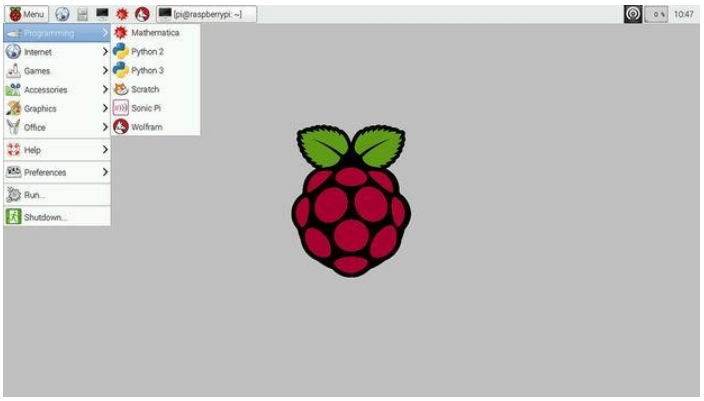
PROJECT IMPLEMENTATION

1. Installing the OS in the raspberry pi



Step 1: Download the required software and files

- You need to download 2 software and 1 OS i.e. Raspbian for this complete process. 1st software: The first software is Win32 Disk Imager. https://sourceforge.net/projects/win32diskimager/

- 2nd software: Second software is SD Card Formatter. https://www.sdcard.org/downloads/formatter_4/

- Raspbian OS: This is the Main operating system of the Pi. https://www.raspberrypi.org/downloads/raspbian/

- Extract all files to the desktop.


RASPBIAN JESSIE LITE
Minimal image based on Debian Jessie
Version: September 2016
Release date: 2016-09-23
Kernel version: 4.4
Release notes: Link
Download Torrent
Download ZIP
SHA-1: 3a34e7b05e1e6e9042294b29065144748625bea8


Home / Browse / System Administration / Storage / Win32 Disk Imager
Win32 Disk Imager
beta
A tool for writing images to USB sticks or SD/CF cards
Brought to you by: gruemaster, tuxinator2009
Summary
Files
Reviews
Support
Wiki
Feature Requests
Bugs
Code
Mailing Lists
4.0 Stars (80)
90,611 Downloads (This Week)
Last Update: 2015-11-27
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Win32DiskImager-0.9.5-binary.zip
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SD Card Formatter 4.0 for Windows and Mac
Download SD Formatter for Windows
Released on January 30, 2013
Download SD Formatter for Mac
Released on January 30, 2013

SD Card Formatter 4.0 for Windows User's Manual
Download the SD Formatter 4.0 for Windows User's Manual from the buttons below:
English (337k)
Japanese (332k)
Traditional Chinese (517k)
Simplified Chinese (423k)

Step 2: Get the SD card and the card reader

- Get a minimum 8GB class 10 SD card with a card reader. Insert that card into the card reader and plug that to the USB port.

Step 3: Check the drive in which the SD card is mounted

- Go to my computer or My PC and find the drive name where the SD card is mounted.

Step 4: Format the SD Card

- Open SD Card Formatter and select the drive you noticed in the previous step.
- Click on format and don't alter any other options.
- When formatting is completed, click on OK.

Step 5: Write the OS on the SD Card

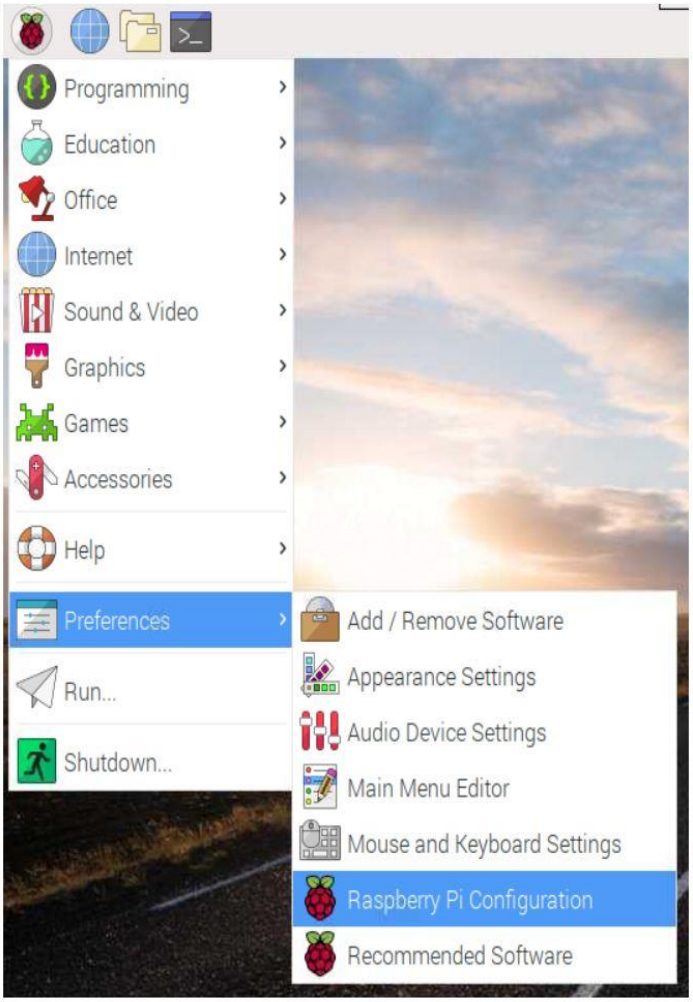
- Open win32disk imager.
- Browse the .img file of Raspbian OS that was extracted from the downloaded file.
- Click on open and then click on Write. If any warning pops up then ignore those by clicking OK.
- Wait for the write to be completed and it may take some minutes. So be patient.

