INDEX

NAME :- SAMIKSHA SANJAY HALVE.

CLASS :- T.Y.B.Sc.I.T.

ROLL NO.:- 14

SUBJECT :- INTERNET OF THINGS

COLLEGE :- St. ROCKS DEGREE COLLEGE

SR.NO.	TITLE	SIGN
1.	Understanding Raspberry pi and its pins	
2.	Installing OS Manager noobs on SD card and burning it .	
3.A	Installing Raspbian OS on Raspberry Pi.	
3.B	Installing Raspbian OS with the help of virtual machine software.	
4.	Blinking LED using Raspberry Pi.	
5.	Capturing Images by connecting camera using Raspberry Pi.	
6.	Capturing Video by connecting camera using Raspberry Pi.	
7.	Interfacing seven segment display with Raspberry Pi.	

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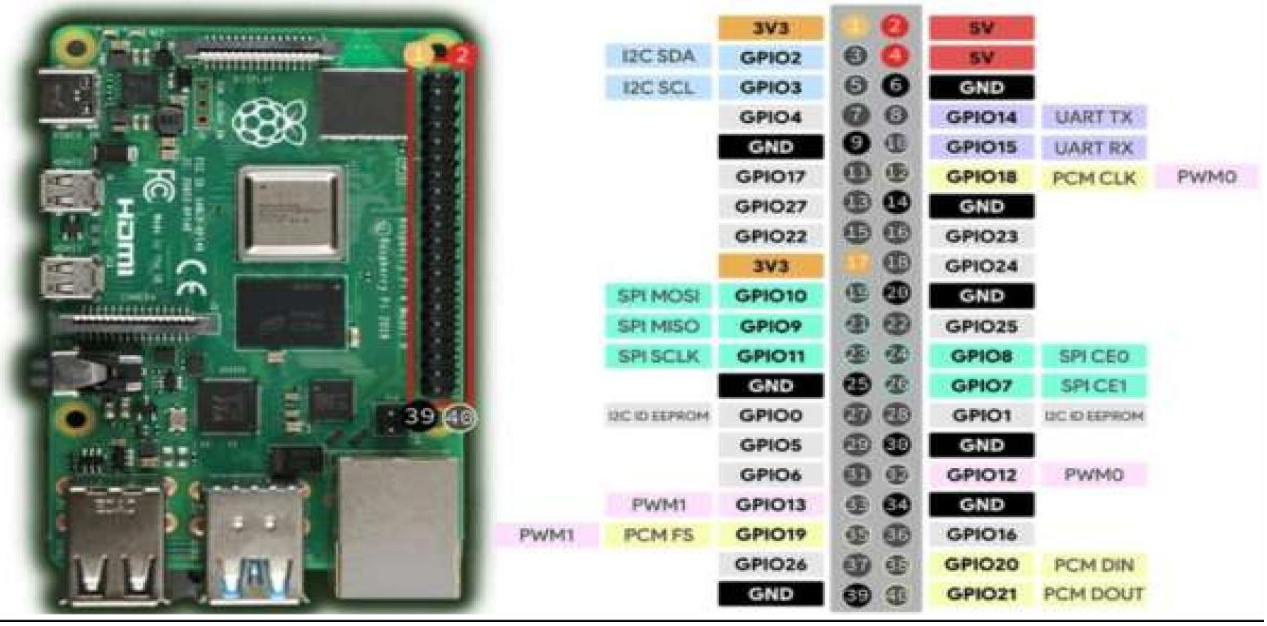
PRACTICAL NO - 1

Aim: Understanding Raspberry pi and its pins



Raspberry Pi is a small, affordable computer developed by the Raspberry Pi Foundation. It is used for learning programming, electronics, and creating DIY projects.

The Raspberry Pi has a 40-pin GPIO (General Purpose Input/Output) header, which includes:

1. Power Pins
    - 3.3V (Pins 1, 17): Provides 3.3 volts of power.
    - 5V (Pins 2, 4): Provides 5 volts of power.
    - Ground (GND - Pins 6, 9, 14, 20, 25, 30, 34, 39): Common ground for all devices.
2. GPIO Pins (Digital Input/Output)
    - Used for controlling LEDs, buttons, sensors, motors, etc.
    - Example: GPIO17 (Pin 11), GPIO27 (Pin 13), etc.
    - These can be programmed using Python or other languages.
3. I2C (Inter-Integrated Circuit)
    - Used for communication with sensors and modules.
    - SDA (Data) - Pin 3, SCL (Clock) - Pin 5
4. SPI (Serial Peripheral Interface)
    - Used for fast communication with devices like displays or ADCs.
    - MOSI (Pin 19), MISO (Pin 21), SCLK (Pin 23), CE0 (Pin 24), CE1 (Pin 26)
5. UART (Universal Asynchronous Receiver/Transmitter)
    - For serial communication with other devices like GPS modules.
    - TXD (Pin 8), RXD (Pin 10)

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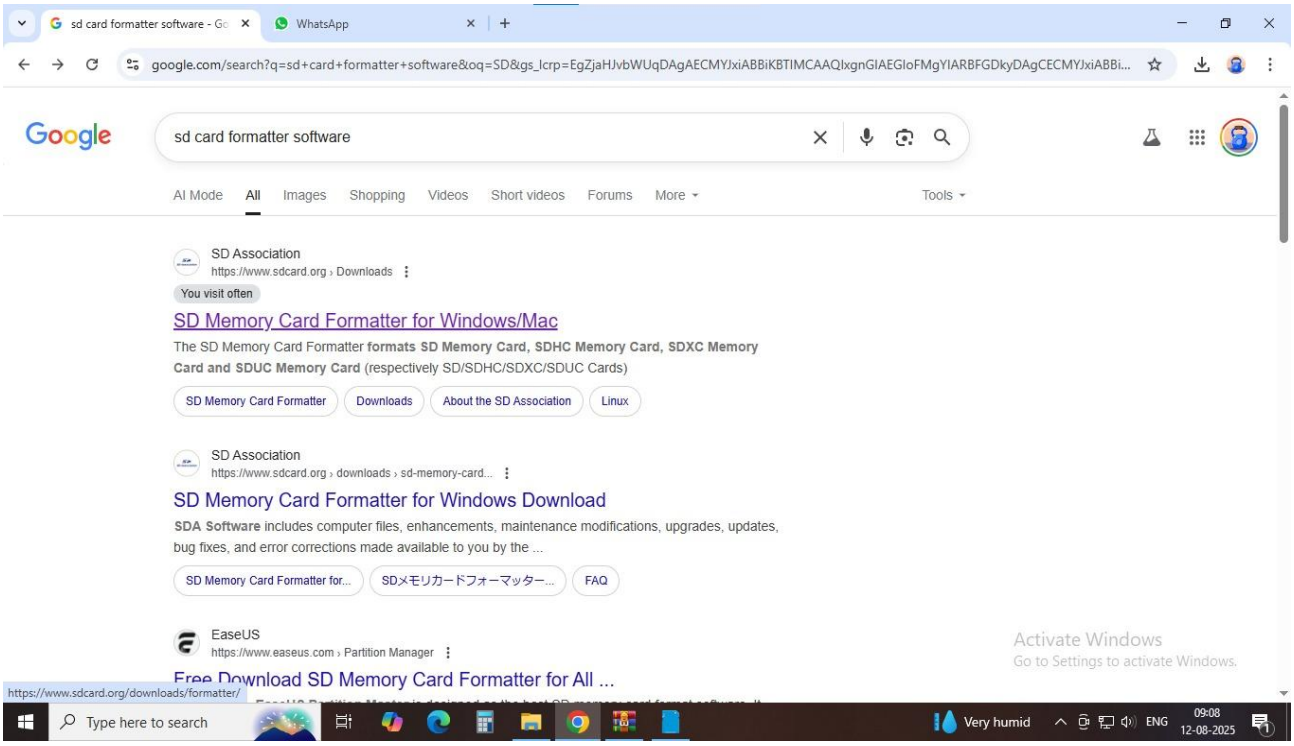
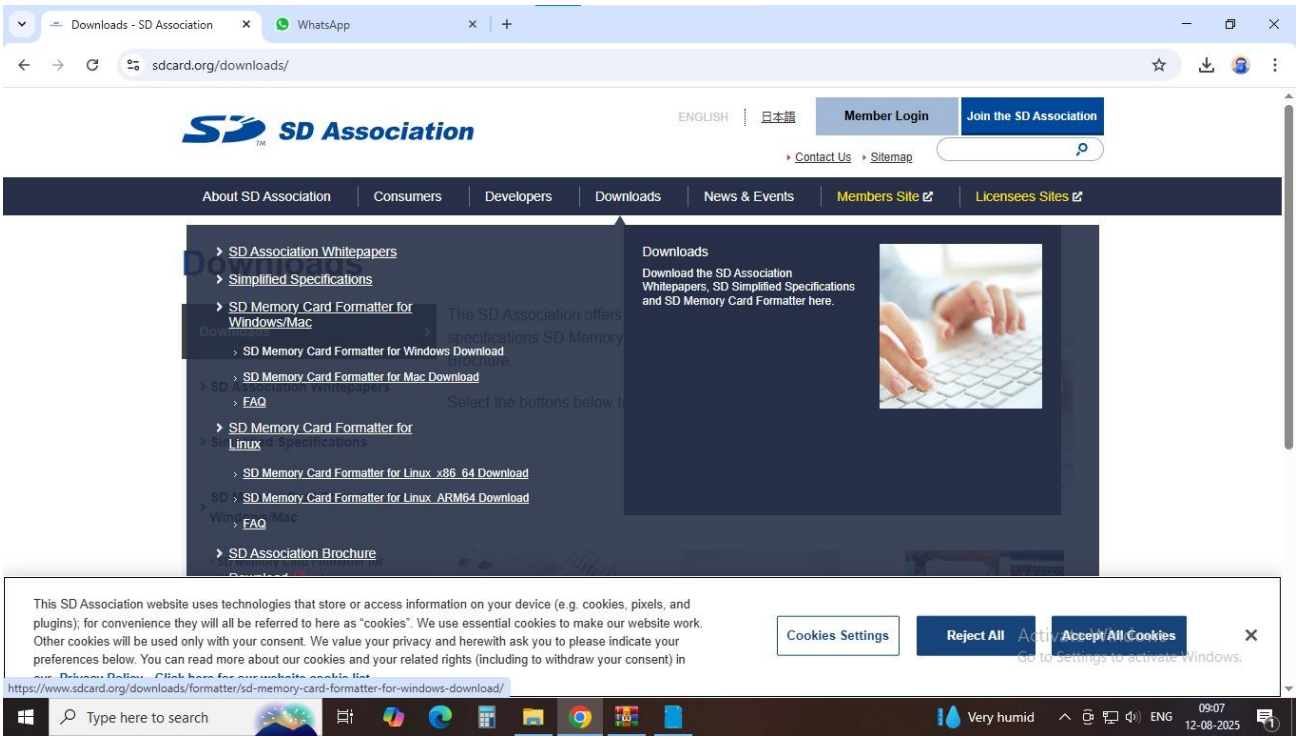
PRACTICAL NO - 2

AIM :- Installing OS Manager noobs on SD card and burning it .

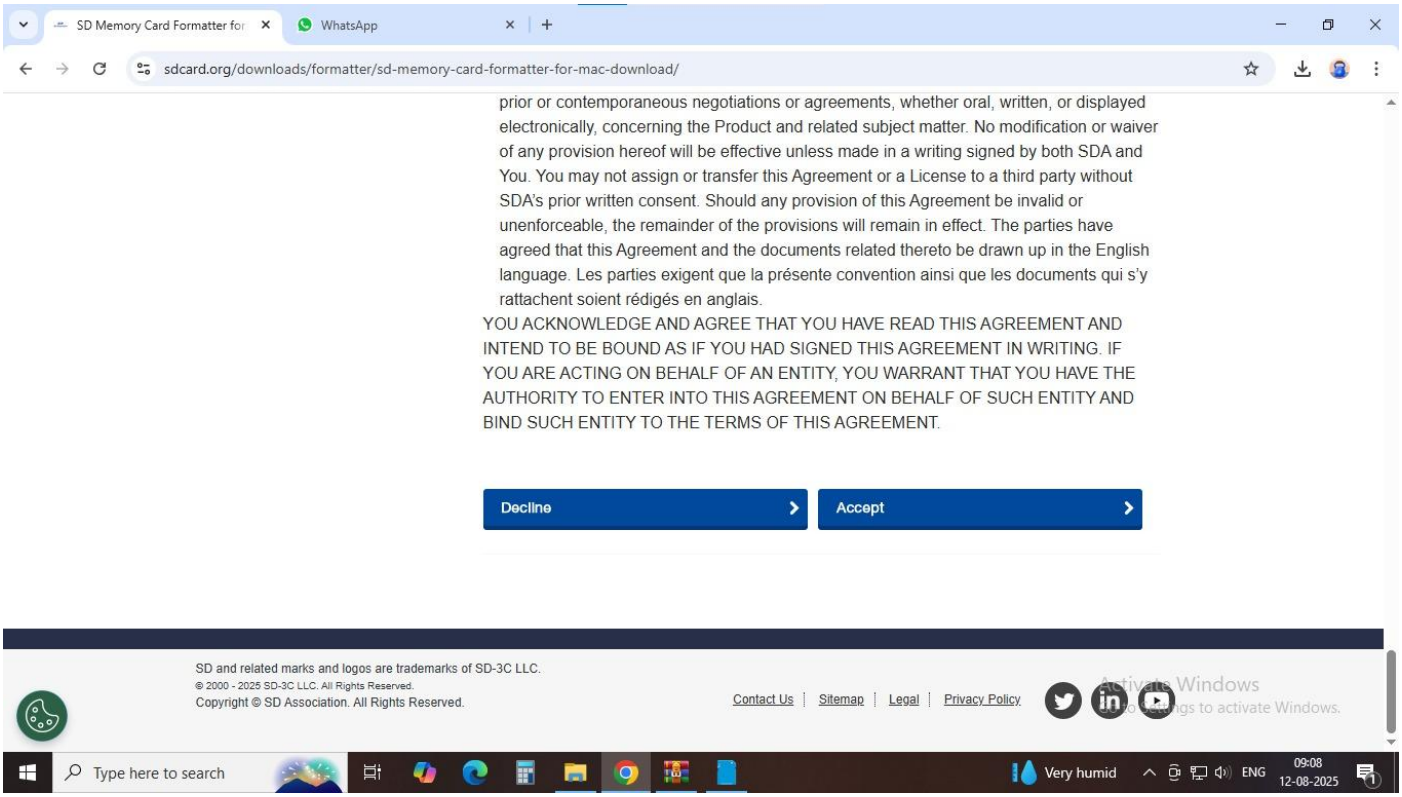
Step 1:- Download the SD card Formatter.



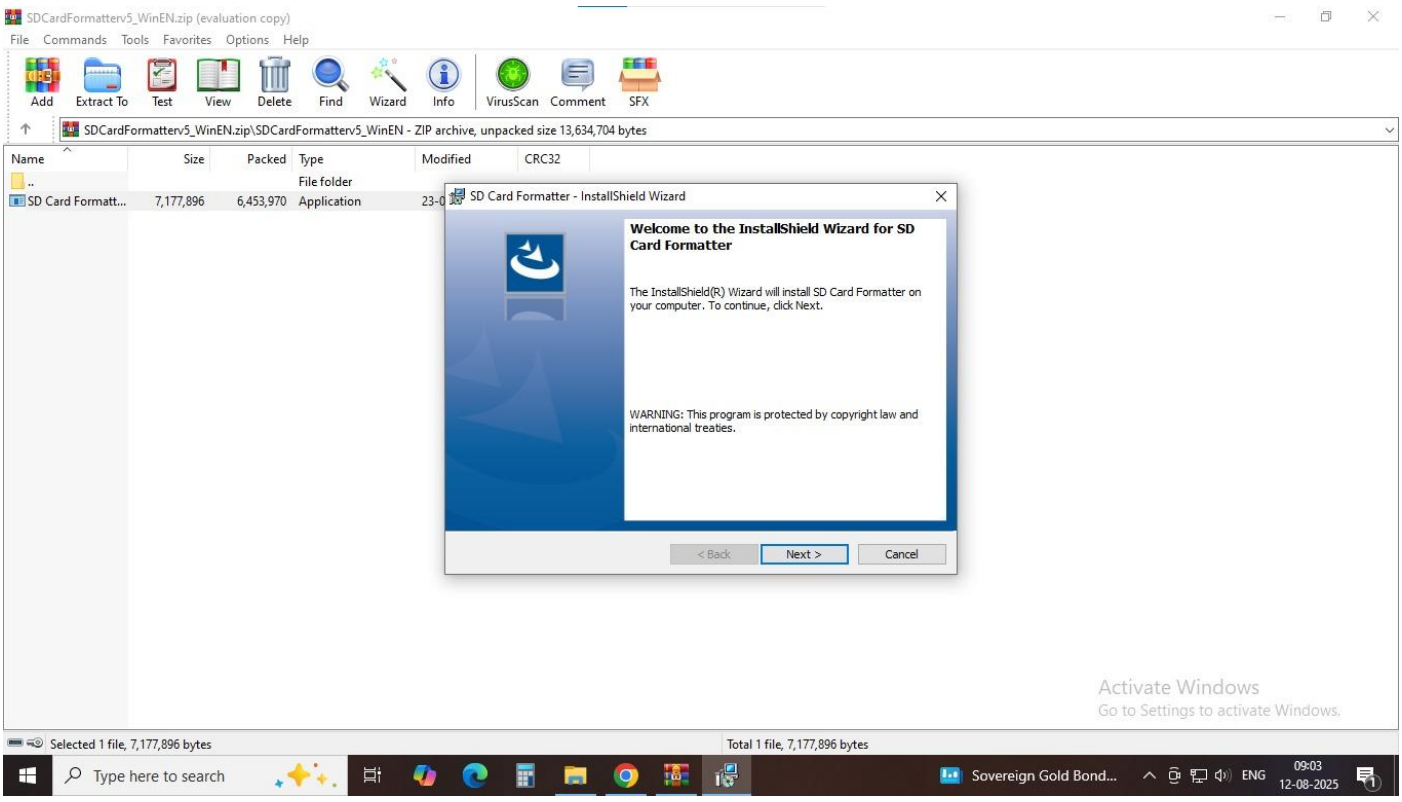
Step 2 :- Click on the SD card formatter for windows download.



