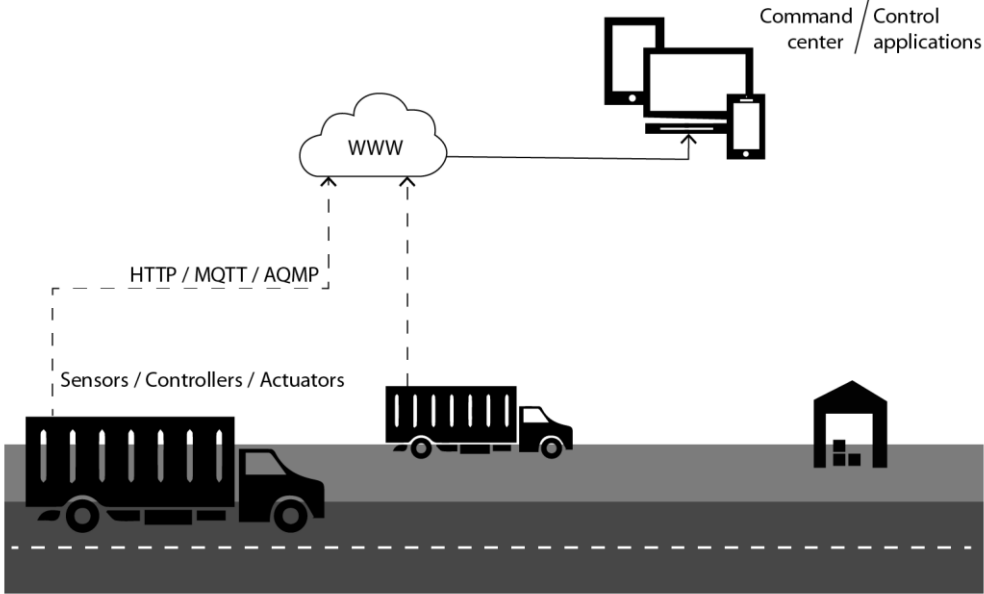
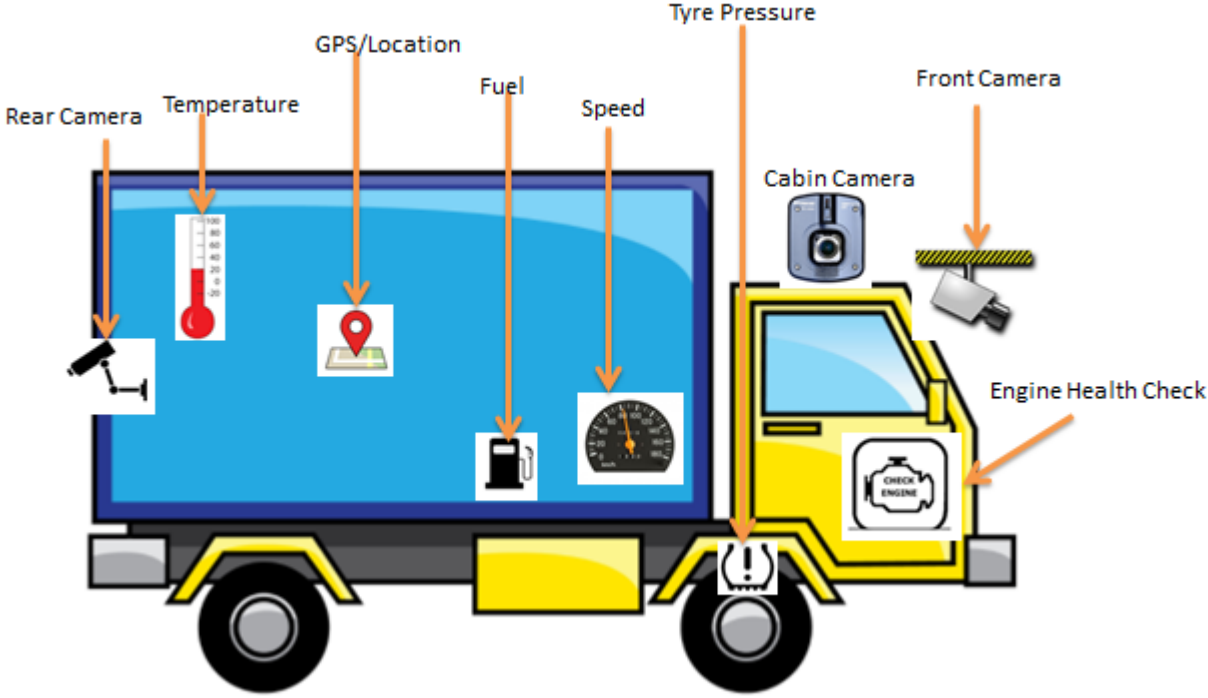
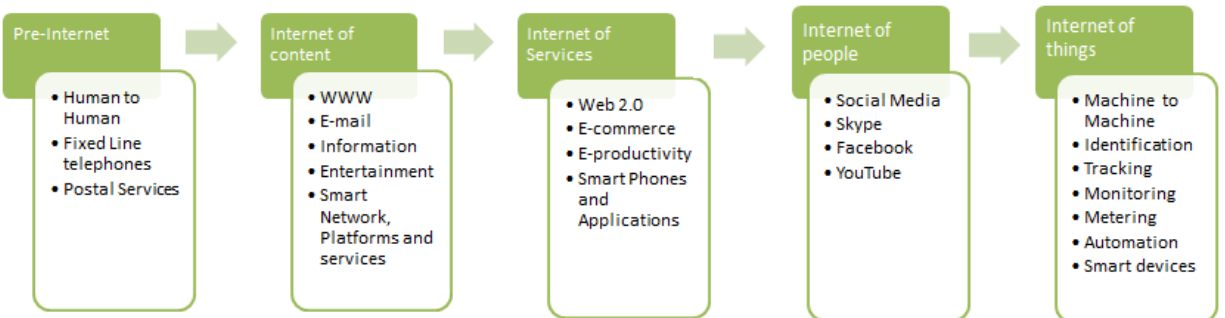
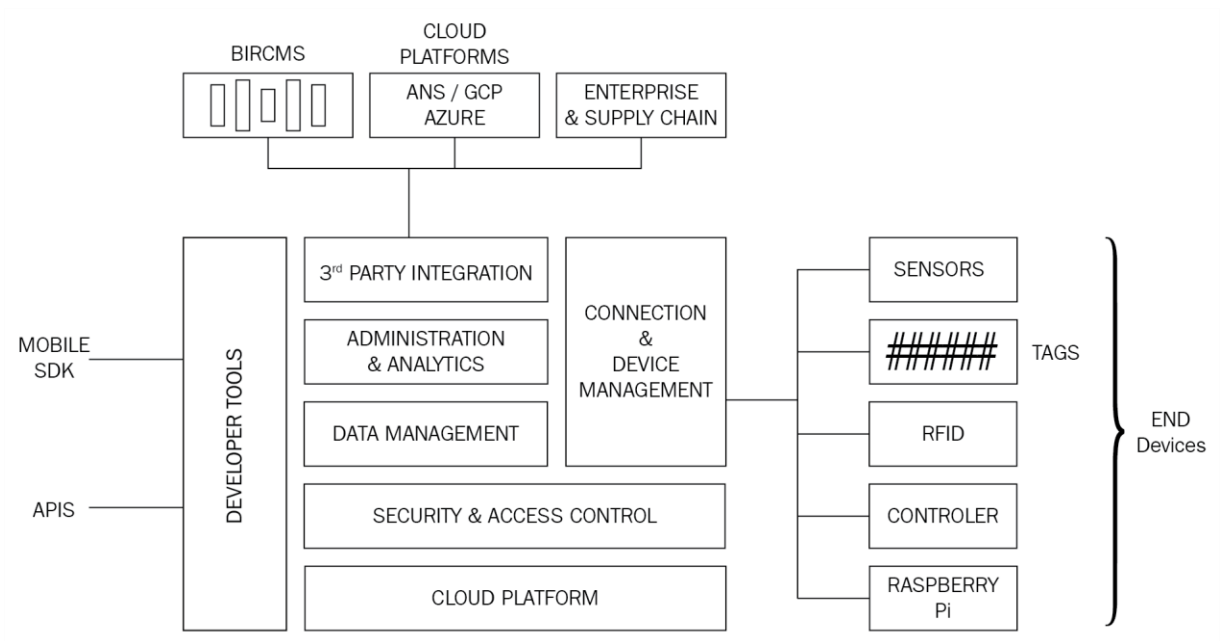


# Chapter 1: Introduction to IoT

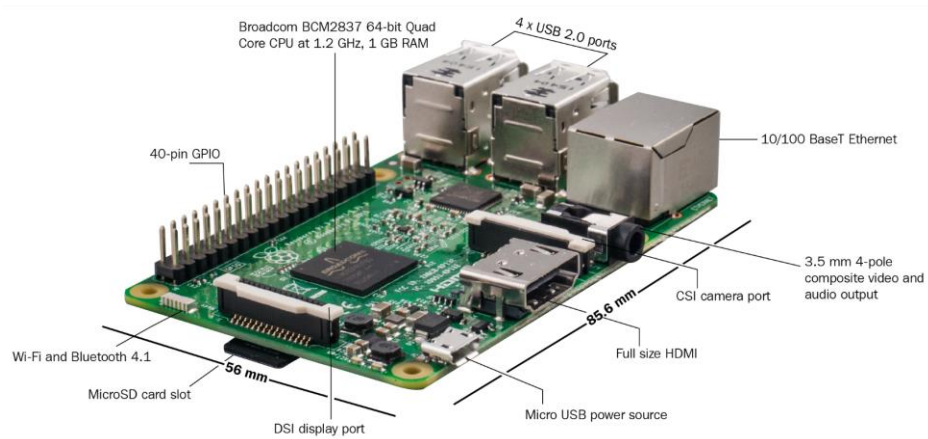





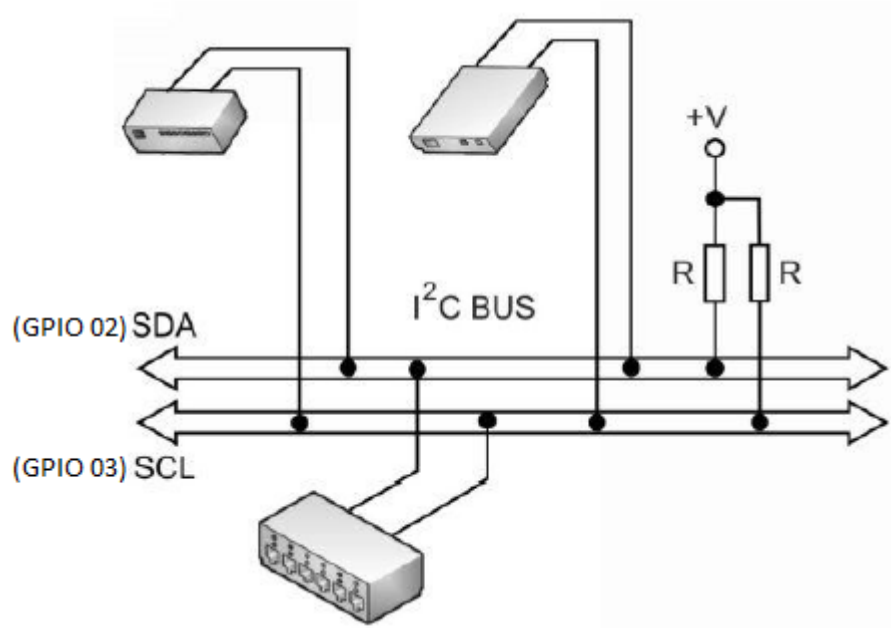




# Chapter 2: Know Your Raspberry Pi



Pin#	NAME		NAME	Pin#
01	3.3v DC Power		DC Power 5v	02
03	GPIO02 (SDA1 , I <sup>2</sup> C)		DC Power 5v	04
05	GPIO03 (SCL1 , I <sup>2</sup> C)		Ground	06
07	GPIO04 (GPIO_GCLK)		(TXD0) GPIO14	08
09	Ground		(RXD0) GPIO15	10
11	GPIO17 (GPIO_GEN0)		(GPIO_GEN1) GPIO18	12
13	GPIO27 (GPIO_GEN2)		Ground	14
15	GPIO22 (GPIO_GEN3)		(GPIO_GEN4) GPIO23	16
17	3.3v DC Power		(GPIO_GEN5) GPIO24	18
19	GPIO10 (SPI_MOSI)		Ground	20
21	GPIO09 (SPI_MISO)		(GPIO_GEN6) GPIO25	22
23	GPIO11 (SPI_CLK)		(SPI_CE0_N) GPIO08	24
25	Ground		(SPI_CE1_N) GPIO07	26
27	ID_SD (I <sup>2</sup> C ID EEPROM)		(I <sup>2</sup> C ID EEPROM) ID_SC	28
29	GPIO05		Ground	30
31	GPIO06		GPIO12	32
33	GPIO13		Ground	34
35	GPIO19		GPIO16	36
37	GPIO26		GPIO20	38
39	Ground		GPIO21	40



## NOOBS

Offline and network install

Version: 2.4.5  
Release date: 2017-11-29

[Download Torrent](#) [Download ZIP](#)



Install (i)



Edit config (e)










Wifi networks (w)



Online help (h)



Exit (Esc)

-  **Raspbian [RECOMMENDED]**  
A port of Debian jessie for the Raspberry Pi (full desktop version)
-  **LibreELEC\_RPi2**  
LibreELEC is a fast and user-friendly Kodi Entertainment Center distribution.
-  **Raspbian Lite**  
A port of Debian jessie for the Raspberry Pi (minimal version)
-  **Lakka\_RPi2**  
The DIY retro emulation console
-  **Data Partition**  
Adds an empty 512MB ext4 format partition to the partition layout.
-  **OSMC\_Pi2**  
A fast and feature filled open source media center
-  **recalboxOS-rpi3**

Disk space

Needed: 3970 MB

Available: 7416 MB

System tray icons: Raspberry Pi logo, globe, folder, terminal, red starburst, red circle with white icon, 'V2' logo, Bluetooth, Wi-Fi, speaker, 2% battery, 15:19 time, and a triangle icon.



Wastebasket







- Programming >
- Office >
- Internet >
- Games >
- Accessories >
- Help >
- Preferences >**
- Run...
- Shutdown...

- Add / Remove Software
- Appearance Settings
- Audio Device Settings
- Main Menu Editor
- Mouse and Keyboard Settings
- Raspberry Pi Configuration

### Raspberry Pi Configuration

System Interfaces Performance Localisation

Filesystem: Expand Filesystem

Password: Change Password...

Hostname:

Boot:  To Desktop  To CLI

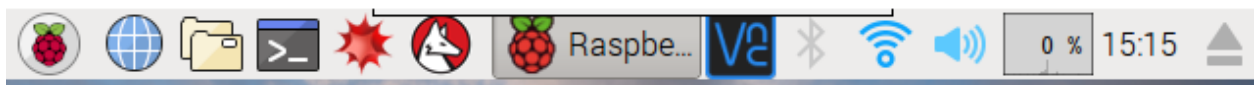
Auto Login:  Login as user 'pi'

Network at Boot:  Wait for network

Splash Screen:  Enabled  Disabled

Underscan:  Enabled  Disabled

Cancel OK



### Raspberry Pi Configuration

System Interfaces Performance Localisation

Camera:	<input checked="" type="radio"/> Enabled	<input type="radio"/> Disabled
SSH:	<input checked="" type="radio"/> Enabled	<input type="radio"/> Disabled
VNC:	<input checked="" type="radio"/> Enabled	<input type="radio"/> Disabled
SPI:	<input checked="" type="radio"/> Enabled	<input type="radio"/> Disabled
I2C:	<input type="radio"/> Enabled	<input checked="" type="radio"/> Disabled
Serial:	<input type="radio"/> Enabled	<input checked="" type="radio"/> Disabled
1-Wire:	<input checked="" type="radio"/> Enabled	<input type="radio"/> Disabled
Remote GPIO:	<input type="radio"/> Enabled	<input checked="" type="radio"/> Disabled

Cancel OK

The image shows a Raspberry Pi desktop environment. The background is a sunset over a long, straight road. In the top-left corner, there is a blue trash can icon labeled "Wastebasket". The top-right corner shows system status icons: a Raspberry Pi logo, a globe, a folder, a terminal window, a red starburst, a mouse cursor, a "Va" logo, Bluetooth, Wi-Fi, and a speaker. The system tray on the right shows "0 %", "15:12", and a volume icon. A "Turn Off Wi-Fi" menu is open, displaying a list of available Wi-Fi networks. The first network is checked with a green checkmark and has a lock icon. The other networks are also locked.

Network Name	Status	Lock	Wi-Fi
[Redacted]	Checked	Locked	On
ANA	Unchecked	Locked	On
Anant	Unchecked	Locked	On
Angel@2012	Unchecked	Locked	On
[Redacted]	Unchecked	Locked	On
[Redacted]	Unchecked	Locked	On
Jamesbond	Unchecked	Locked	On
[Redacted]	Unchecked	Locked	On
Zombie	Unchecked	Locked	On

```
pi@raspberrypi: ~  
pi@raspberrypi ~ $ ifconfig  
eth0      Link encap:Ethernet  HWaddr b8:27:eb:b3:fc:2e  
          inet addr:192.168.1.81  Bcast:192.168.1.255  Mask:255.255.255.0  
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1  
          RX packets:4078 errors:0 dropped:0 overruns:0 frame:0  
          TX packets:256 errors:0 dropped:0 overruns:0 carrier:0  
          collisions:0 txqueuelen:1000  
          RX bytes:264593 (258.3 KiB)  TX bytes:31343 (30.6 KiB)  
  
lo        Link encap:Local Loopback  
          inet addr:127.0.0.1  Mask:255.0.0.0  
          UP LOOPBACK RUNNING  MTU:16436  Metric:1  
          RX packets:8 errors:0 dropped:0 overruns:0 frame:0  
          TX packets:8 errors:0 dropped:0 overruns:0 carrier:0  
          collisions:0 txqueuelen:0  
          RX bytes:1104 (1.0 KiB)  TX bytes:1104 (1.0 KiB)  
  
wlan0    Link encap:Ethernet  HWaddr 00:0f:54:12:15:97  
          UP BROADCAST MULTICAST  MTU:1500  Metric:1  
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0  
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0  
          collisions:0 txqueuelen:1000  
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)  
  
pi@raspberrypi ~ $
```

Scan [Pause] [Stop] [IP] [C] [Network] [Search]

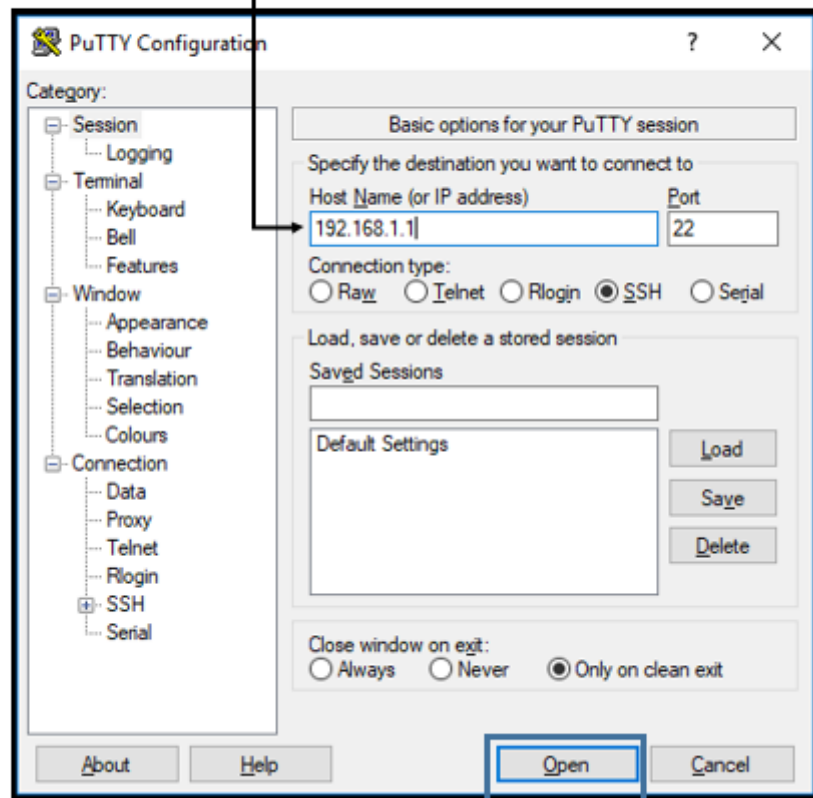
192.168.1.1-254

Example: 192.168.0.1-100, 192.168.0.200

Status	Name	IP	Manufacturer	MAC address
> [Computer]	192.168.1.1	192.168.1.1	D-Link International	[Redacted]
[Computer]	192.168.1.2	192.168.1.2		[Redacted]
[Computer]	192.168.1.4	192.168.1.4	Apple, Inc.	[Redacted]
[Computer]	DESKTOP-R1OC8NQ.domain.name	192.168.1.5		[Redacted]
[Computer]	192.168.1.100	192.168.1.100	Raspberry Pi Foundation	[Redacted]
[Computer]	192.168.1.101	192.168.1.101	Motorola Mobility LLC, a ...	[Redacted]

5 alive, 1 dead, 248 unknown

IP address of Raspberry pi on your network



PuTTY Security Alert



The server's host key is not cached in the registry. You have no guarantee that the server is the computer you think it is.

The server's ssh-ed25519 key fingerprint is:  
ssh-ed25519 256

9f:3a:d4:ca:8c:14:f7:9c:b6:3a:03:e4:0e:d0:77:ad

If you trust this host, hit Yes to add the key to PuTTY's cache and carry on connecting.

If you want to carry on connecting just once, without adding the key to the cache, hit No.

If you do not trust this host, hit Cancel to abandon the connection.

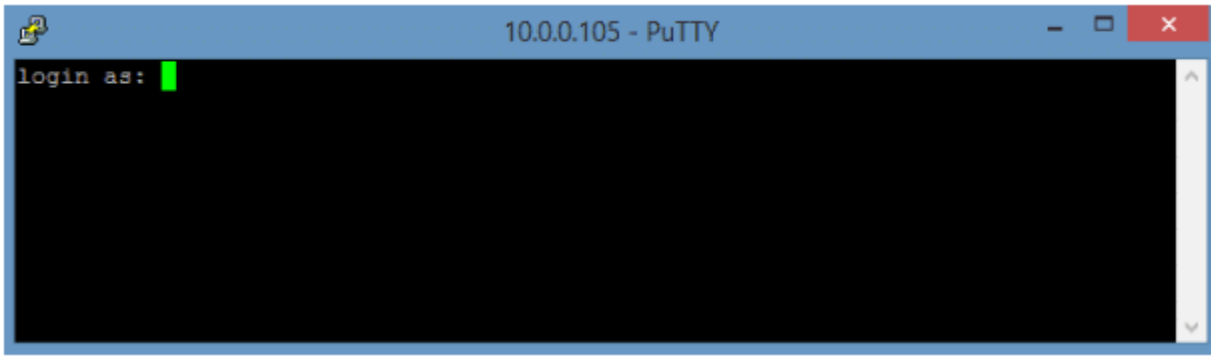
Yes

No

Cancel

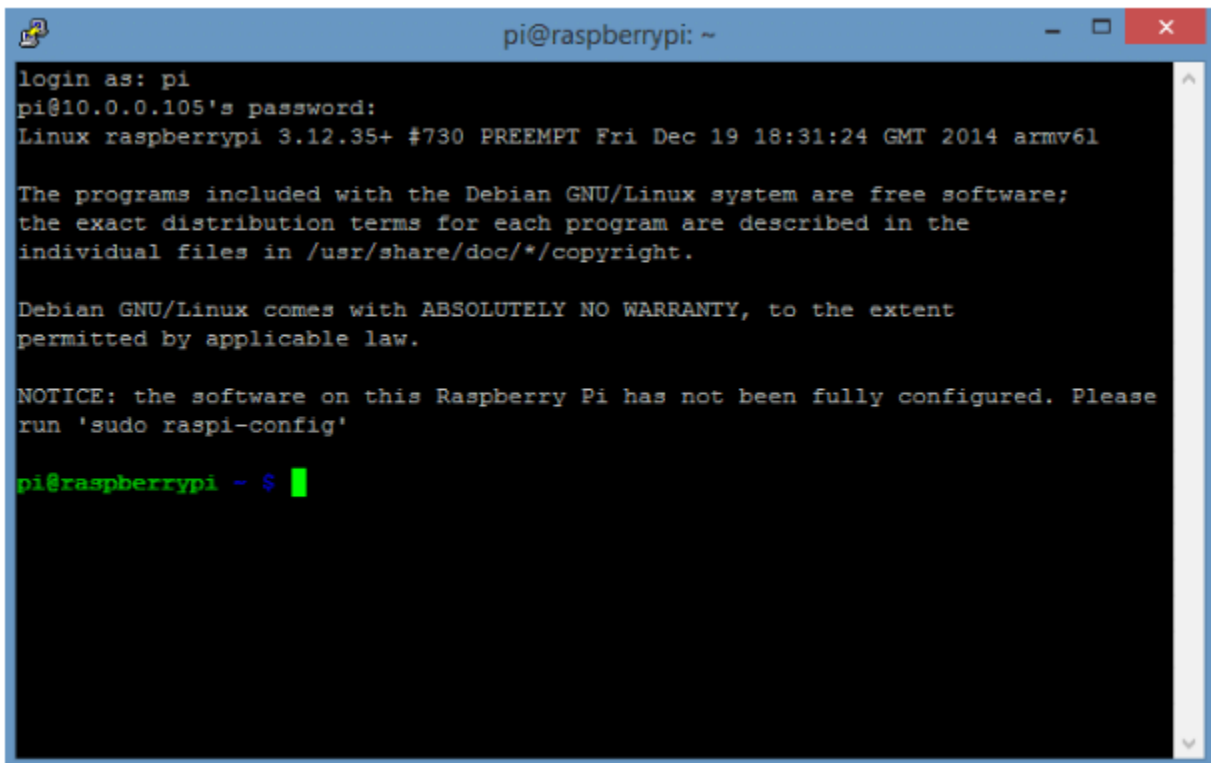
Help





A terminal window titled "10.0.0.105 - PuTTY" with a blue header bar. The main area is black with white text. The prompt "login as:" is followed by a green cursor.

```
login as: █
```



