

Camera Connection Guide

COMS W4733

This guide has four parts:

- 1) How to configure the router
- 2) How to configure the camera
- 3) How to power the camera from the iRobot Create battery
- 4) How to capture and edit an image from the camera in MATLAB



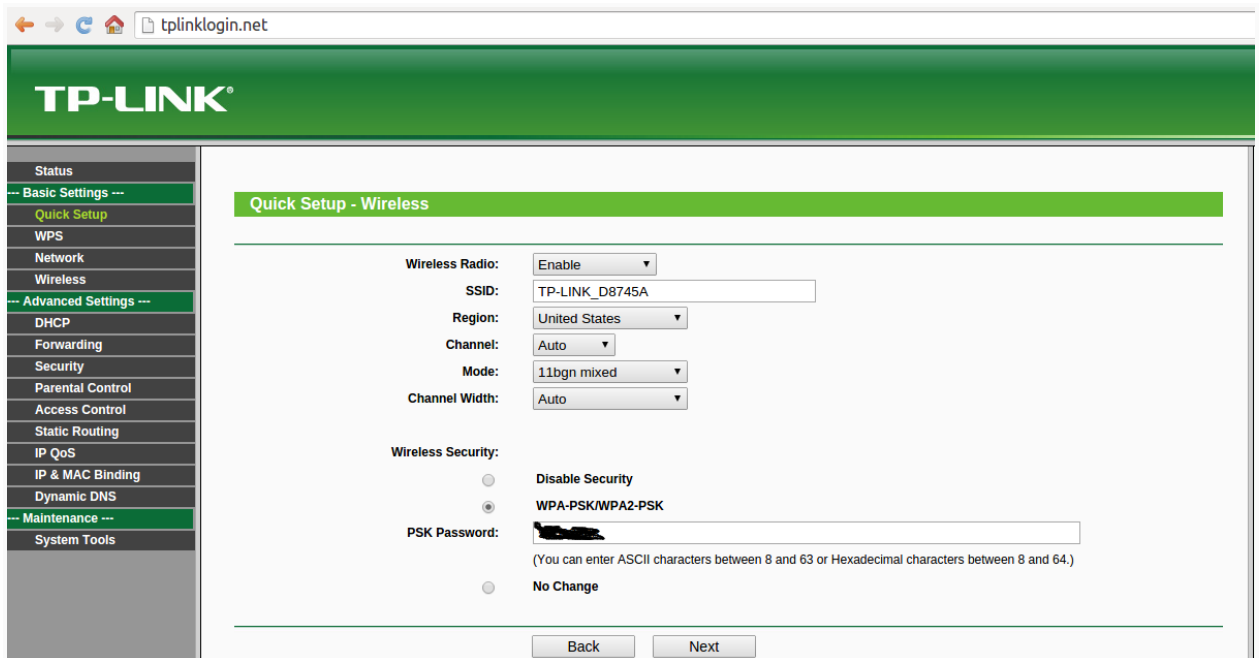
UserGuide:
http://downloads.linksys.com/downloads/userguide/WVC80N_V10_UG_NC-WEB_1.pdf



UserGuide:
<http://www.easyn.com/download/FS%20Quick%20Installation%20Guide.pdf>

Part 1: Configure the Router

- a) Plug the router in.
- b) Connect to that wireless network, or directly to the router via ethernet.
- c) Go to: <http://tplinklogin.net/> . (If you do not see the TP-LINK dashboard and instead see some random webpage, please make sure you are connected to your router and not some other wireless network)
- d) The very first time you configure the router you should run through Quick Setup under Basic Settings.
 - i. **Auto-Detect** - Let the Router automatically detect the connection type your ISP provides.
 - ii. Enable Security, and set a password.