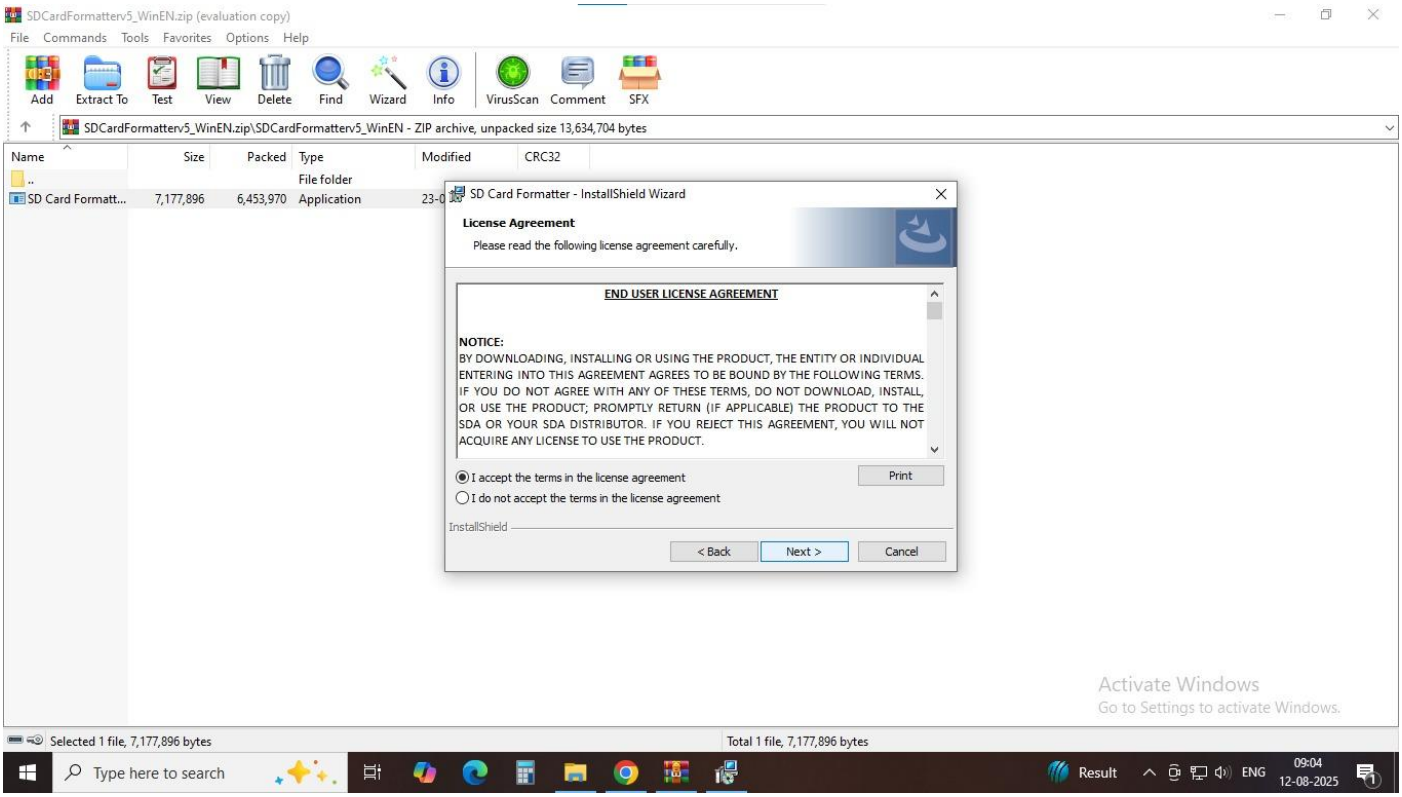
Step 3:- Click on the Accept button.



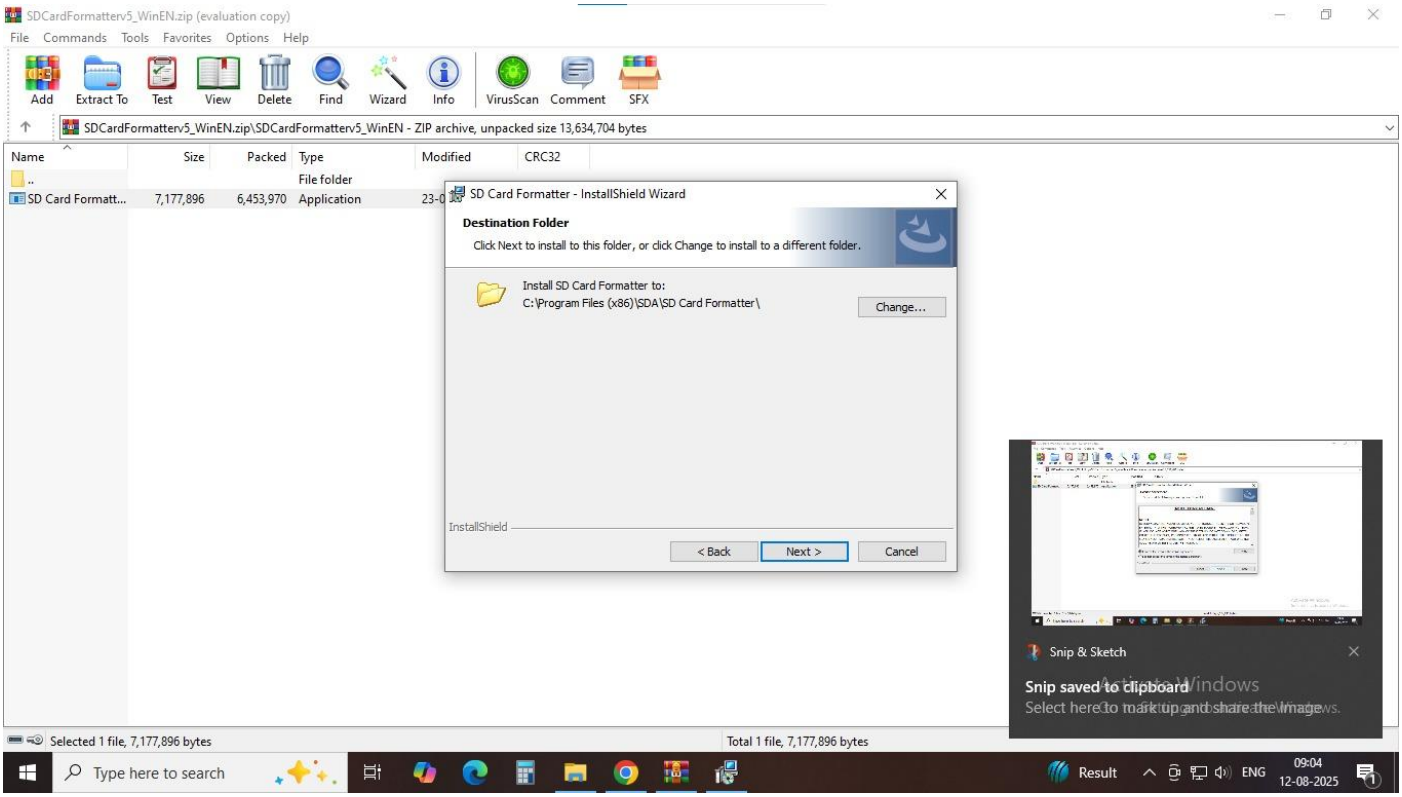
Step 4 :- Click on the next button.



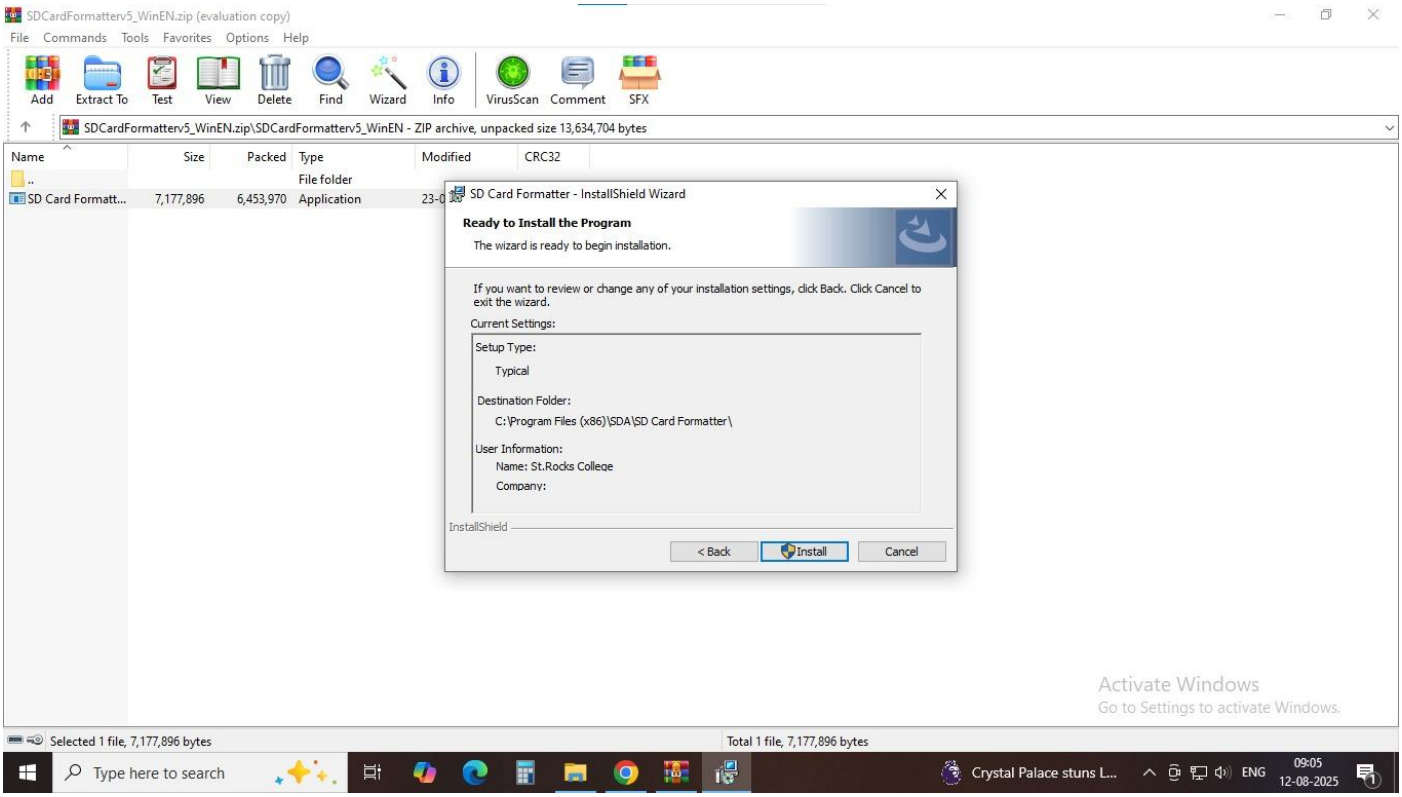
Step 5 :- Accept the terms and agreement and click on the next button.



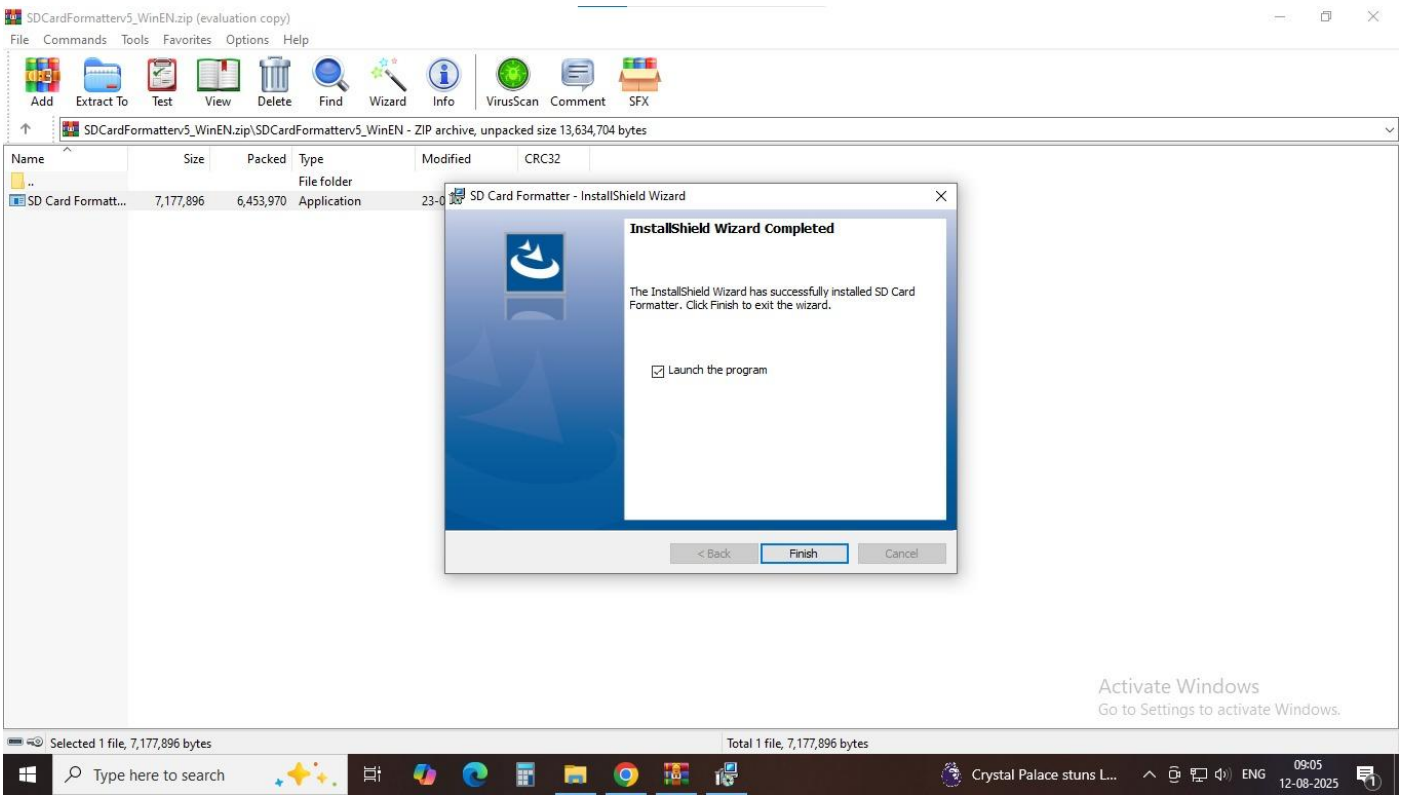
Step 6:- Click on the next button.



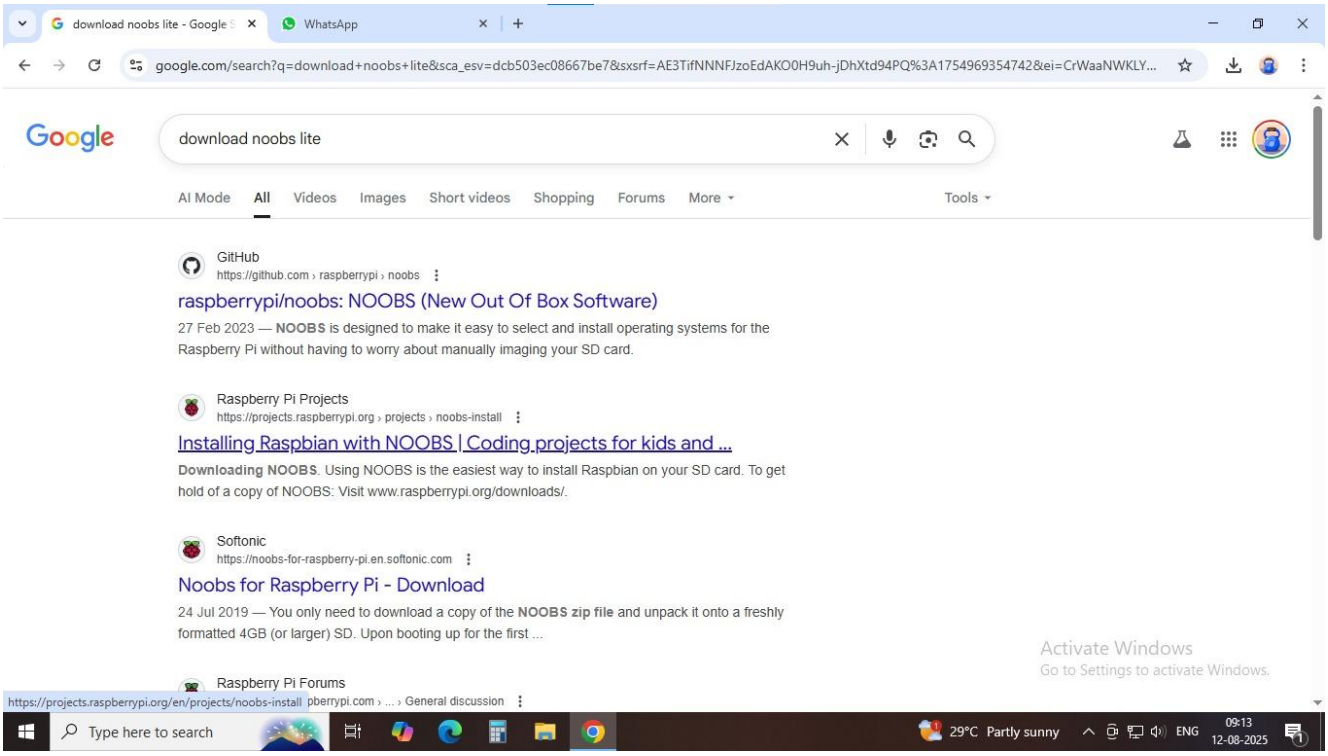
Step 7 :- click on the install button.



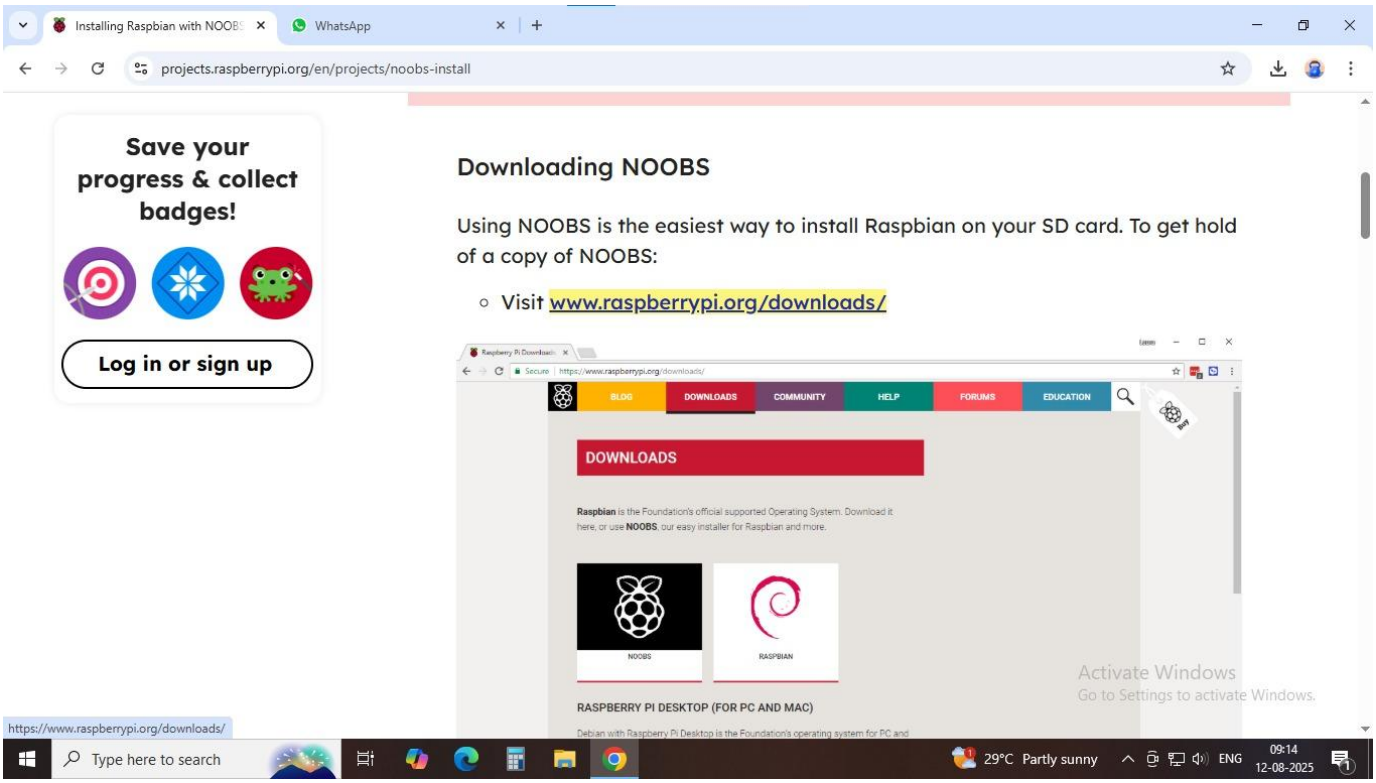
Step 8:- after that click on the finish button.