A terminal window titled "pi@raspberrypi: ~" with a blue header bar. The main area is black with white text. The text shows the login process, system information, and a warning message.

```
login as: pi
pi@10.0.0.105's password:
Linux raspberrypi 3.12.35+ #730 PREEMPT Fri Dec 19 18:31:24 GMT 2014 armv6l

The programs included with the Debian GNU/Linux system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

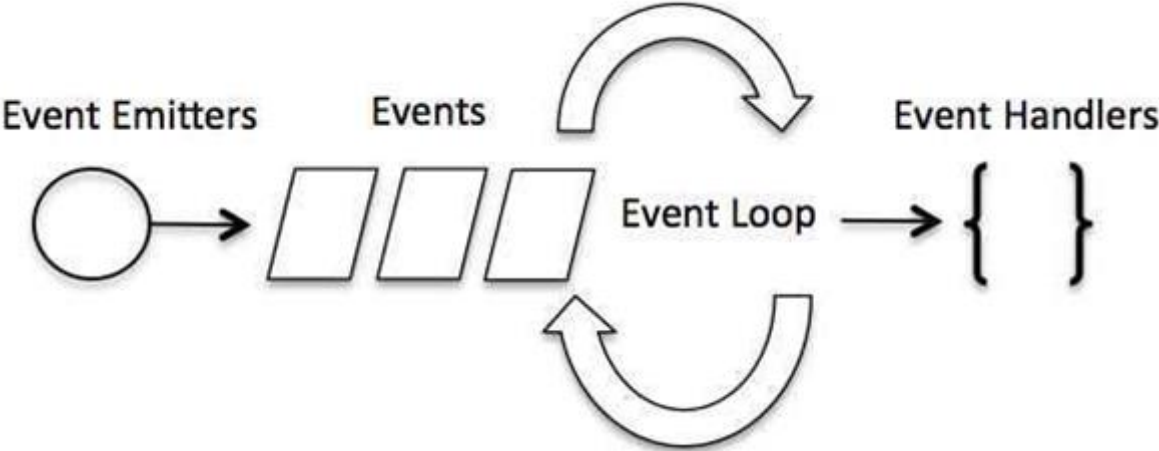
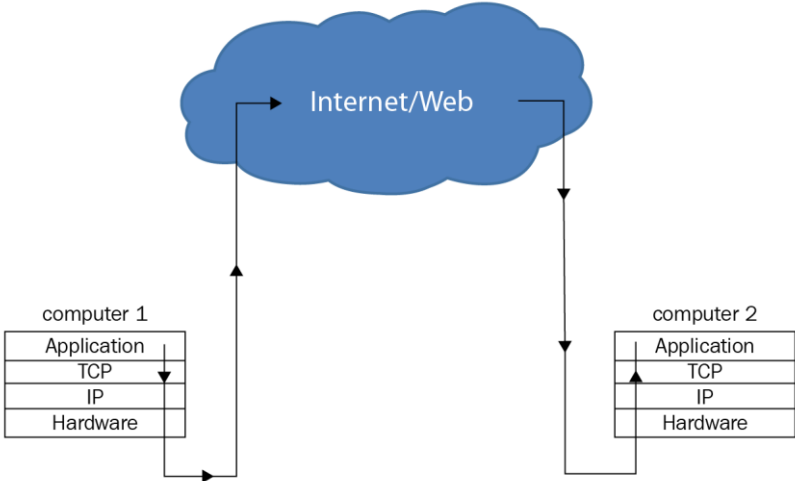
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent
permitted by applicable law.

NOTICE: the software on this Raspberry Pi has not been fully configured. Please
run 'sudo raspi-config'

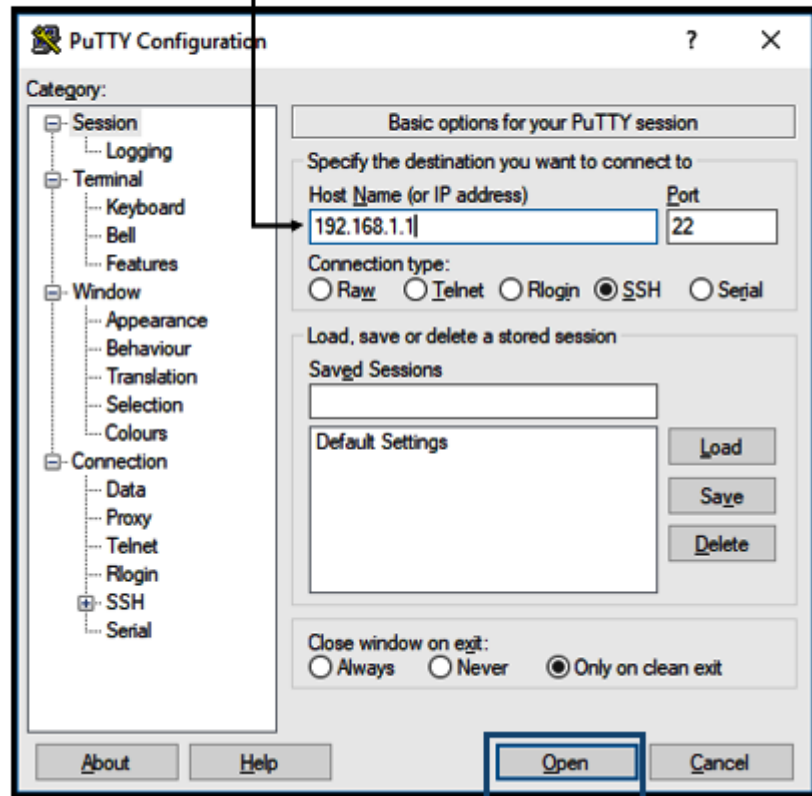
pi@raspberrypi ~ $ █
```



# Chapter 3: Let's Communicate



IP address of Raspberry pi on your network



PuTTY Security Alert



The server's host key is not cached in the registry. You have no guarantee that the server is the computer you think it is.  
The server's ssh-ed25519 key fingerprint is:  
ssh-ed25519 256  
9f:3a:d4:ca:8c:14:f7:9c:b6:3a:03:e4:0e:d0:77:ad  
If you trust this host, hit Yes to add the key to PuTTY's cache and carry on connecting.  
If you want to carry on connecting just once, without adding the key to the cache, hit No.  
If you do not trust this host, hit Cancel to abandon the connection.

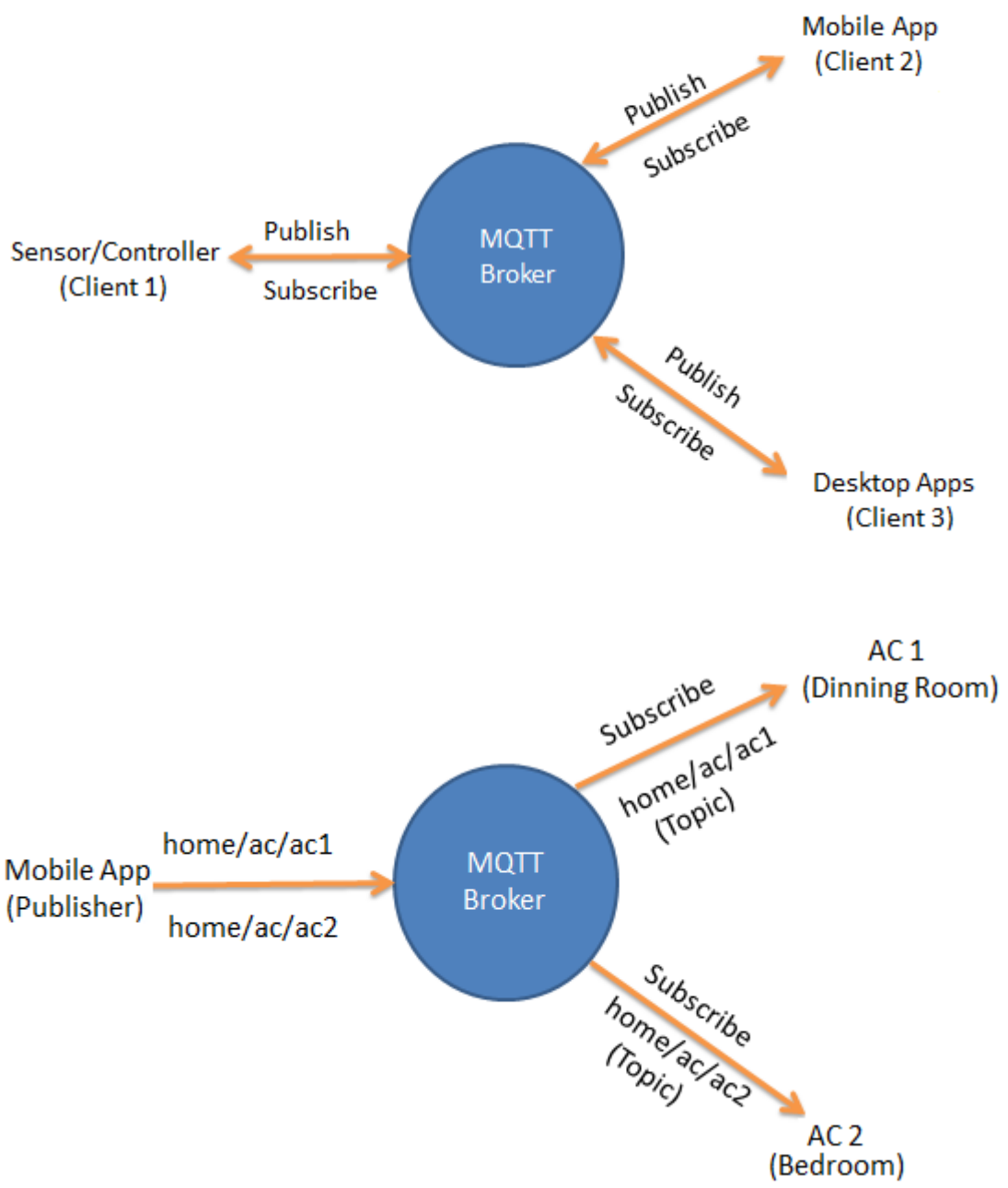
Yes

No

Cancel

Help

```
192.168.1.100 - PuTTY
login as: █
```



EMQ Dashboard

emq@127.0.0.1 中文 / EN admin

### Overview

Broker

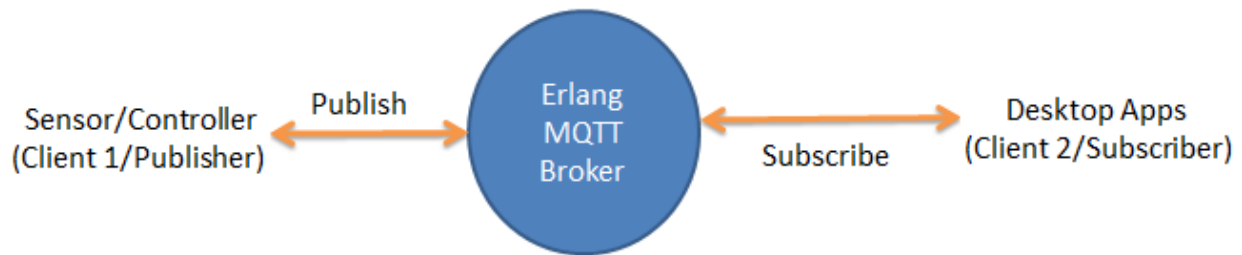
	System Name Erlang MQTT Broker		Version 2.3.3		Uptime 15 minutes, 46 seconds		System Time 2018-02-25 10:44:39
--	-----------------------------------	--	------------------	--	----------------------------------	--	------------------------------------

Nodes(1)

Name	Erlang Processes (used/available)	CPU Info (1load/5load/15load)	Memory Info (used/total)	MaxFds	Status
emq@127.0.0.1	291 / 262144	0.00 / 0.00 / 0.00	32.94M / 45.69M	131072	● Running

Stats(1)

Name	Clients/Count	Clients/Max	Topics/Count	Topics/Max	Retained/Count	Retained/Max



```

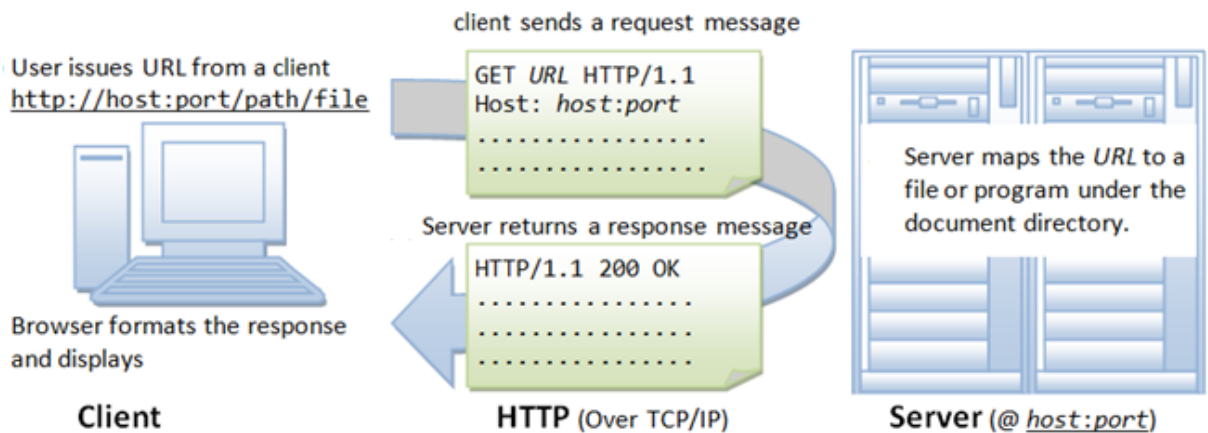
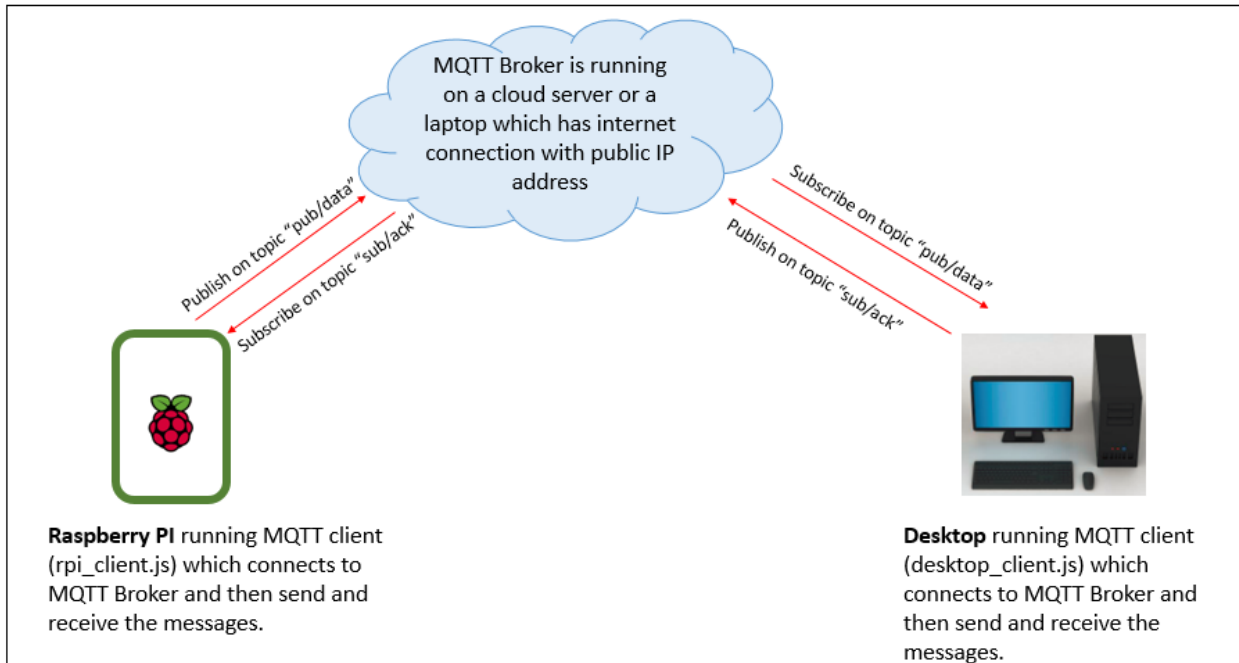
pi@raspberrypi:~/Node_Programs $ sudo node rpi_client.js
Rpi mqtt client connected to broker
  
```

```

pi@raspberrypi:~/Node_Programs $ sudo node rpi_client.js
Rpi mqtt client connected to broker

Data pushed from Pi client on topic: pub/data ==> pi_data
Acknowledgement recieved on topic: sub/ack ==> Ack: Success..!!

Data pushed from Pi client on topic: pub/data ==> pi_data
Acknowledgement recieved on topic: sub/ack ==> Ack: Success..!!
  
```



```

C:\> Command Prompt
D:\> cd HttpServer
  
```

```

D:\HttpServer>npm init
This utility will walk you through creating a package.json file.
It only covers the most common items, and tries to guess sensible defaults.

See `npm help json` for definitive documentation on these fields
and exactly what they do.

Use `npm install <pkg> --save` afterwards to install a package and
save it as a dependency in the package.json file.

Press ^C at any time to quit.
name: (HttpServer) package.json
version: (1.0.0)
description: http server
entry point: (index.js) server.js
test command:
git repository:
keywords:
author: Maneesh
license: (ISC)
About to write to D:\HttpServer\package.json:

{
  "name": "package.json",
  "version": "1.0.0",
  "description": "http server",
  "main": "server.js",
  "scripts": {
    "test": "echo `Error: no test specified` && exit 1"
  },
  "author": "Maneesh",
  "license": "ISC"
}

Is this ok? (yes) yes
D:\HttpServer>

```

```

Command Prompt - node server.js
D:\HttpServer>node server.js
Example app listening at http://:::8080

```

```

response from server: success :: Wed Oct 25 2017 01:49:43 GMT+0530 (India Standard Time)
response from server: success :: Wed Oct 25 2017 01:49:48 GMT+0530 (India Standard Time)
response from server: success :: Wed Oct 25 2017 01:49:53 GMT+0530 (India Standard Time)

```

```
D:\>cd Maneesh\MQTT\emqtt-d-windows7-v2.2.0\emqtt-d\bin
```

```
D:\Maneesh\MQTT\emqtt-d-windows7-v2.2.0\emqtt-d\bin>emqtt console
```

```

Erlang
File Edit Options View Help
kernel-poll not supported; "K" parameter ignored
Erlang/OTP 19 [erts-8.3] [64-bit] [smp:4:4] [async-threads:32]

starting emqttd on node 'emqttd@127.0.0.1'
emqttd ctl is starting...[ok]
emqttd hook is starting...[ok]
emqttd router is starting...[ok]
emqttd pubsub is starting...[ok]
emqttd stats is starting...[ok]
emqttd metrics is starting...[ok]
emqttd pooler is starting...[ok]
emqttd trace is starting...[ok]
emqttd client manager is starting...[ok]
emqttd session manager is starting...[ok]
emqttd session supervisor is starting...[ok]
emqttd wsclient supervisor is starting...[ok]
emqttd broker is starting...[ok]
emqttd alarm is starting...[ok]
emqttd mod supervisor is starting...[ok]
emqttd bridge supervisor is starting...[ok]
emqttd access control is starting...[ok]
emqttd system monitor is starting...[ok]
Load emq_mod_presence module successfully.
Load emq_mod_subscription module successfully.
dashboard:http listen on 0.0.0.0:18083 with 2 acceptors.
mqtt:tcp listen on 127.0.0.1:11883 with 16 acceptors.
mqtt:tcp listen on 0.0.0.0:1883 with 16 acceptors.
mqtt:ws listen on 0.0.0.0:8083 with 4 acceptors.
mqtt:ssl listen on 0.0.0.0:8883 with 16 acceptors.
mqtt:wss listen on 0.0.0.0:8084 with 4 acceptors.
mqtt:api listen on 127.0.0.1:8080 with 4 acceptors.
emqttd 2.2 is running now
Eshell V8.3 (abort with ^G)
(emqttd@127.0.0.1)1>

```

```

D:\Maneesh\MQTT\emqttd-windows7-v2.2.0\emqttd\bin>emqttd start
D:\Maneesh\MQTT\emqttd-windows7-v2.2.0\emqttd>

```

Default Address	<a href="http://localhost:18083">http://localhost:18083</a>
Default User	admin
Default Password	public

```

Command Prompt
D:\Maneesh\MQTT>node desktop_client.js
desktop mqtt client connected to broker

```

CA. Command Prompt

```
D:\Maneesh\MQTT>node desktop_client.js
```

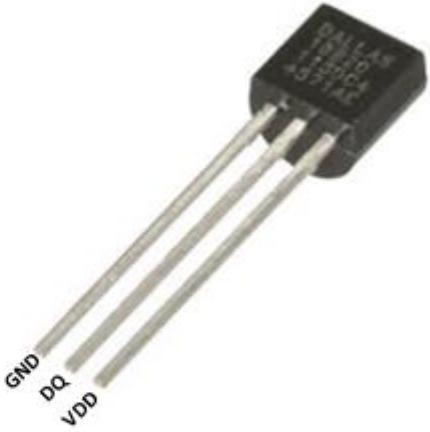
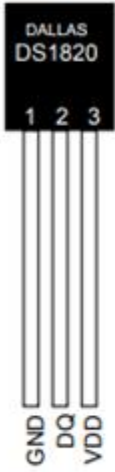
```
desktop mqtt client connected to broker
```

```
Data recieved from Rpi client on topic: pub/data pi_data  
Acknowledgement sent to Rpi client ==> Ack: Success..!!
```

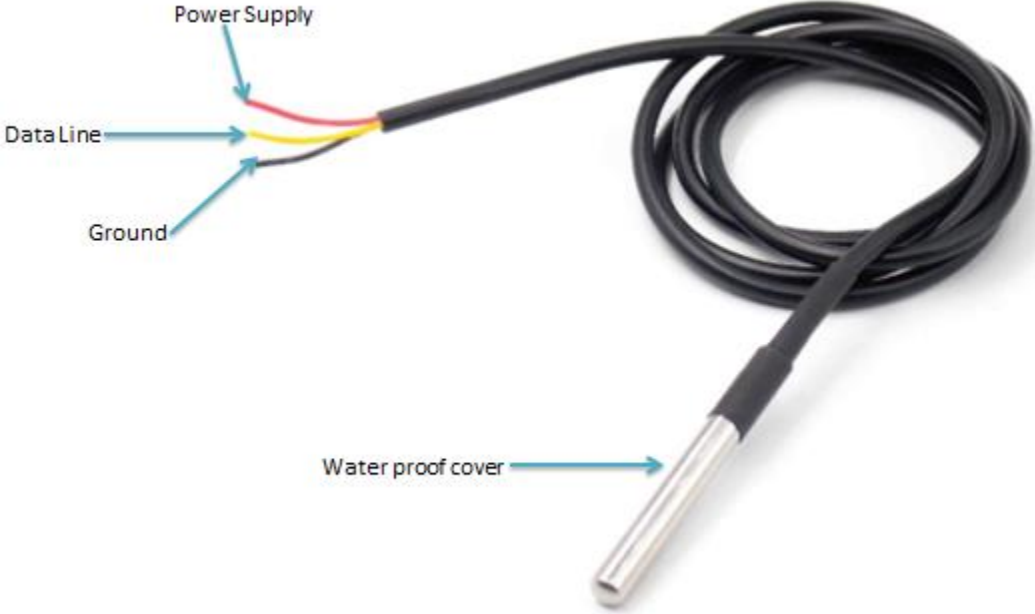
```
Data recieved from Rpi client on topic: pub/data pi_data  
Acknowledgement sent to Rpi client ==> Ack: Success..!!
```

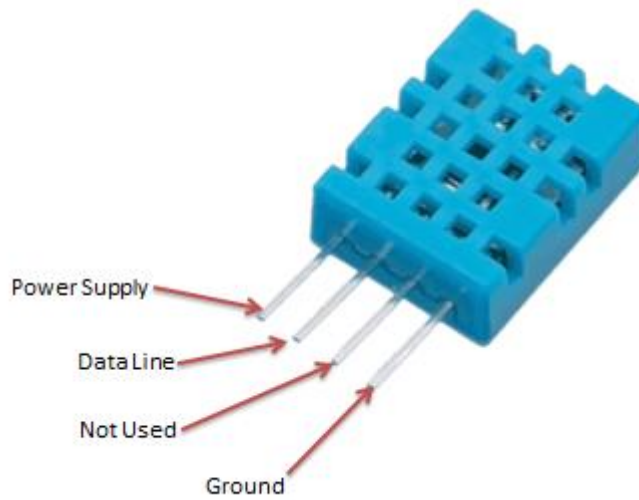
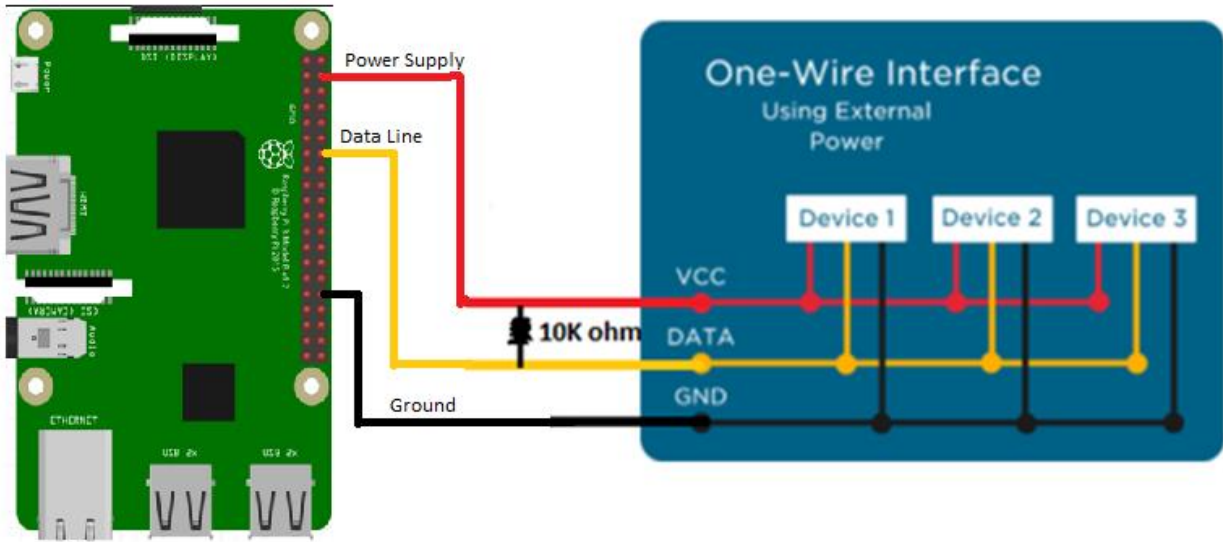


# Chapter 4: Weather Station



GND: Ground  
DQ: Data Line  
VDD: Power





**OpenWeatherMap** Weather Maps API Price Partners Stations Widgets News About

My Home [Home](#)

Setup API keys My Services My Payments Billing plans Map editor Block logs History bulk [Logout](#)

[User settings](#) Username

Activation of an API key for **Free** and **Startup accounts** takes **10 minutes**. For **other accounts** it takes from **10 to 60 minutes**. You can generate as many API keys as needed for your subscription. We accumulate the **total load** from all of them.

