Raspbian lite installation steps:

1. Download Raspbian Jessie lite from their official website. An image burnable file is obtained.
2. Download image burning tool Win32 Disk Imager and burn the file to an 8GB SD card. Now the OS is installed into the raspberry pi.
3. Now we have to allow SSH to obtain communication between PC and pi and hence opening OS on the computer. For this we will connect pi and PC to the same wifi and therefore obtain a LAN connection.
4. To allow create a file named ssh in the boot partition: touch /path/to/boot/partition/***ssh.***
5. Open up the file **wpa\_supplicant.conf** and type in your network settings *nano /path/to/root/partition/****etc/wpa\_supplicant/wpa\_supplicant.conf***
6. Type as mentioned below:
7. network={ ssid="YOUR WIFI SSID HERE" psk="YOUR WIFI PASSPHRASE HERE" }. Ssid is the wifi source name to which the raspbian lite will be connected. Passphrase is the wifi password.
8. Unmount the root and boot partition to safely remove your SD-Card from SD port using the following command. *umount -fl /path/to/****root****/partition /path/to/****boot****/partition*
9. Remove the SD-Card from SD port and plug it into the pi.
10. Now switch on the pi. After few seconds it will connect to the specifies wifi in the configuration file.
11. Connect the linux PC to the same wifi.
12. Now type the following command: *ping -c3 raspberrypi*
13. Now the details of the pi is obtained which also includes the ip address.
14. Note down the ip address.
15. Use an SSH tool such PuttyWeb and connect to the pi.
16. Type the noted ip address in the PuttyWeb window.
17. Now a black command window opens which belongs to the pi.
18. Now all the operations of the pi can be done here in this command window as if the window is of pi itself.
19. Hence pi is now connected to the PC. Perform all operations on pi using this window.

Installing Python on Pi:

1. Installing python is very simple. Just type **sudo apt-get install python3.**
2. Now python is installed. To check the version type **python3 –version.**

Using Python in pi:

1. To create a file use touch command of linux.
2. Open the file using nano command.
3. Edit the file as you want and save.
4. To run the file type **python filename.**
5. Check for errors and warnings if any.
6. If there are errors open the file again and edit.
7. If there are no errors observe the output.

Code 1

In any embedded systems the first part is informing the processor what are the inputs connected and what is the type (input /output). In this we first import two libraries time and RPI.GPIO. The time library is used to import time functions such as time.sleep() which is used to provide the necessary delay. RPI.GPIO library is used to provide the necessary I/O to the pi. Pin no 23 and 24 are defined as output and input respectively. 23 is used as trigger pin and 24 as echo.

To start the initialization of the sensor, that is a trigger pulse of 1 ms pulse width has to be sent to the trigger pin so that the ultrasonic sensor sends its pulses. This is made by making pin 23 low and high and waiting for duration of 0.5s and again making it low. This triggers the signals.

The total time elapsed from the start of the trigger to the stop is used to calculate the distance between the transmitter and the receiver.

When echo pin becomes 1, a counter is started and this time is made note by a variable. Until echo falls to zero, the timer is noted. When it falls to zero the step time is noted. The difference between the start time an stop time gives the overall time by using the above formula the total distance can be calculated

Code 2

Two motors A and B are connected to the motor driver and from the motor driver to the raspberry pi. The pins are as follows: 24, 23, 25, 26 respectively.

For a motor to move, one of the pins should be at higher potential with respect to the other. To make the motor go in a clockwise direction 24 and 25 are made high by the command GPIO.OUTPUT(motor1, HIGH). Similarly 23 and 26 are made low by the command GPIO.OUTPUT(motor1, LOW). If both the motors move in the same direction then it moves forward or backward. If both or in opposite direction, we get axial turn towards right or left and thus locomotion is achieved.

Code 3

Form the code of ultrasonic sensor we get the distance in centimeters. Our objective is to detect the obstacles and stop the car. When the distance between them is less than 5 cm the car stops else it moves according to the navigation.