Step 6: Eject the SD Card

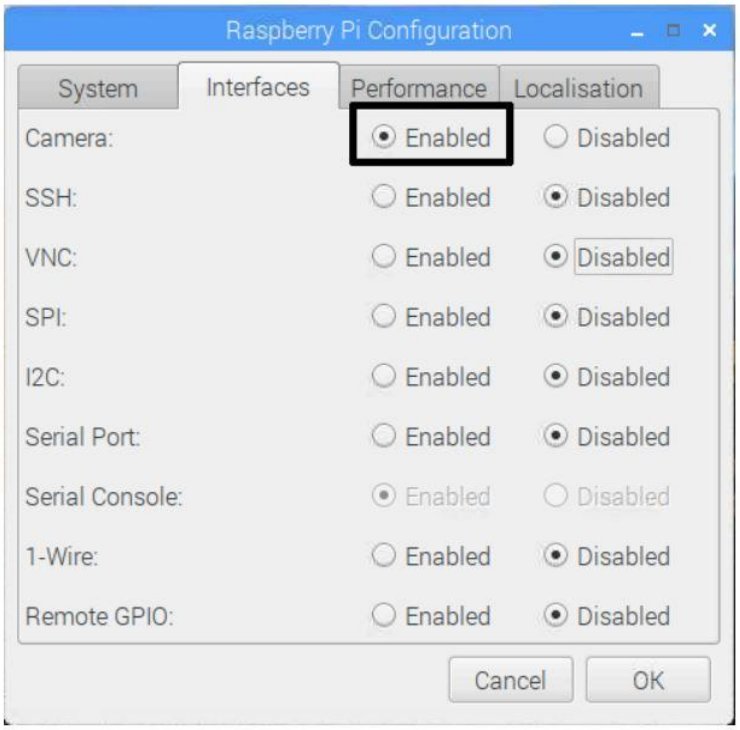
- Now your OS in installed on your Raspberry Pi.

2. Embedding the camera

- Locate the Camera Module port.
- Gently pull up on the edges of the port's plastic clip.
- Insert the Camera Module ribbon cable; make sure the cable is the right way round
- Push the plastic clip back into place.
- Start up your Raspberry Pi.Go to the main menu and open the **Raspberry Pi Configuration** tool.



Select the ***Interfaces*** *tab and ensure that the camera is* ***enabled***



Reboot your Raspberry Pi.

3. Live Streaming the camera

Up to now we are done with installing the camera, now we have to live stream the camera, for that we have to install a server in our case it is apache server.

To be precise we are calling this server as Rpi-cam-web-interface.

The steps to install the server are

Step 1: Update your RPi with the following commands:

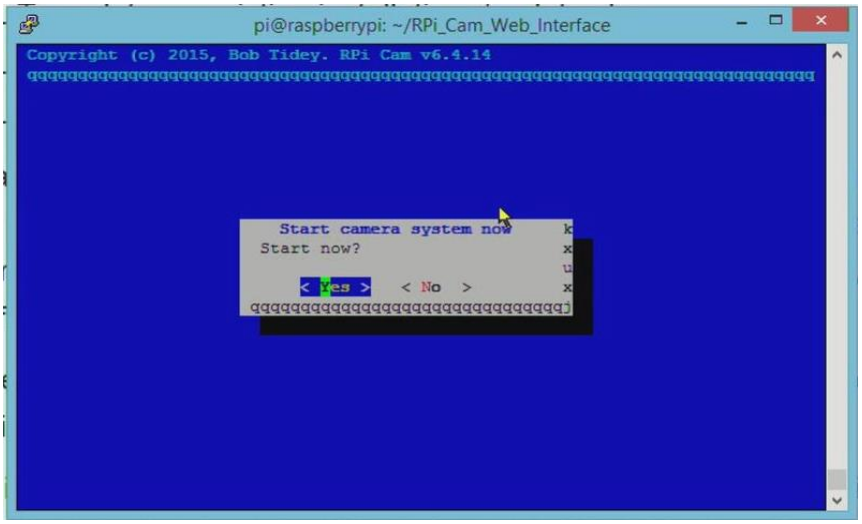
- Sudo apt-get update
- Sudo apt-get dist-upgrade