Key

Name

Create key

[Redacted key]

Default



\* Name

Generate

GET

api.openweathermap.org/data/2.5/weather?id=1273293&APPID=db4d42dfc51faa72f27020abb02

Params

Send

Authorization Headers (1) Body Pre-request Script Tests

Type

No Auth

```
{
  "coord": {
    "lon": 77.25,
    "lat": 28.75
  },
  "weather": [
    {
      "id": 711,
      "main": "Smoke",
      "description": "smoke",
      "icon": "50d"
    }
  ],
  "base": "stations",
  "main": {
    "temp": 293.15,
    "pressure": 1018,
    "humidity": 40,
    "temp_min": 293.15,
    "temp_max": 293.15
  },
  "visibility": 1500,
  "wind": {
    "speed": 2.6,
    "deg": 50
  },
  "clouds": {
    "all": 0
  },
  "dt": 1518238800,
  "sys": {
    "type": 1,
    "id": 7809,
    "message": 0.0074,
    "country": "IN",
    "sunrise": 1518226411,
    "sunset": 1518246237
  },
  "id": 1273293,
  "name": "National Capital Territory of Delhi",
  "cod": 200
}
```

## APIs & Services

Dashboard

Library

Credentials

## Credentials

Credentials [OAuth consent screen](#) Domain verification

Email address <sup>?</sup>

Product name shown to users <sup>?</sup>

Homepage URL (Optional)

Product logo URL (Optional) <sup>?</sup>



This is how your logo will look to end users  
Max size: 120x120 px

Privacy policy URL

Optional until you deploy your app

Terms of service URL (Optional)



The consent screen will be shown to users whenever you request access to their private data using your client ID. It will be shown for all applications registered in this project.

You must provide an email address and product name for OAuth to work.

## APIs & services



Dashboard



Library



Credentials



## Create client ID

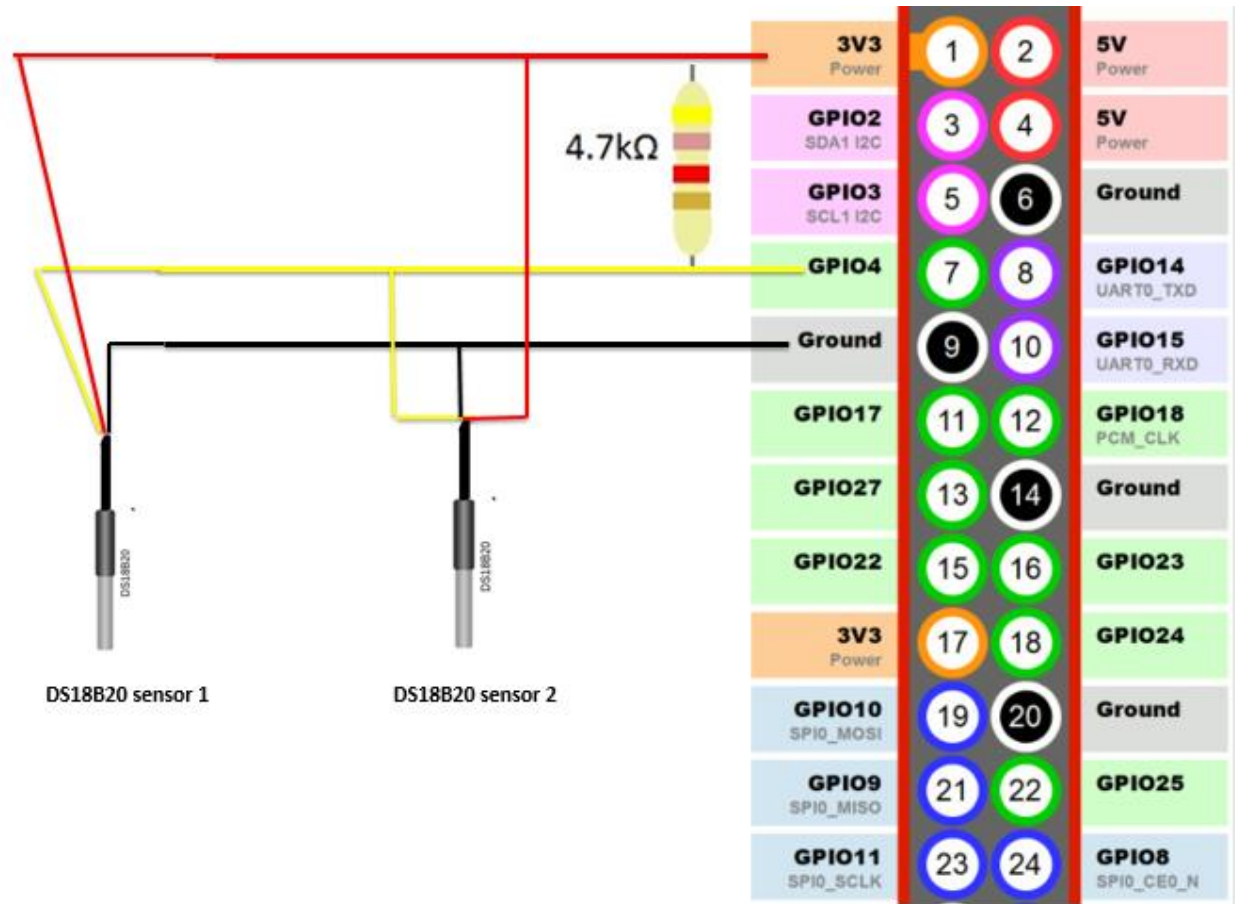
Application type

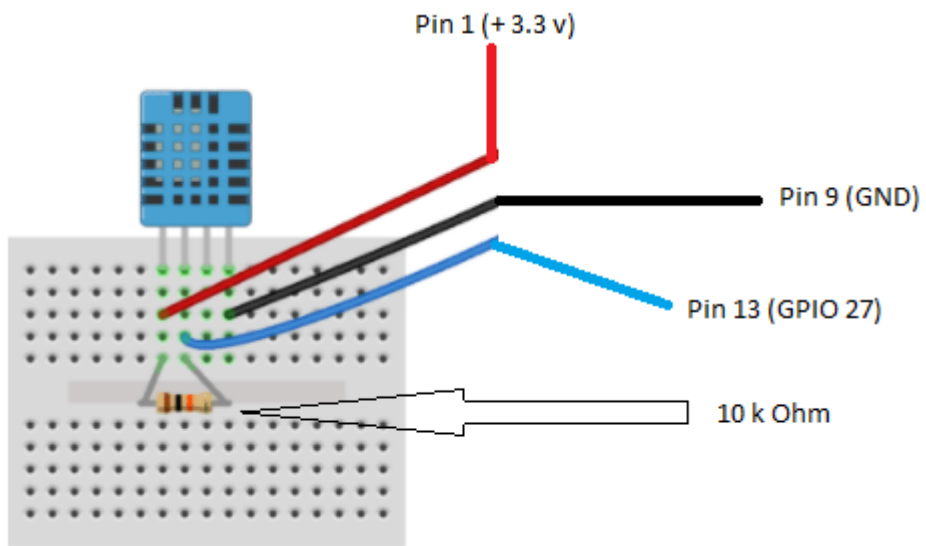
- Web application
- Android [Learn more](#)
- Chrome App [Learn more](#)
- iOS [Learn more](#)
- PlayStation 4
- Other

Name

# OAuth 2.0 client IDs

<input checked="" type="checkbox"/> Name	Creation date ▾	Type	Client ID
<input checked="" type="checkbox"/> Google Sheet API	14 Nov 2017	Other	██████████





```

{
  "coord": {
    "lon": 77.25,
    "lat": 28.75
  },
  "weather": [
    {
      "id": 711,
      "main": "Smoke",
      "description": "smoke",
      "icon": "50d"
    }
  ],
  "base": "stations",
  "main": {
    "temp": 293.15,
    "pressure": 1018,
    "humidity": 40,
    "temp_min": 293.15,
    "temp_max": 293.15
  },
  "visibility": 1500,
  "wind": {
    "speed": 2.6,
    "deg": 50
  },
  "clouds": {
    "all": 0
  },
  "dt": 1518238800,
  "sys": {
    "type": 1,
    "id": 7809,
    "message": 0.0074,
    "country": "IN",
    "sunrise": 1518226411,
    "sunset": 1518266237
  },
  "id": 1273293,
  "name": "National Capital Territory of Delhi",
  "cod": 200
}

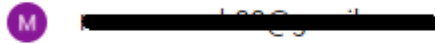
```

Authorize this app by visiting this url: [https://accounts.google.com/o/oauth2/auth?access\\_type=offline&scope=https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fspreadsheets&response\\_type=code&client\\_id=152752360311-hsqt10kf300c31rtio5c9k7boj9i8aku.apps.googleusercontent.com&redirect\\_uri=urn%3Aietf%3Aawg%3Aoauth%3A2.0%3Anoo](https://accounts.google.com/o/oauth2/auth?access_type=offline&scope=https%3A%2F%2Fwww.googleapis.com%2Fauth%2Fspreadsheets&response_type=code&client_id=152752360311-hsqt10kf300c31rtio5c9k7boj9i8aku.apps.googleusercontent.com&redirect_uri=urn%3Aietf%3Aawg%3Aoauth%3A2.0%3Anoo)






Hi Maneesh



WeatherStation wants to

- View and manage your spreadsheets in Google Drive 

**Allow WeatherStation to do this?**

By clicking Allow, you allow this app to use your information in accordance to their terms of service and privacy policies. You can remove this or any other app connected to your account in [My Account](#)

CANCEL

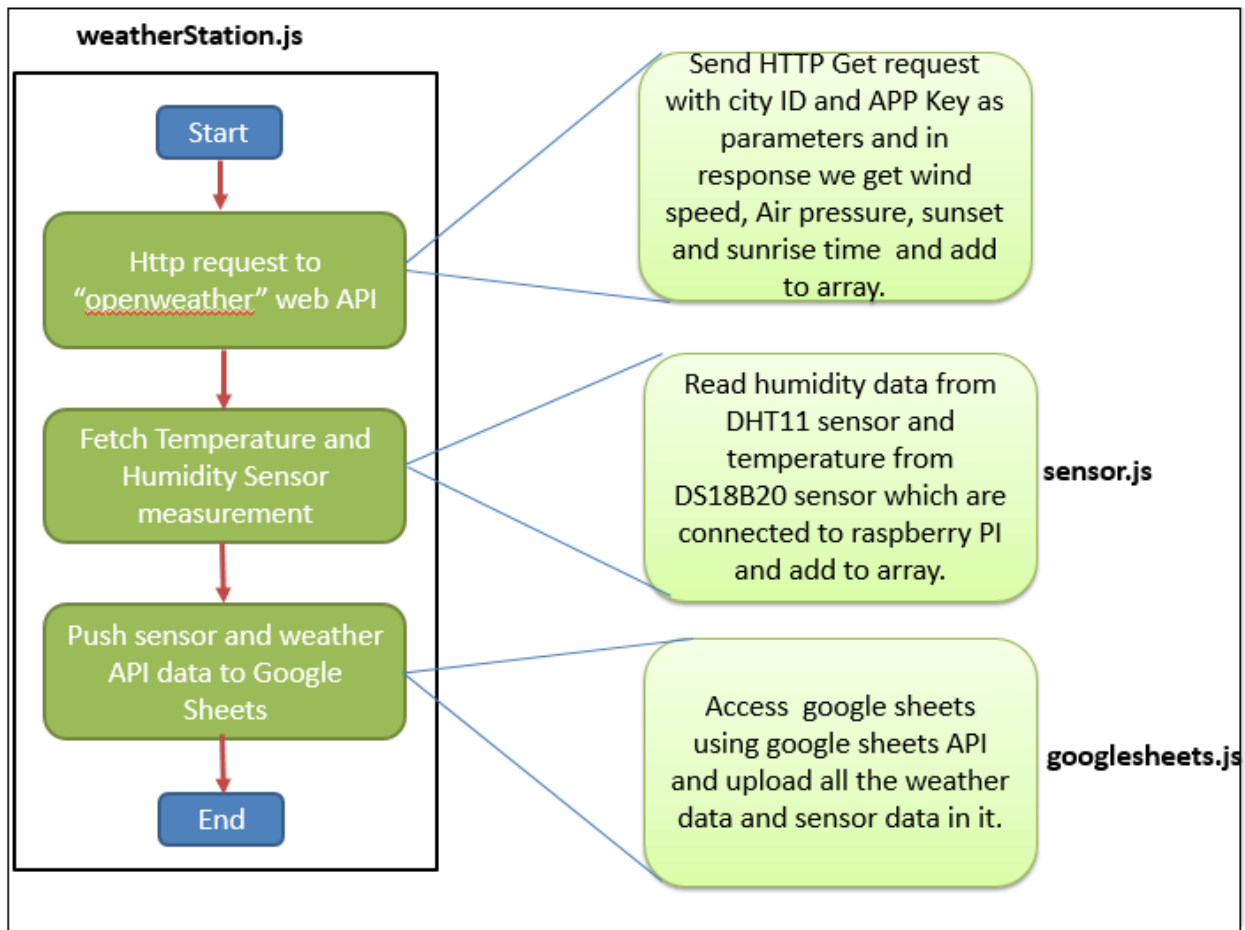
ALLOW

Sign in

Please copy this code, switch to your application and paste it there:

4/AACwz19Ljj9Wlif7zEpA\_HZmEWh0sPTcpla3BZ\_glhuDu-Ecl4Fig

Wind Speed	Air Pressure	Sunrise Time	Sunset Time	Temp Sensor 1	Temp Sensor 2	humidity
3.6	1016	1514166108	1514203248	65.8616	66.9866	47
3.6	1016	1514166108	1514203248	65.8616	66.9866	47
3.6	1016	1514166108	1514203248	65.8616	66.9866	47
3.6	1016	1514166108	1514203248	65.8616	66.9866	47



☰ Google APIs Select a project ▼

**Register your application for Google Sheets API in Google API Console**

Google API Console allows you to manage your application and monitor API usage.

**Select a project where your application will be registered**  
 You can use one project to manage all of your applications, or you can create a different project for each application.

Create a project ▼

Please email me updates regarding feature announcements, performance suggestions, feedback surveys and special offers.

Yes  No

I have read and agree to the [Firebase APIs/Services Terms of Service](#).

Yes  No

**Agree and continue**

☰ Google APIs Select a project ▾

---

The API is enabled

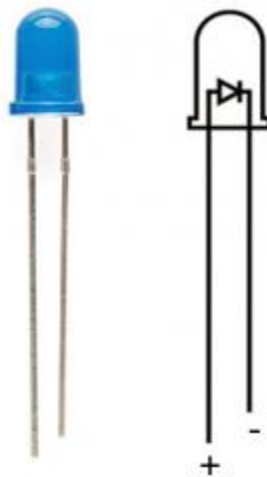
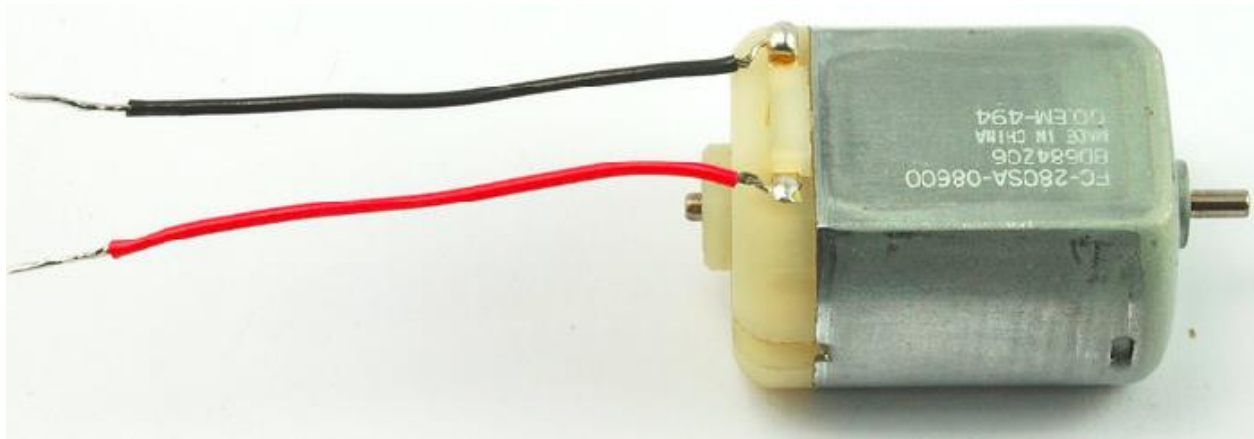
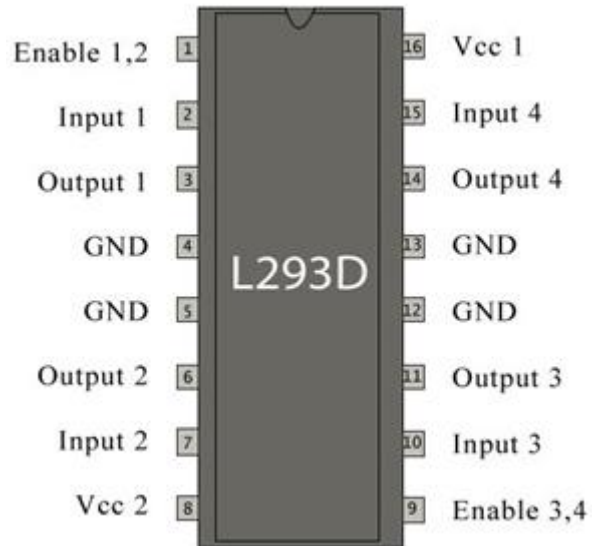
The project has been created and Google Sheets API has been enabled.

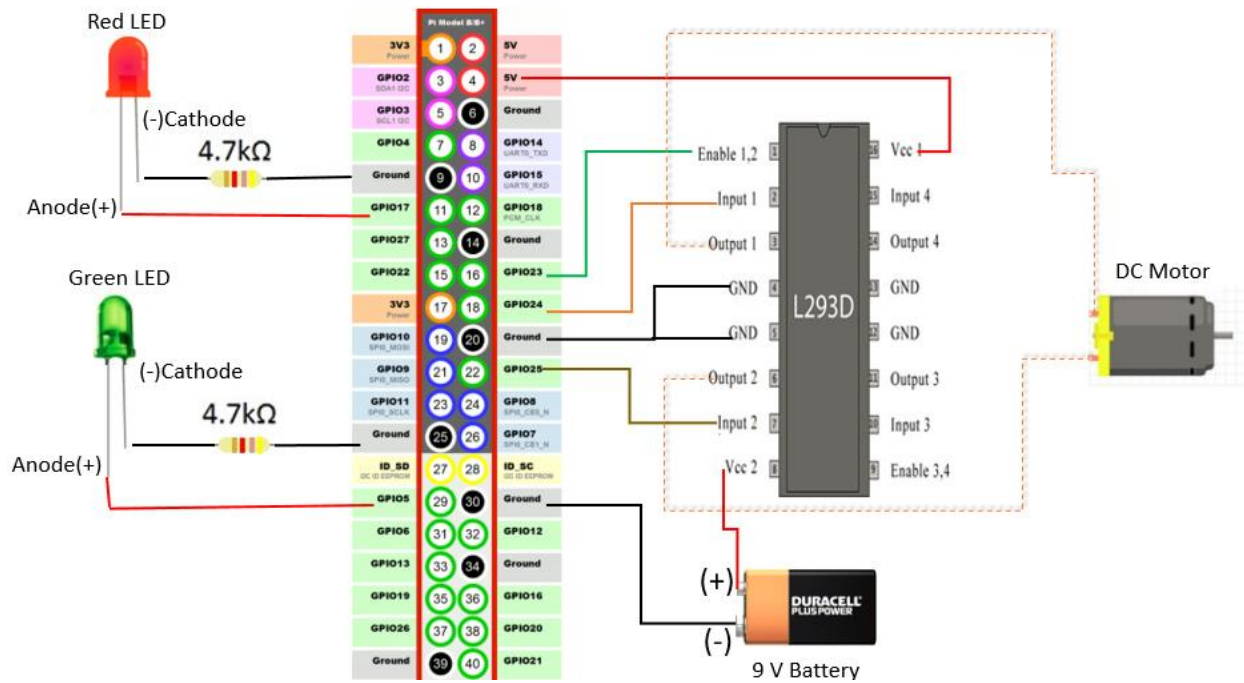
To use the API you'll need the right credentials.

[Go to credentials](#)

```
pi@raspberrypi: /sys/bus/w1/devices/28-0516a05186ff - □  
File Edit Tabs Help  
pi@raspberrypi: /sys/bus/w1/devices/28-0516a05186ff $ cat w1_slave  
9b 01 4b 46 7f ff 0c 10 dc : crc=dc YES  
9b 01 4b 46 7f ff 0c 10 dc t=25687
```

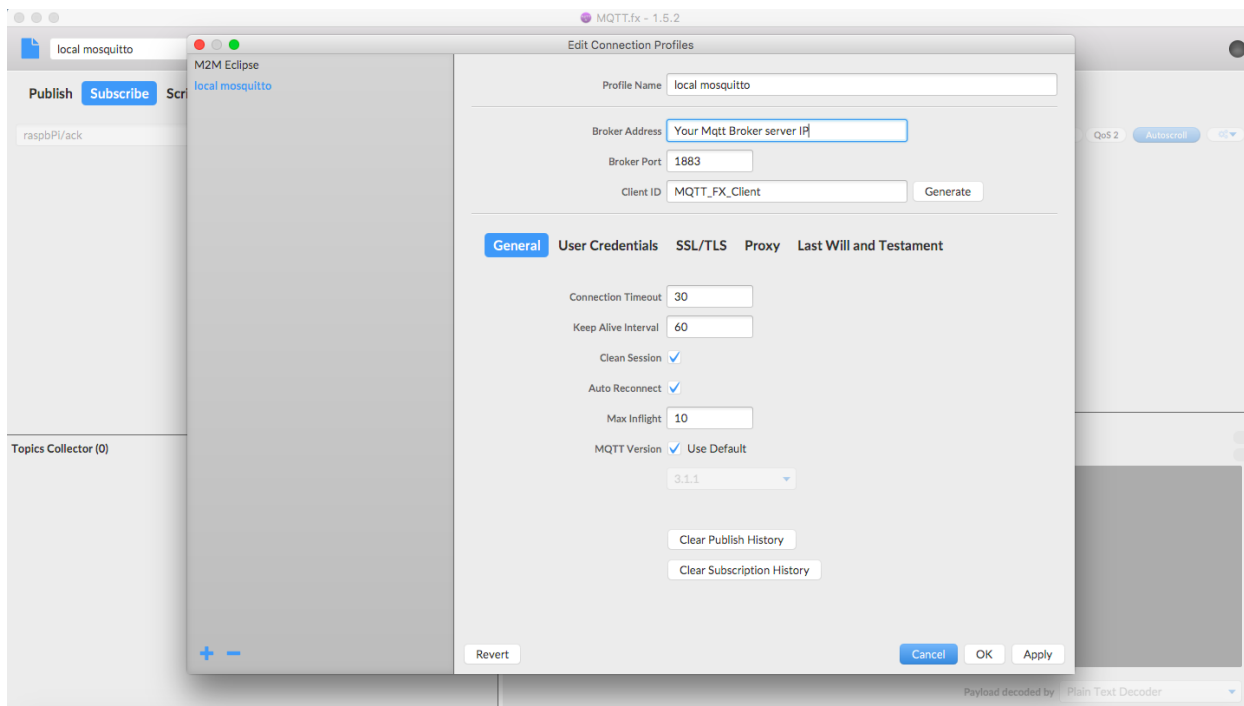
# Chapter 5: Controlling the Pi

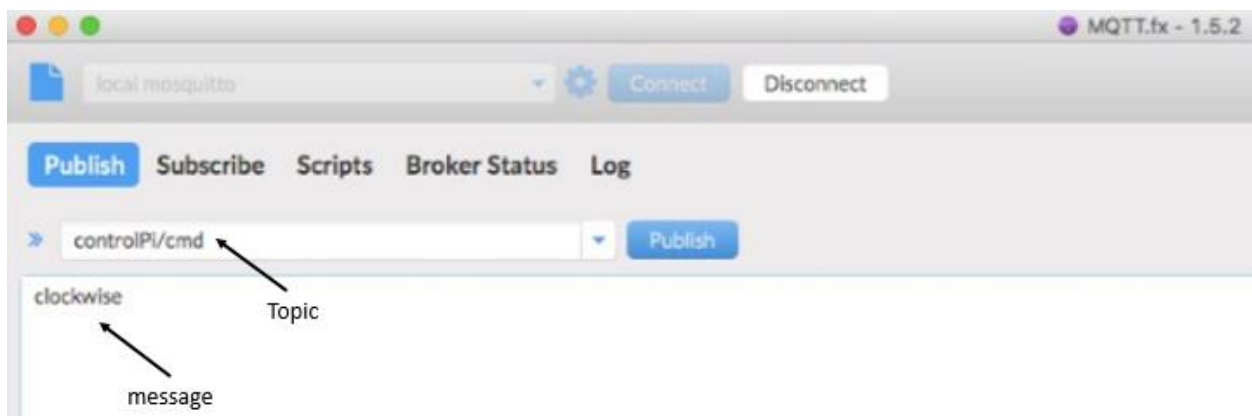
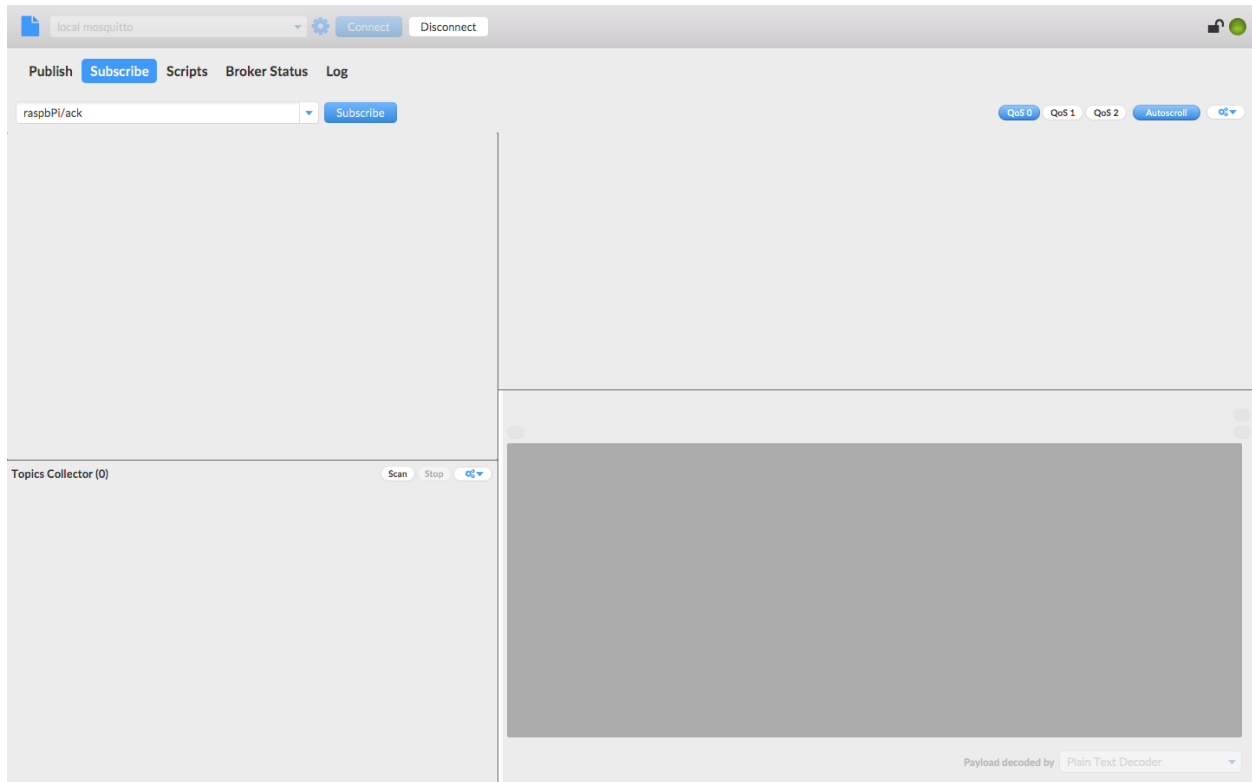
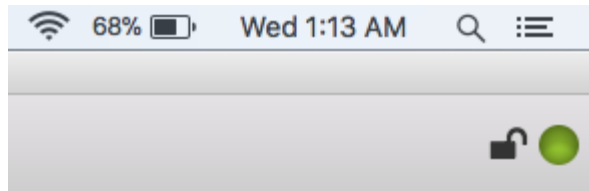




```

pi@raspberrypi: ~/Node_Programs
File Edit Tabs Help
pi@raspberrypi:~/Node_Programs $ sudo node controlPi
Raspberry Pi mqtt client connected to broker
  
