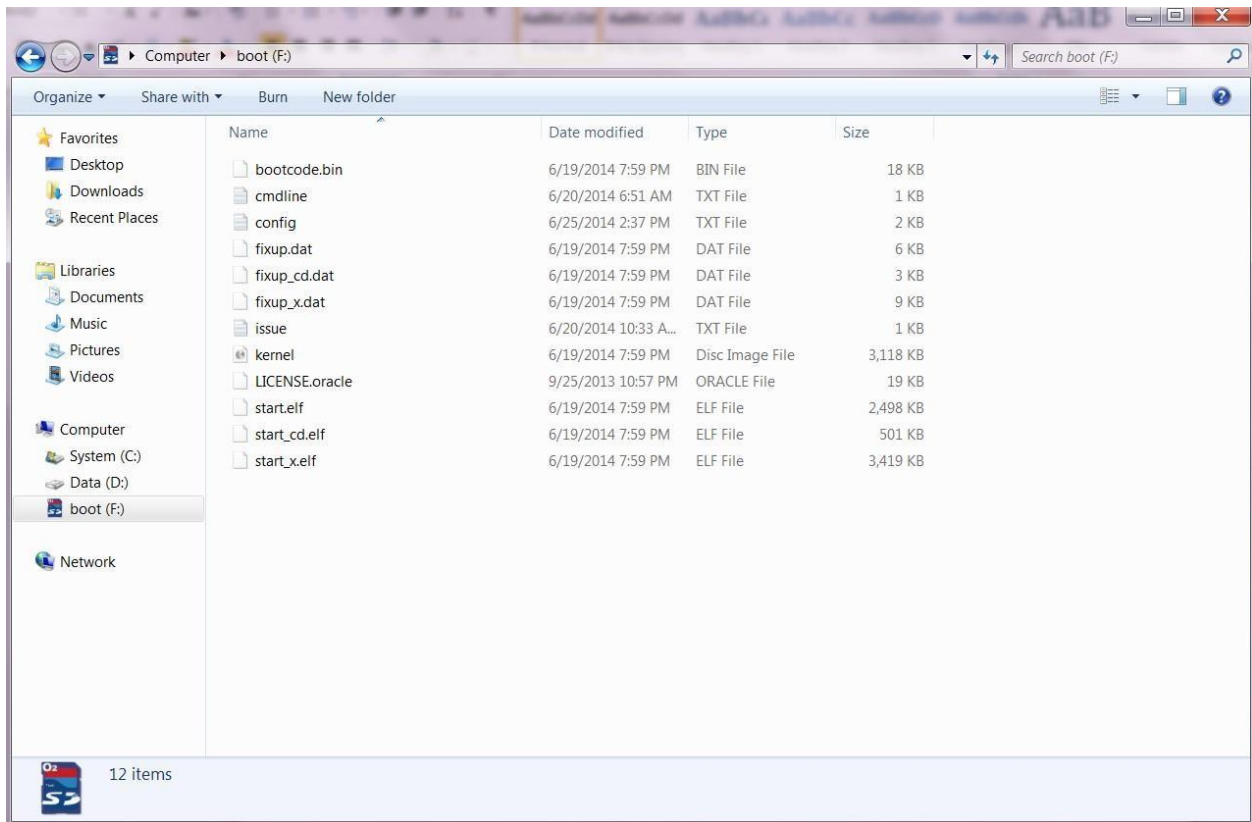Next, place your SD card into that slot and open up "Libraries":
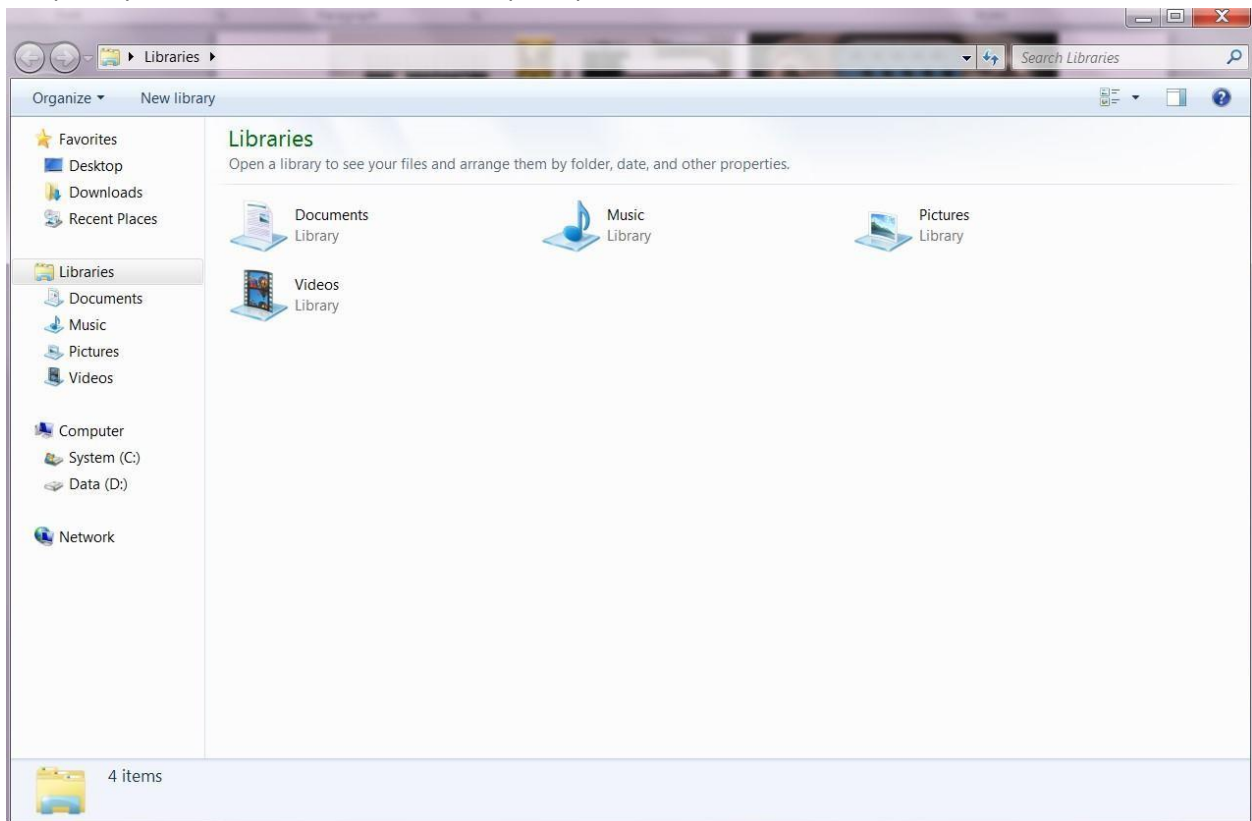
Note: *If you're computer does not have this display right off and you don't want to fidget