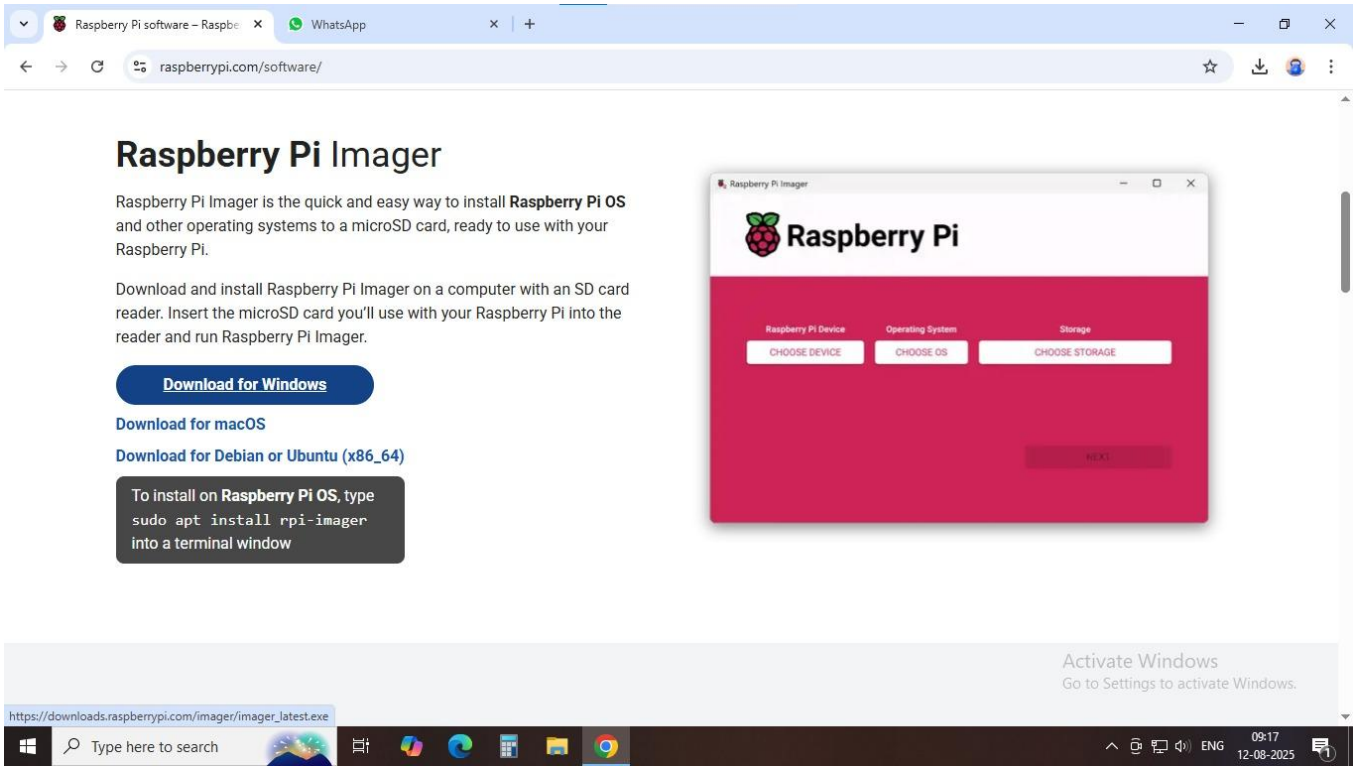
Step 9:- Now search for the software - You perform a Google search for "download noobs lite" and find the official Raspberry Pi website link.



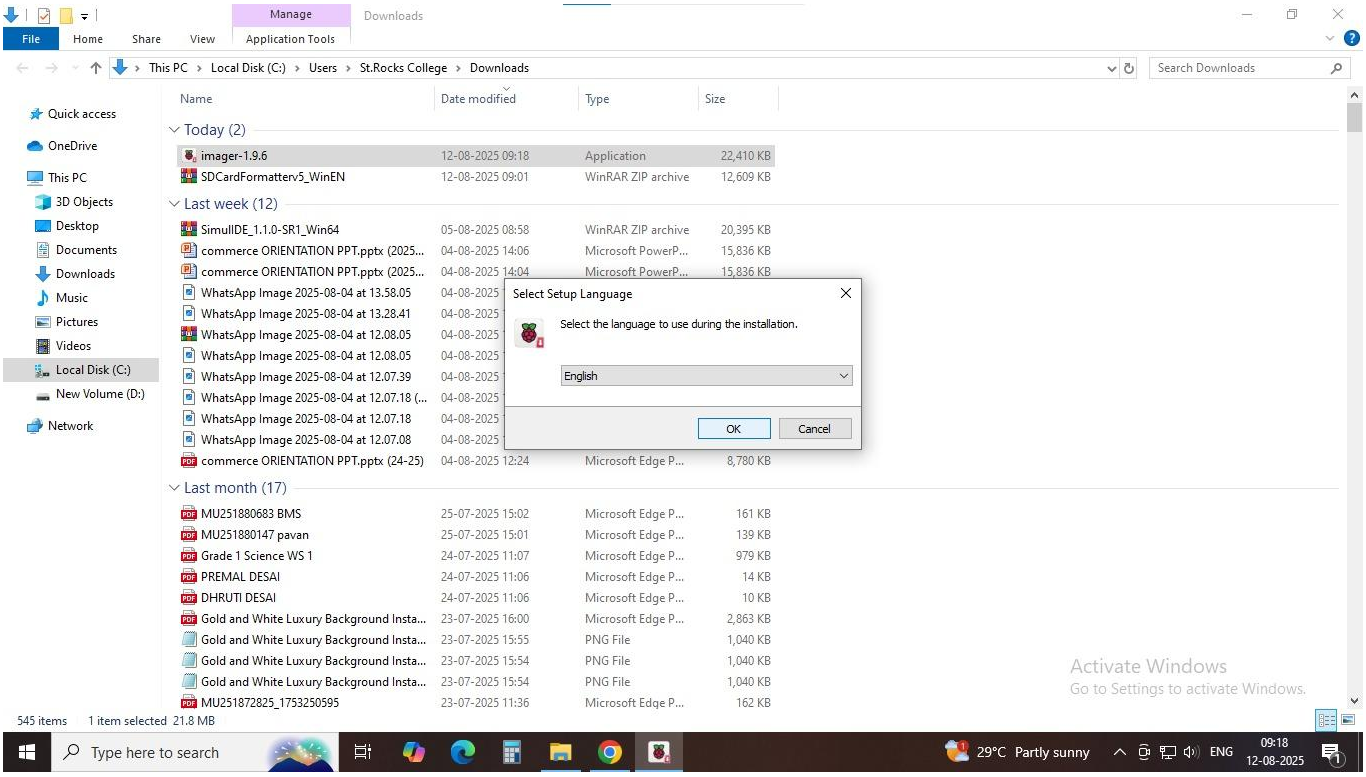
Step 10:- Navigate to the download page - You click the link to "Installing Raspbian with NOOBS" which directs you to the Raspberry Pi website.



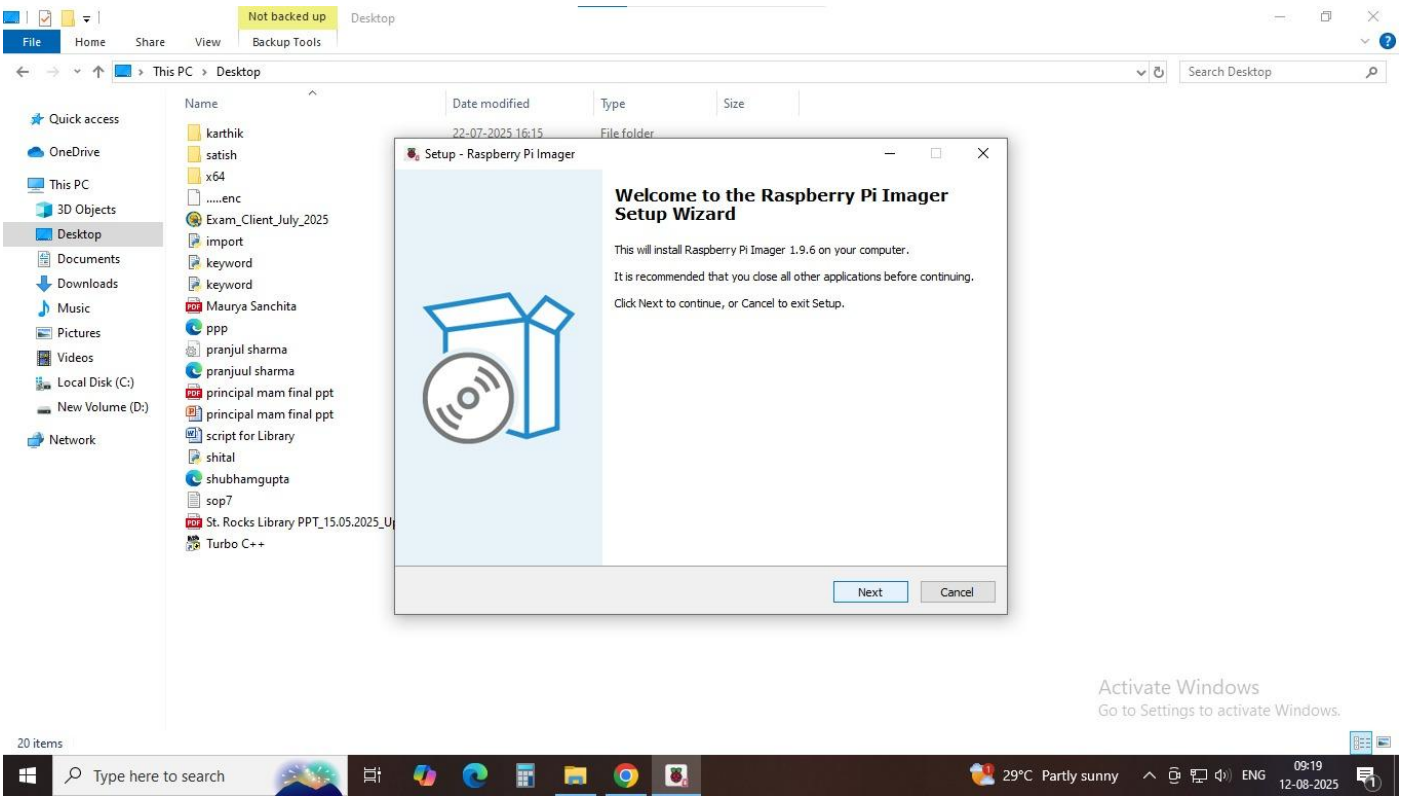
Step 11:- Download Raspberry Pi Imager - On the Raspberry Pi software page, you click "Download for Windows" to get the installer for Raspberry Pi Imager.



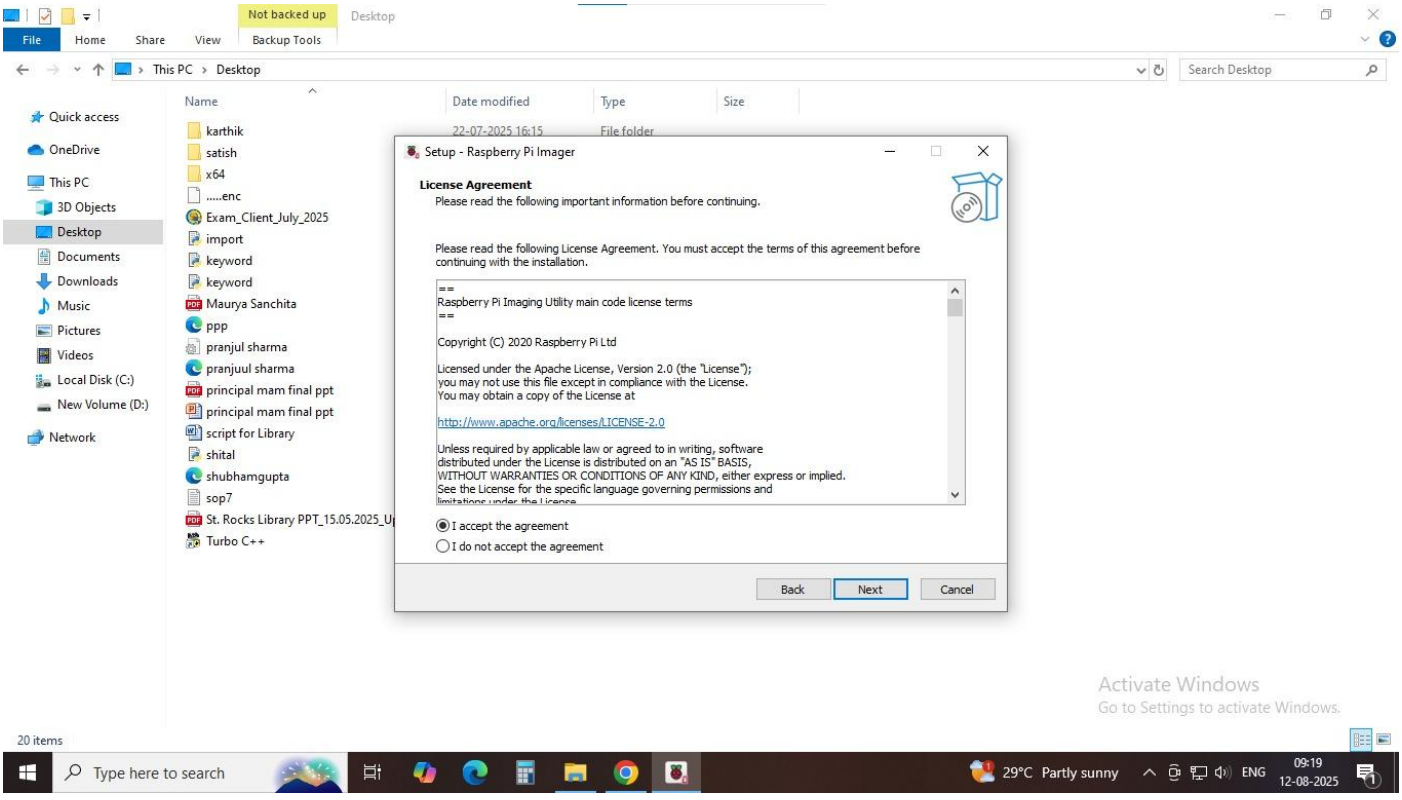
Step 12 :- Launch the installer - You open the downloaded imager_1.8.6.exe file from your downloads folder. Select the installation language - A pop-up appears, and you select "English" as the language for the installation.



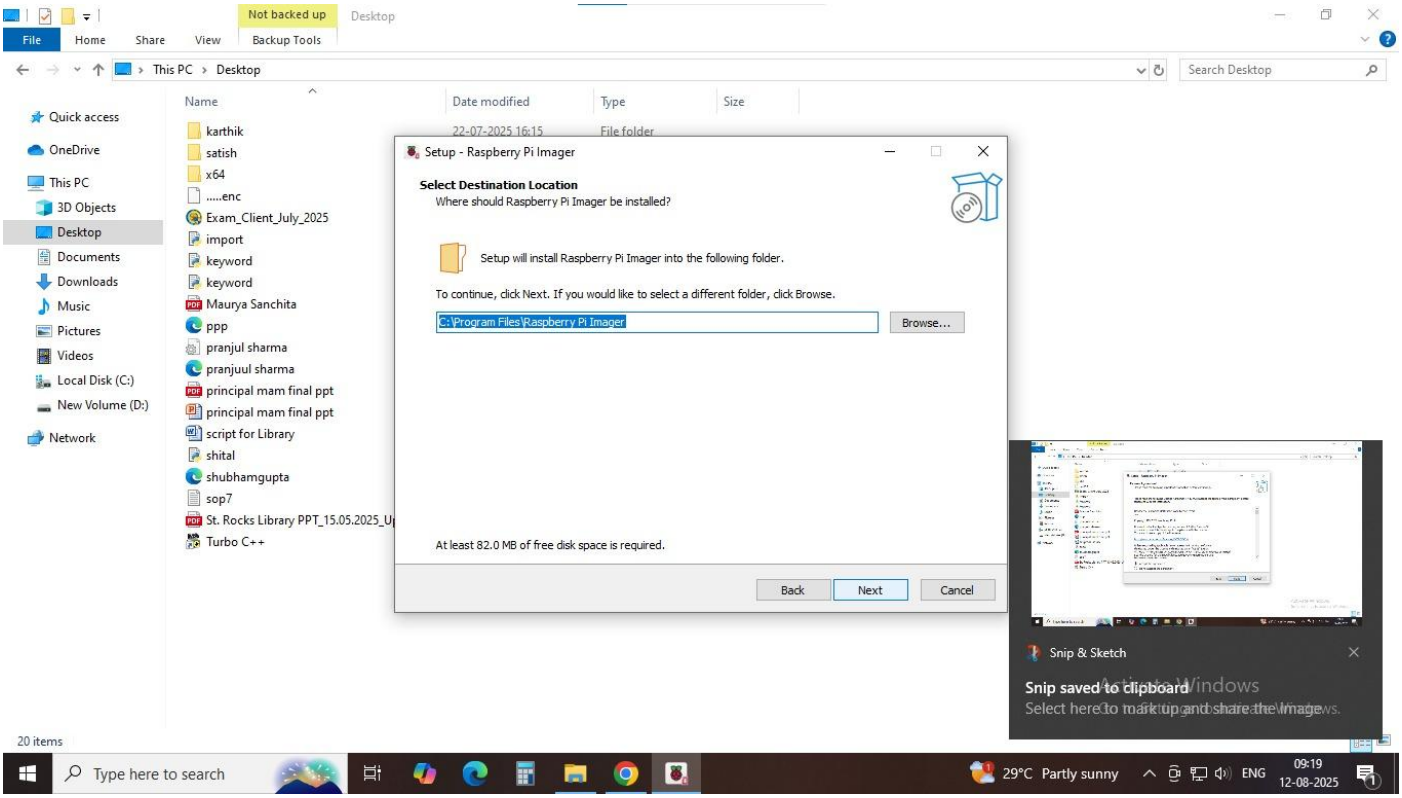
Step 13:- Start the setup wizard - The "Raspberry Pi Imager Setup Wizard" welcomes you and you click "Next" to continue.