```





```
pi@raspberrypi: ~/Node_Programs
File Edit Tabs Help
pi@raspberrypi:~/Node_Programs $ sudo node controlPi.js
Raspberry Pi mqtt client connected to broker
Clockwise Rotation
```

MQTT.fx - 1.5.2

local mosquitto [Connect] [Disconnect]

Publish **Subscribe** Scripts Broker Status Log

raspbPi/ack [Subscribe]

raspbPi/ack 2 [Dump Messages] [Mute] [Unsubscribe]

Topics Collector (0) [Scan] [Stop] [Refresh]

raspbPi/ack

21-01-2018 21:14:06.76446175  
**Clockwise Rotation**

MQTT.fx

local mosquitto [Connect] [Disconnect]

**Publish** Subscribe Scripts Broker Status Log

>> controlPi/cmd [Publish]

anticlockwise

MQTT.fx - 1.5.2

local mosquitto Connect Disconnect

Publish **Subscribe** Scripts Broker Status Log

raspbPI/ack Subscribe

raspbPI/ack 3 Dump Messages Mute Unsubscribe

QoS 0 QoS 1 QoS 2 Autoscroll ⌵

raspbPI/ack 1 QoS 0

raspbPI/ack 2 QoS 0

raspbPI/ack 3 QoS 0

---

Topics Collector (0) Scan Stop ⌵

raspbPI/ack 3 QoS 0

24-01-2018 01:12:25,4345298

**Anti Clockwise Rotation**

Payload decoded by Plain Text Decoder

local mosquitto Connect Disconnect

**Publish** Subscribe Scripts Broker Status Log

controlPI/cmd Publish

stop

QoS 0 QoS 1 QoS 2 Retained ⌵

local mosquitto Connect Disconnect

Publish **Subscribe** Scripts Broker Status Log

raspbPI/ack Subscribe

raspbPI/ack 1 Dump Messages Mute Unsubscribe

QoS 0 QoS 1 QoS 2 Autoscroll ⌵

raspbPI/ack 1 QoS 0

---

Topics Collector (0) Scan Stop ⌵

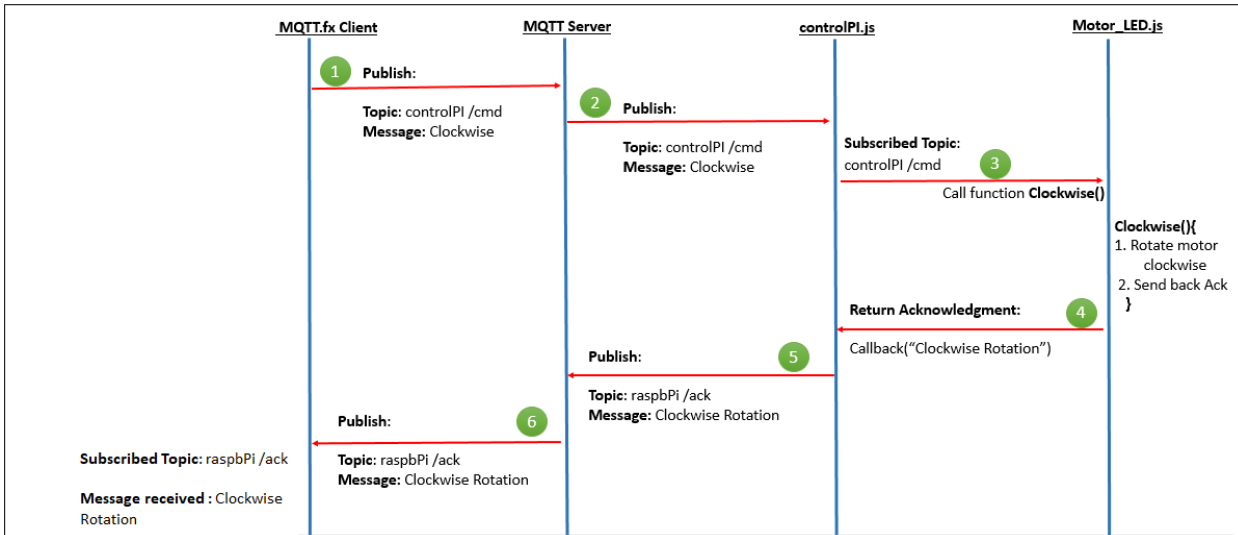
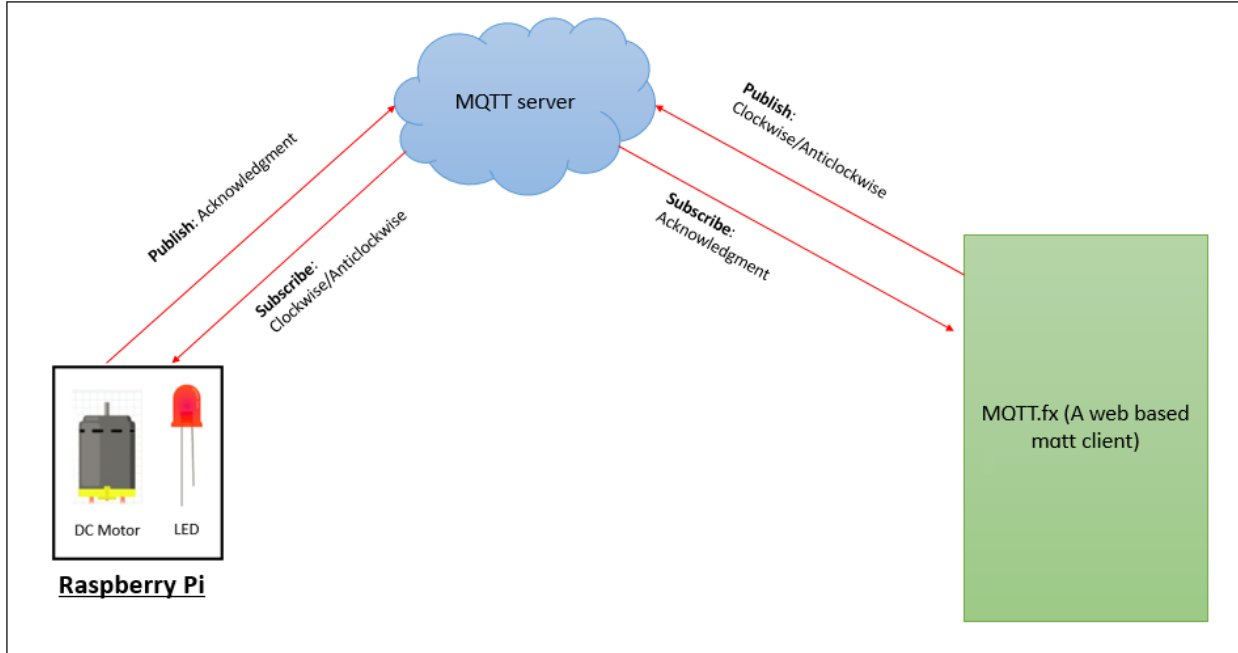
raspbPI/ack 1 QoS 0

24-01-2018 01:27:24,5244358

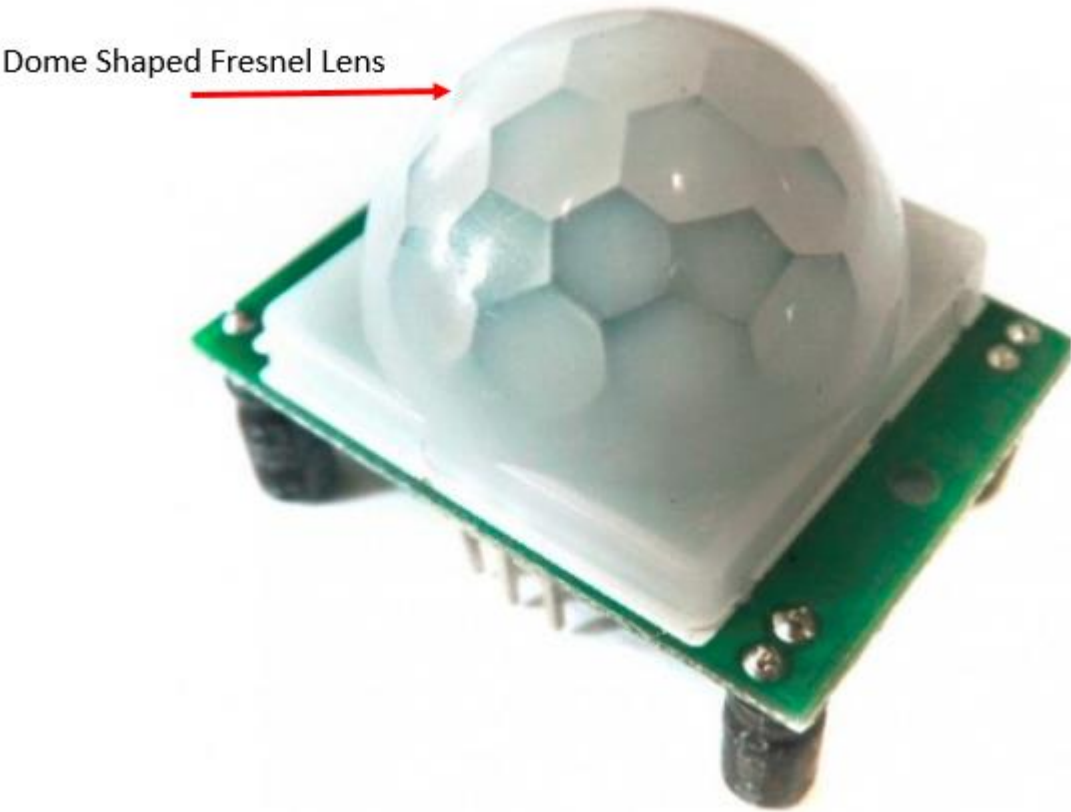
**Motor Stopped**

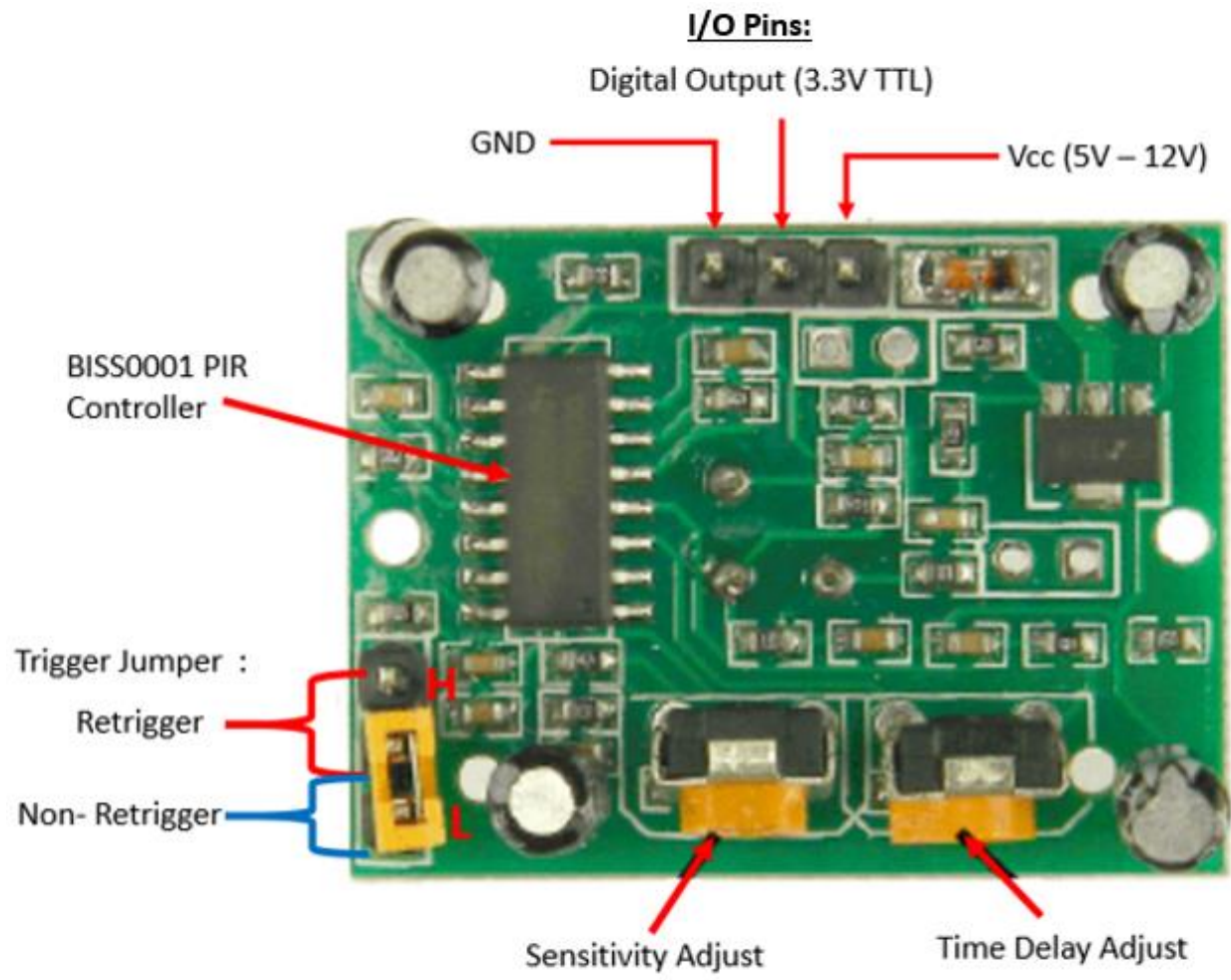
Payload decoded by Plain Text Decoder

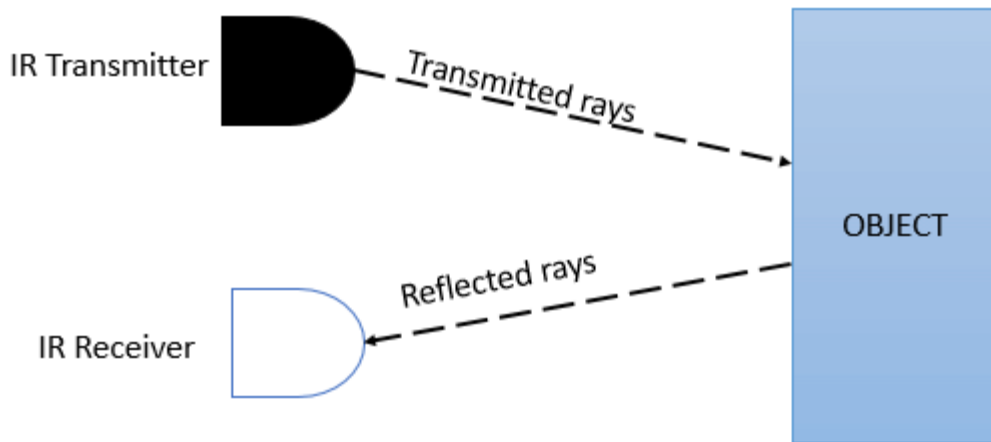
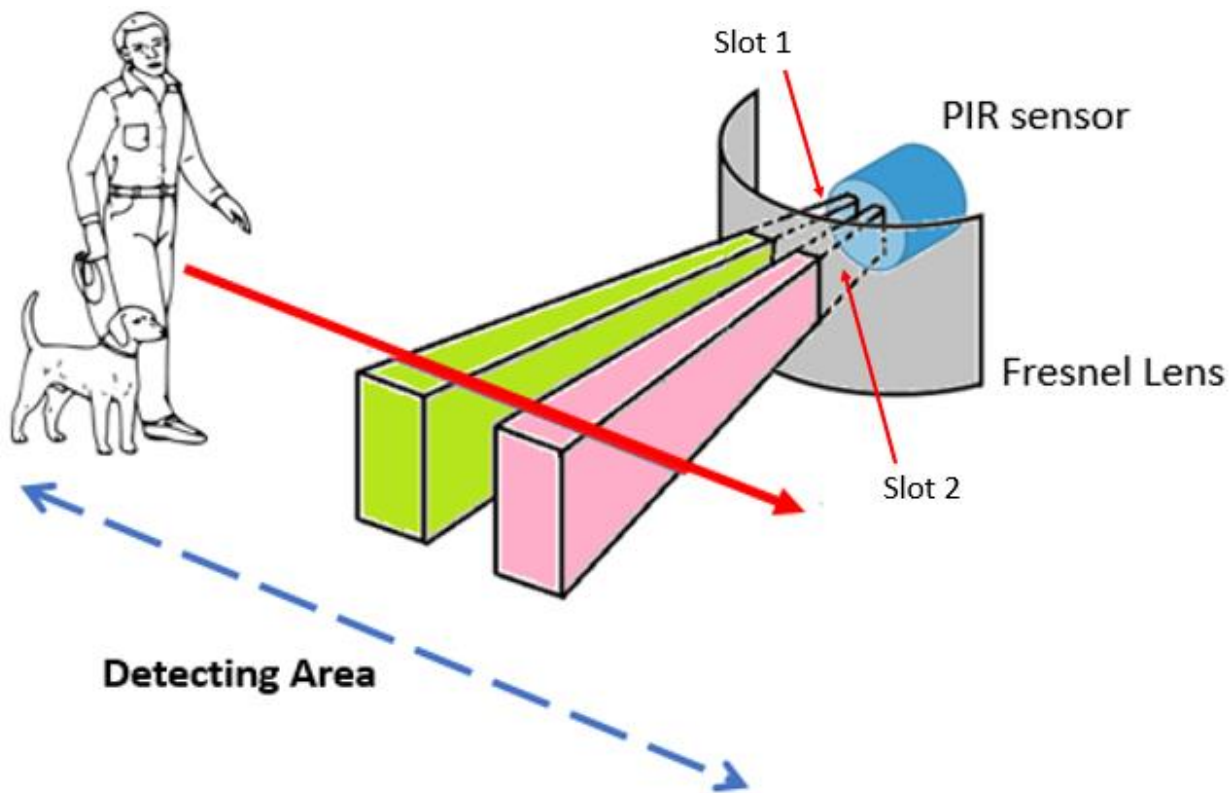


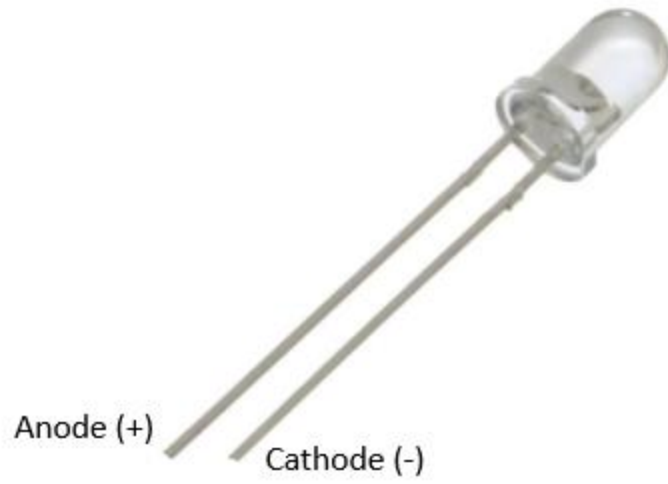


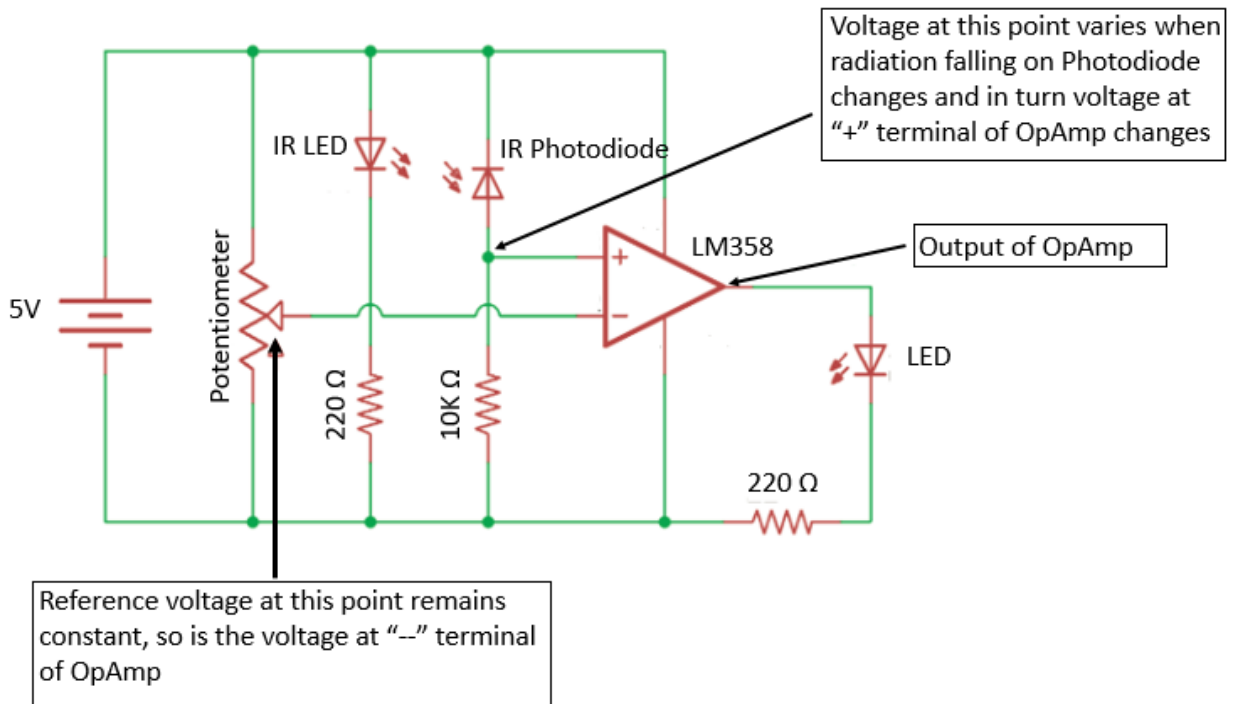
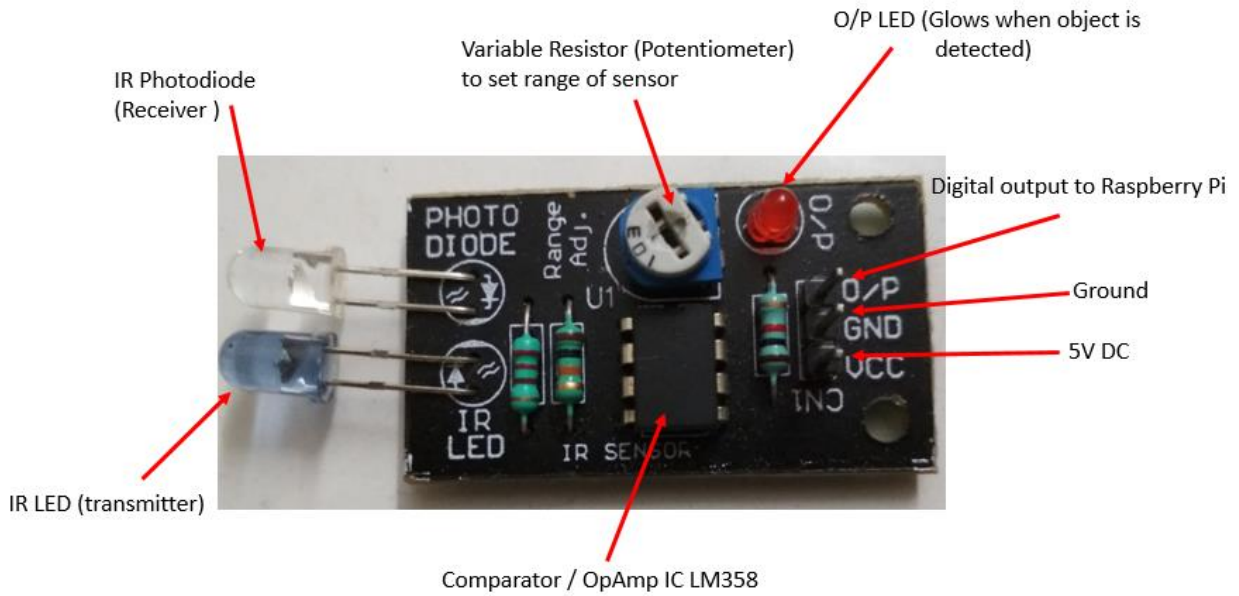
# Chapter 6: Security Surveillance