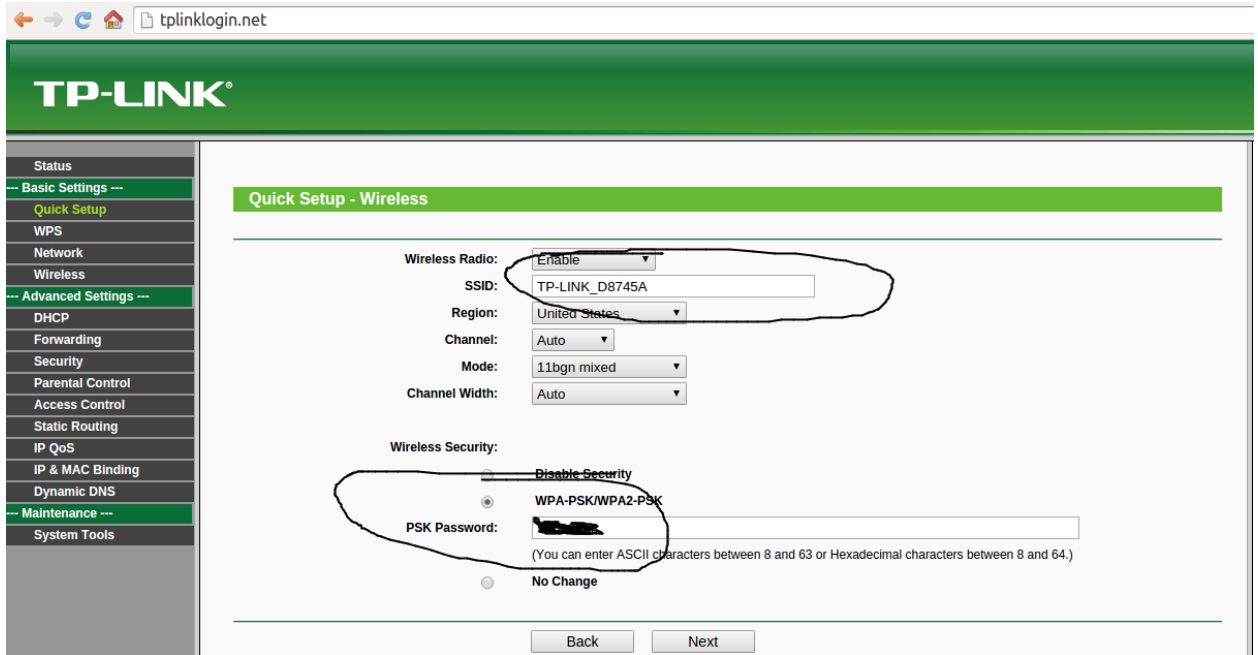


The screenshot shows the TP-LINK web interface for configuring wireless settings. The browser address bar shows 'tplinklogin.net'. The left sidebar contains a navigation menu with categories: Status, Basic Settings (selected), Advanced Settings, Maintenance, and System Tools. Under Basic Settings, 'Quick Setup' is highlighted. The main content area is titled 'Quick Setup - Wireless' and contains the following configuration options:

- Wireless Radio:** Enable (dropdown)
- SSID:** TP-LINK_D8745A (text input)
- Region:** United States (dropdown)
- Channel:** Auto (dropdown)
- Mode:** 11bgn mixed (dropdown)
- Channel Width:** Auto (dropdown)
- Wireless Security:**
 - Disable Security
 - WPA-PSK/WPA2-PSK
- PSK Password:** [Redacted] (text input)
- (You can enter ASCII characters between 8 and 63 or Hexadecimal characters between 8 and 64.)
- No Change