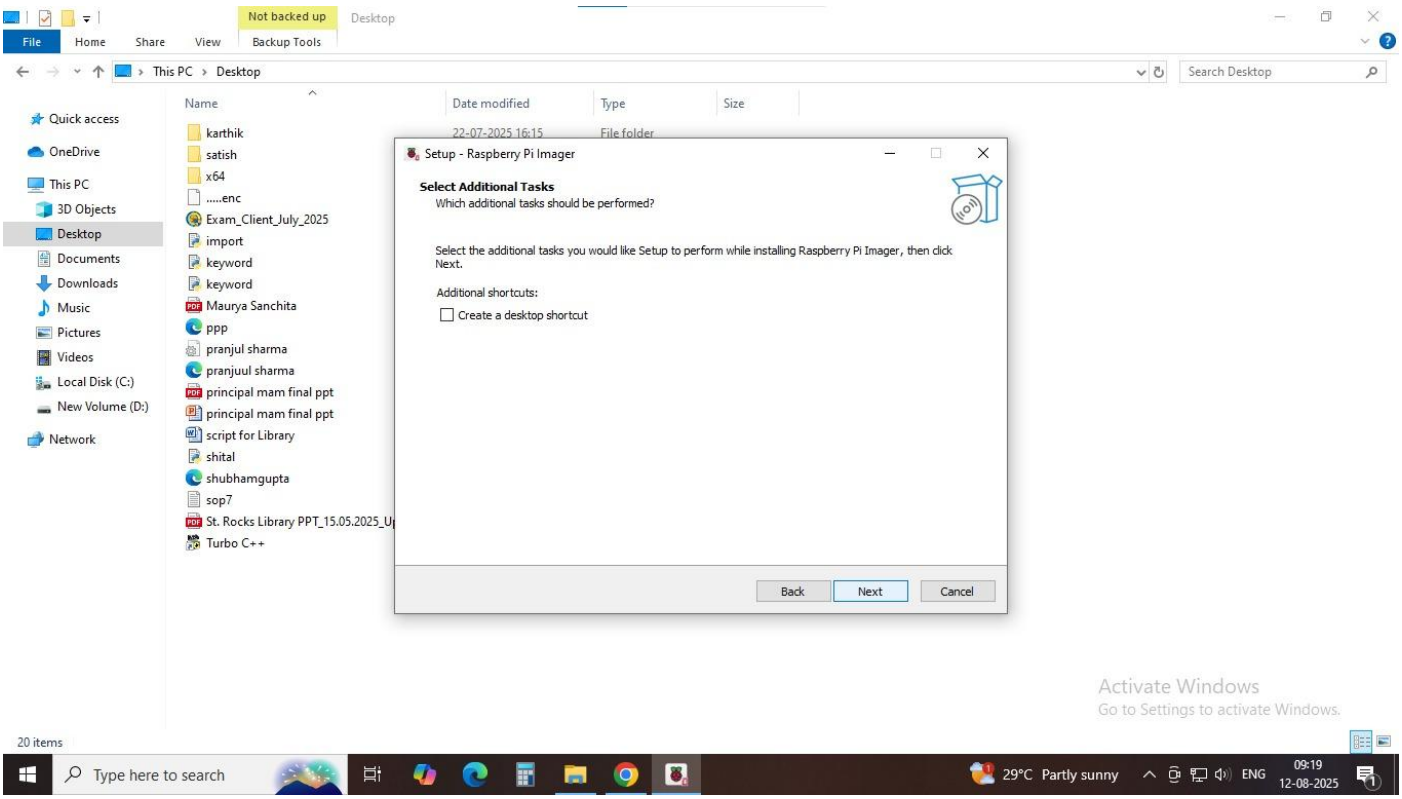
Step 14:- Accept the license agreement - You read the "License Agreement," select "I accept the agreement," and click "Next".



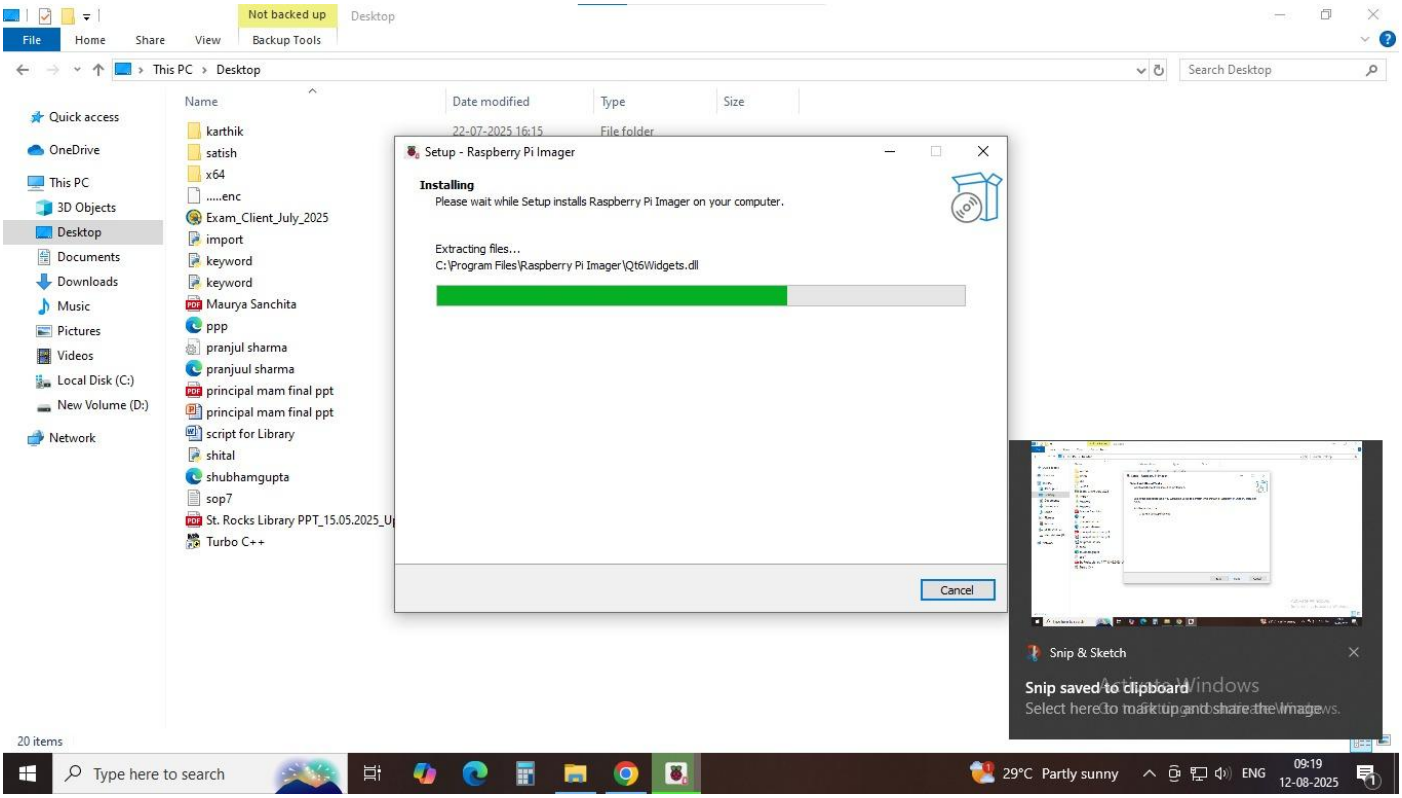
Step 15:- Choose the destination folder - You are prompted to select the destination folder for the installation, which is set to C:\Program Files\Raspberry Pi Imager by default, and click "Next".



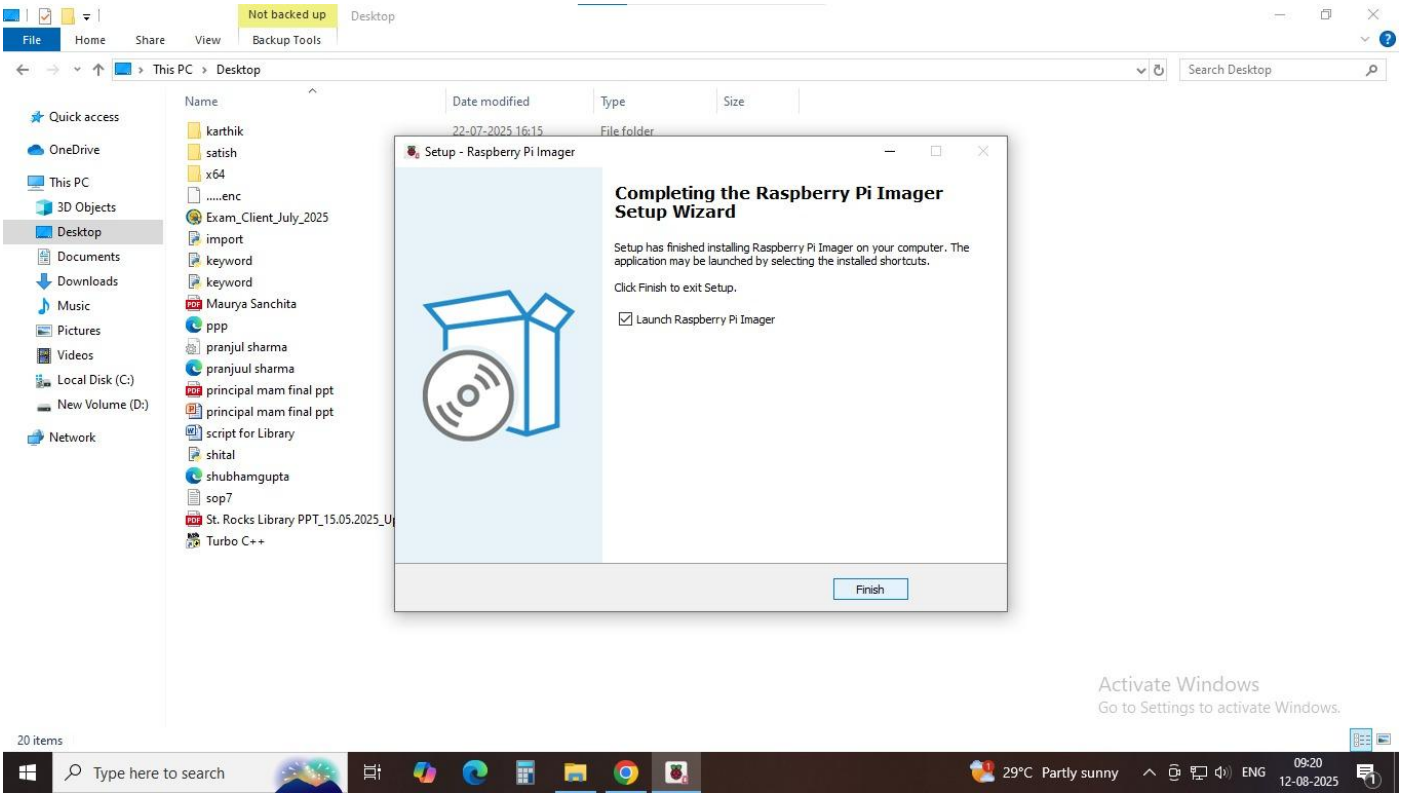
Step 16:- Select additional tasks - You can choose to "Create a desktop shortcut" and click "Next".



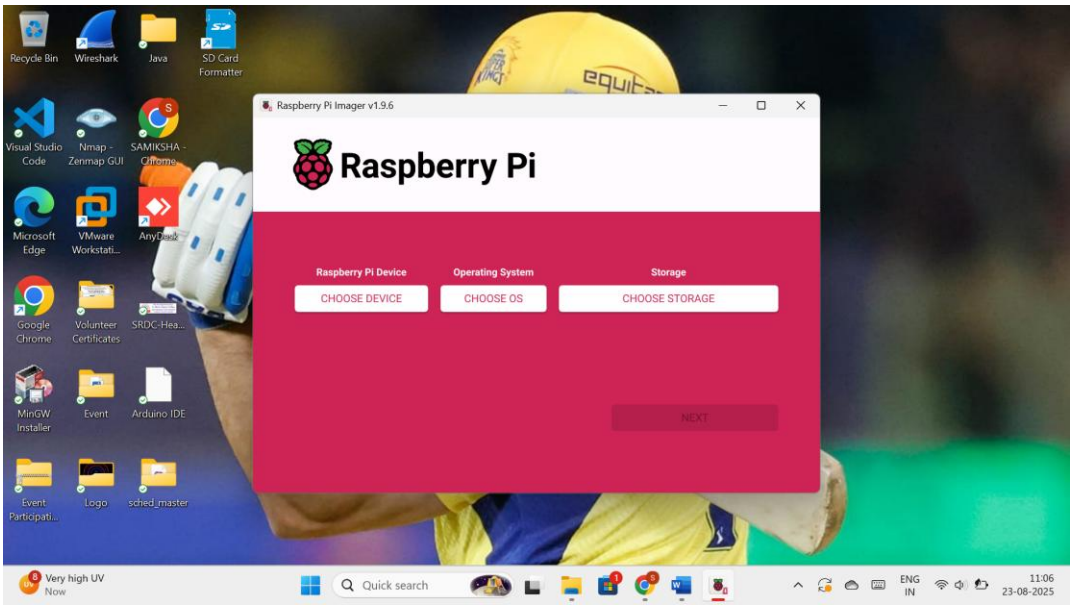
Step 17:- Wait for installation to complete - The setup wizard extracts files and installs Raspberry Pi Imager on your computer.



Step 18:- Finish the setup - The "Completing the Raspberry Pi Imager Setup Wizard" screen appears, and you can choose to "Launch Raspberry Pi Imager" before clicking "Finish".



Step 19:- Connect your SD card and use your SD card software to format it.



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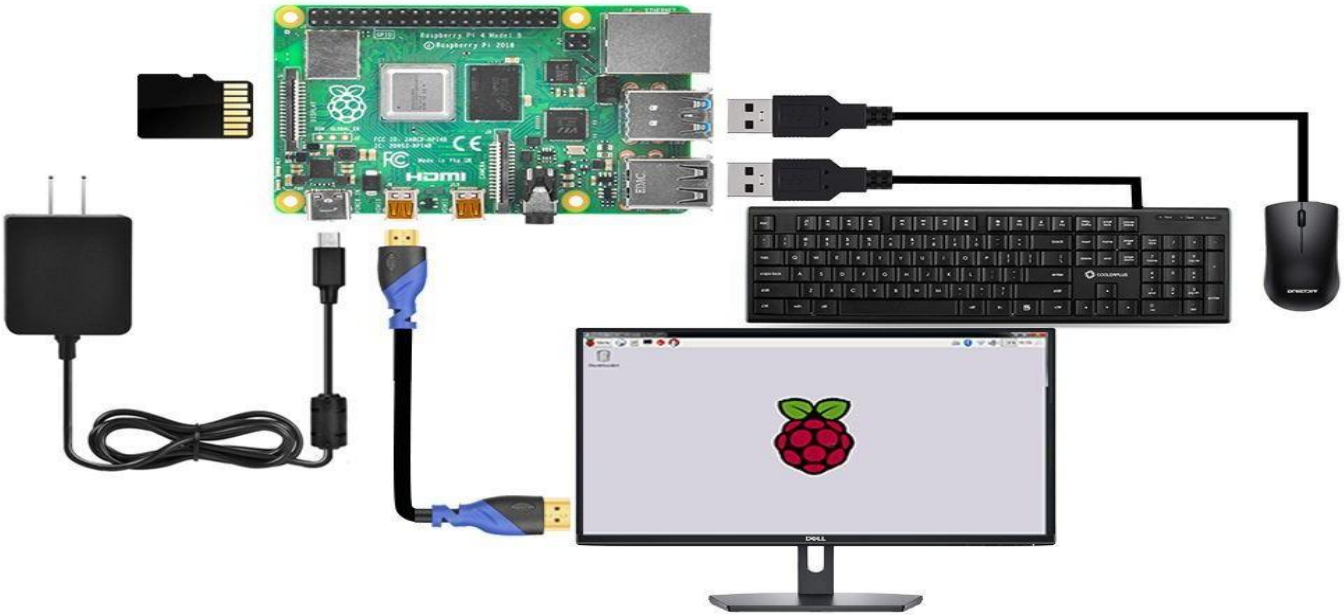
PRACTICAL NO – 3 A

AIM :- Installing Raspbian OS on Raspberry Pi.

CONNECTION



Step 1: Connecting the Keyboard

Insert the keyboard's USB cable into one of the Raspberry Pi's USB ports. This enables you to input text and control commands directly.

Step 2: Connecting the Mouse

Plug the mouse's USB cable into another USB port on the Raspberry Pi. It allows you to move the cursor and interact with graphical applications.

Step 3: Powering the Raspberry Pi

Connect the power adapter's micro-USB or USB-C plug into the power port on the Raspberry Pi. Plug the other end into a wall socket for power.

Step 4: Connecting the HDMI Cable to the Monitor

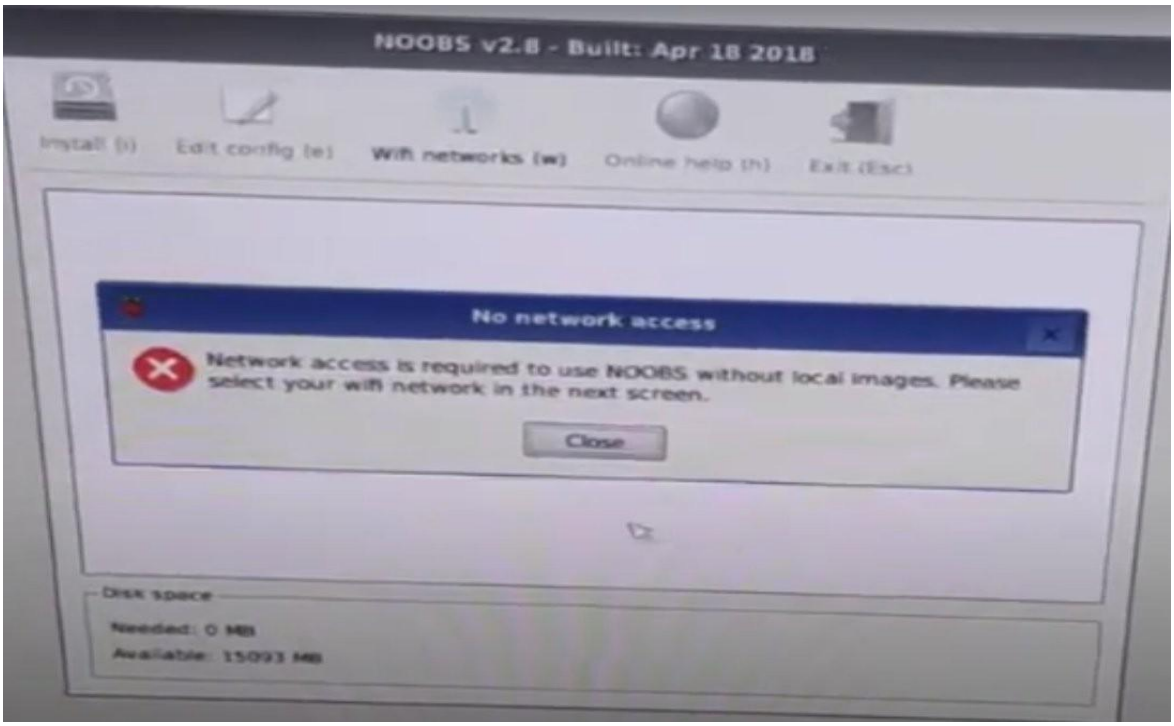
Insert one end of the HDMI cable into the Raspberry Pi's HDMI output port. Connect the other end to your monitor's HDMI input port.