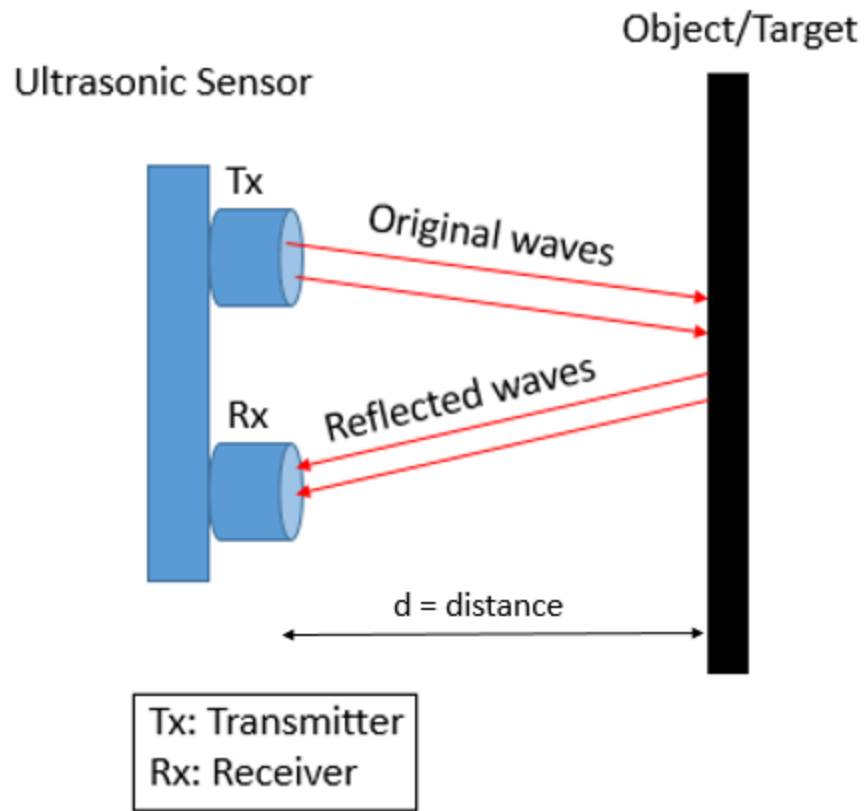


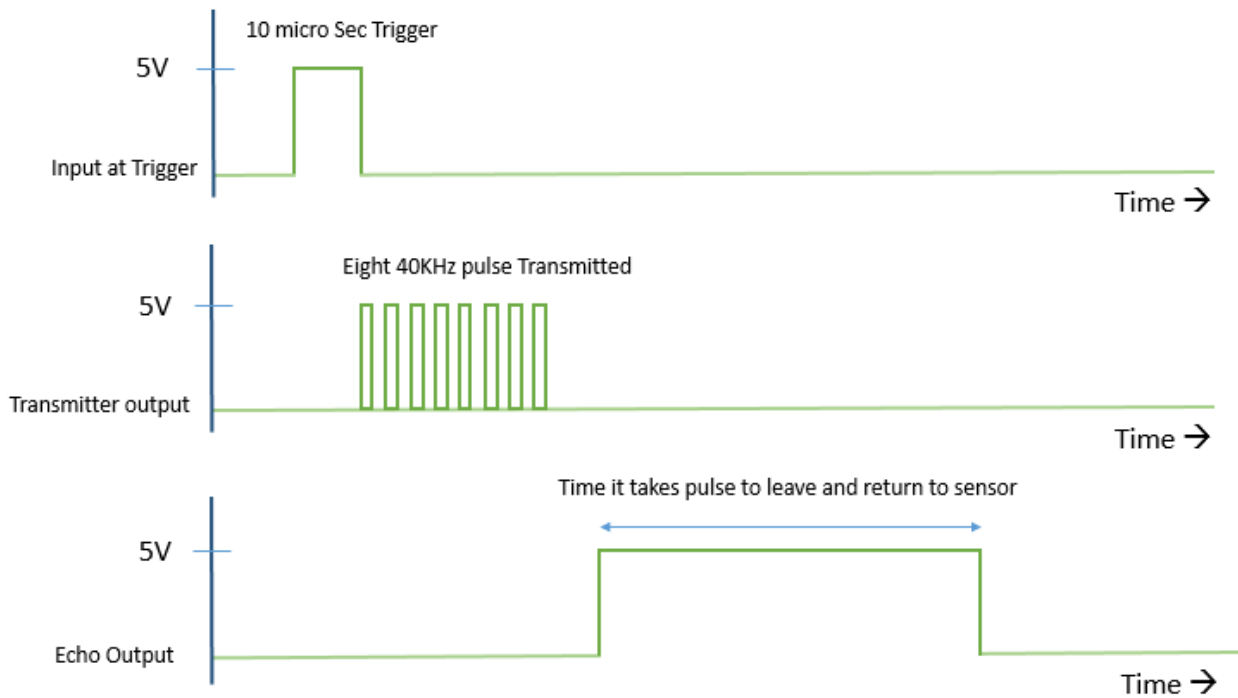
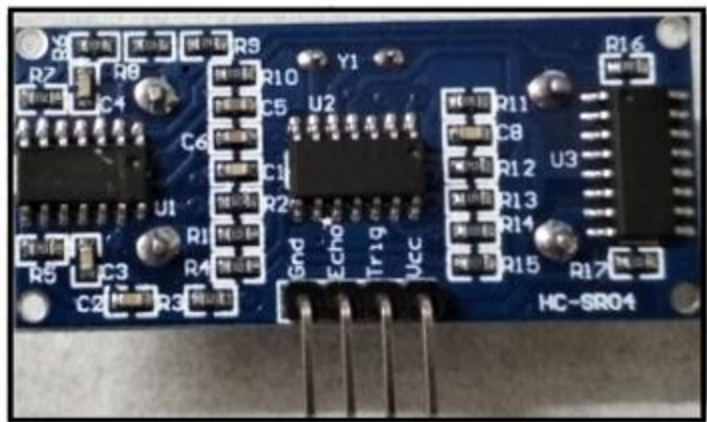
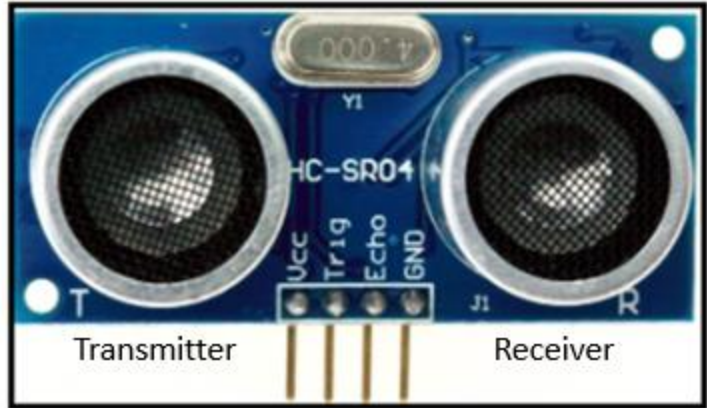










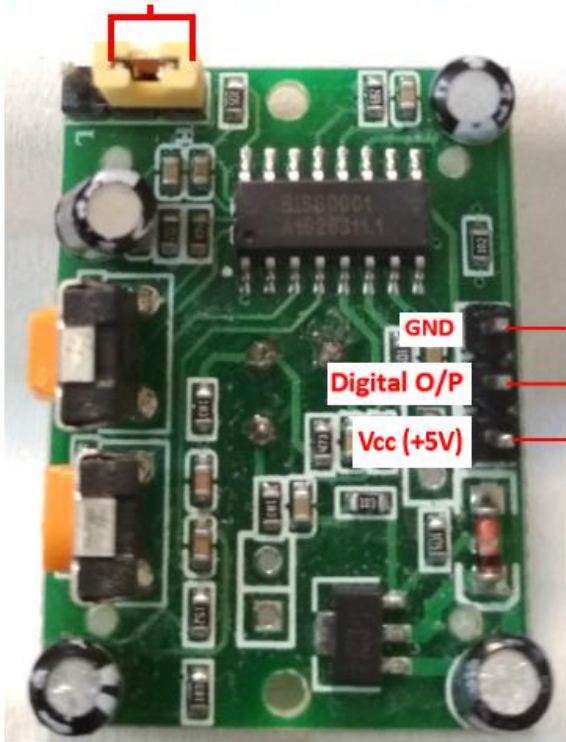




$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$



**Trigger Jumper :**  
Retrigger Mode (Short-circuit pin H with middle pin )



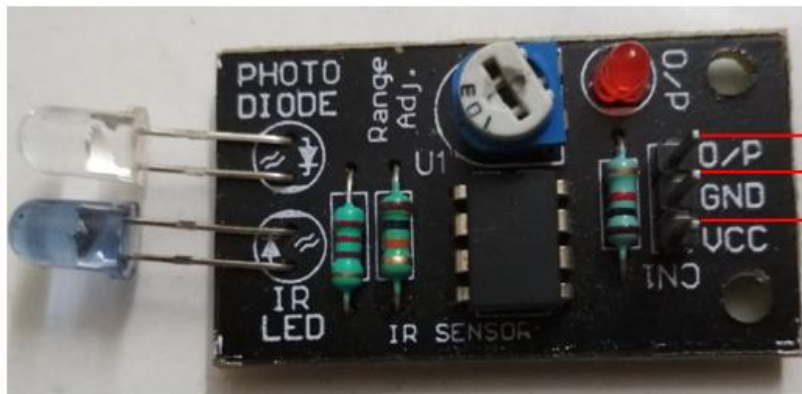
**PIR sensor**

**Raspberry PI**

- GND (Pin 06)
- GPIO 19 (Pin 35)
- +5V (Pin 04)



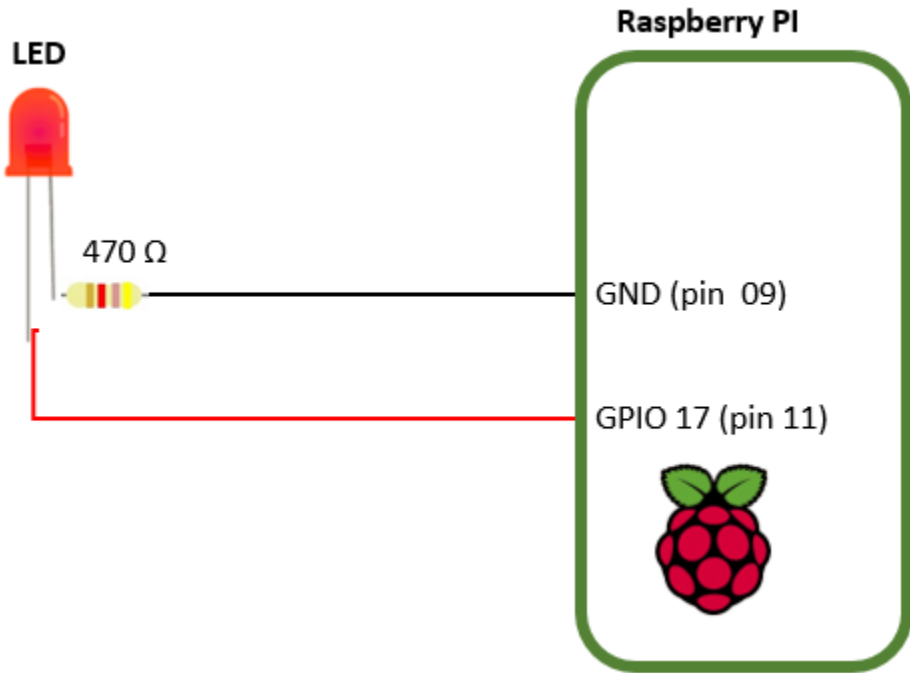
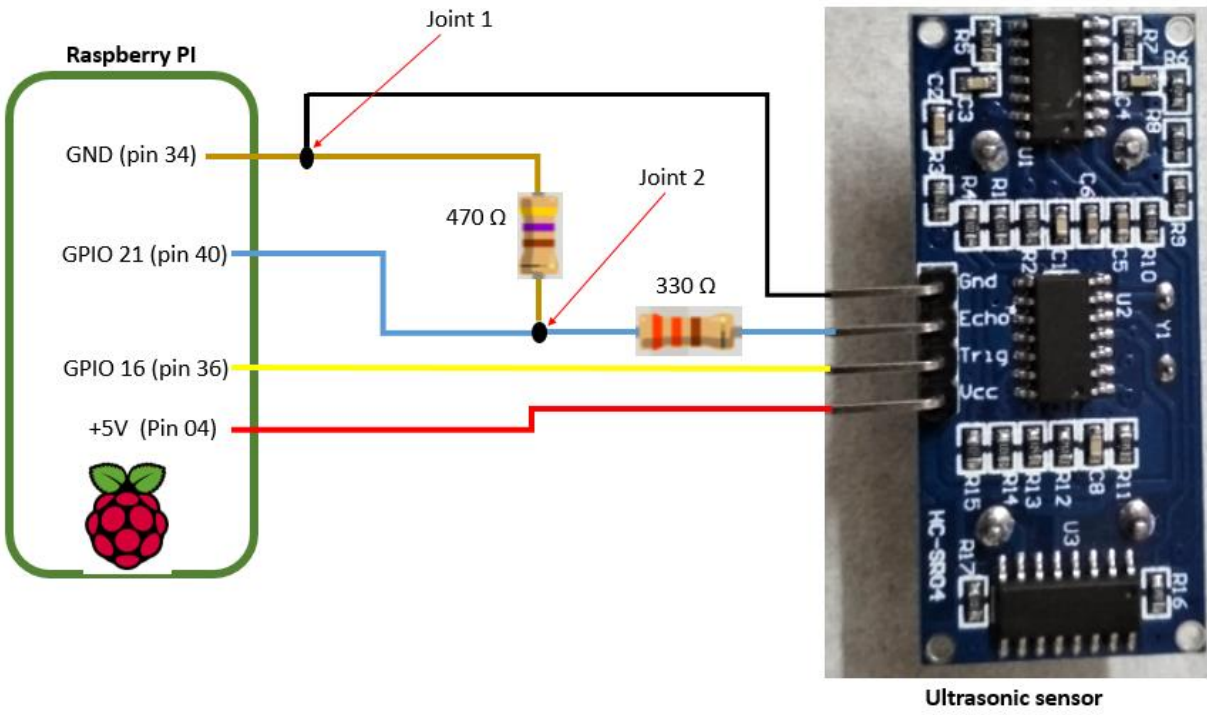
**IR sensor**

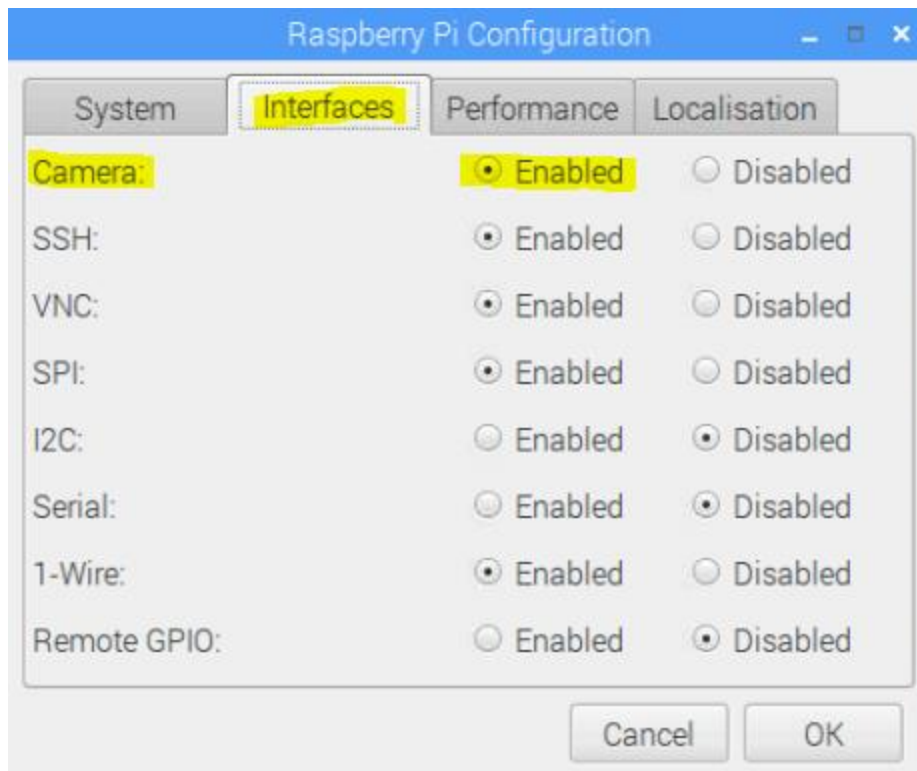
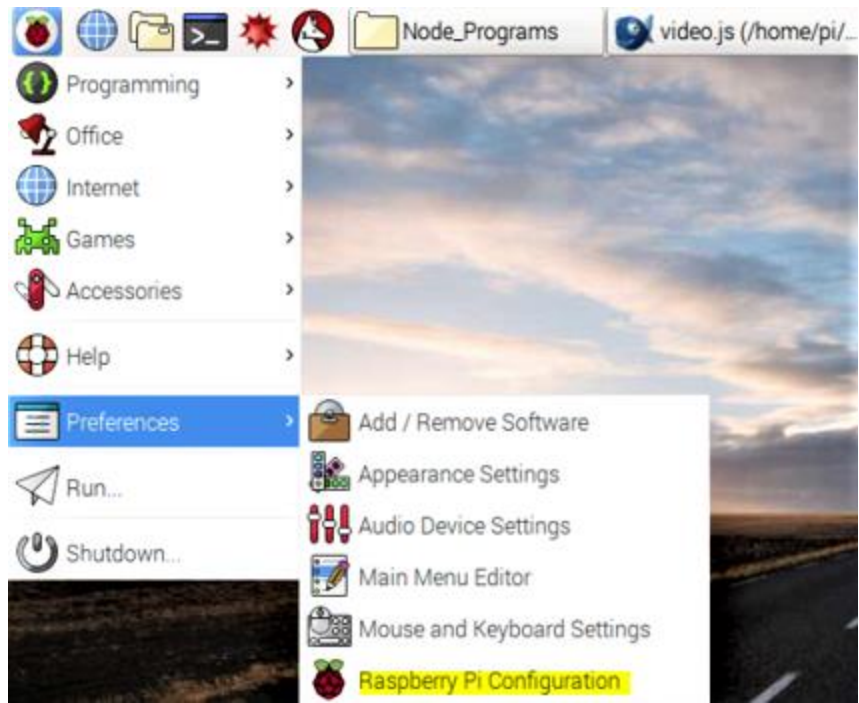


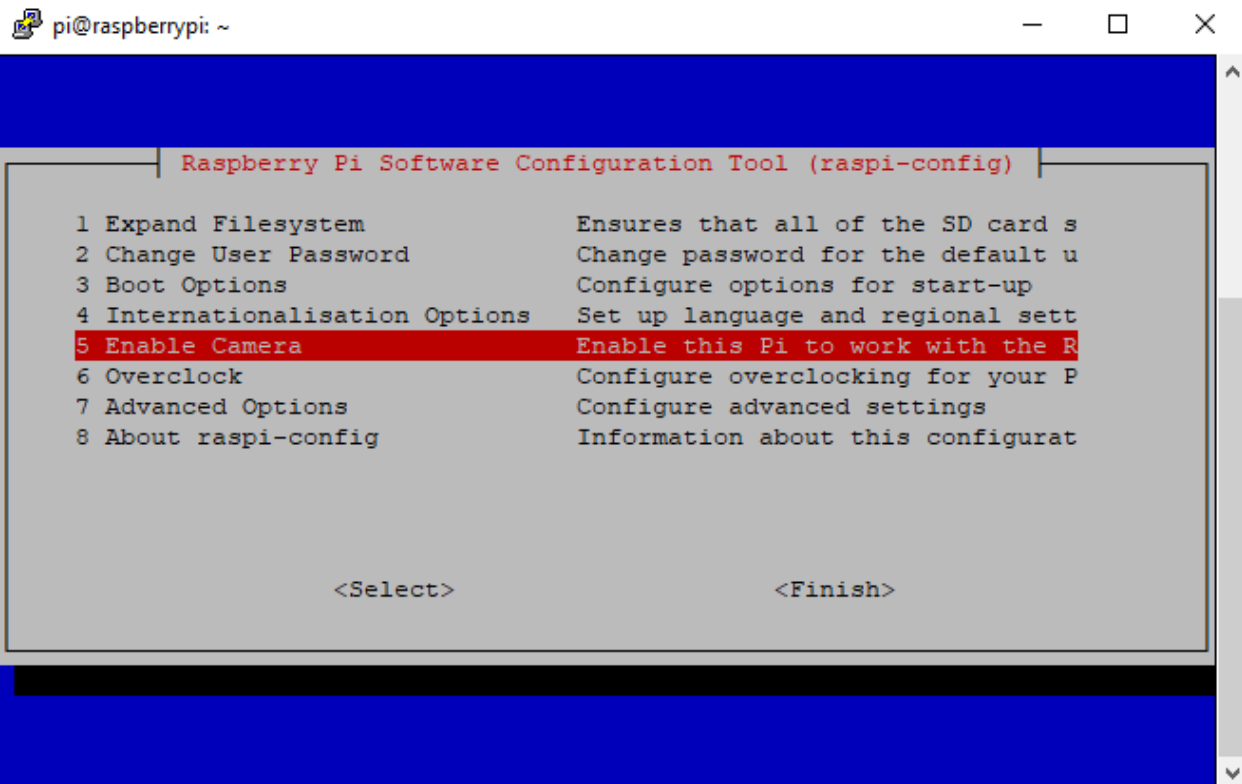
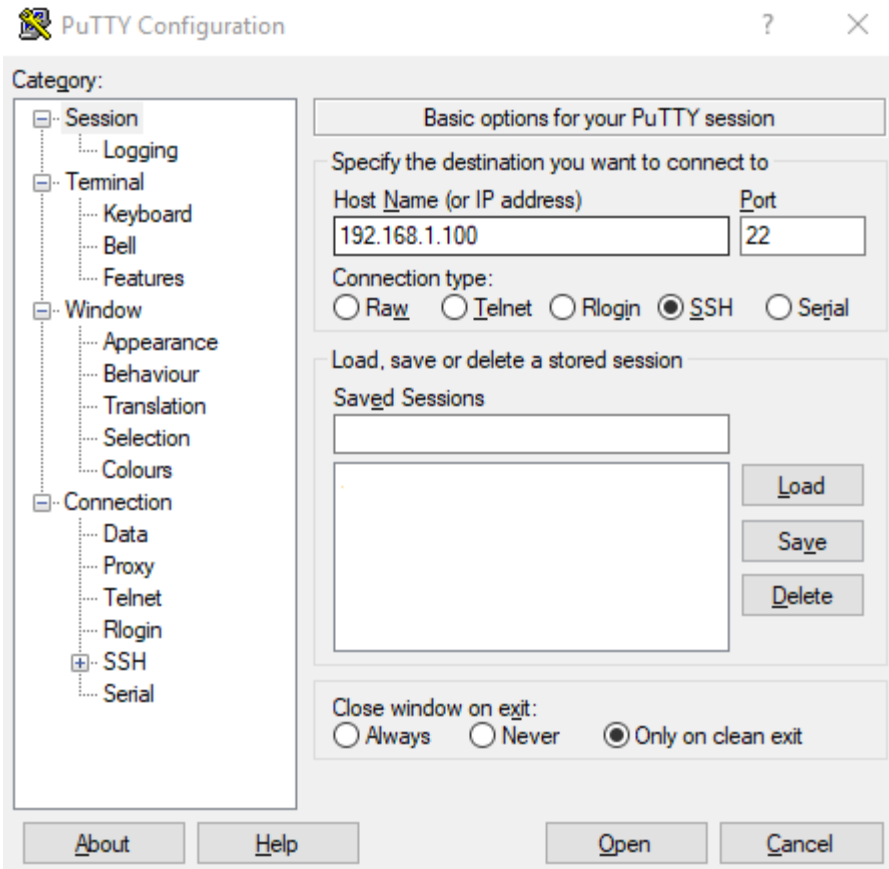
**Raspberry PI**

- GPIO 05 (pin 29)
- GND (pin 06)
- +5V (Pin 04)











```
pi@raspberrypi: ~/Node_Programs
File Edit Tabs Help
pi@raspberrypi:~ $ cd Node_Programs/
pi@raspberrypi:~/Node_Programs $ npm install pi-camera
└─ pi-camera@1.0.1

pi@raspberrypi:~/Node_Programs $
```

```
pi@raspberrypi: ~/Node_Programs
File Edit Tabs Help
pi@raspberrypi:~/Node_Programs $ npm install nodemailer
└─ nodemailer@4.6.3

pi@raspberrypi:~/Node_Programs $
```

```
pi@raspberrypi: ~/Node_Programs
File Edit Tabs Help
pi@raspberrypi:~/Node_Programs $ sudo npm install pigpio
> pigpio@0.6.4 install /home/pi/Node_Programs/node_modules/pigpio
> node-gyp rebuild

make: Entering directory '/home/pi/Node_Programs/node_modules/pigpio/build'
  CXX(target) Release/obj.target/pigpio/src/pigpio.o
  SOLINK_MODULE(target) Release/obj.target/pigpio.node
  COPY Release/pigpio.node
make: Leaving directory '/home/pi/Node_Programs/node_modules/pigpio/build'
iot-hub-node-raspberrypi-client-app@1.0.0 /home/pi/Node_Programs
└─ pigpio@0.6.4

npm WARN iot-hub-node-raspberrypi-client-app@1.0.0 No repository field.
pi@raspberrypi:~/Node_Programs $
```

```
pi@raspberrypi: ~/Node_Programs
File Edit Tabs Help
pi@raspberrypi:~/Node_Programs $ sudo node Surveillance.js
PIR : Intruder Alert...!!
Your picture was captured
Photo email success...!!
```

```
pi@raspberrypi: ~/Node_Programs
File Edit Tabs Help
pi@raspberrypi:~/Node_Programs $ sudo node Surveillance.js
Ultrasonic : Intruder Detected...!!
Your picture was captured
Photo email success...!!
```

```
pi@raspberrypi: ~/Node_Programs
File Edit Tabs Help
pi@raspberrypi:~/Node_Programs $ sudo node Surveillance.js
Ultrasonic : Intruder Detected...!!
Your picture was captured
Photo email success...!!
```

Intruder in your Castle..!! Inbox x

 [REDACTED]

to me 

Some one is trying to steal your gold..!!



**Chapter 7: Image Recognition**







Search for buckets

[+ Create bucket](#) [Delete bucket](#) [Empty bucket](#)

0 Buckets 0 **Public** 0 Regions [↻](#)

You do not have any buckets. Here is how to get started with Amazon S3.