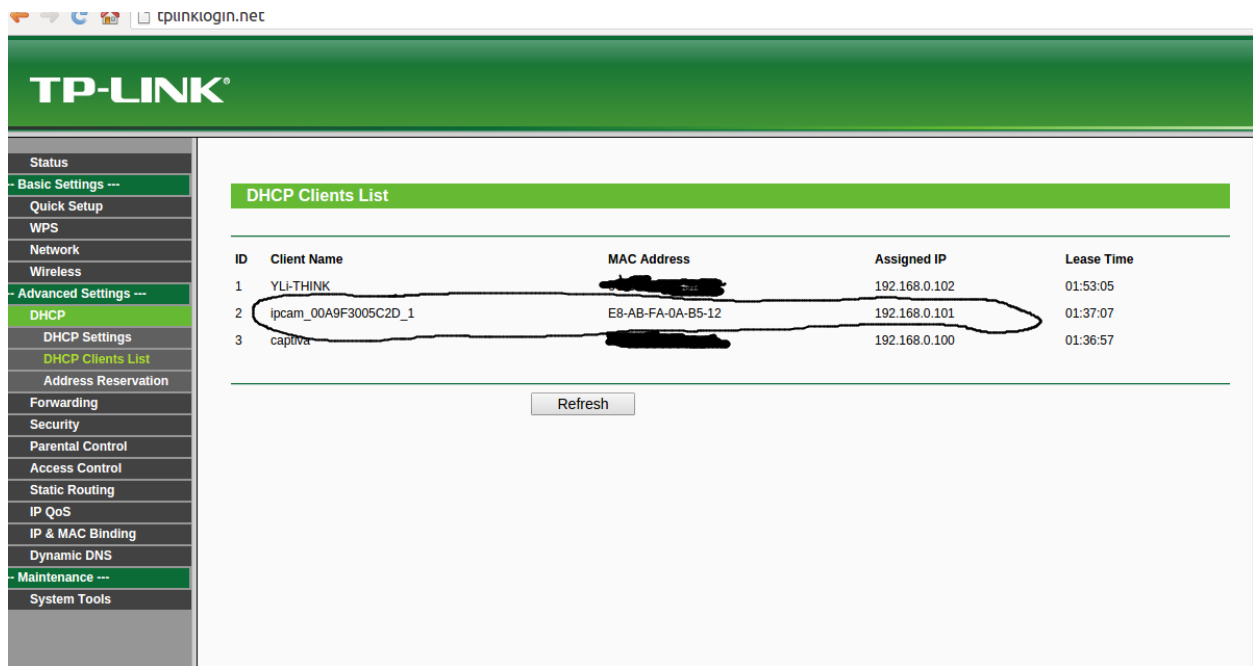
At the bottom of the form are 'Back' and 'Next' buttons.

- e) Take note of your password and SSID for the router. The camera needs this information in order to be able to connect to the router.



Part 2: Configure your Camera

- Connect the camera to the router via an ethernet cable and power it on.
- Determine the camera's MAC address and current IP address :



- c) Enter that IP address in your browser. You will need to login with the default camera username and password. If these appear to be set to something other than factory default, then find the reset button on the camera and use a paperclip to hold it down for 30 seconds while the camera is powered on.
 - i. Linksys Camera: Enter IP address (ex: <http://192.168.0.101>) then click advanced configuration and make sure you can login.
 - ii. EasyN Camera: Enter IP address with port 81 (ex: <http://192.168.0.102:81>). Sign in to Server Push Mode.

- d) Verify that you can capture an image from the camera
 - i. Linksys Camera: [http://\[INSERT IP_ADDRESS\]/img/snapshot.cgi?](http://[INSERT IP_ADDRESS]/img/snapshot.cgi?)
ex: <http://192.168.0.102/img/snapshot.cgi?>
 - ii. EasyN Camera: [http://\[INSERT IP_ADDRESS\]/snapshot.cgi?](http://[INSERT IP_ADDRESS]/snapshot.cgi?)
ex: <http://192.168.0.101:81/snapshot.cgi?>

Note: the EasyN camera uses port 81, while the Linksys camera uses default port 80.

- e) Give the camera the SSID and password for your wireless router. Just like you need the SSID and password to use the router wirelessly, your camera needs it as well.

The screenshot shows the Linksys WVC80N administration page. The browser address bar displays `192.168.0.101/adm/admin_fs.htm`. The page header includes the Linksys logo and the text "A Division of Cisco Systems, Inc." and "WVC80N". The main navigation bar contains "Home", "View Video", "Linksys Web", "Help", and "Exit". The left sidebar is titled "Setup" and includes a "Basic" menu item which is highlighted. Below the sidebar, there are two tabs: "Network Settings" and "Wireless Settings". The "Network Settings" tab is active, showing the following configuration:

- IPv4 only (dropdown)
- IPv4 Configuration Type: Obtain Address Automatically (dropdown)
- IPv4 Address: 192.168.0.10
- IPv4 Subnet Mask: 255.255.255.0
- IPv4 Gateway: 192.168.0.1
- IPv4 Primary DNS: 128.59.1.3
- IPv4 Secondary DNS: 128.59.1.4
- SSID: TP-LINK_D8745A
- Network Type: Infrastructure (dropdown)
- Channel No: Auto (dropdown)
- Security: WPA2 Personal (dropdown) with an "Edit Security Settings" button next to it.

At the bottom of the settings area, there are three buttons: "Apply", "Cancel", and "Help".