Step 5: Inserting the microSD Card

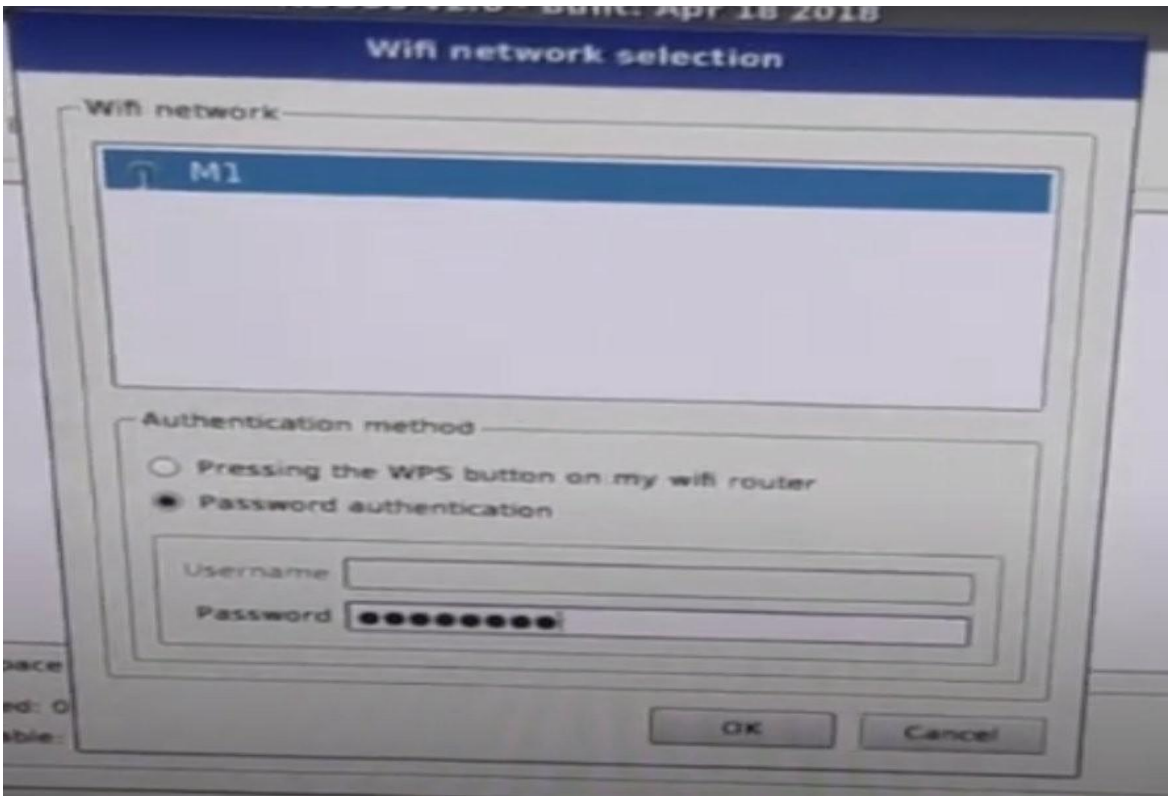
Place the microSD card containing the operating system into the slot on the Raspberry Pi. It stores the system files and boots the device.

INSTALLATION

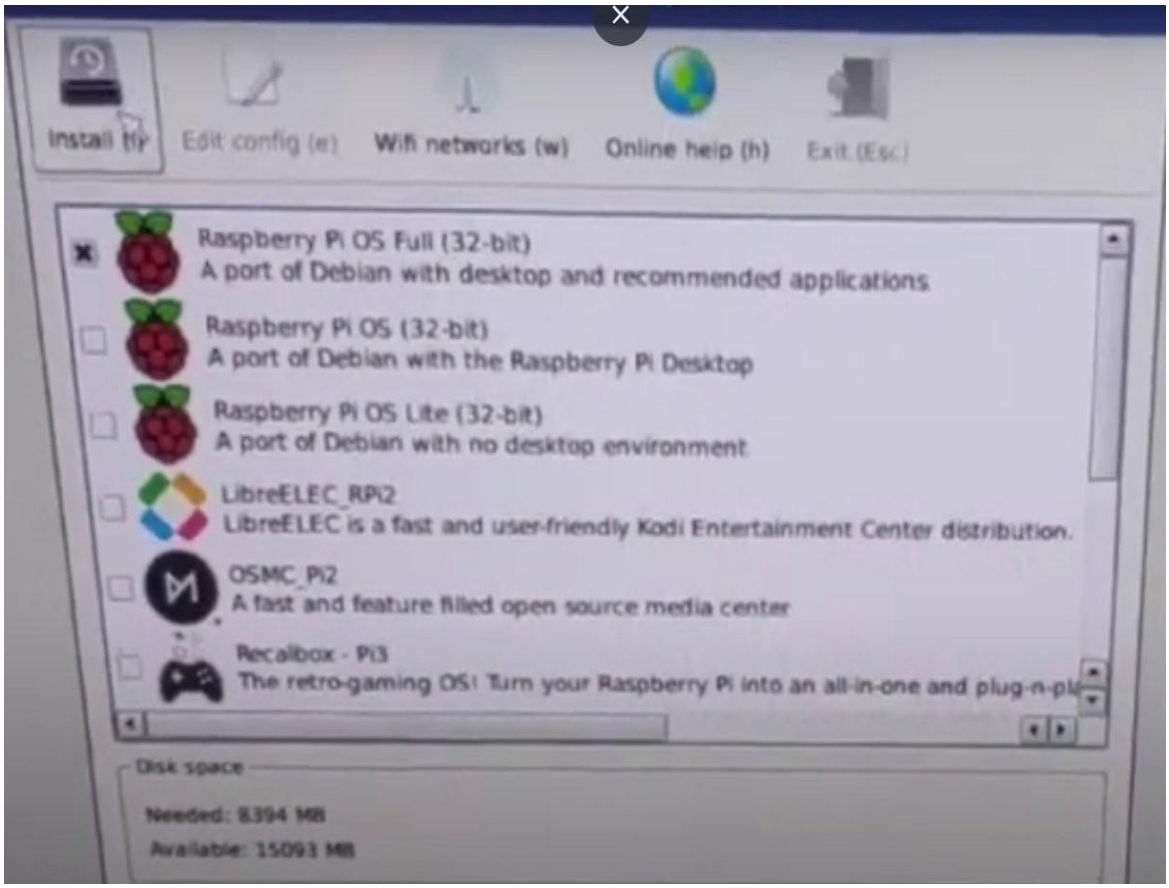
Step 1 :- Connect to a Wi-Fi Network - A "No network access" pop-up appears, prompting you to select a Wi-Fi network to continue the installation.



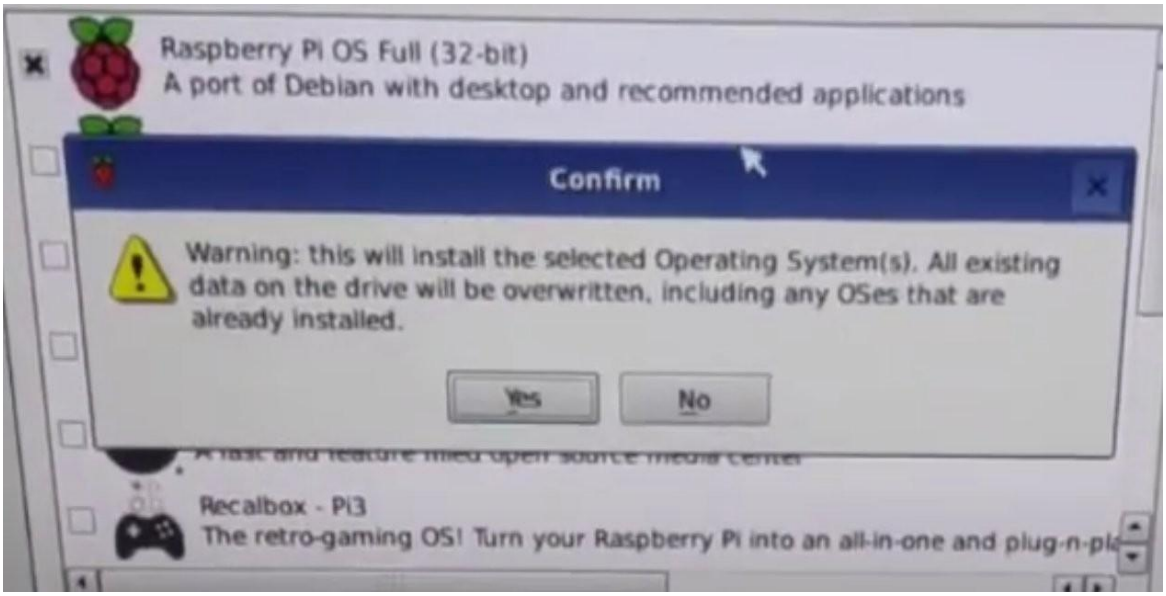
Step 2 :- Enter Wi-Fi Credentials - A "Wifi network selection" window shows the available network "M1." You select "Password authentication" and enter the Wi-Fi password.



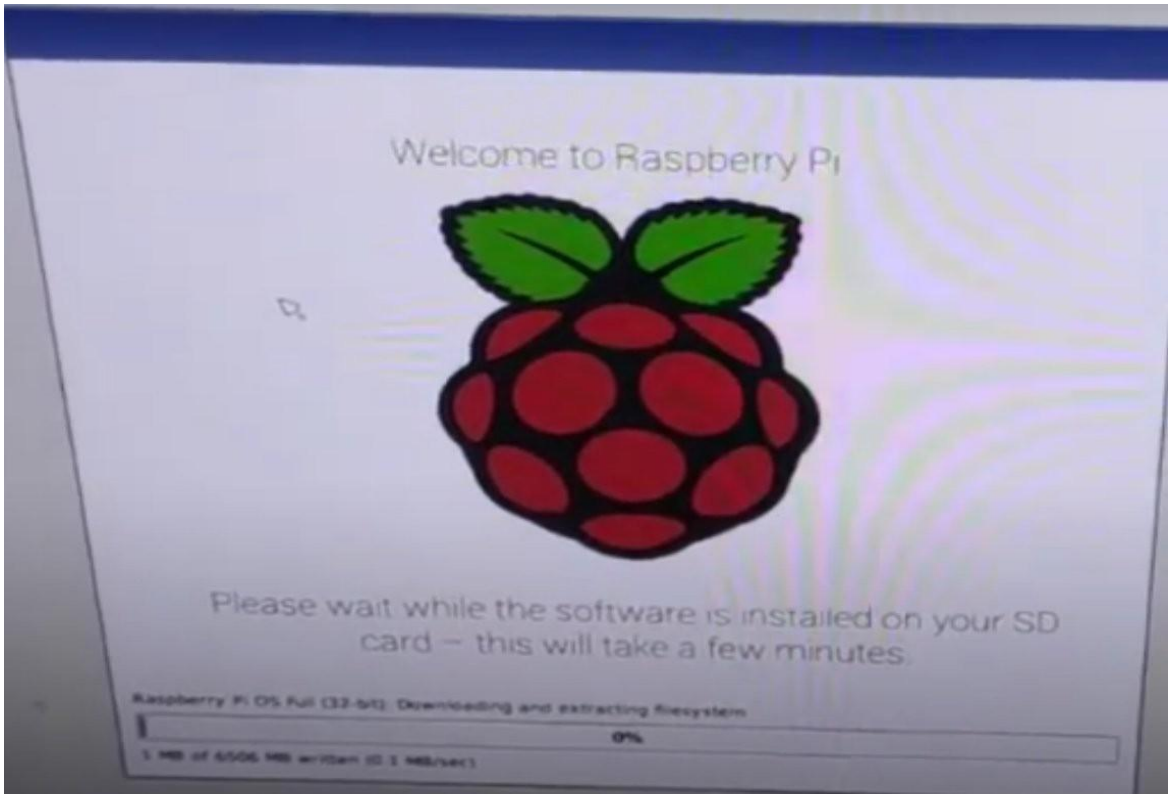
Step 3 :- Select an Operating System - After connecting to the internet, a list of operating systems becomes available. You select "Raspberry Pi OS Full (32-bit).



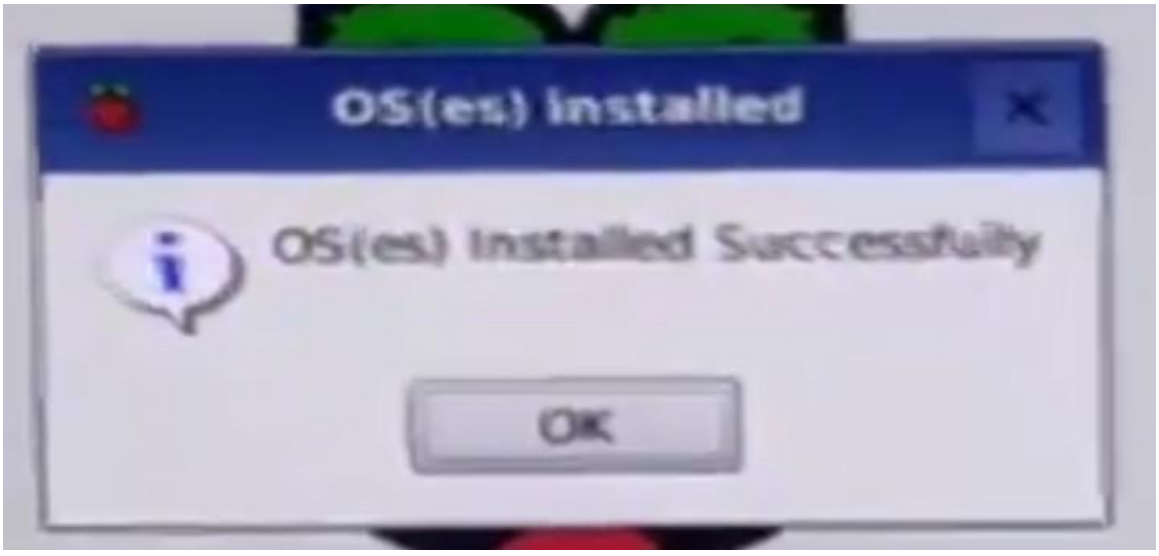
Step 4 :- Confirm Installation - A "Confirm" warning box appears, stating that all existing data on the drive will be overwritten. You select "Yes" to proceed.



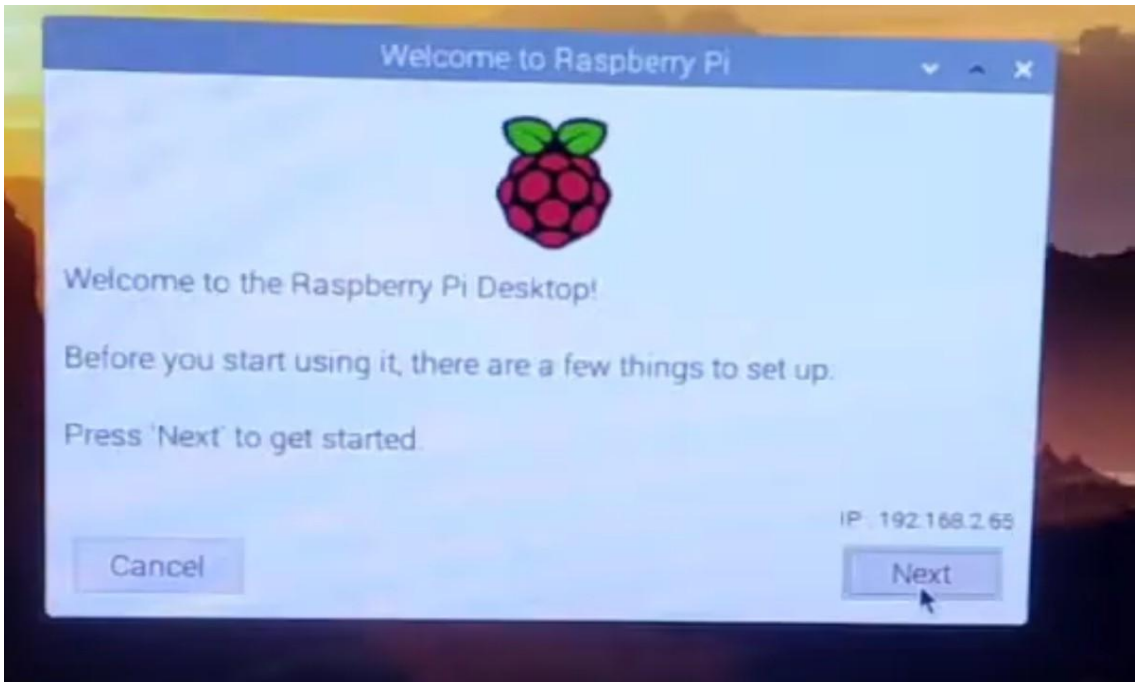
Step 5 :- Install the Operating System - The system begins to download and install the software on the SD card.



Step 6 :- Confirm Successful Installation - An "OS(es) installed" pop-up confirms that the installation was successful.

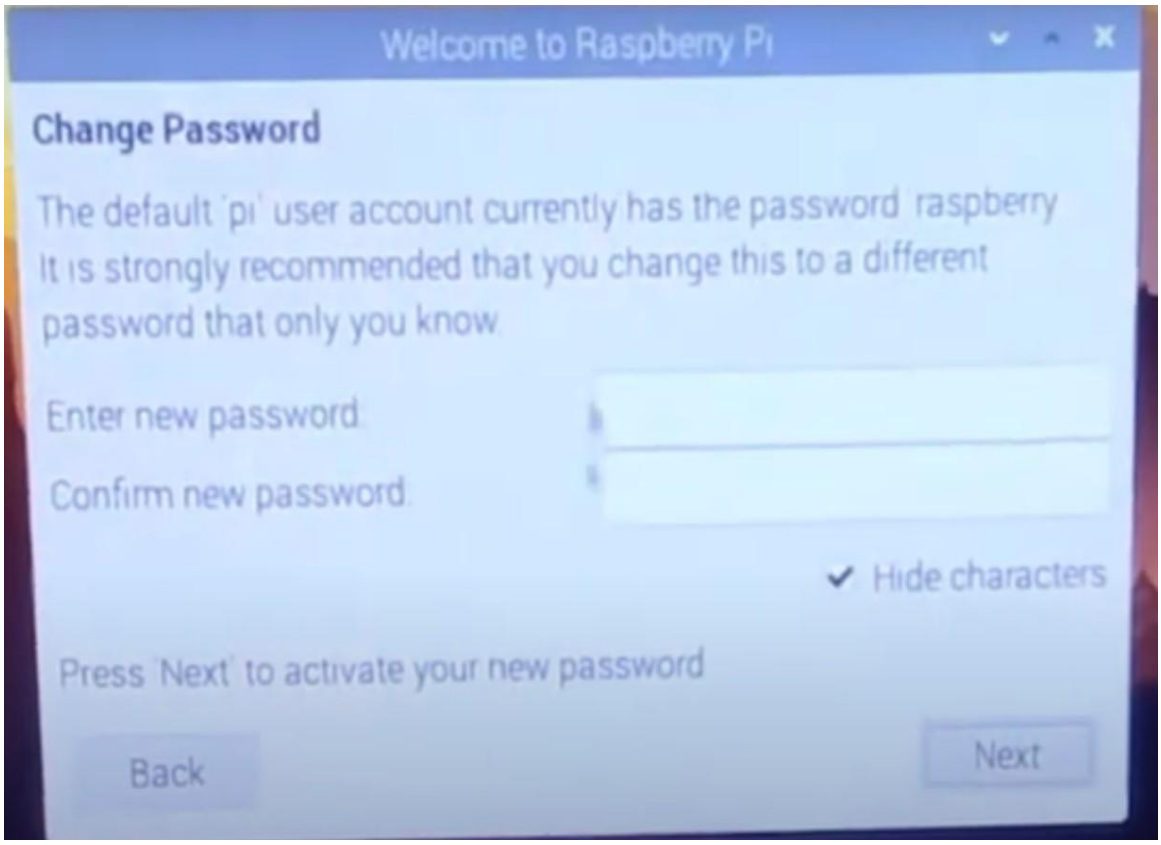


Step 7 :- Start Initial Setup - A "Welcome to Raspberry Pi" screen appears, prompting you to start the initial setup by clicking "Next.