### Create a new bucket

Buckets are globally unique containers for everything that you store in Amazon S3.

[Learn more](#)



### Upload your data

After you create a bucket, you can upload your objects (for example, your photo or video files).

[Learn more](#)



### Set up your permissions

By default, the permissions on an object are private, but you can set up access control policies to grant permissions to others.

[Learn more](#)

[Get started](#)

## Create bucket ✕

1 Name and region
2 Set properties
3 Set permissions
4 Review

**Name and region**

Bucket name ⓘ

Region

Asia Pacific (Sydney)
▼

Copy settings from an existing bucket

*You have no buckets*
0 Buckets ▼

Create
Cancel
Next

aws Services ▾ Resource Groups ▾
Maneesh ▾ Global ▾ Support ▾

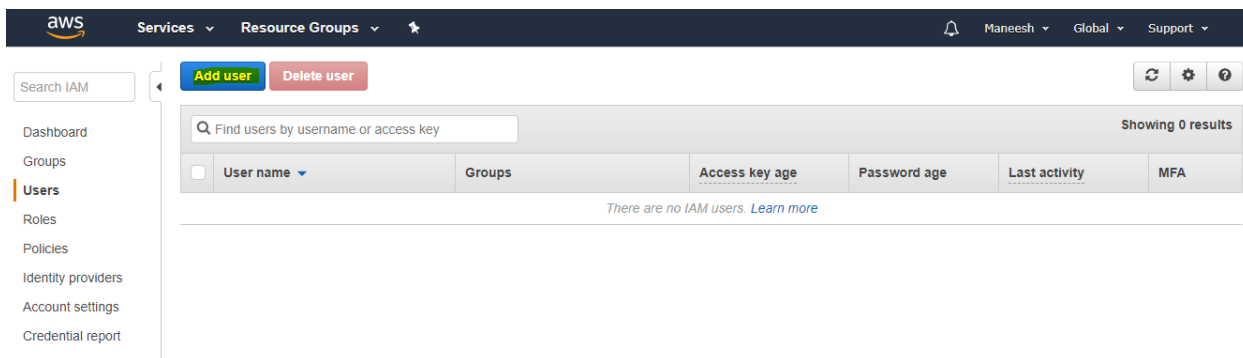
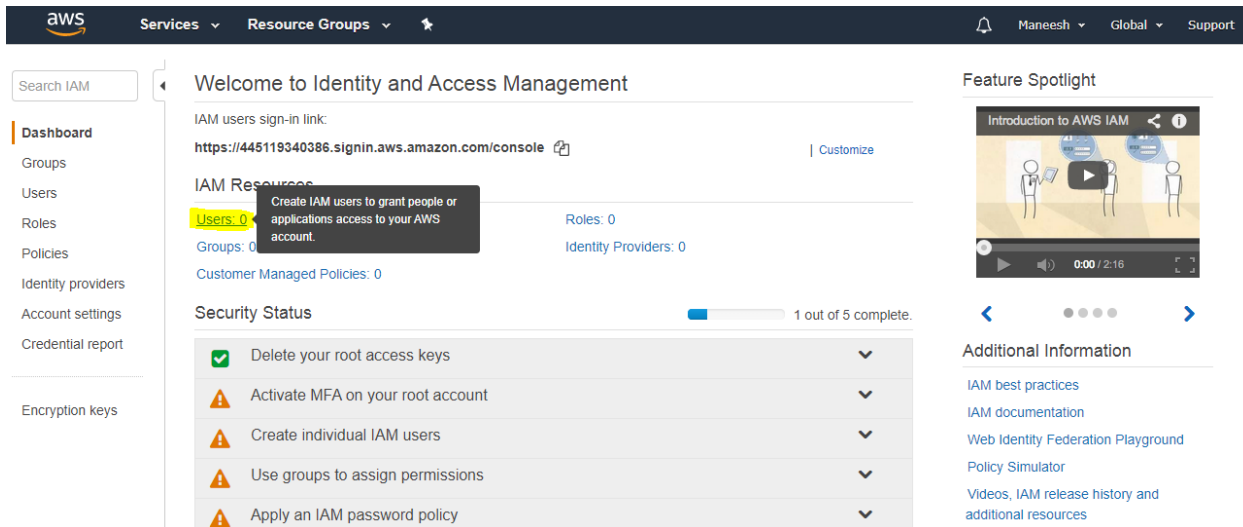
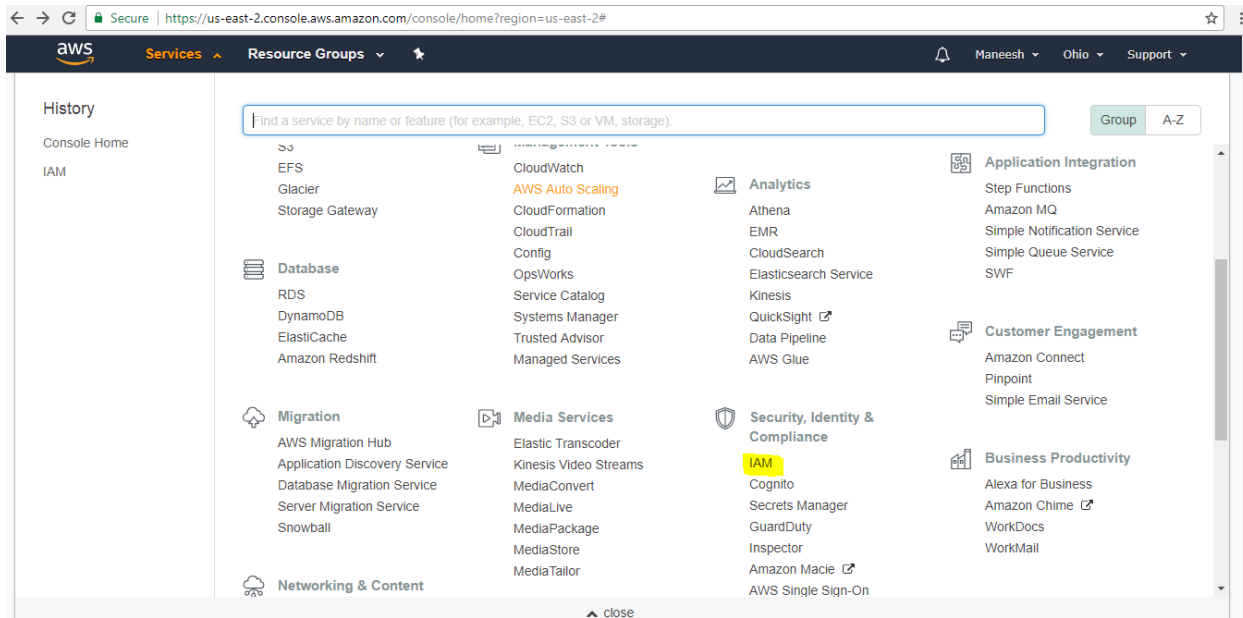
Amazon Glacier now offers expedited retrievals, typically in 1-5 minutes. [Learn More >](#) [Documentation](#)

Amazon S3
Discover the new console Quick tips

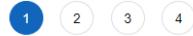
+ Create bucket
Delete bucket
Empty bucket
1 Buckets 0 Public 1 Regions ↻

Bucket name ↑	Access ⓘ ↑	Region ↑	Date created ↑
pibucketmaneesh	Not public *	Asia Pacific (Sydney)	Apr 9, 2018 11:53:00 PM GMT+0530

\* Objects might still be publicly accessible due to object ACLs. [Learn more](#)



## Add user



### Set user details

You can add multiple users at once with the same access type and permissions. [Learn more](#)

User name\*

[+ Add another user](#)

### Select AWS access type

Select how these users will access AWS. Access keys and autogenerated passwords are provided in the last step. [Learn more](#)

- Access type\*  **Programmatic access**  
 Enables an **access key ID** and **secret access key** for the AWS API, CLI, SDK, and other development tools.
- AWS Management Console access**  
 Enables a **password** that allows users to sign-in to the AWS Management Console.

\* Required

[Cancel](#) [Next: Permissions](#)

Use IAM policies to grant permissions. You can assign an existing policy or create a new one.

Add user to group

Copy permissions from existing user

Attach existing policies directly

Attach one or more existing policies directly to the users or create a new policy. [Learn more](#)

[Create policy](#) [Refresh](#)

Filter: Policy type  Showing 4 results

	Policy name	Type	Attachments	Description
<input type="checkbox"/>	AmazonDMSRedshiftS3Role	AWS managed	0	Provides access to manage S3 settings for Redshift endpoints for DMS.
<input checked="" type="checkbox"/>	AmazonS3FullAccess	AWS managed	0	Provides full access to all buckets via the AWS Management Console.
<input type="checkbox"/>	AmazonS3ReadOnlyAccess	AWS managed	0	Provides read only access to all buckets via the AWS Management Console.
<input type="checkbox"/>	QuickSightAccessForS3StorageMana...	AWS managed	0	Policy used by QuickSight team to access customer data produced by S3 Storage Man...

## Add user



✔ **Success**

You successfully created the users shown below. You can view and download user security credentials. You can also email users instructions for signing in to the AWS Management Console. This is the last time these credentials will be available to download. However, you can create new credentials at any time.

Users with AWS Management Console access can sign-in at: <https://445119340386.signin.aws.amazon.com/console>

[Download .csv](#)

User	Access key ID	Secret access key
raspberryPi	A*****Q	***** <a href="#">Show</a>

[Close](#)

Command Prompt

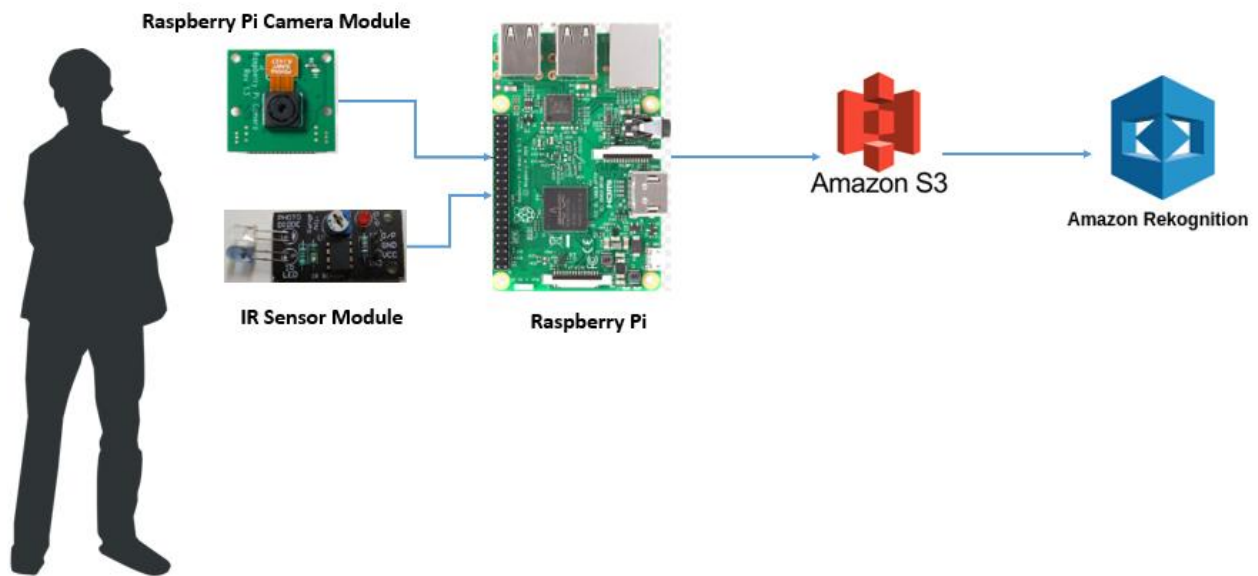
— □ ×

```
Microsoft Windows [Version 10.0.16299.309]  
(c) 2017 Microsoft Corporation. All rights reserved.
```

```
C:\Users\Maneesh Rao>aws --version  
aws-cli/1.15.2 Python/2.7.9 Windows/8 botocore/1.10.2
```

```
C:\Users\Maneesh Rao>
```

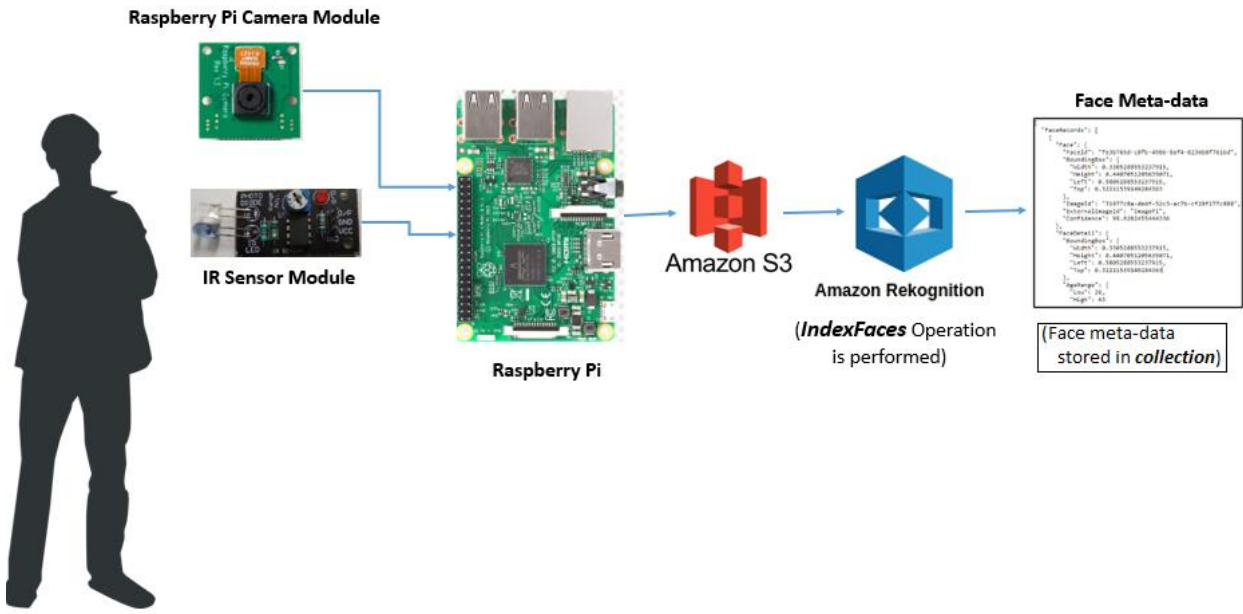
```
Administrator: Command Prompt
C:\WINDOWS\system32>aws configure
AWS Access Key ID [None]: A
AWS Secret Access Key [None]: PDdyPi0ACg1-Cc1M4-F3PP1mp2SRP-zTbu5r-J6y4
Default region name [None]: ap-southeast-2
Default output format [None]: json
C:\WINDOWS\system32>
```



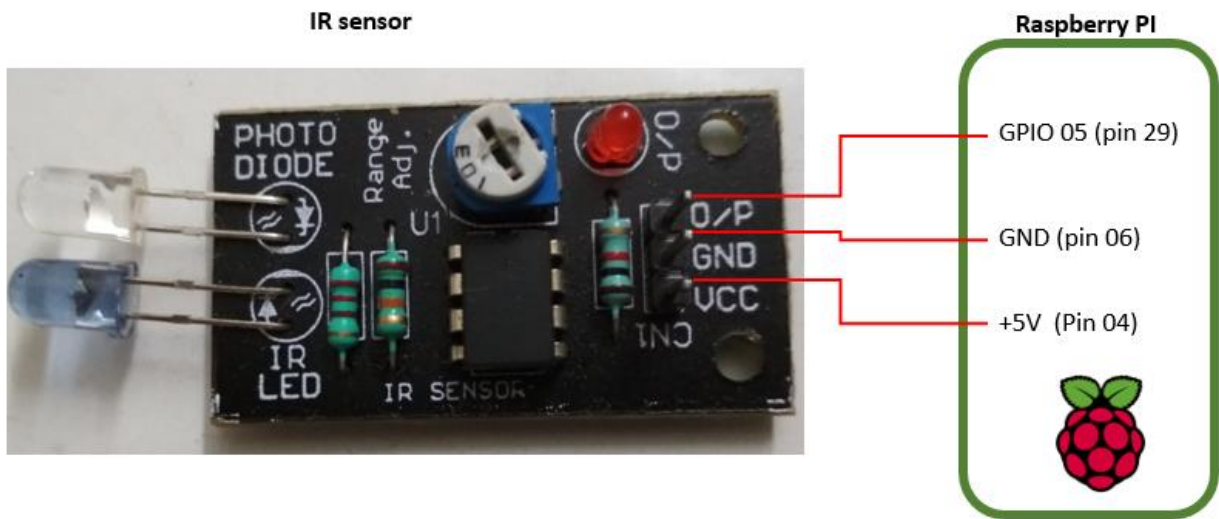
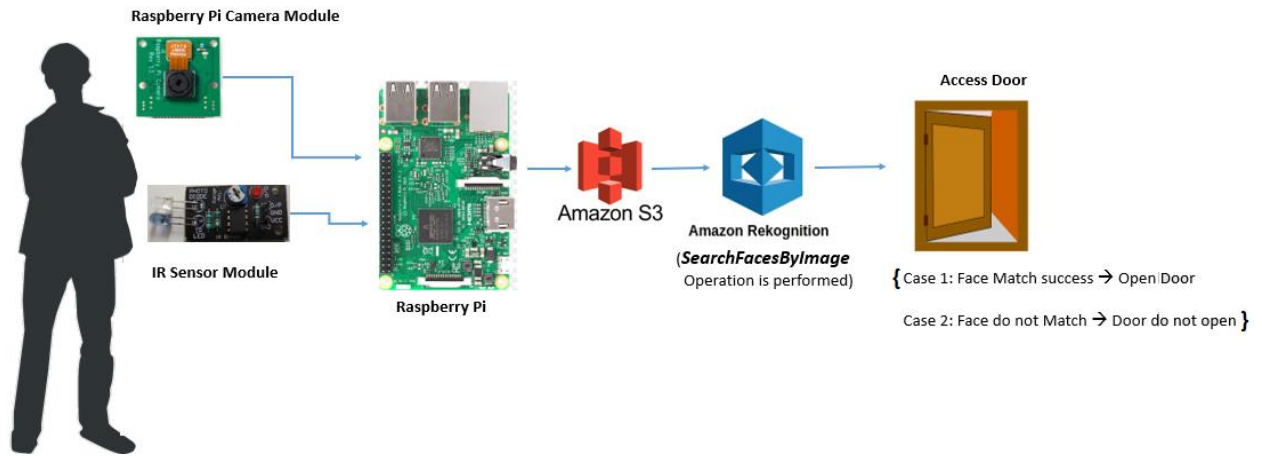
```

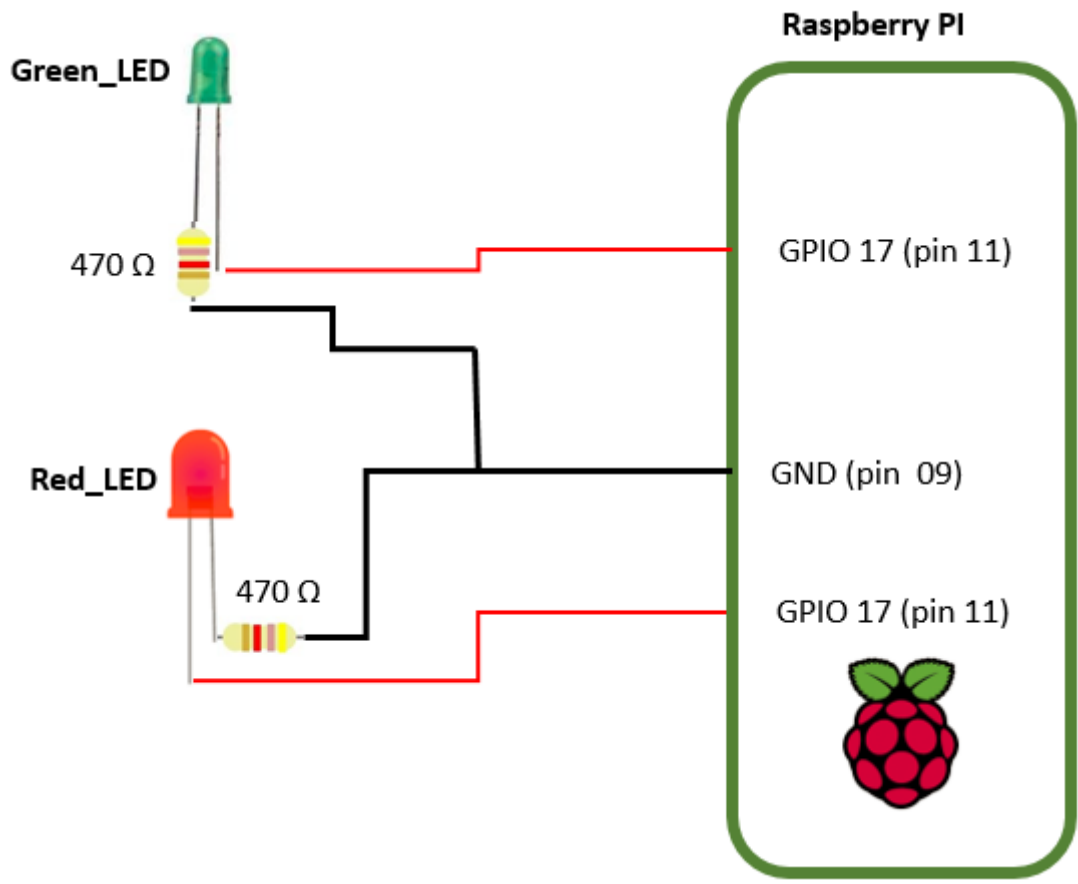
Administrator: Command Prompt
C:\WINDOWS\system32>aws rekognition create-collection --collection-id "piCollection"
{
  "CollectionArn": "aws:rekognition:ap-southeast-2:115514931493:collection/piCollection",
  "FaceModelVersion": "3.0",
  "StatusCode": 200
}
C:\WINDOWS\system32>

```









```
pi@raspberrypi: ~/Node_Programs
File Edit Tabs Help
pi@raspberrypi:~/Node_Programs $ sudo npm install fs --save
iot-hub-node-raspberrypi-client-app@1.0.0 /home/pi/Node_Programs
└─ fs@0.0.1-security

pi@raspberrypi:~/Node_Programs $
```

```
pi@raspberrypi: ~/Node_Programs
File Edit Tabs Help
pi@raspberrypi:~/Node_Programs $ sudo node FaceComparision.js
IR : Imaging you.!!!
Your picture was captured
{ '0': null,
  '1': { ETag: '"15b98f8cf021d395e4d0c330554bca6e"' } }
{ ETag: '"15b98f8cf021d395e4d0c330554bca6e"' }
Successfully uploaded Image.
{"SearchedFaceBoundingBox":{"Width":0, "Height":0, "Left":0, "Top":0}, "SearchedFaceConfidence":99.99842834472656, "FaceMatches":[{"Similarity":99.53974914550781, "Face":{"FaceId":"a1dbf250-ec2d-49ea-8c88-b66defb47cdc", "BoundingBox":{"Width":0, "Height":0, "Left":0, "Top":0}, "ImageId":"39028ac1-8bad-51ca-a227-a181003813e0", "ExternalImageId":"ImagePi", "Confidence":99.99889373779297}}, {"FaceModelVersion":"3.0"}]}
Face Match Success.!!!
```

aws Services Resource Groups

### Add user

1 2 3 4

#### Set permissions for raspberrypi

Add user to group  Copy permissions from existing user  Attach existing policies directly

Attach one or more existing policies directly to the users or create a new policy. [Learn more](#)

Filter: Policy type  Showing 3 results

	Policy name	Type	Attachments	Description
<input checked="" type="checkbox"/>	AmazonRekognitionFullAccess	AWS managed	0	Access to all Amazon Rekognition APIs
<input type="checkbox"/>	AmazonRekognitionReadOnlyAccess	AWS managed	0	Access to all Read rekognition APIs
<input type="checkbox"/>	AmazonRekognitionServiceRole	AWS managed	0	Allows Rekognition to call AWS services on your behalf.