The screenshot shows the EasyN IP Camera Options administration page. The browser address bar displays `192.168.0.102:81/admin2.htm`. The page header features the title "EasyN IP Camera Options". The left sidebar lists various settings categories, with "Wireless Lan Settings" highlighted. The main content area is titled "Wireless Lan Settings" and contains the following configuration:

- Wireless Network List: (empty list box)
- Scan: (button)
- Using Wireless Lan:
- SSID: TP-LINK_D8745A
- Network Type: Infra (dropdown)
- Encryption: WPA2 Personal (AES) (dropdown)
- Share Key: (blacked out)

At the bottom of the settings area, there are two buttons: "Set" and "Refresh".

- f) Turn off the camera, unplug the ethernet and turn the camera back on.
- g) Verify that the camera is able to connect to the internet wirelessly by going to <http://tplinklogin.net/> and looking under DHCP clients checking that your camera is listed.

h) Verify you can capture an image wirelessly

i. Linksys Camera: [http://\[INSERT IP_ADDRESS\]/img/snapshot.cgi?](http://[INSERT IP_ADDRESS]/img/snapshot.cgi?)
ex: <http://192.168.0.102/img/snapshot.cgi?>

ii. EasyN Camera: [http://\[INSERT IP_ADDRESS\]/snapshot.cgi?](http://[INSERT IP_ADDRESS]/snapshot.cgi?)
ex: <http://192.168.0.101:81/snapshot.cgi?>

Note: the EasyN camera uses port 81, while the Linksys camera uses default port 80.

i) Reserve an IP address for your camera

i. Go to “DHCP->Address Reservation” Configure router to always assign a specific IP for your camera’s MAC address. This way you can hardcode the IP and not have to worry about it changing every time you turn everything back on.

The screenshot shows the TP-Link web interface for Address Reservation. The left sidebar contains a navigation menu with options like Status, Basic Settings, Network, Wireless, Advanced Settings, DHCP, Forwarding, Security, Parental Control, Access Control, Static Routing, IP QoS, IP & MAC Binding, Dynamic DNS, Maintenance, and System Tools. The main content area is titled 'Address Reservation' and contains a table with the following data:

ID	MAC Address	Reserved IP Address	Status	Modify
1	00-22-6B-F7-1F-FC	192.168.0.101	Enabled	Modify Delete
2	E8-AB-FA-0A-B5-12	192.168.0.102	Enabled	Modify Delete

Below the table, there are buttons for 'Add New...', 'Enable All', 'Disable All', and 'Delete All'. At the bottom of the page, there are 'Previous' and 'Next' navigation buttons.

If this has been done correctly, after rebooting your router if you go to DHCP Clients List, your camera’s IP should be marked as permanent:

TP-LINK

--- Basic Settings ---

- Quick Setup
- WPS
- Network
- Wireless

--- Advanced Settings ---

- DHCP
- DHCP Settings
- DHCP Clients List
- Address Reservation

Forwarding

Security

- Parental Control
- Access Control
- Static Routing
- IP QoS
- IP & MAC Binding
- Dynamic DNS

--- Maintenance ---

- System Tools

DHCP Clients List

ID	Client Name	MAC Address	Assigned IP	Lease Time
1	captiva	70-18-88-B6-77-AB	192.168.0.100	01:53:16
2	ipcam_00A9F3005C2D_1	E8-AB-FA-0A-B5-12	192.168.0.102	Permanent
3	MyCamera	00-22-68-F7-1F-FC	192.168.0.101	Permanent