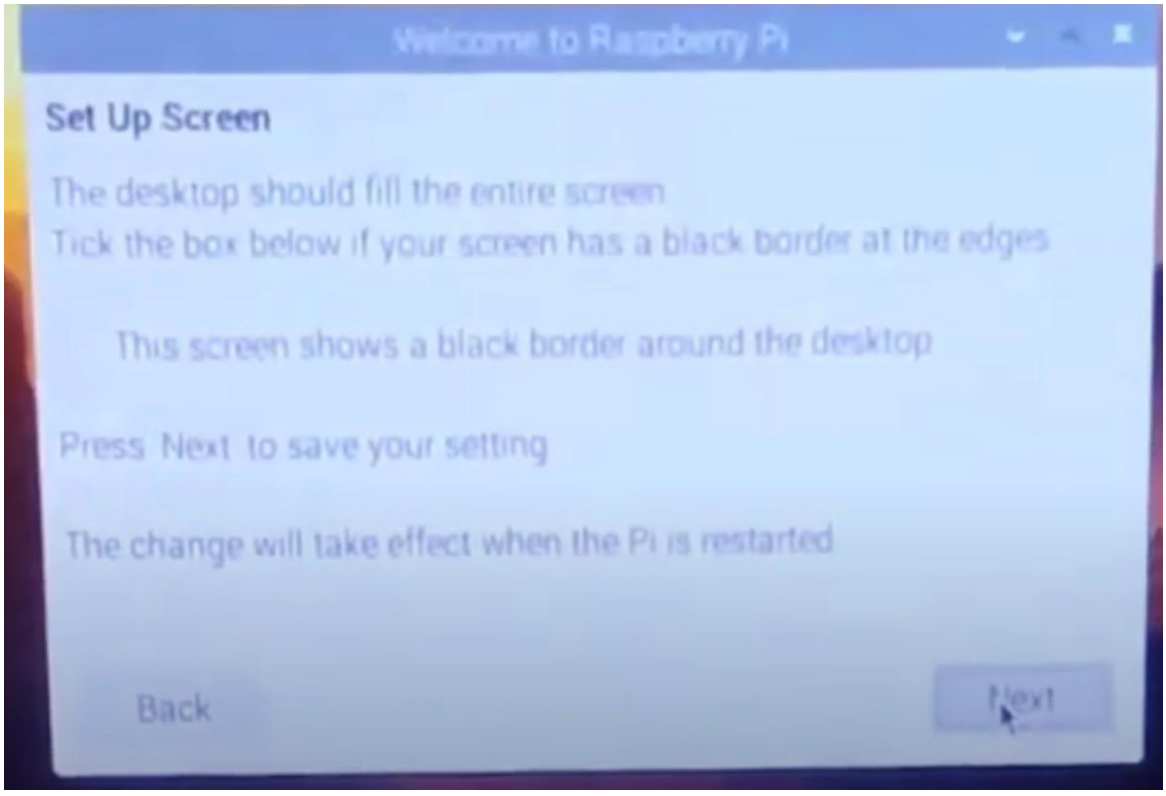


Step 8 :- Set Your Location - You are asked to enter your country, language, and timezone.

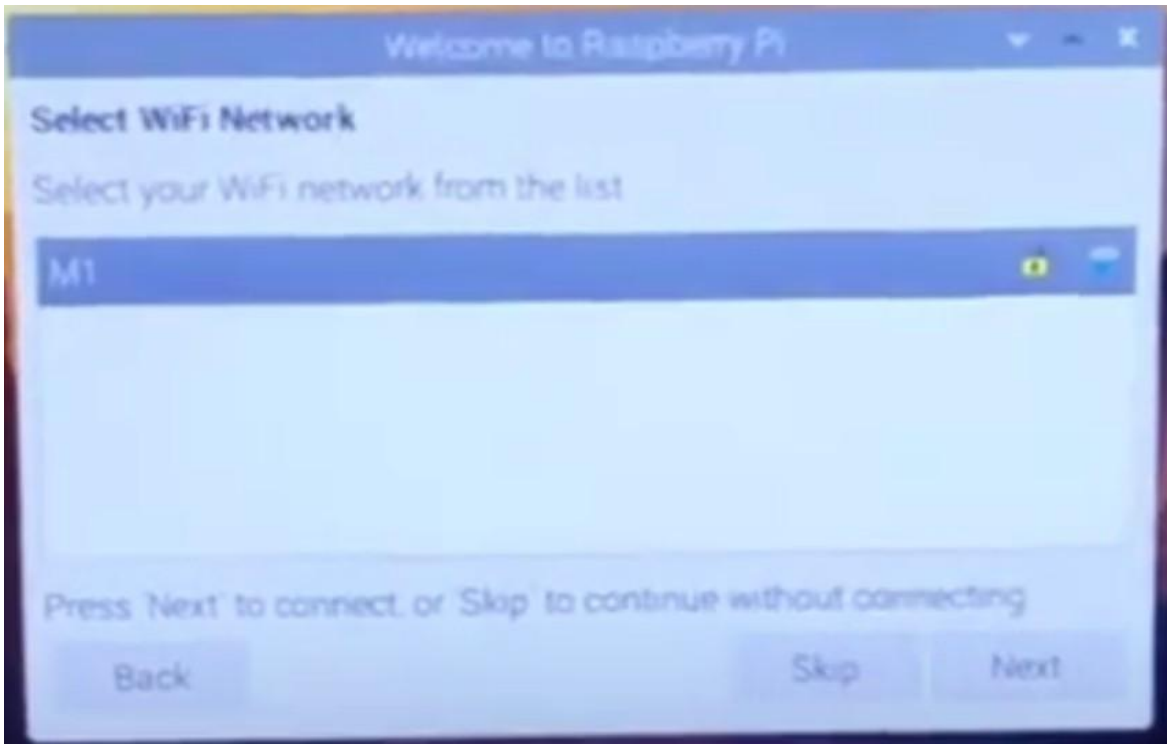
Step 9 :- Change the Default Password - The system prompts you to change the default "pi" user password.



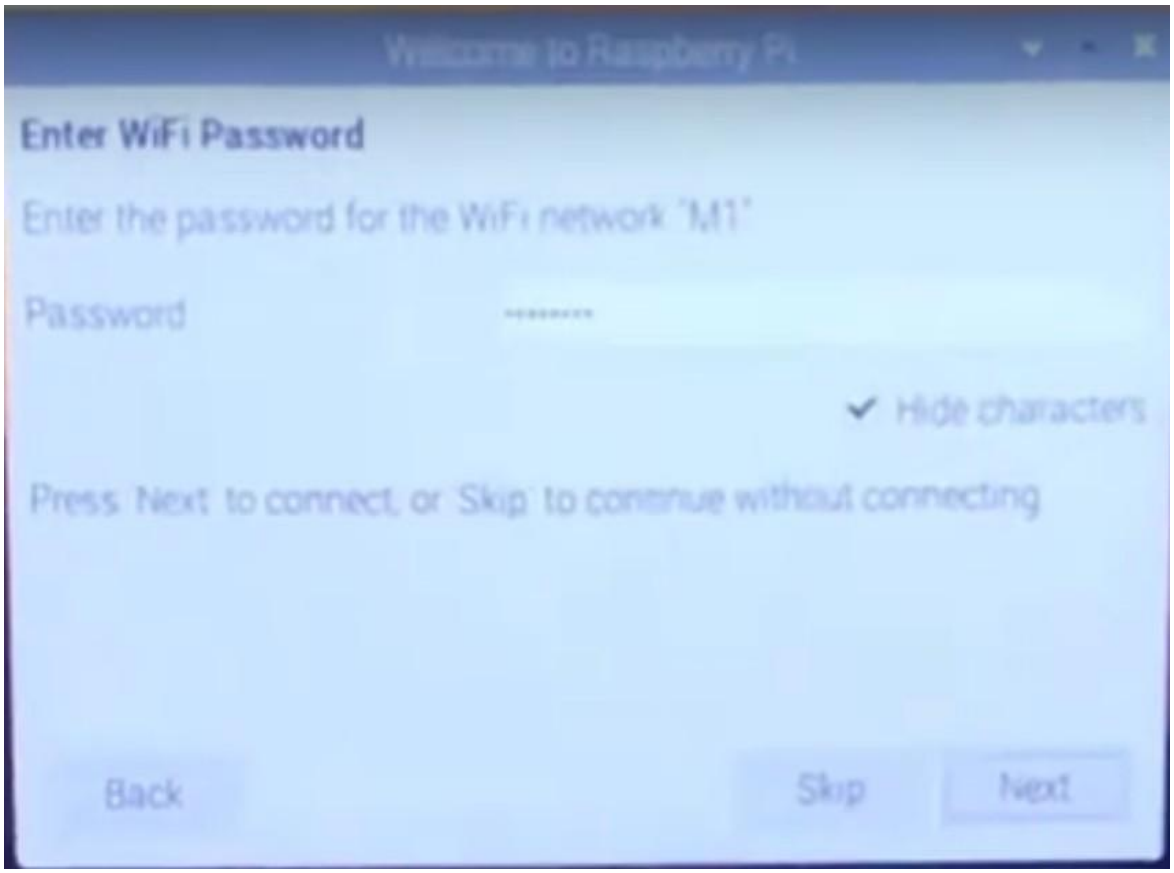
Step 10 :- Adjust Screen Settings - A "Set Up Screen" option appears, allowing you to adjust the desktop to fill the entire screen if it has a black border.



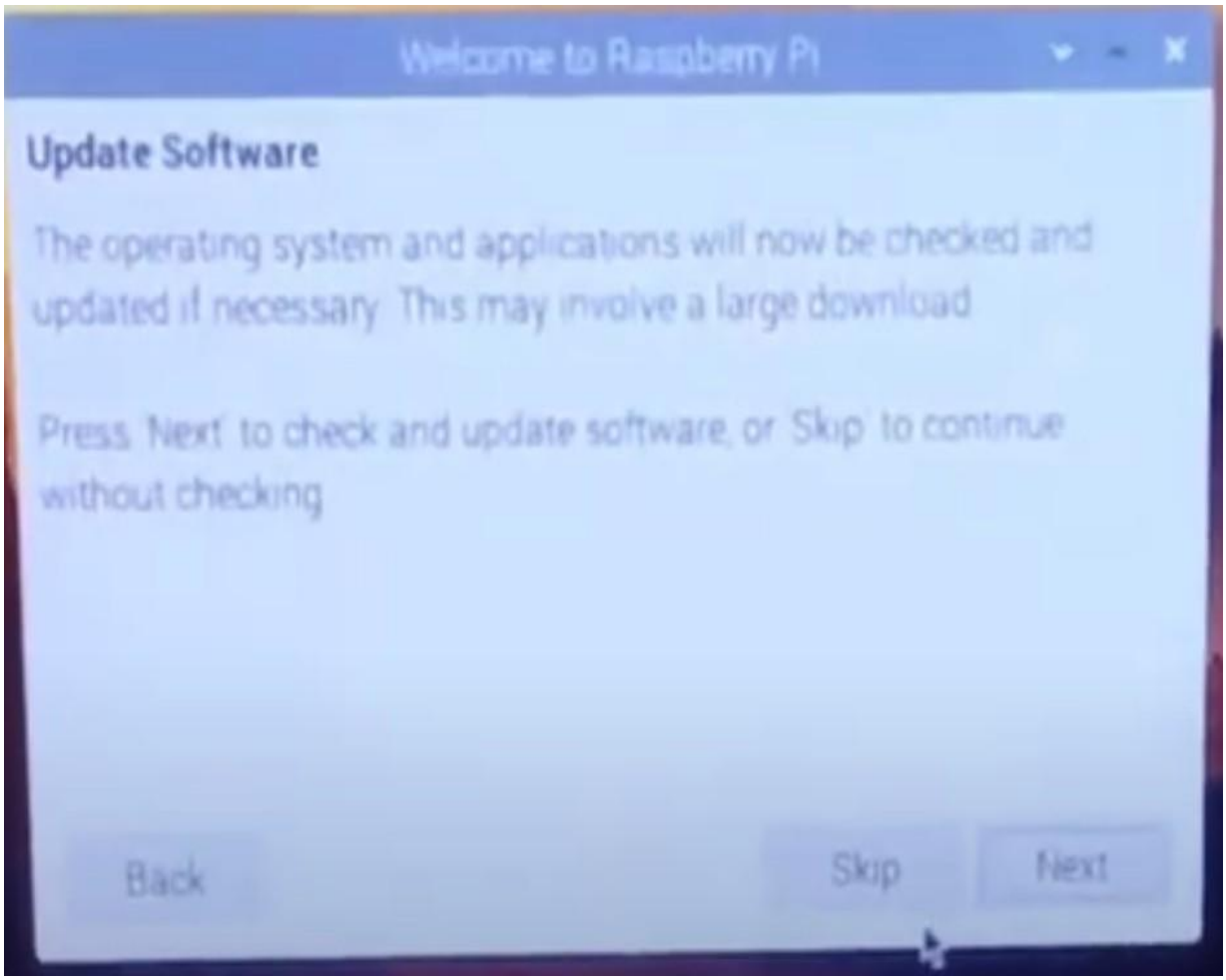
Step 11 :- Connect to Wi-Fi Again - You are prompted to select your Wi-Fi network once more and enter the password.



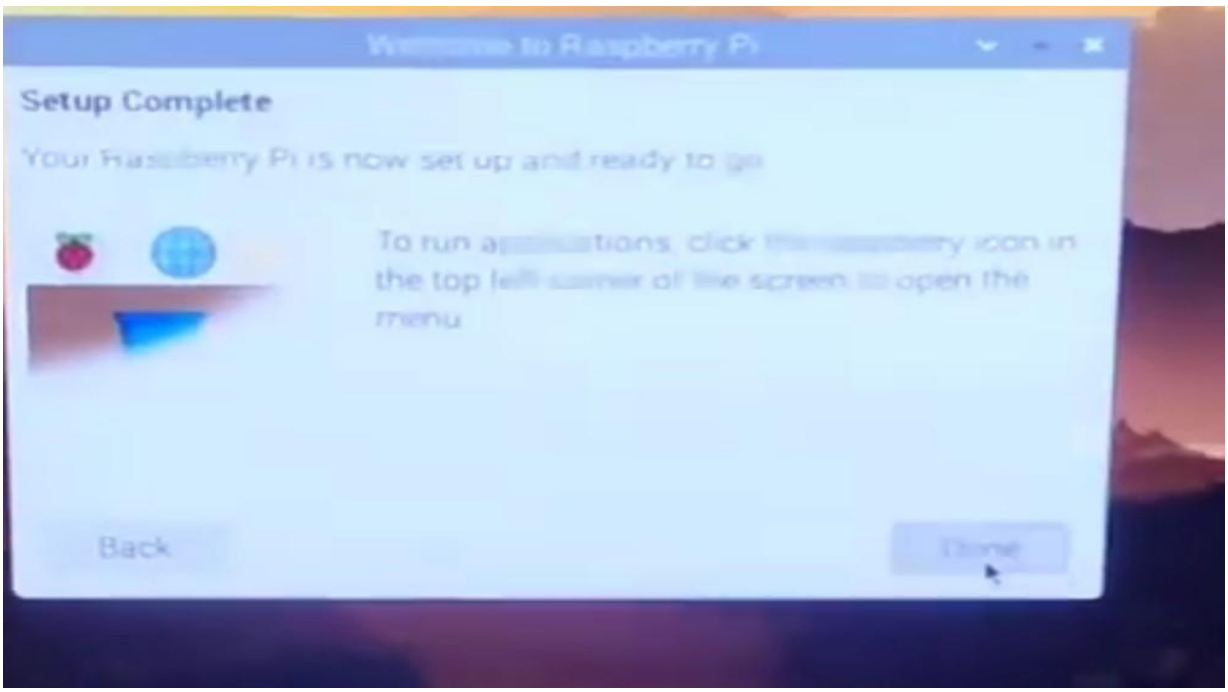
Step 12 :- Update Software - The system offers to check for and update the operating system and applications. You can choose to proceed or skip.



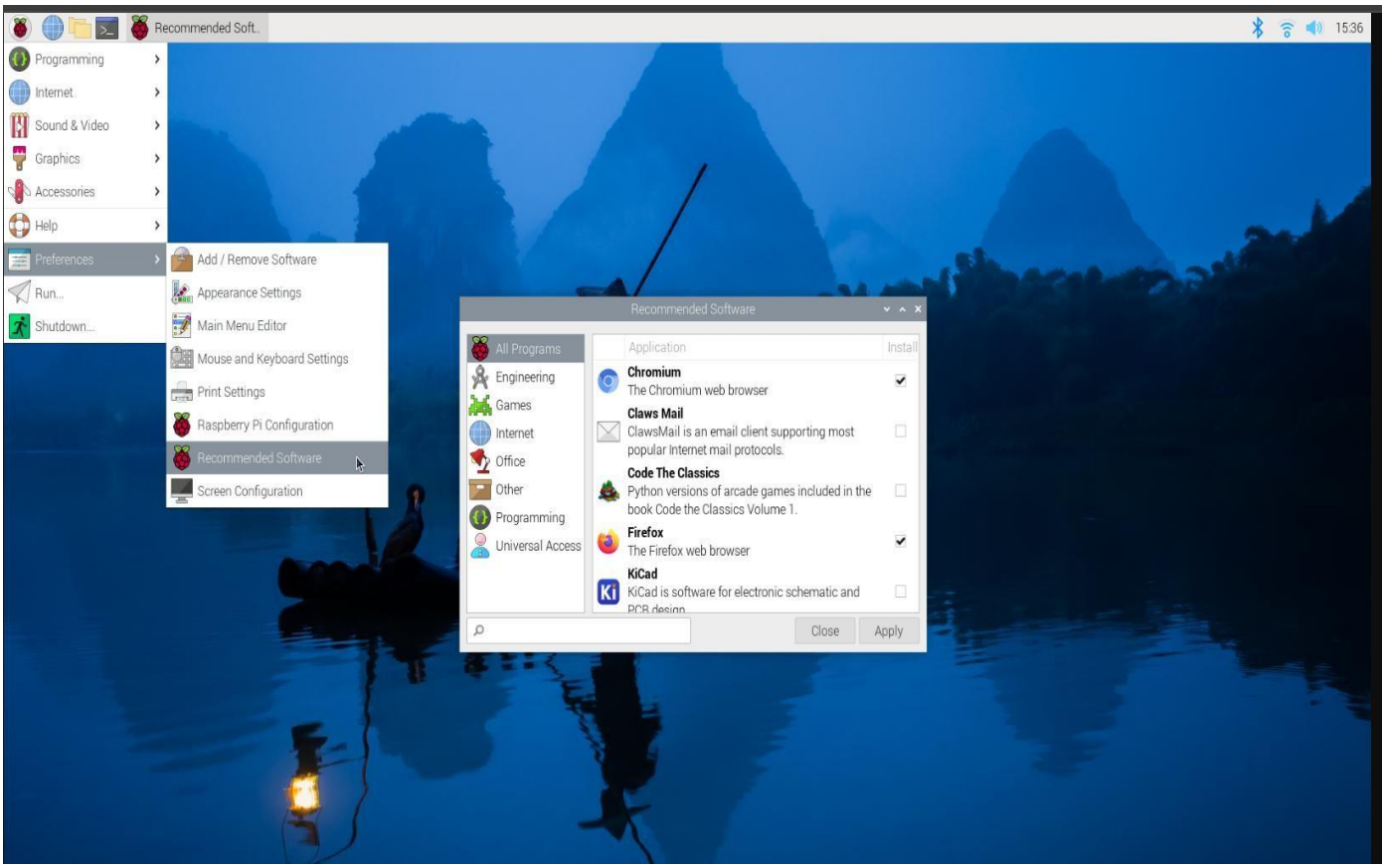
Step 13 :- Complete Setup - A "Setup Complete" message appears, indicating that the Raspberry Pi is ready to use.