pi@raspberrypi: ~/Node\_Programs

File Edit Tabs Help

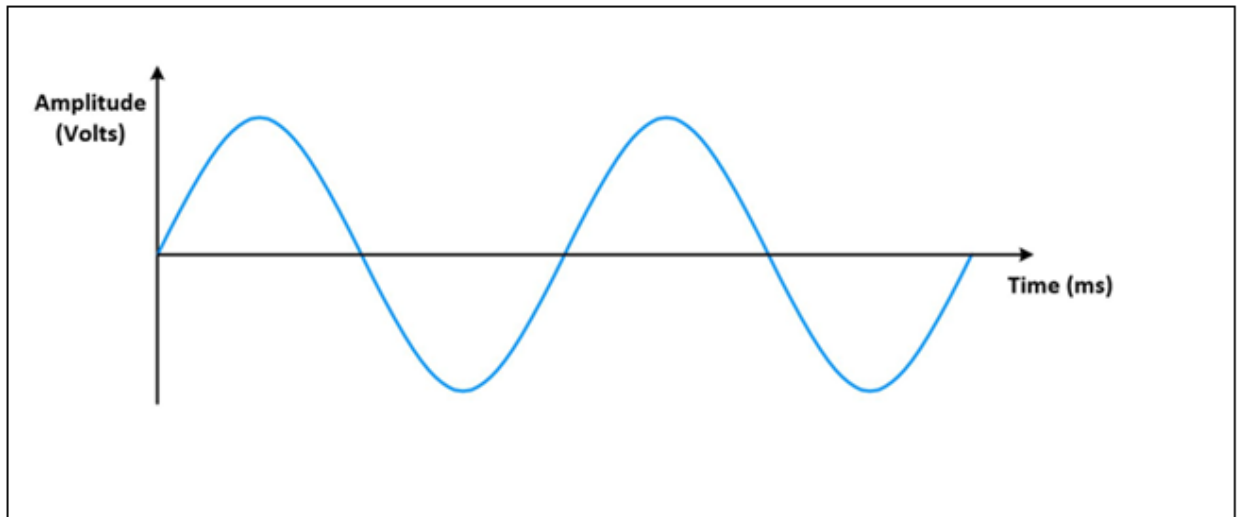
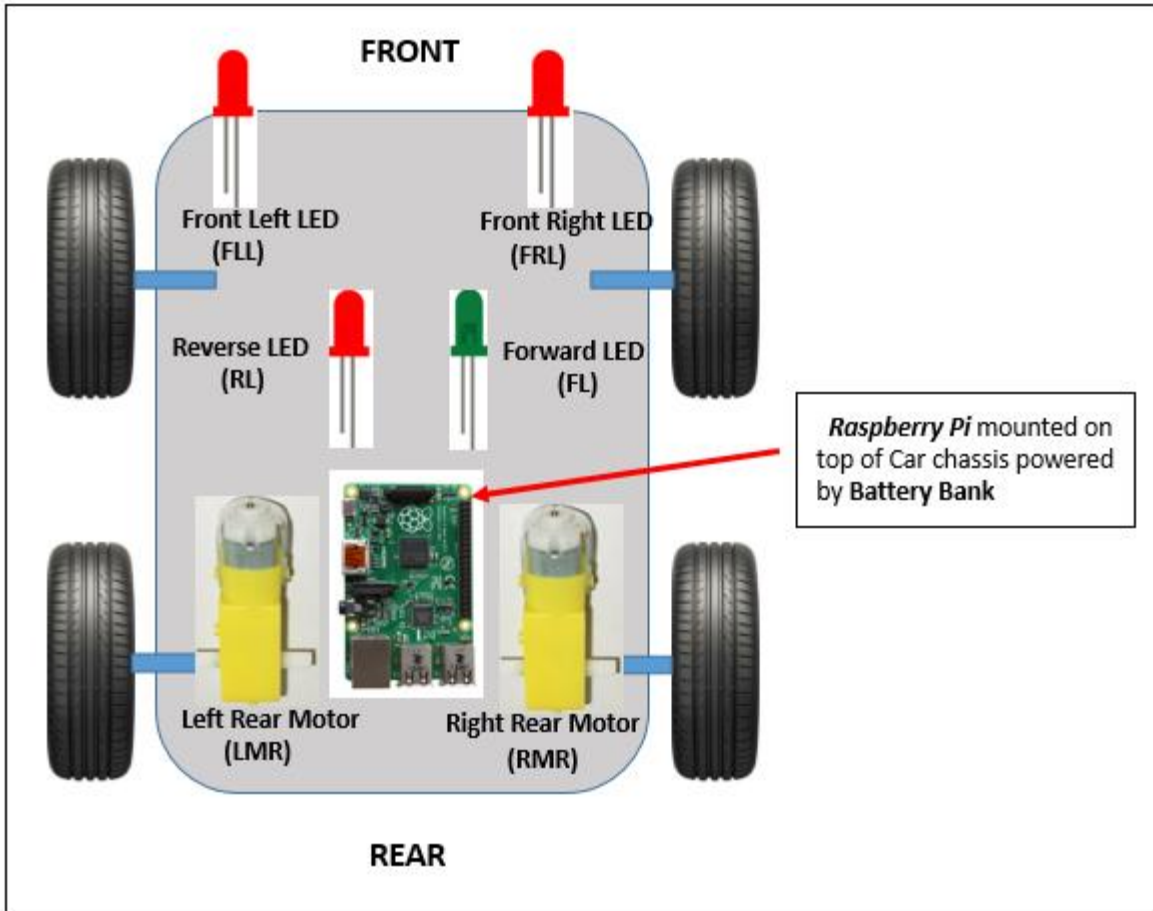
```
pi@raspberrypi:~/Node_Programs $ sudo npm install aws-sdk --save  
iot-hub-node-raspberrypi-client-app@1.0.0 /home/pi/Node_Programs
```

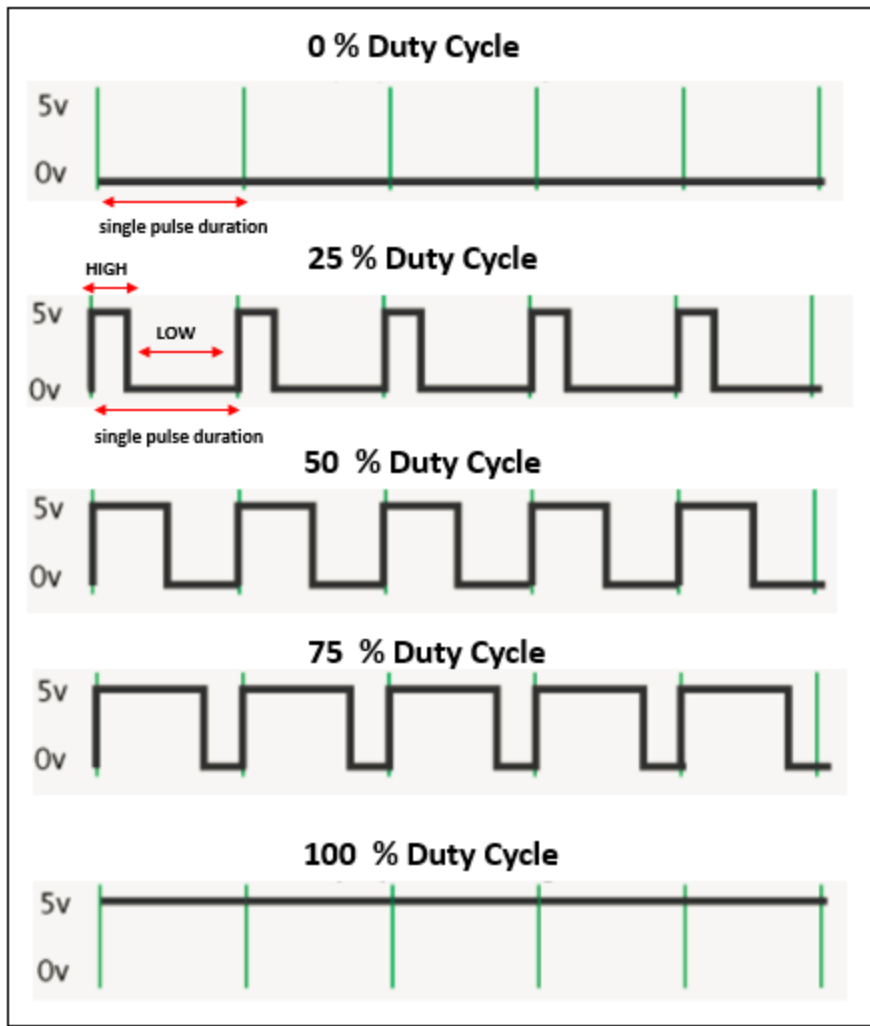
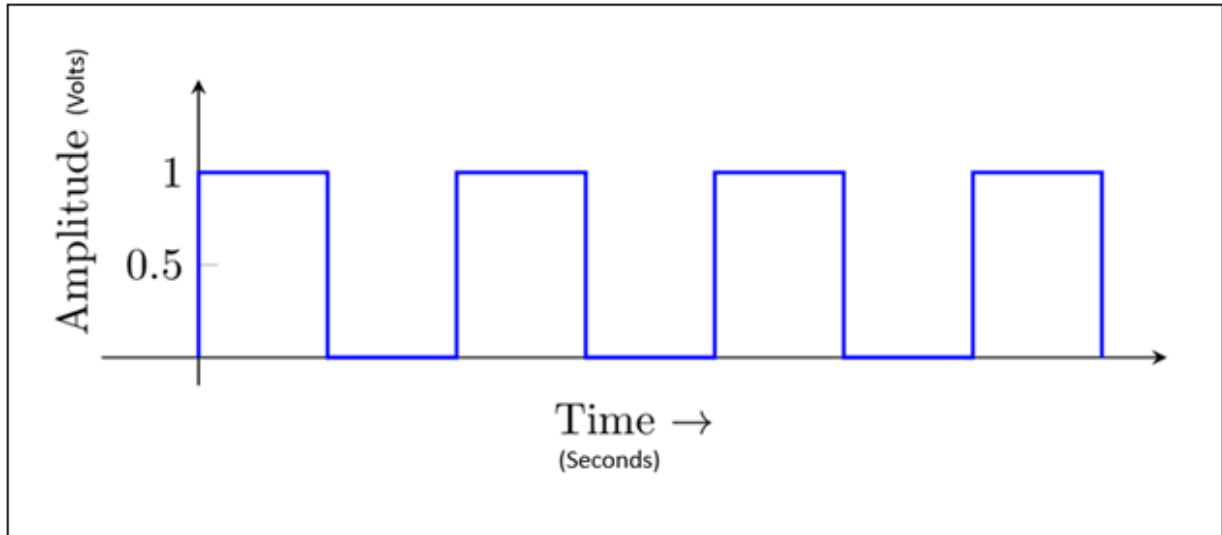
```
├─ aws-sdk@2.224.1  
├─ buffer@4.9.1  
│ └─ base64-js@1.2.3  
├─ events@1.1.1  
├─ ieee754@1.1.8  
├─ jmespath@0.15.0  
├─ querystring@0.2.0  
├─ sax@1.2.1  
├─ url@0.10.3  
│ └─ punycode@1.3.2  
├─ xml2js@0.4.17  
└─ xmlbuilder@4.2.1
```

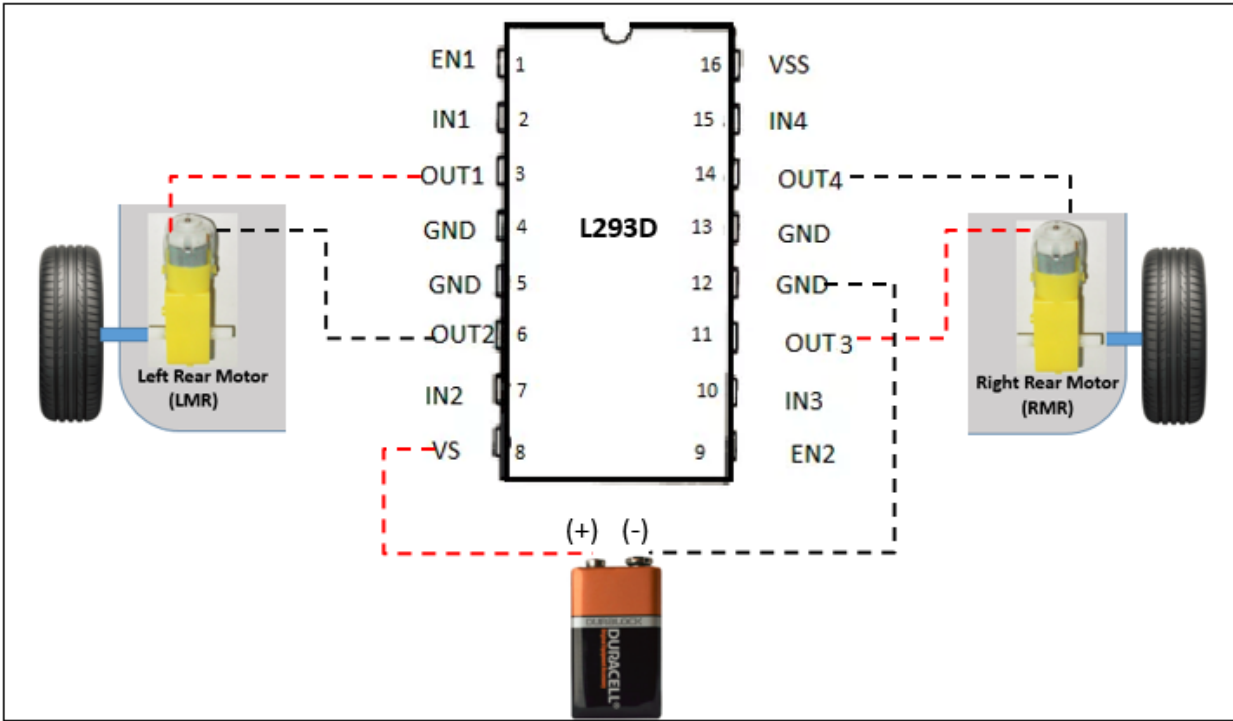
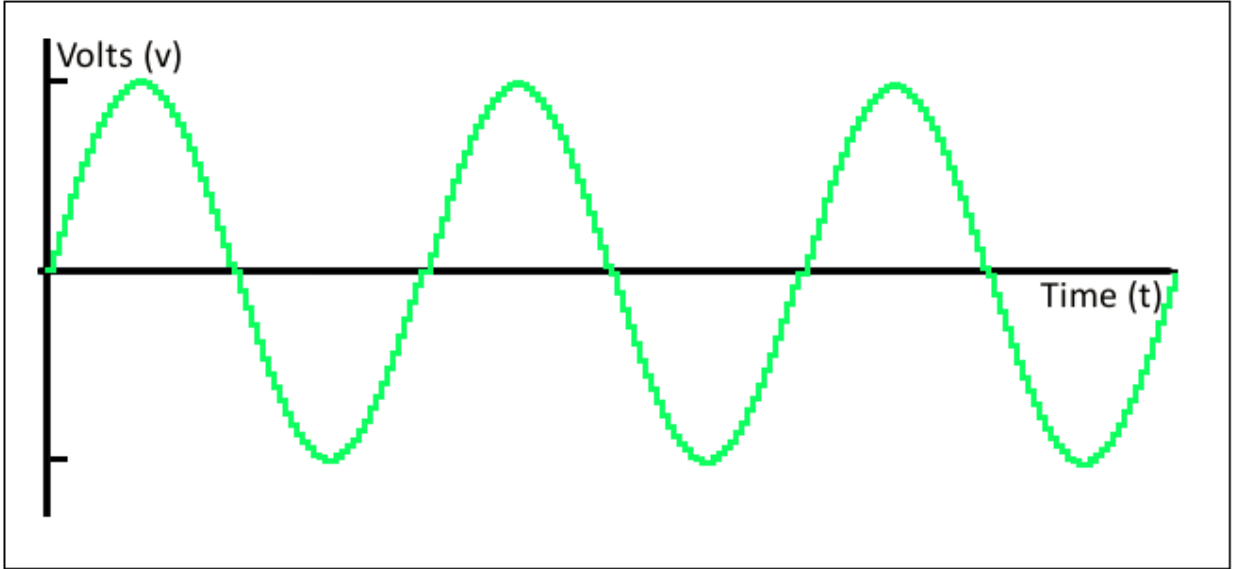
```
pi@raspberrypi:~/Node_Programs $ █
```

**Chapter 8: Bot Building**

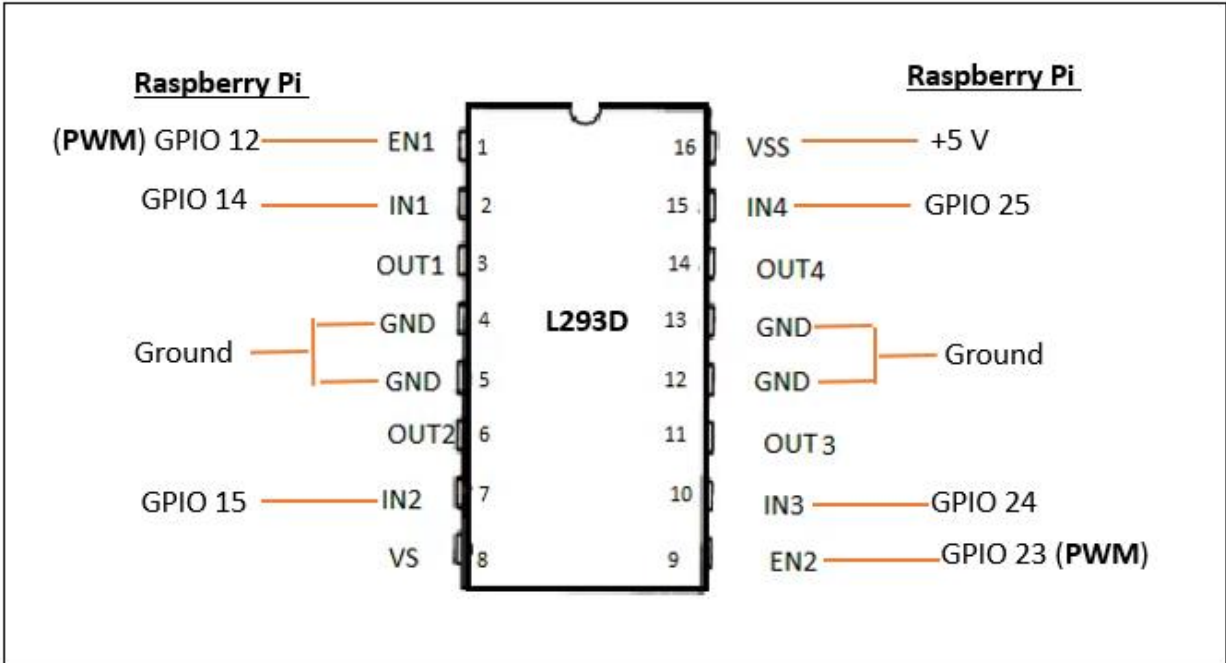


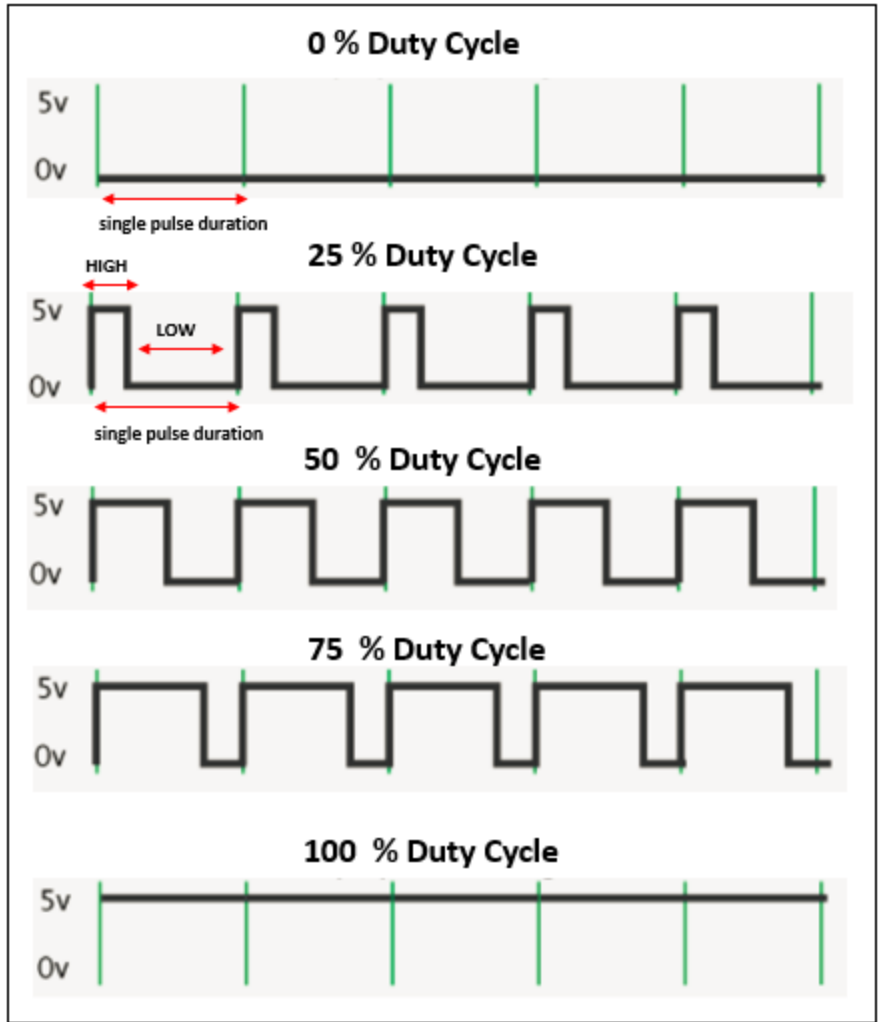




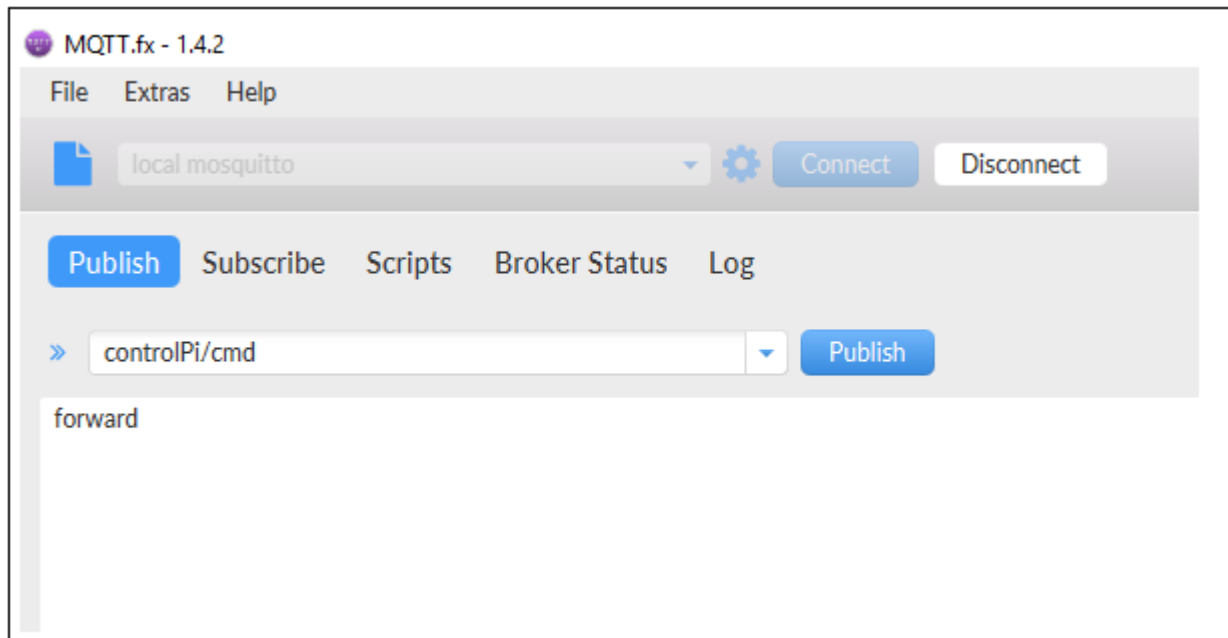
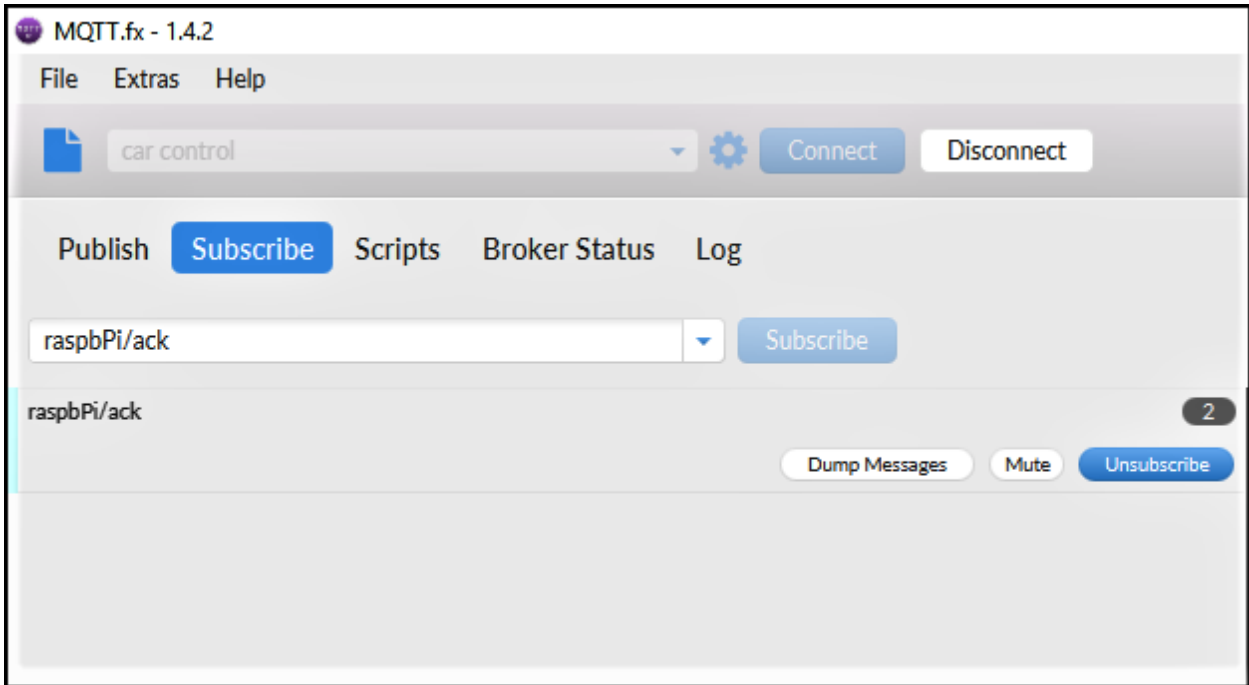