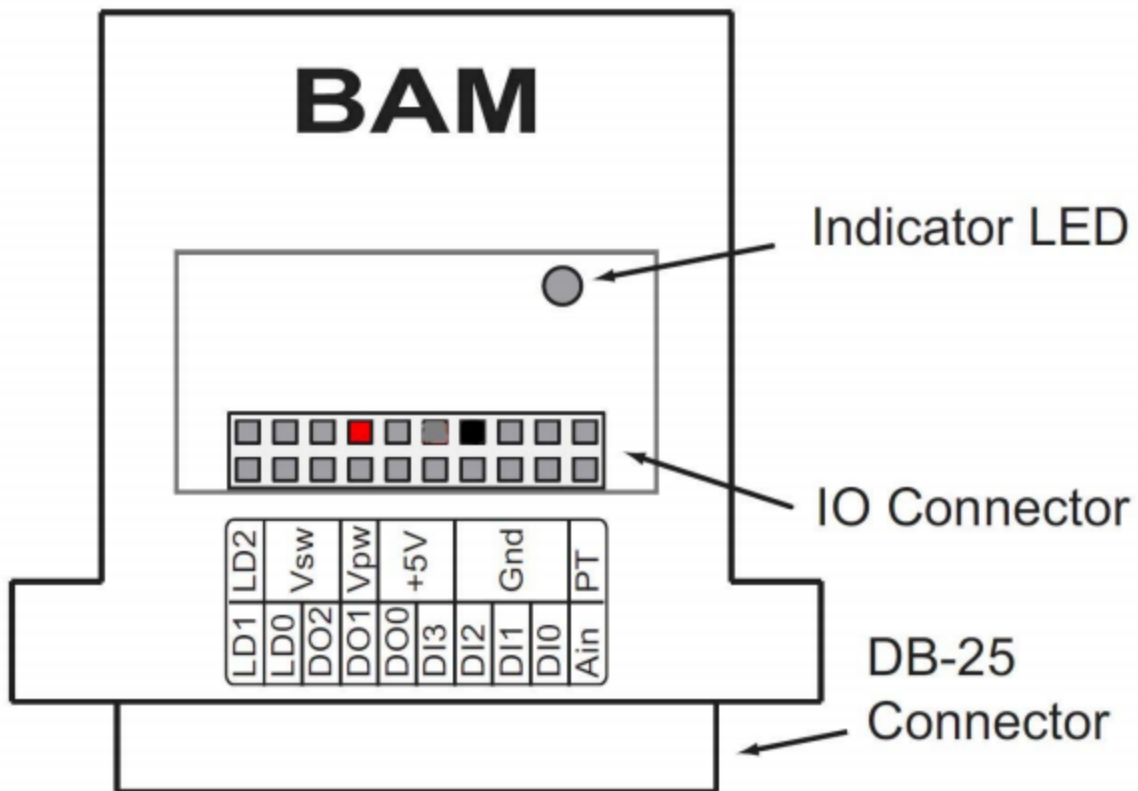
Refresh

j) Disable DDNS and UPnP

- i. Linksys Camera: Under Options make sure DDNS and UPnP are both disabled
- ii. EasyN Camera: Under UPnP settings make sure “Using UPnP to Map Port” is NOT checked. and under DDNS Service Settings make sure “DDNS Service” is None.

Part 3 : Power your Camera using the Robot's Bluetooth Adapter Module

To connect the black power supply box to the Bluetooth Adapter Module (BAM), plug the red wire into the Vpw slot on the front of the BAM and the black wire into the ground pin as illustrated in the figure below.



Part 4: Capturing and Editing Images using MATLAB

1) Reading an image from the camera:

You should be able to capture an image from the camera using the same urls that were entered into the browser:

```
%linksys camera:
%example: image =
% imread('http://192.168.0.102/img/snapshot.cgi?')
image = imread('http://[IP_ADDRESS]/img/snapshot.cgi?');

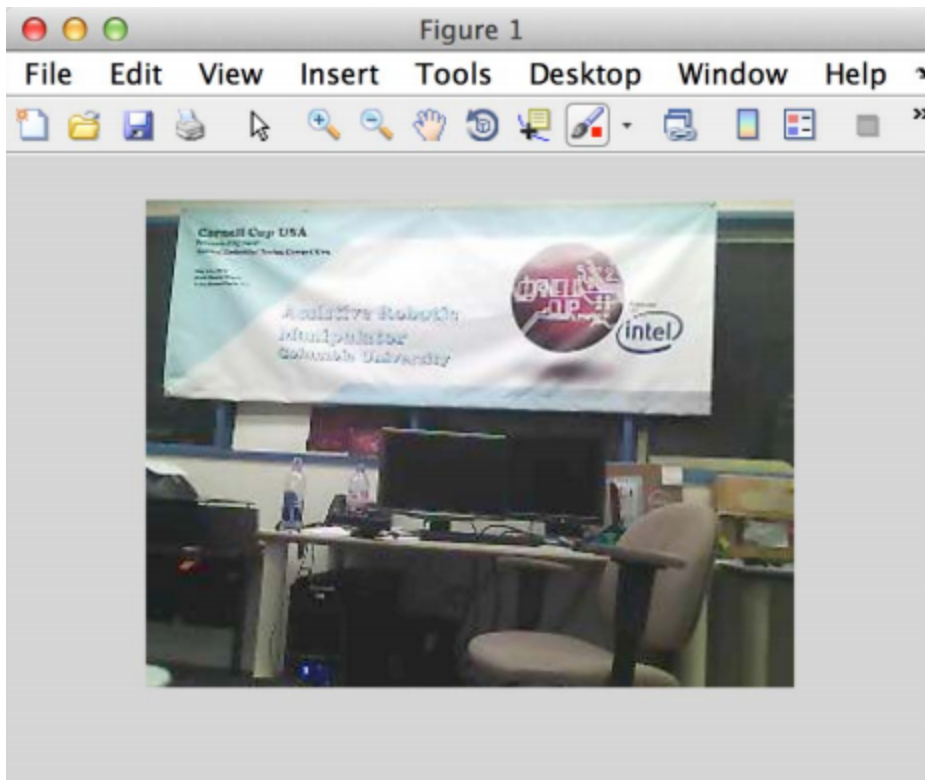
%easyn camera:
%example: image =
% imread('http://192.168.0.101:81/snapshot.cgi?')
image = imread('http://[IP_ADDRESS]/snapshot.cgi?')
```