Step 14 :- Access Recommended Software - You navigate to the main menu and select "Recommended Software" to browse and install applications.



Step 15 :- Now we can access a menu.

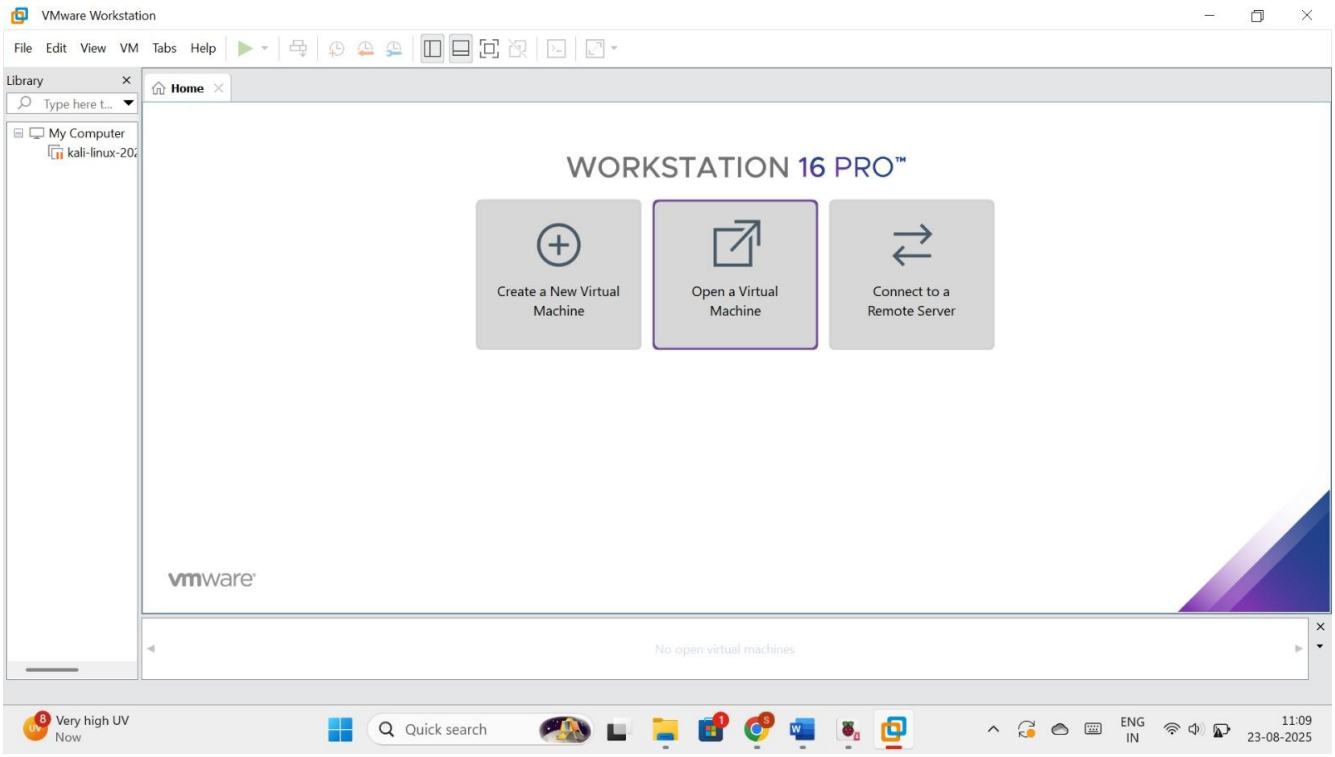


SAMIKSHA HALVE - 14

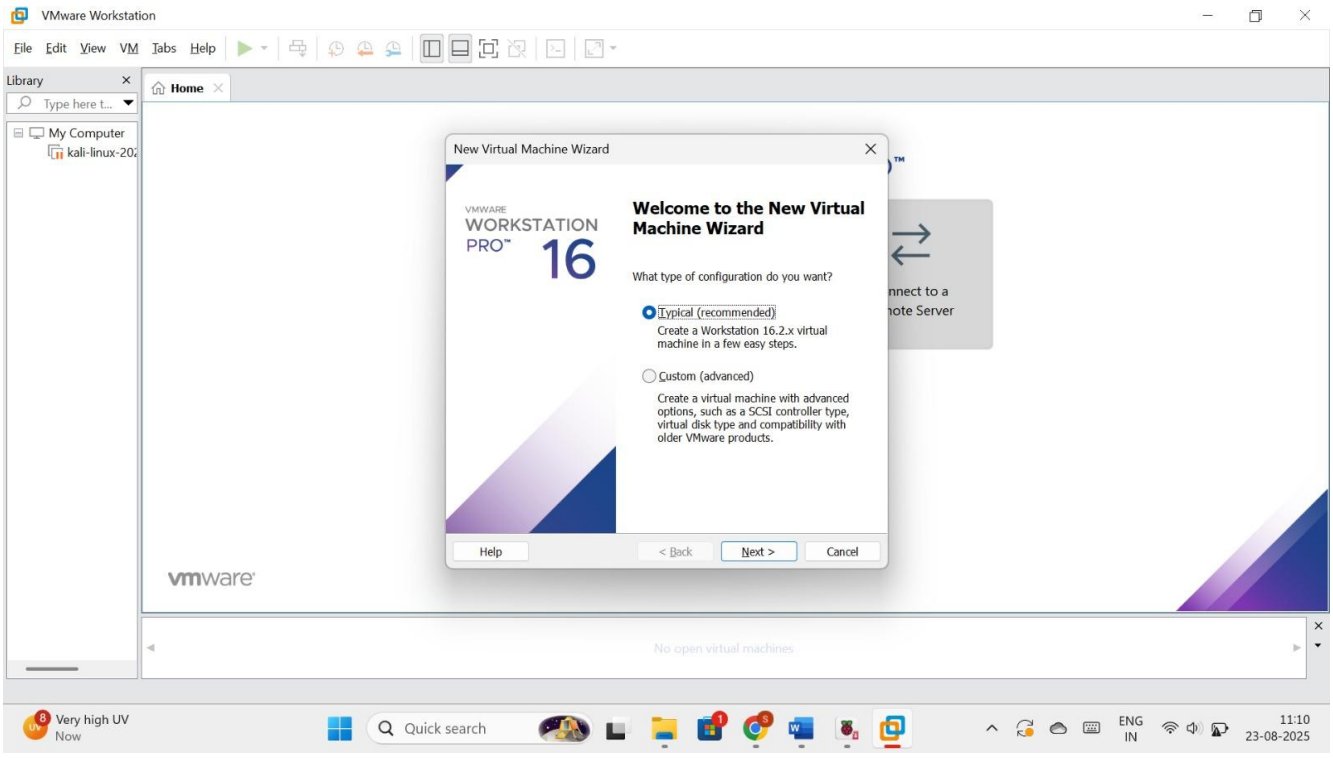
PRACTICAL NO – 3 B

AIM :- Installing Raspbian OS with the help of virtual machine software.

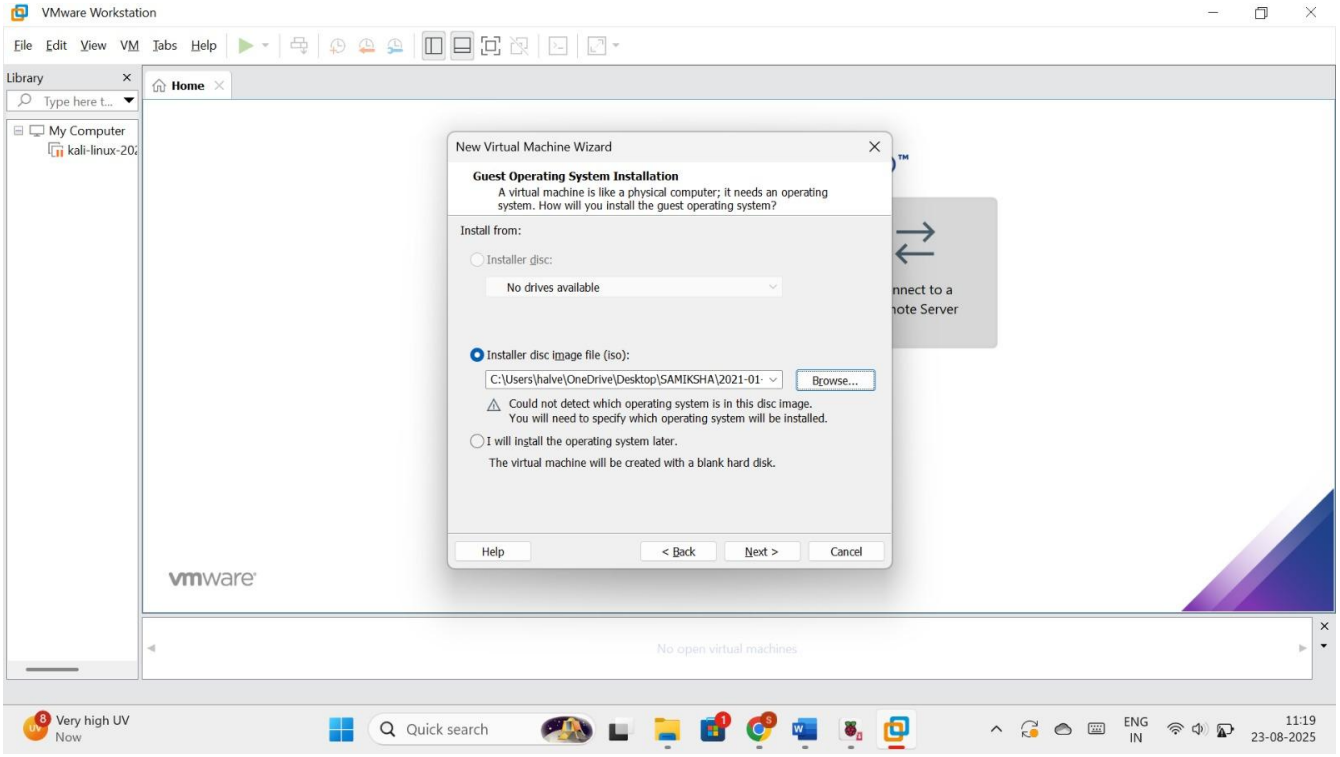
Step 1 :- Open VMware and click on create new virtual machine2.



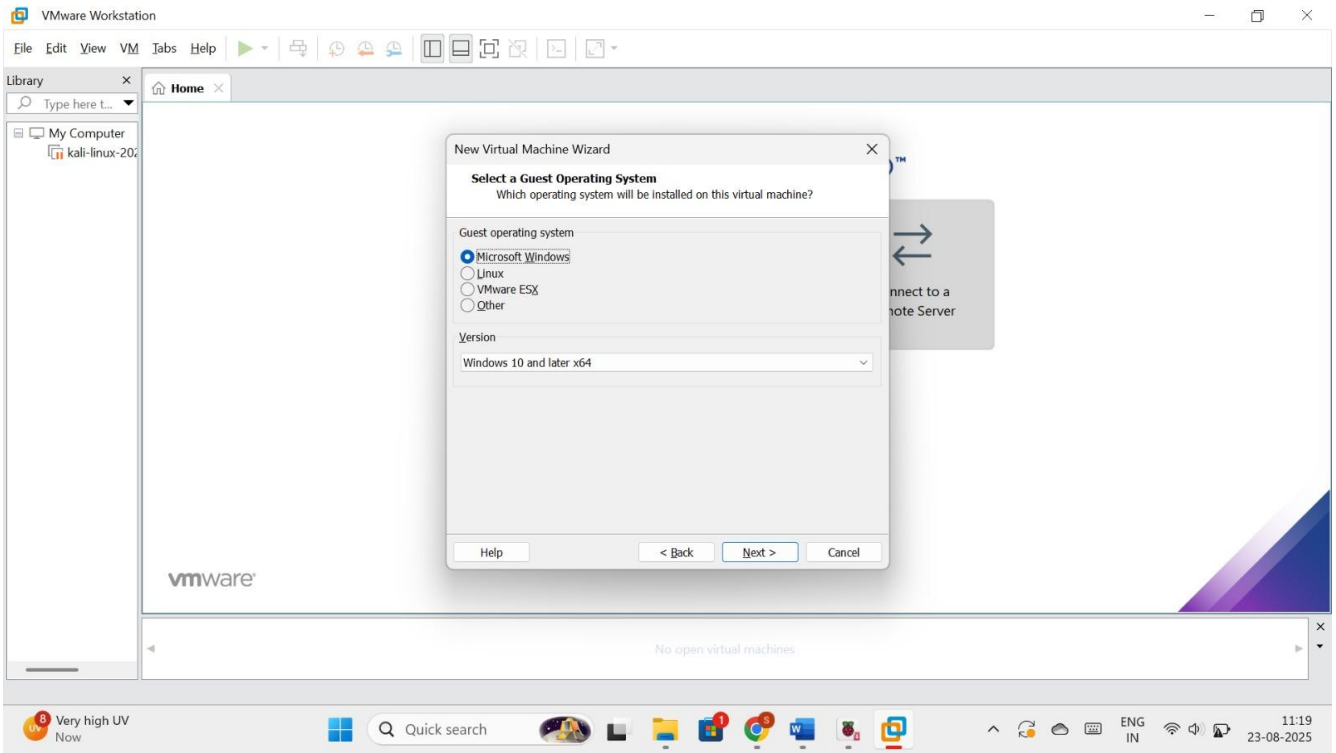
Step 2 :- Now click on Typical and click on the Next button.



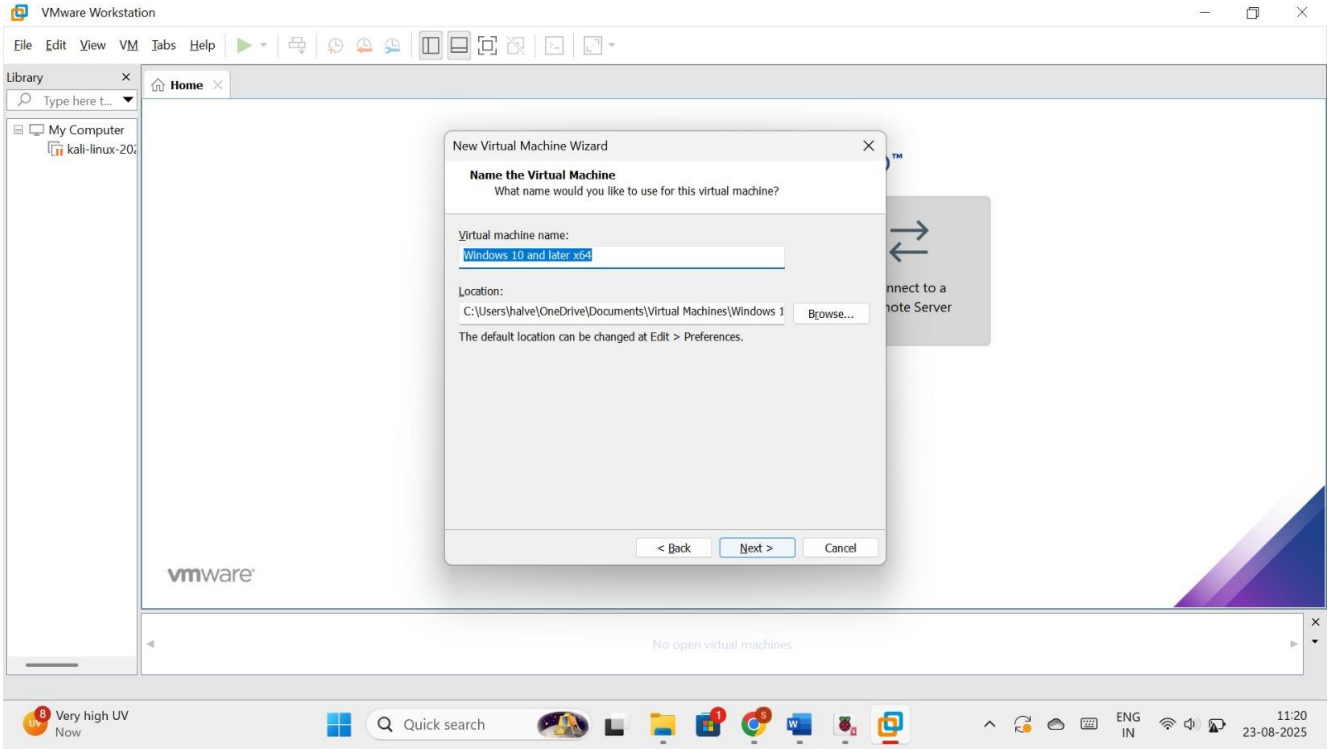
Step 3 :- Then browse the **ISO** file and again hit the next button.



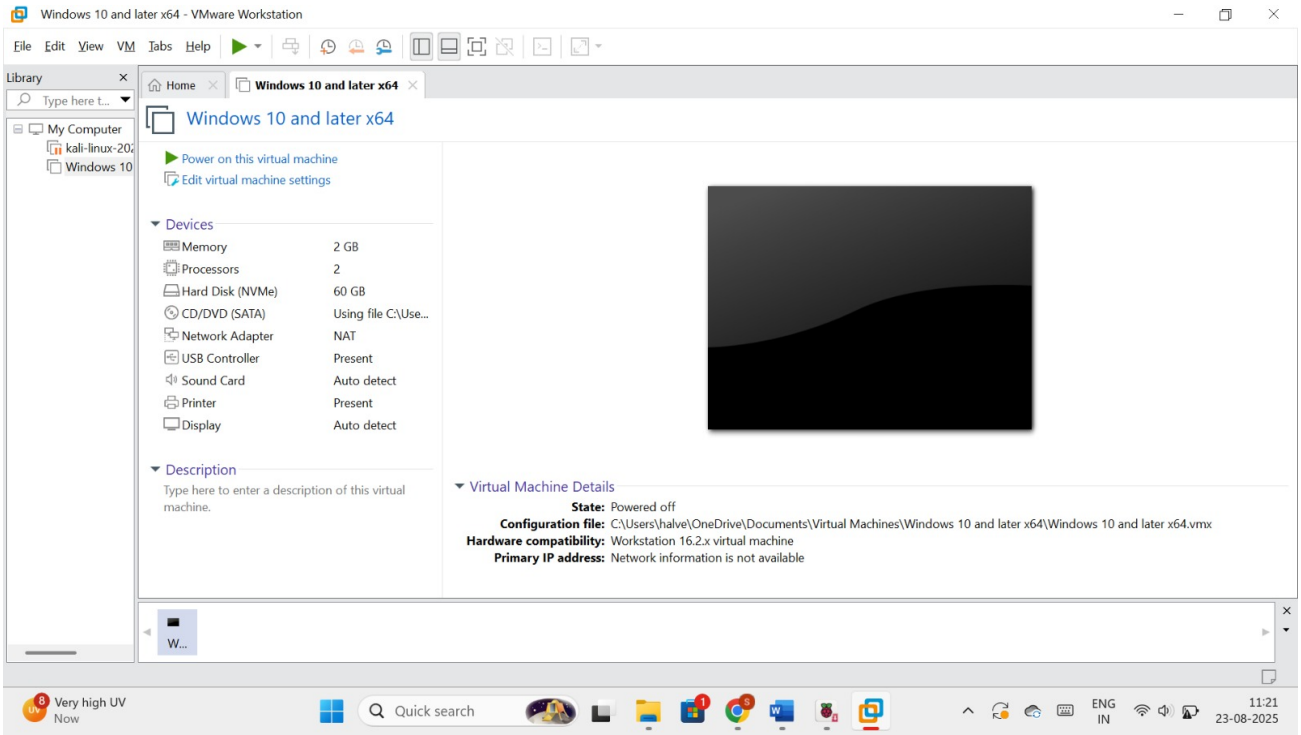
Step 4 :- Click on the Microsoft window and click on the Next button.