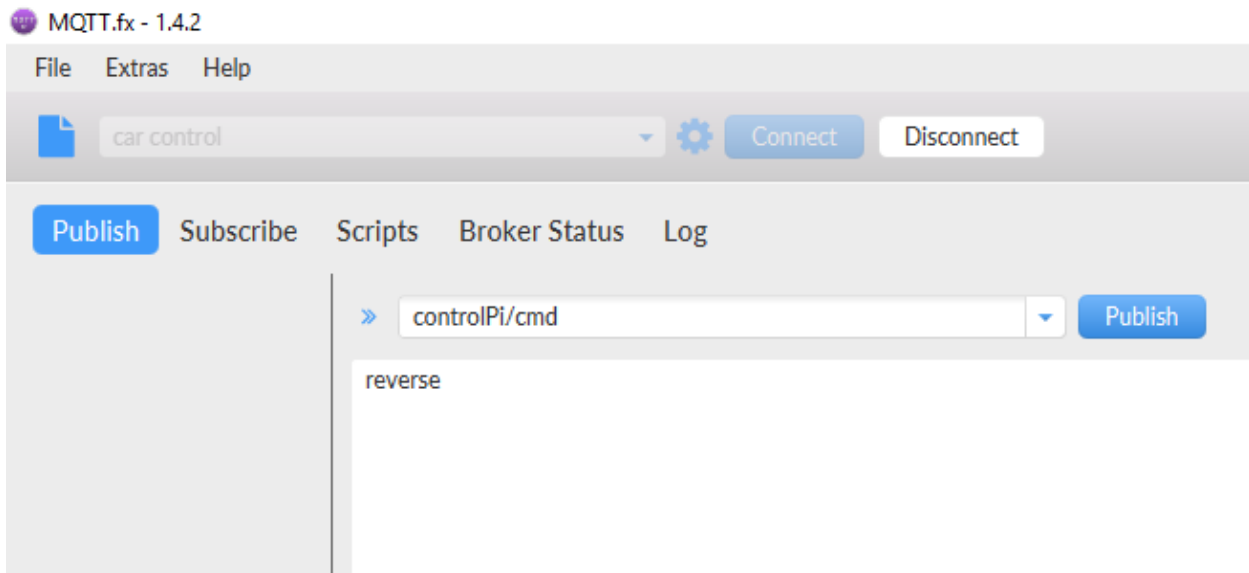
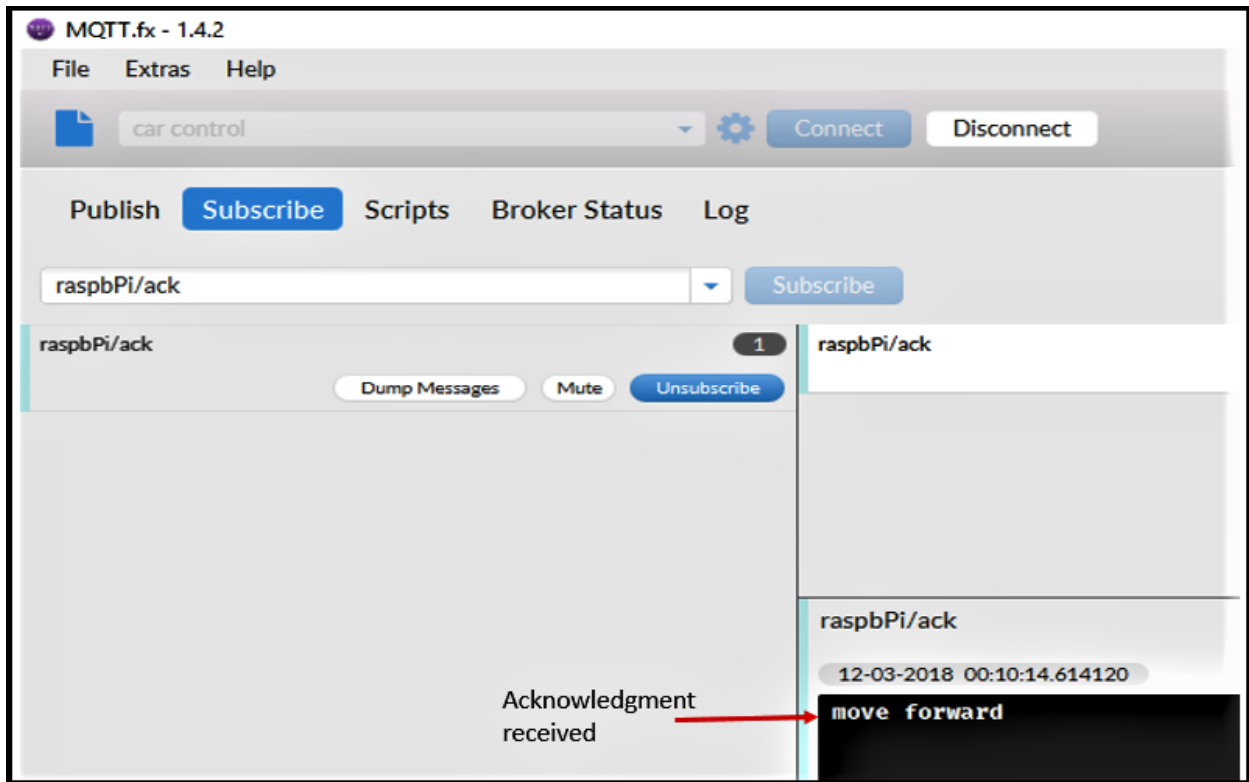






```
pi@raspberrypi: ~/Node_Programs
File Edit Tabs Help
pi@raspberrypi:~/Node_Programs $ sudo node car_control.js
Raspberry Pi mqtt client connected to broker
```





MQTT.fx - 1.4.2

File Extras Help

car control [gear icon] Connect Disconnect

Publish **Subscribe** Scripts Broker Status Log

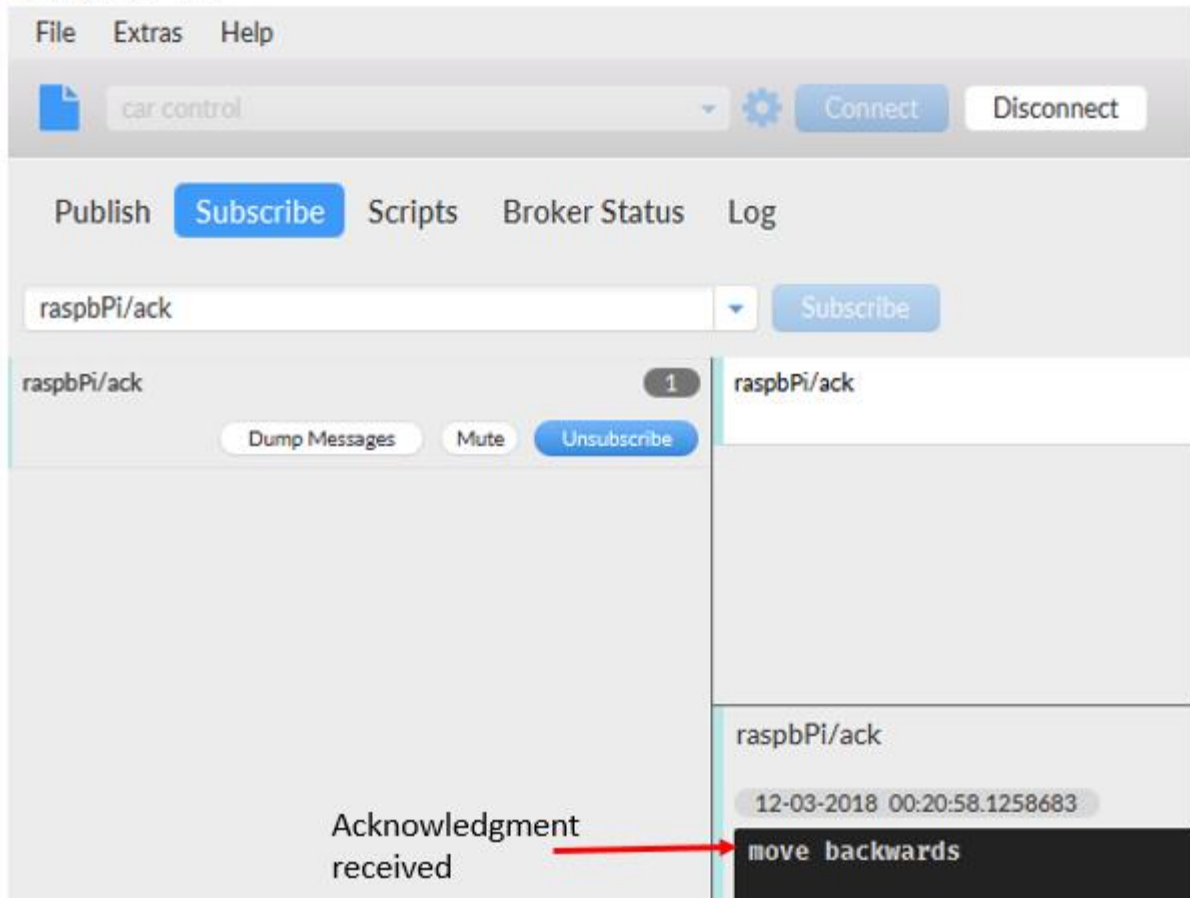
raspbPi/ack [dropdown arrow] Subscribe

raspbPi/ack 1

Dump Messages Mute Unsubscribe

Acknowledgment received → raspbPi/ack

12-03-2018 00:20:58.1258683  
**move backwards**



MQTT.fx - 1.4.2

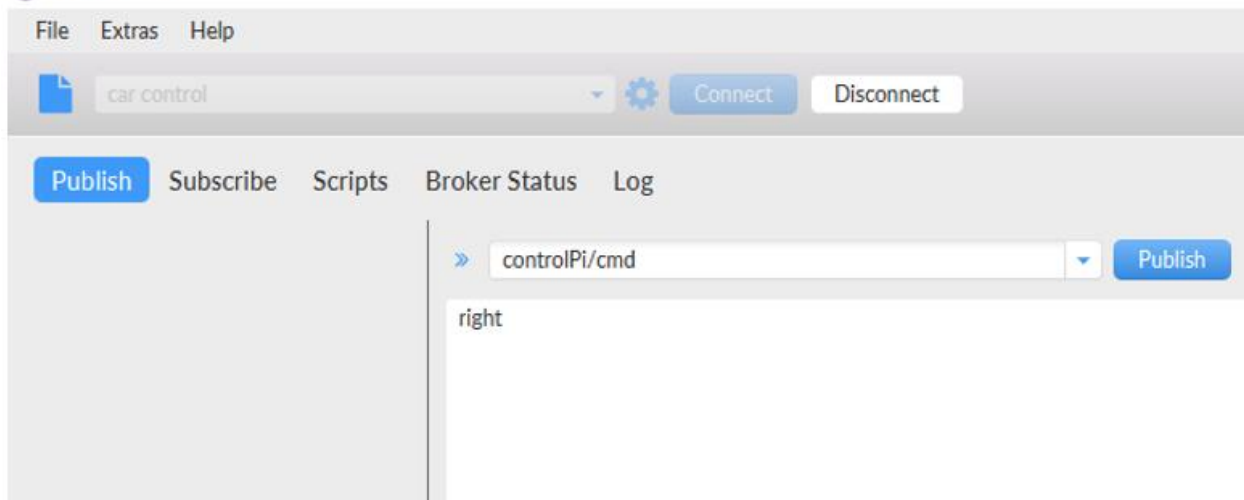
File Extras Help

car control [gear icon] Connect Disconnect

**Publish** Subscribe Scripts Broker Status Log

>> controlPi/cmd [dropdown arrow] Publish

right



MQTT.fx - 1.4.2

File Extras Help

car control [gear] Connect Disconnect

Publish **Subscribe** Scripts Broker Status Log

raspbPi/ack [dropdown] Subscribe

raspbPi/ack 1

Dump Messages Mute **Unsubscribe**

Acknowledgment received →

raspbPi/ack

12-03-2018 00:38:35.2315462

**Right Turn**

MQTT.fx - 1.4.2

File Extras Help

car control [gear] Connect Disconnect

**Publish** Subscribe Scripts Broker Status Log

> controlPi/cmd [dropdown] Publish

left

File Extras Help

car control [gear icon] Connect Disconnect

Publish **Subscribe** Scripts Broker Status Log

raspbPi/ack [dropdown arrow] Subscribe

raspbPi/ack 1

Dump Messages Mute Unsubscribe

raspbPi/ack

12-03-2018 00:45:22.2722347

**Left Turn**

Acknowledgment received →

File Extras Help

car control [gear icon] Connect Disconnect

**Publish** Subscribe Scripts Broker Status Log

>> controlPi/cmd [dropdown arrow] Publish

64



car control



Connect

Disconnect

Publish

Subscribe

Scripts

Broker Status

Log

raspbPi/ack

Subscribe

raspbPi/ack

1

Dump Messages

Mute

Unsubscribe

raspbPi/ack

raspbPi/ack

12-03-2018 01:21:13.4873556

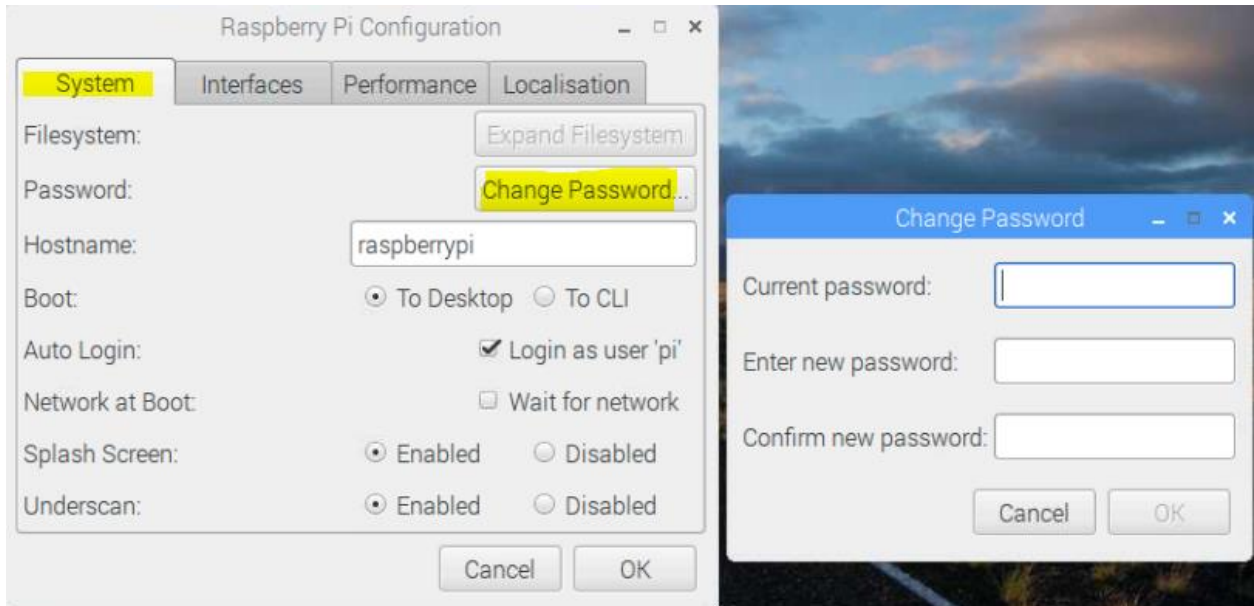
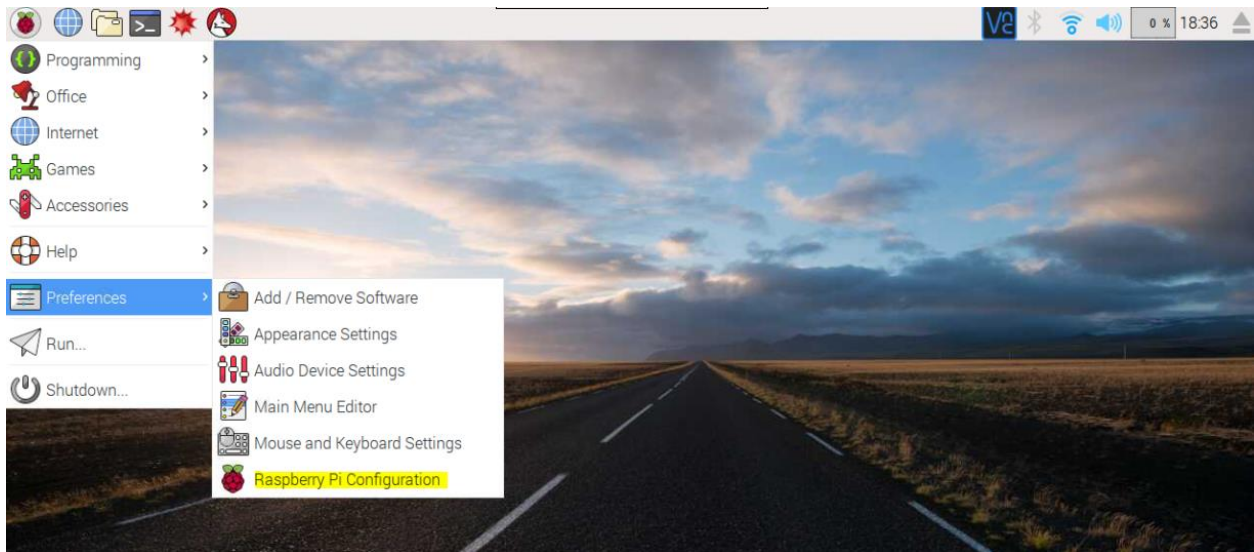
speed change

Acknowledgment received





# Chapter 9: Security in IoT



```
pi@raspberrypi: ~  
login as: pi  
pi@192.168.1.100's password:  
  
The programs included with the Debian GNU/Linux system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/copyright.  
  
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent  
permitted by applicable law.  
Last login: Tue Mar 27 15:06:53 2018  
pi@raspberrypi:~ $ sudo raspi-config
```

```
pi@raspberrypi: ~  
  
Raspberry Pi Software Configuration Tool (raspi-config)  
  
1 Expand Filesystem          Ensures that all of the SD card s  
2 Change User Password       Change password for the default u  
3 Boot Options               Configure options for start-up  
4 Internationalisation Options Set up language and regional sett  
5 Enable Camera              Enable this Pi to work with the R  
6 Overclock                  Configure overclocking for your P  
7 Advanced Options           Configure advanced settings  
8 About raspi-config         Information about this configurat  
  
<Select>                    <Finish>
```

```
pi@raspberrypi: ~  
login as: pi  
pi@192.168.1.100's password:  
  
The programs included with the Debian GNU/Linux system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/copyright.  
  
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent  
permitted by applicable law.  
Last login: Tue Mar 27 15:06:53 2018  
  
pi@raspberrypi:~ $ sudo raspi-config  
Enter new UNIX password: █
```

```
pi@raspberrypi: ~  
File Edit Tabs Help  
pi@raspberrypi:~ $ sudo adduser adminuser  
Adding user `adminuser' ...  
Adding new group `adminuser' (1001) ...  
Adding new user `adminuser' (1001) with group `adminuser' ...  
Creating home directory `/home/adminuser' ...  
Copying files from `/etc/skel' ...  
Enter new UNIX password:  
Retype new UNIX password:  
passwd: password updated successfully  
Changing the user information for adminuser  
Enter the new value, or press ENTER for the default  
  Full Name []: Maneesh Rao  
  Room Number []:  
  Work Phone []:  
  Home Phone []:  
  Other []:  
Is the information correct? [Y/n] y  
pi@raspberrypi:~ $ █
```

```
pi@raspberrypi: ~  
File Edit Tabs Help  
pi@raspberrypi:~ $ sudo adduser adminuser sudo  
Adding user `adminuser' to group `sudo' ...  
Adding user adminuser to group sudo  
Done.  
pi@raspberrypi:~ $ █
```

```
pi@raspberrypi: /  
File Edit Tabs Help  
pi@raspberrypi:/ $ sudo nano /etc/sudoers.d/010_pi-nopasswd █
```

Key

No key.

Actions

Generate a public/private key pair

Generate

Load an existing private key file

Load

Save the generated key

Save public key

Save private key

Parameters

Type of key to generate:

RSA

DSA

ECDSA

ED25519

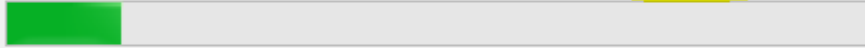
SSH-1 (RSA)

Number of bits in a generated key:

2048

Key

Please generate some randomness by moving the mouse over the blank area.



Actions

Generate a public/private key pair

Generate

Load an existing private key file

Load

Save the generated key

Save public key

Save private key

Parameters

Type of key to generate:

RSA

DSA

ECDSA

ED25519

SSH-1 (RSA)

Number of bits in a generated key:

2048

Key

Public key for pasting into OpenSSH authorized\_keys file:

```
ssh-rsa AAAAB3NzaC1yc2EAAAABJQAAAQEASPTOfVYDfoc13d+Cf
+FjzeOeDRTLdW08oznszVV
urLsCEKt82jVXRtExpjWHHHZT0vaZUwSjQJ1cm9mj+hQC0Qkz5pAMVGcl+gJy
+mORGURF7aIDao0jieLdOrSQotQ2NYAHa/Ydl1ugb8wk9o8TzkHuCkjVsCysqDYwQ
```

Key fingerprint: ssh-rsa 2048 c2:1c:37:46:85:e1:0a:6e:7e:b9:a6:17:44:b4:74:da

Key comment: rsa-key-20180404

Key passphrase:

Confirm passphrase:

Actions

Generate a public/private key pair Generate

Load an existing private key file Load

Save the generated key Save public key Save private key

Parameters

Type of key to generate:  
 RSA  DSA  ECDSA  ED25519  SSH-1 (RSA)

Number of bits in a generated key:

```
pi@raspberrypi: ~  
pi@raspberrypi:~ $ pwd  
/home/pi  
pi@raspberrypi:~ $ mkdir .ssh
```

```
pi@raspberrypi: ~/.ssh  
pi@raspberrypi:~ $ cd .ssh/  
pi@raspberrypi:~/.ssh $ sudo nano authorized_keys
```



```
pi@raspberrypi: ~/.ssh
pi@raspberrypi: ~/.ssh $ ls -l
total 4
-rw-r--r-- 1 pi pi 468 Apr  4 01:43 authorized_keys
pi@raspberrypi: ~/.ssh $ chmod 700 ~/.ssh/
pi@raspberrypi: ~/.ssh $ chmod 600 ~/.ssh/authorized_keys
pi@raspberrypi: ~/.ssh $ ls -l
total 4
-rw----- 1 pi pi 468 Apr  4 01:43 authorized_keys
pi@raspberrypi: ~/.ssh $
```

PuTTY Configuration

Category:

- Keyboard
- Bell
- Features
- Window
  - Appearance
  - Behaviour
  - Translation
  - Selection
  - Colours
- Connection
  - Data
  - Proxy
  - Telnet
  - Rlogin
  - SSH
    - Kex
    - Host keys
    - Cipher
    - Auth
      - GSSAPI
    - TTY

Options controlling SSH connections

Data to send to the server

Remote command:

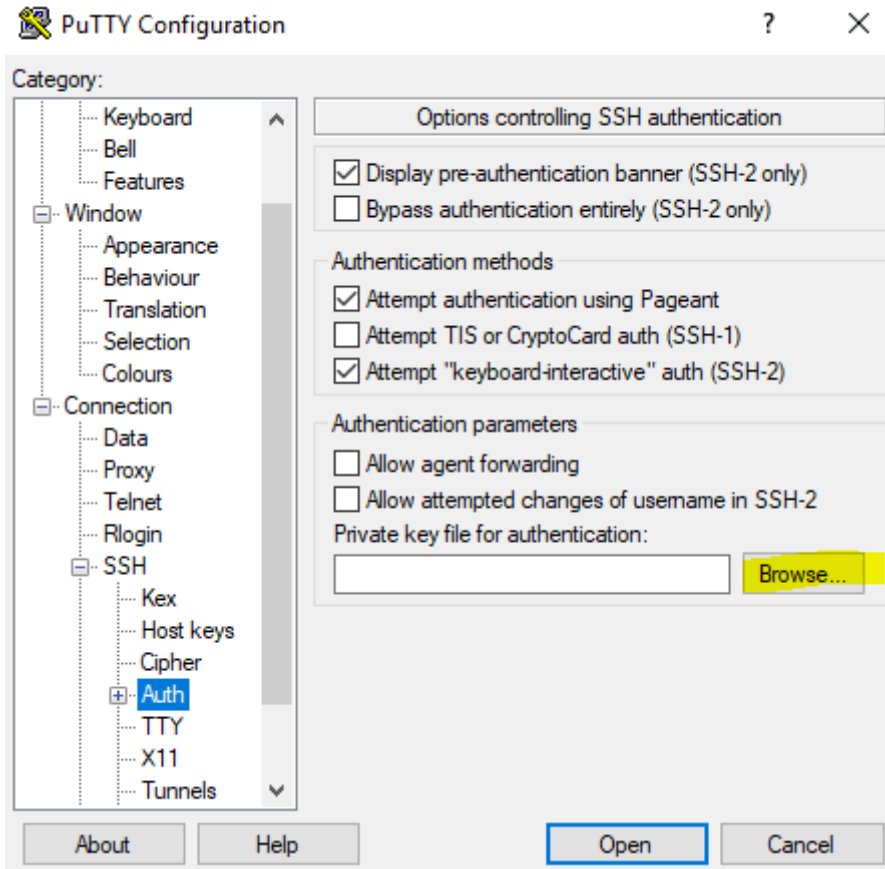
Protocol options

- Don't start a shell or command at all
- Enable compression
- SSH protocol version:  
 2  1 (INSECURE)

Sharing an SSH connection between PuTTY tools

- Share SSH connections if possible
- Permitted roles in a shared connection:
  - Upstream (connecting to the real server)
  - Downstream (connecting to the upstream PuTTY)

About Help Open Cancel



```
pi@raspberrypi: ~  
pi@raspberrypi:~ $ sudo apt install ufw  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following packages were automatically installed and are no longer required:  
  libc-ares2 libv8-3.14.5  
Use 'apt-get autoremove' to remove them.  
The following NEW packages will be installed:  
  ufw  
0 upgraded, 1 newly installed, 0 to remove and 261 not upgraded.  
Need to get 138 kB of archives.  
After this operation, 733 kB of additional disk space will be used.  
Get:1 http://mirrordirector.raspbian.org/raspbian/ jessie/main ufw all 0.33-2 [138 kB]  
Fetched 138 kB in 2s (49.2 kB/s)  
Preconfiguring packages ...  
Selecting previously unselected package ufw.  
(Reading database ... 135679 files and directories currently installed.)  
Preparing to unpack .../archives/ufw_0.33-2_all.deb ...  
Unpacking ufw (0.33-2) ...  
Processing triggers for systemd (215-17+deb8u5) ...  
Processing triggers for man-db (2.7.0.2-5) ...  
Progress: [ 50%] [#####.....]
```

```
pi@raspberrypi: ~  
pi@raspberrypi:~ $ sudo ufw enable  
Command may disrupt existing ssh connections. Proceed with operation (y|n)? y  
Firewall is active and enabled on system startup  
pi@raspberrypi:~ $ █
```

```
pi@raspberrypi: ~  
pi@raspberrypi:~ $ sudo ufw disable  
Firewall stopped and disabled on system startup  
pi@raspberrypi:~ $ █
```

```
pi@raspberrypi: ~  
pi@raspberrypi:~ $ sudo ufw allow 22  
Rule added  
Rule added (v6)  
pi@raspberrypi:~ $ █
```

```
pi@raspberrypi: ~  
pi@raspberrypi:~ $ sudo ufw deny 21  
Rule added  
Rule added (v6)  
pi@raspberrypi:~ $ █
```

```
pi@raspberrypi: ~  
pi@raspberrypi:~ $ sudo ufw allow 21/tcp  
Rule added  
Rule added (v6)  
pi@raspberrypi:~ $
```

```
pi@raspberrypi: ~  
pi@raspberrypi:~ $ sudo ufw allow 21/tcp  
Rule added  
Rule added (v6)  
pi@raspberrypi:~ $ sudo ufw status  
Status: active  
  
To           Action      From  
--           -  
22          ALLOW      Anywhere  
21          ALLOW      Anywhere  
21/tcp     ALLOW      Anywhere  
22          ALLOW      Anywhere (v6)  
21          ALLOW      Anywhere (v6)  
21/tcp     ALLOW      Anywhere (v6)  
  
pi@raspberrypi:~ $
```

```
pi@raspberrypi: ~  
pi@raspberrypi:~ $ sudo ufw deny from 192.168.2.1 port 30  
Rule added  
pi@raspberrypi:~ $ █
```

```
[ssh]  
enabled = true  
port = ssh  
filter = sshd  
logpath = /var/log/auth.log  
maxretry = 6
```

```
# Default banning action (e.g. iptables, iptables-new,  
# iptables-multiport, shorewall, etc) It is used to def  
# action_* variables. Can be overridden globally or per  
# section within jail.local file  
banaction = iptables-multiport
```