with it, just go to your start menu and search "computer." This should bring you to the screen we're looking for.* Click on "Computer":
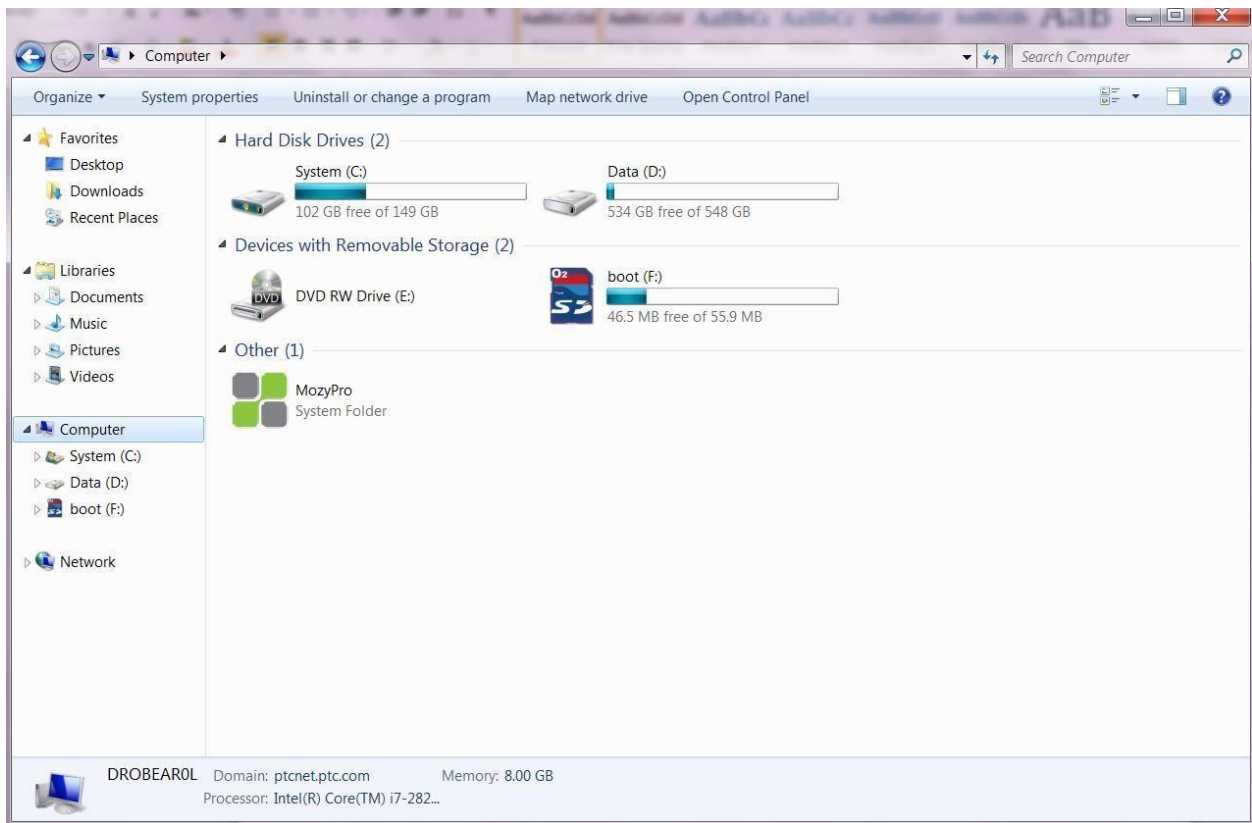
In my case, the SD card is called boot(F:) click on that:

Click on the file that says "config" and select "Open With→Notepad++":
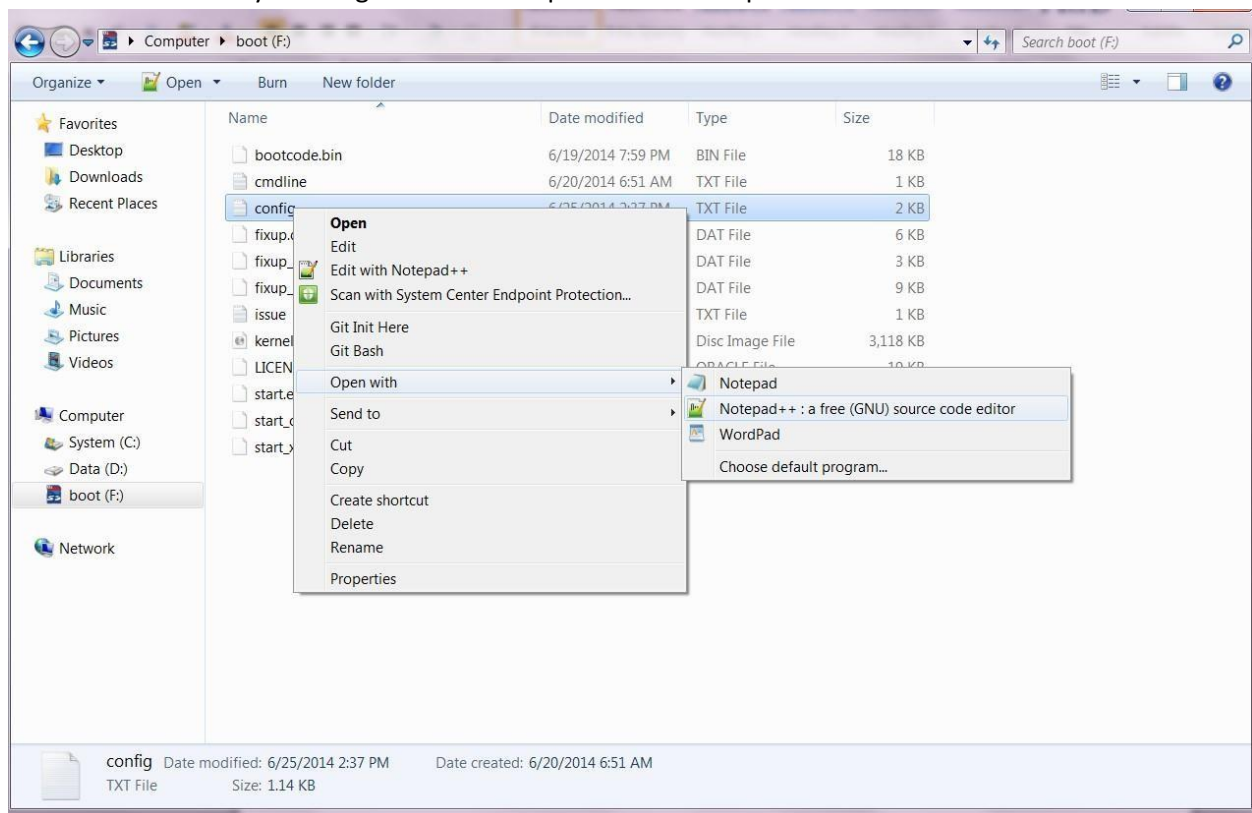
Set up your Raspberry Pi