Step 2: Clone the code from GitHub and enable and run the install script with the following commands

git clone https://github.com/silvanmelchior/RPi_Cam_Web_Interface.git
Cd RPi_Cam_Web_Interface./install.sh

Step 3: After running the install command we will get a dialogue box to configure the server settings.

Step 4: After configuring the settings, the terminal asks you to whether start the camera or not.



Six separate scripts are provided to do separate installation and maintenance functions.

The scripts installed are

- install.sh main installation as used in step 2above
- update.sh check for updates and then run main installation
- start.sh starts the software. If already running it restarts.
- stop.sh stops the software

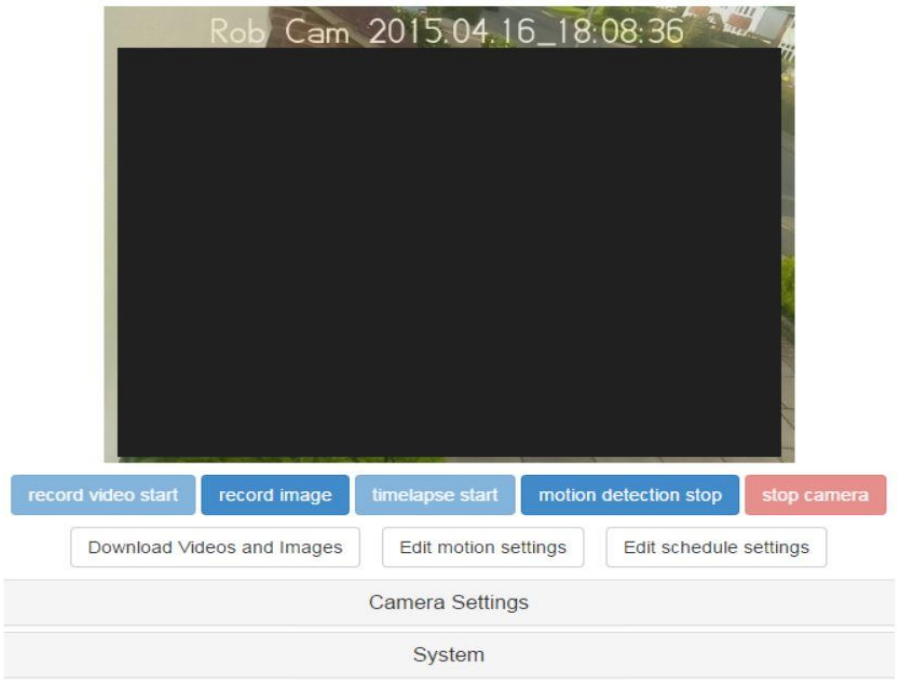
- remove.sh removes the software
- debug.sh is same as start but allows raspimjpeg output to console for debugging
- To run these scripts make sure you are in the RPi_Cam_Web_Interface folder then precede the script with a ./

E.g. To update an existing installation ./update.sh

E.g. To start the camera software ./start.sh

E.g. To stop the camera software ./stop.sh

Step 5: After installing it start the camera and to view the live stream open up any browser on any computer in your network and enter the url to access the camera web site. This will be http://ipAddress:port/subfolder. If the port had been left at default 80 during install then this may be left out. Similarly, the subfolder (default html) can be left out if that was cleared during the install. So, for a port 80, no subfolder install the url becomes http://ipAddress.



4. Designing a Bot

Bot plays a crucial role in our project. For prototype we designed the bot by using plastic. And the design looks neat and contains a slant front which helps in moving the dump.

Step 1: Take a long pvc pipe and cut it into pieces of respective size with a saw blade.

Step 2: Join the pipe with the bend joints so that we get our desired shape.

Step 3: Fix two high speed motors at the rear end.

Step 4: Fix the camera and raspberry pi and get a battery and connect it to all the components.

Step 5: Attach the propellers to the motors.

5. Controlling the Bot

To control the Bot we should provide some buttons in the web interface and we can achieve this by adding some buttons and macros in the www folder which resides in the main folder of the server.

Step 1: Move to /var/www/html folder and before going to visit the folder give all the permissions to the user by using the command.