We have had issues where the above url's worked in the browser, but not through MATLAB, if this is the case, then pass the camera's username and password as part of the url in order to capture an image:

```
image =  
imread('http://[IP_ADDRESS]/snapshot.cgi?user=admin&pwd=&resol  
ution=16&rate=0');
```

2) Display a captured Image:

```
imshow(image);
```



3) Index layers on an image

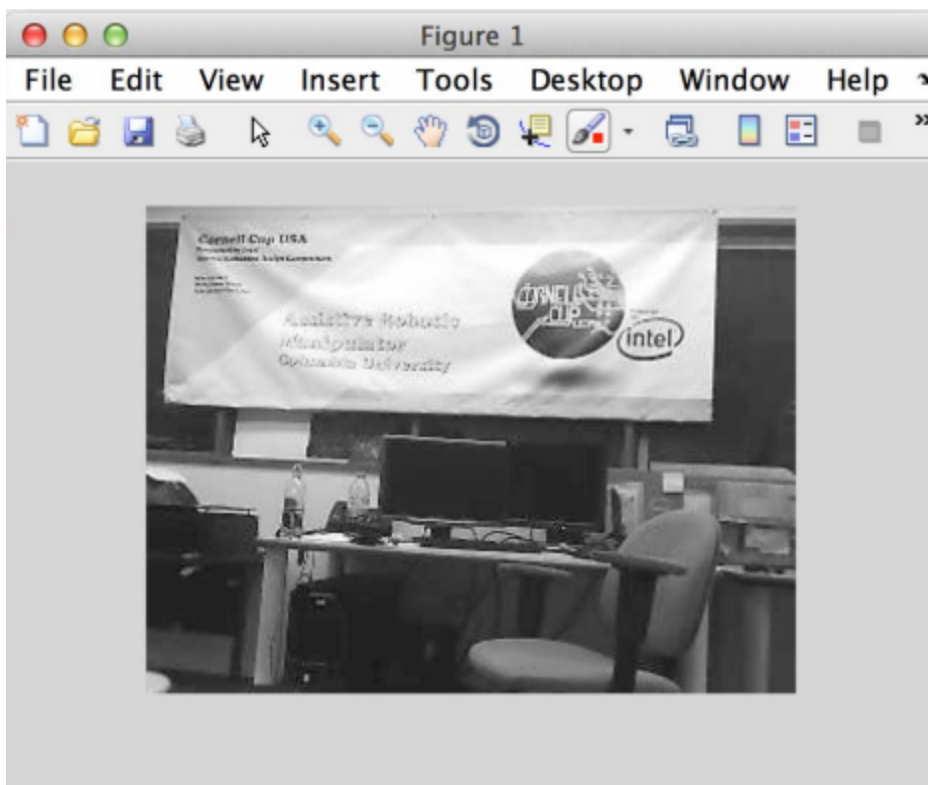
```
red_layer = image(:, :, 1);  
green_layer = image(:, :, 2);  
blue_layer = image(:, :, 3);
```

- 4) Find the resolution of the image

```
resolution = size(image);  
resolution = resolution(1:2);
```

- 5) Convert an RGB image to Grayscale

```
gray_image = rgb2gray(image);
```



- 6) Draw on an image

```
draw_image = image;  
draw_image([50:100], [50:100], :) = 0;
```