Find the lines that say this:

#hdmi_force_hotplug=1

#hdmi_group=1

#hdmi_mode=1

#hdmi_drive=2
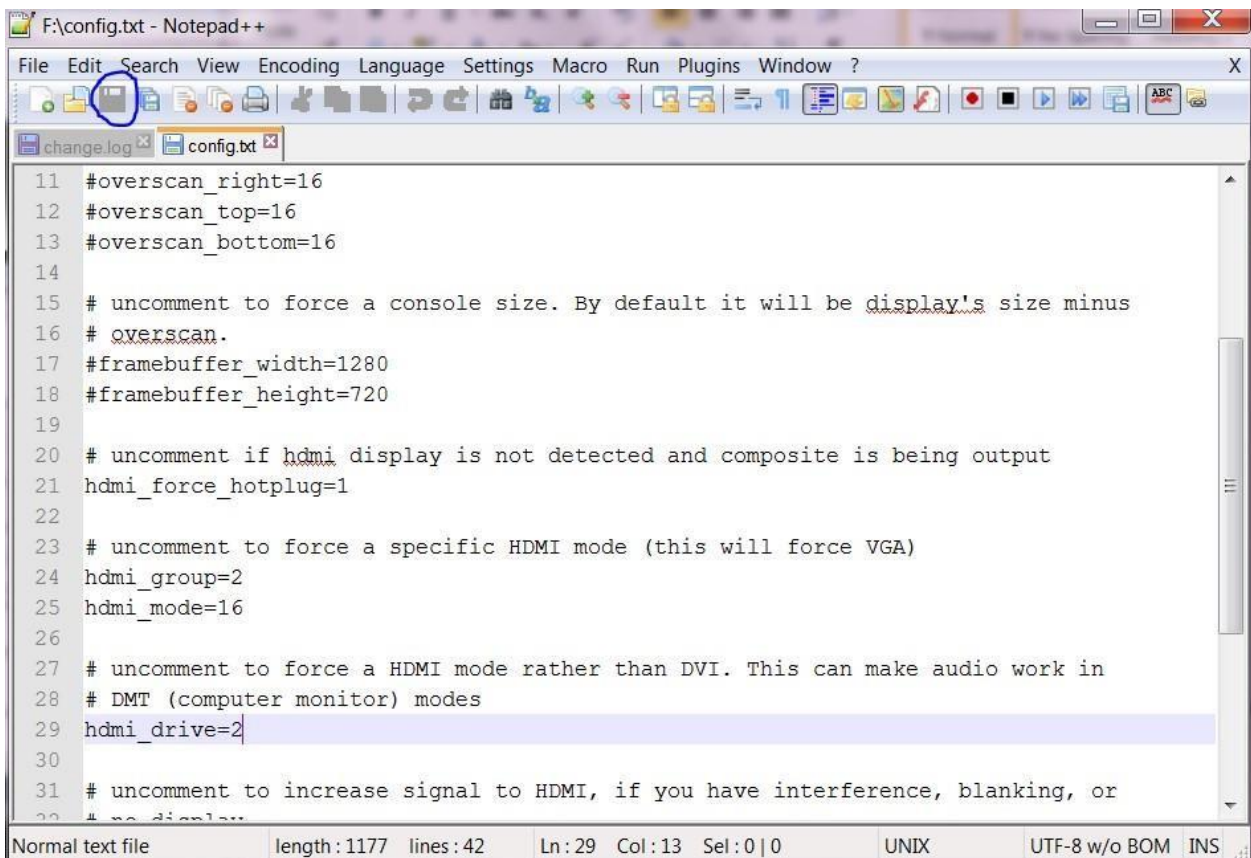
Remove the "#" before each one of these lines and change them so they read like this:

hdmi_force_hotplug=1

hdmi_group=2 hdmi_mode=16

hdmi_drive=2

Removing these "#" symbols uncomments the code line, enabling the action it describes Then click save:

Remove SD card from computer and insert it back into the Raspberry Pi (make sure Raspberry Pi is off when you put the SD card back in).

Plug one end of the VGA cable into your monitor and the other end into the HDMI to VGA adapter. Then plug the HDMI end into the HDMI port on the Raspberry Pi.

Boot up the Raspberry Pi and you're ready to go!

Set up your Raspberry Pi