- Chmod 777 /var/www/html

Step 2: Rename the file UserbuttonsD to Userbuttons.

Step 3: We can add the buttons by writing them in the Userbuttons file. The file is just a text file and contains definition lines which are just.

- buttonName,macroname.sh

Ex: right_button,right_macro.sh

Step 4: After adding the buttons, write the desired code in the macro file. After the writing the code in the macro file, save the file in the macros folder which is in the path /var/www/html.
When a particular button is pressed then the respective macro is executed.

- gpio -g mode 17 out
- gpio -g write 17 1
- gpio.sleep(100)
- gpio -g write 17 0

The above is the macro file to blink an led which is connected to the pin 17.

Step 5: After saving the file in the macros folder honour the file with all the permissions.

Step 6: Till now we are done with the software part, now move to the hardware side. Take the relay and connect the two of its terminals to positive and negative respectively and connect the data pin to the pin given in the macro file

Step 7: Now to the two pins on the other side of the relay , connect one pin to the battery and the other one to the motor , so that when ever we click on the button it will activates the motor and as a result the bot moves in our direction.

6 Deploying the Website

The live stream we got and the controls we have are limited to local host or local network that we are using to run the server. Now we have to deploy that local server on the internet. For that we are using nginx server and ngrok. Ngrok allows you to expose a web server running on your local machine to the internet. To be precise what we are doing is port forwarding.

Step 1: Download the Zip file of ngrok from the website by using the below command.

- sudo wget https://bin.equinox.io/c/4VmDzA7iaHb/ngrok-stable-linux-arm.zip

Step 2: Unzip the folder

- unzip unzip ngrok-stable-linux-arm.zip

Step 3: Give the executable permissions to the file.

- sudo chmod +x ./ngrok

Step 4: Next go to ngrok official website and create an account to get the auth token. Once you got an authentication token download the config file using the auth token by executing the below command.

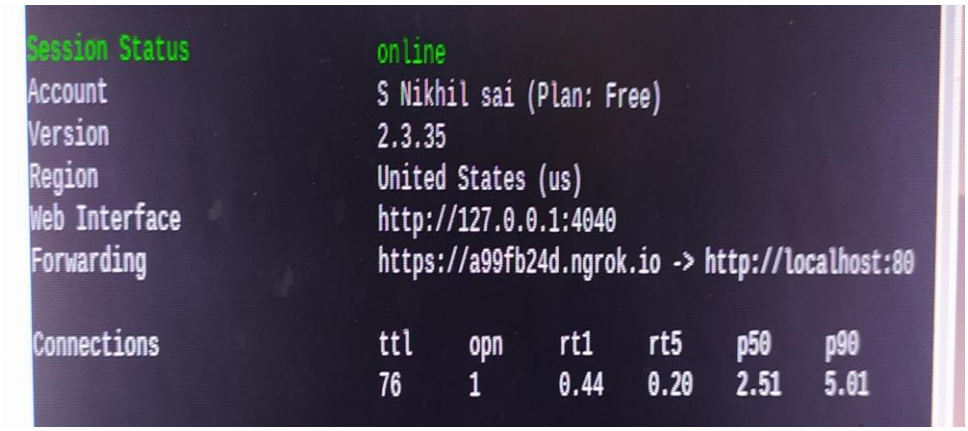
- ./ngrok authtoken 1YkSVonpCzVJrPyIBZTAF4DGSsj_4UD755hEaVcFJh66tnLkh

Step 5: We are done with the setup of ngrok. Now we have to deploy our website on to the internet for that observe the port in which our website is running, in our case it is 80.

Step 6: By using the port number, type down the below command.

- ./ngrok http -bind-tls=true port_number

Step 7: By executing the above command we are starting the server.



Step 8: Find the forwarding website from the terminal and use that url to access our camera interface from anywhere in the world.

Step 9: By default, we will have a simple html page and we have to change the default page to index.php because our whole camera server code is in index.php page.

Step 10: To do that open /etc/ngnix/sites-available/default file and move to location tag and add index.php to that.

```
location / {
        try_files $uri $uri/ /index.php?$args;
}
```

Step 11: Use the above website to access the server.

.7. Showing the Directions:

- Our next task is to show directions to the bot.
- To do that we integrating gps module with the bot.
- After reaching the dump area we have to move the dump to the predetermined locations, so as to reach those locations we have to show the dirrections.
- We will achieve this by using the gps module. By using the gps module we will get the co-ordinates of the location such as latitude and longitude and we already have the co-ordinates of the predetermined locations.
- By using some maps api we will see in which direction that particular location is, and we will show that directions on the web page.
- Here the directions are like North, East, North-East and so on...