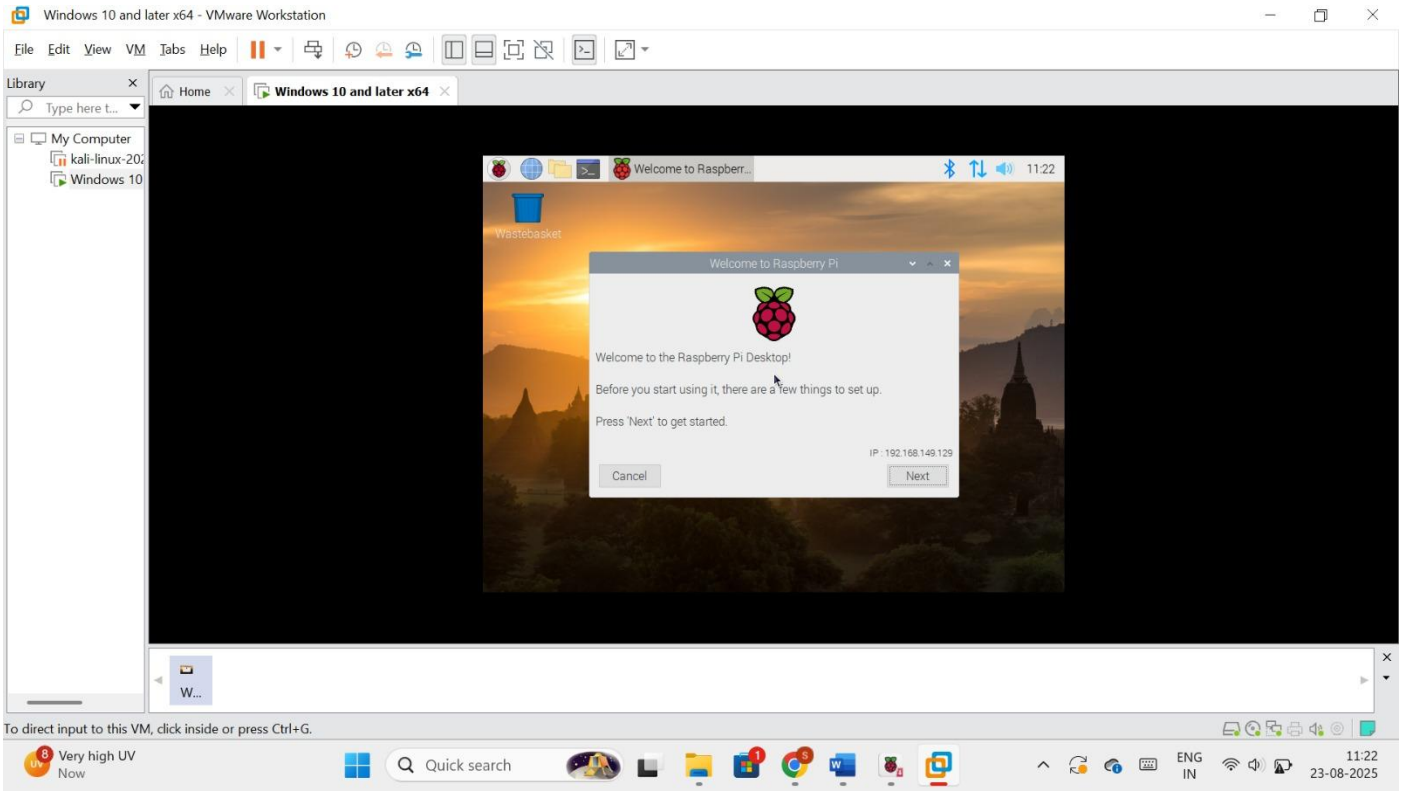
Step 5 :- Name the Virtual Machine - You provide a name for the virtual machine, in this case, "Windows 11 x64.



Step 6 :- Now we automatically redirect on the home interface of the VMware application. Select your machine name and click on the power on this virtual machine. This option is at top left hand side.



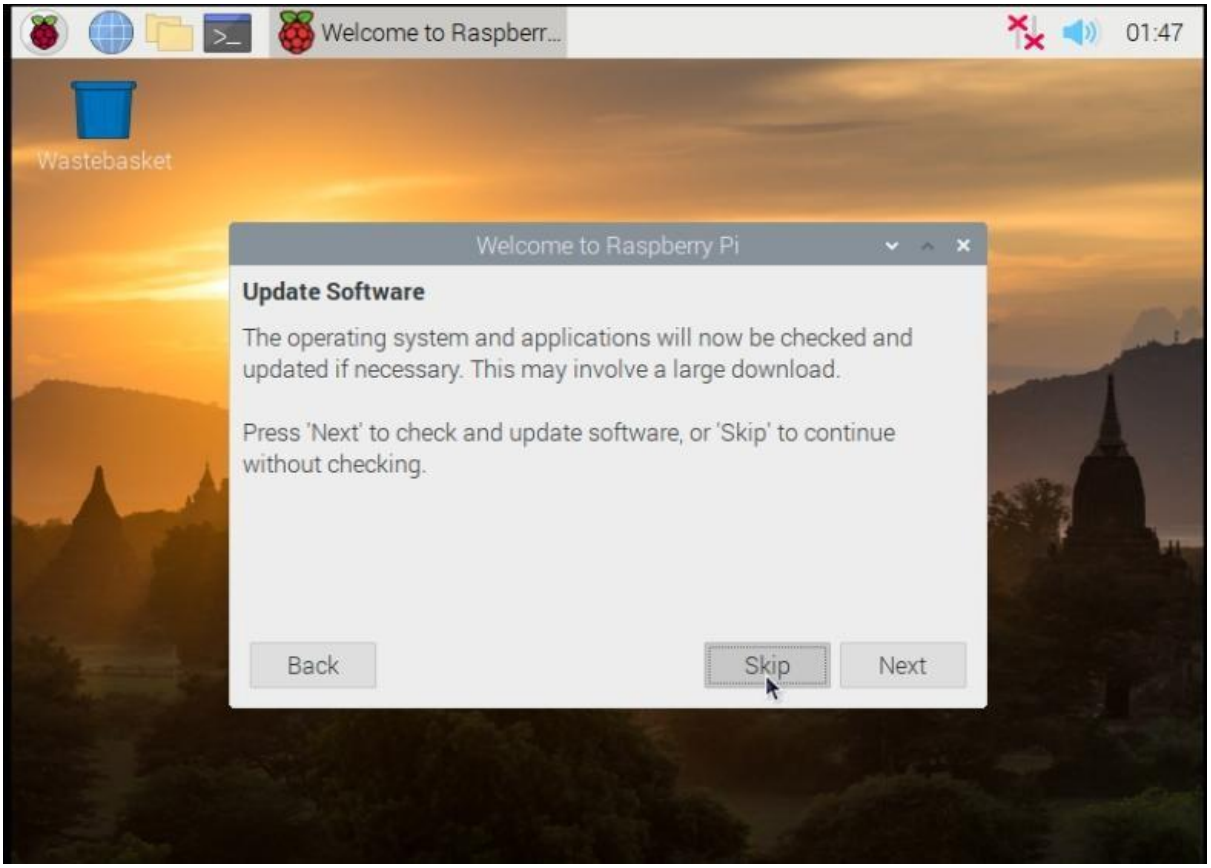
Step 7 :- Now we redirect to the Set-up the Raspbian O.S on the VMware software. Click on the next button.



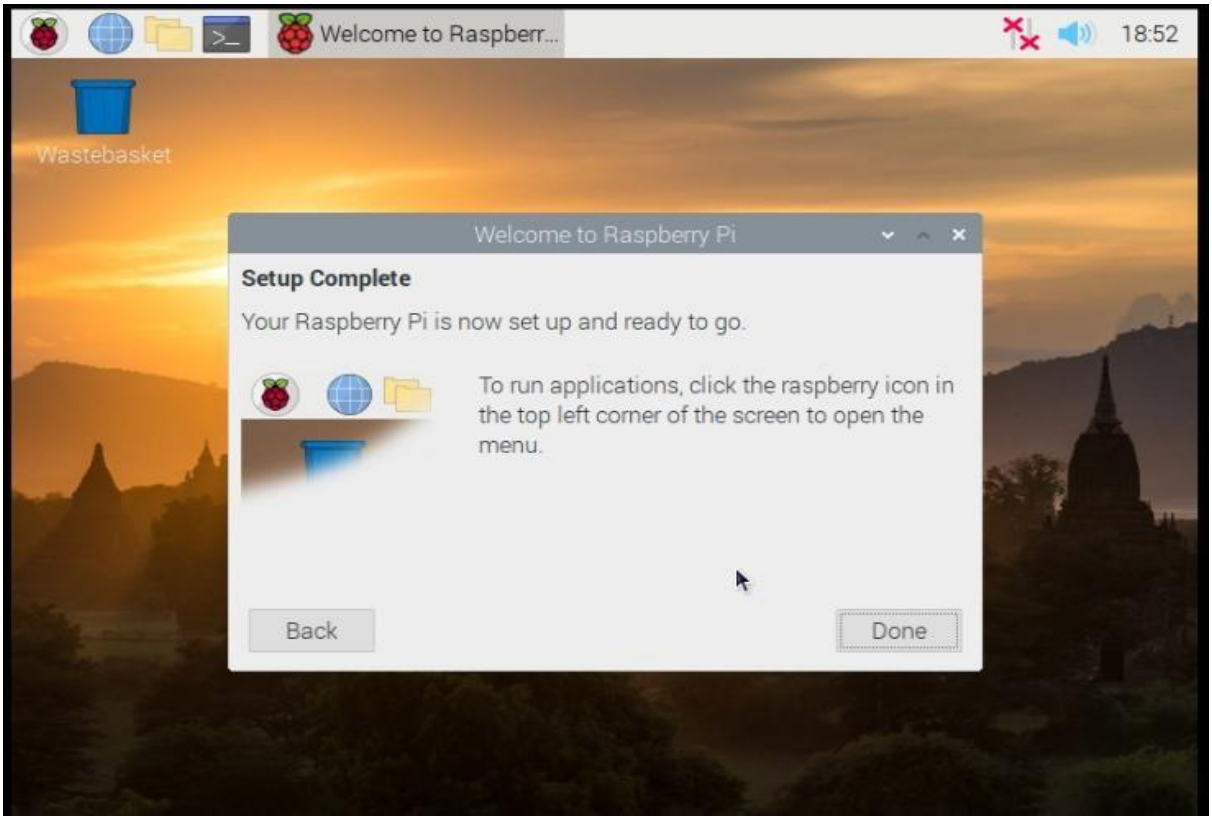
Step 8 :- After clicking on the Next button then click on the both option Use English language and Use U.S keyboard then click on the Next Button.

Step 9 :- I don't want password here so I kept it blanks, if you want your personal password then you can enter the password otherwise, they have their own default password "raspberry". Then click on the Next button.

Step 10 :- I don't want any update right now then I want to choose skip button for the skip the Updates.



Step 11 :- This is the last and the final process of yours installing the Raspbian O.S on your VMware box. Now you get the interface of Setup complete. Click on done button and Enjoy your Raspbian O.S on your VMware box.

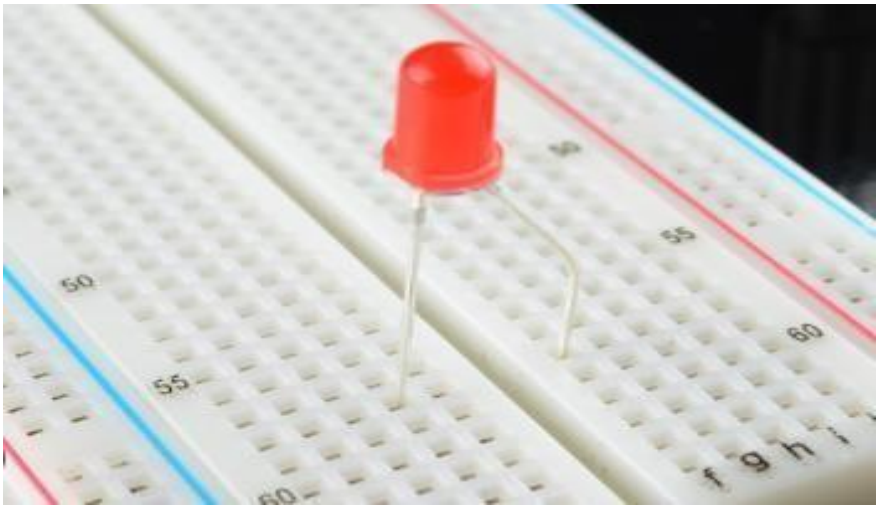


SAMIKSHA HALVE - 14

PRACTICAL NO – 4

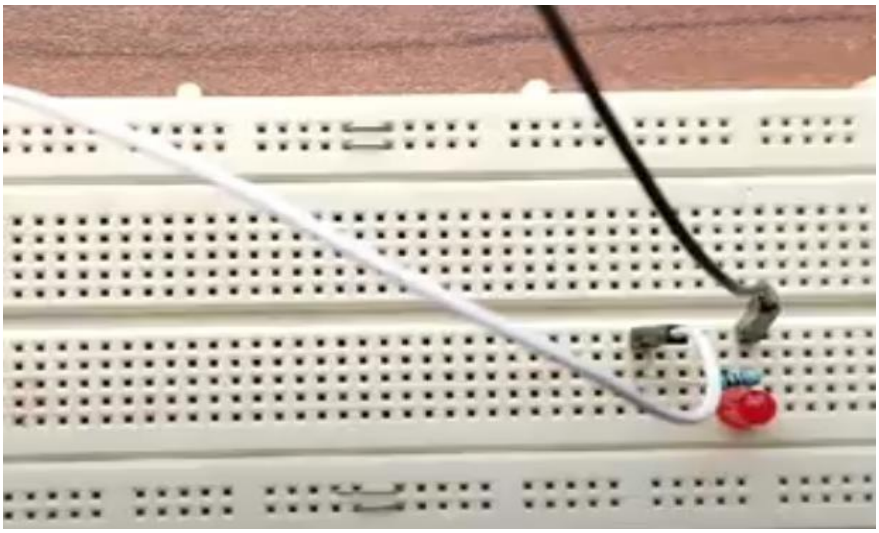
AIM :- Blinking LED using Raspberry Pi.

Step 1 :- Connect LED to breadboard.

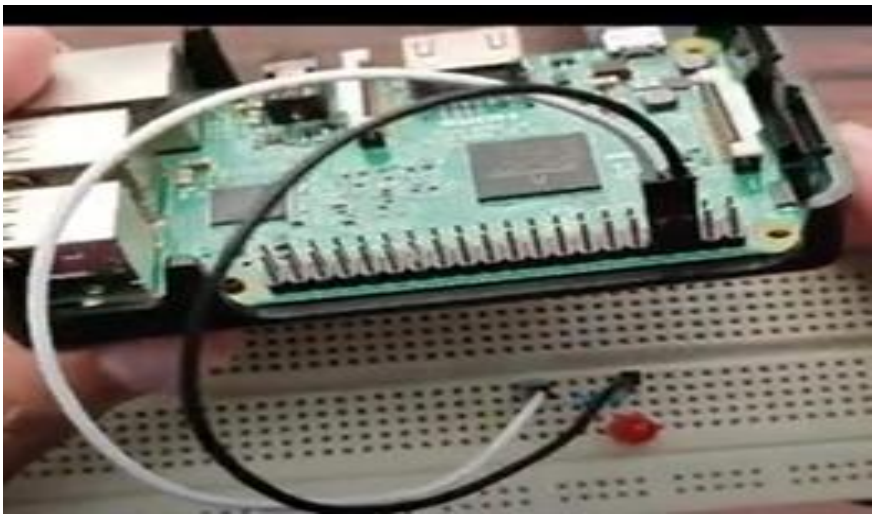


Step 2 :- Connect Resistor on breadboard.

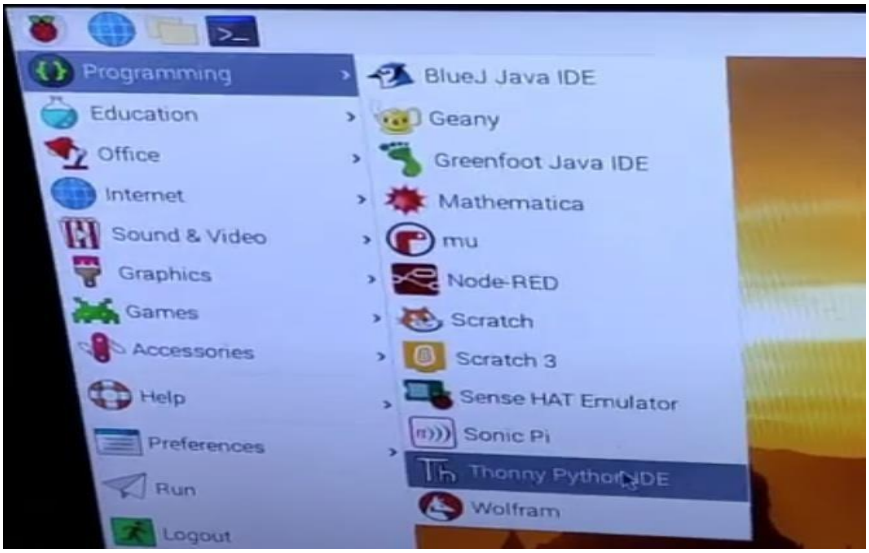
Step 3 :- Connect two jumper wire to breadboard.



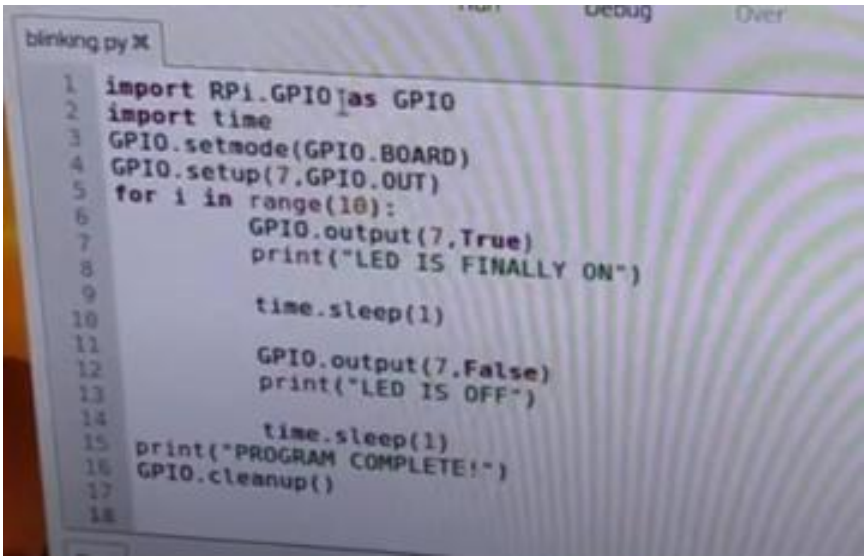
Step 4 :- Connect these jumper wire to Pin 7 and Pin 9 of Raspberry Pi respectively.



Step 5 ;- Open Thonny Python IDE on Raspberry Pi OS.



Step 6 :- Write a code on IDE to blink the LED and Run the code.



SAMIKSHA HALVE - 14

PRACTICAL NO – 5

AIM :- Capturing Images by connecting camera using Raspberry Pi.

Step 1 :- Insert Camera strip into CSI connector and power on the Raspberry Pi.

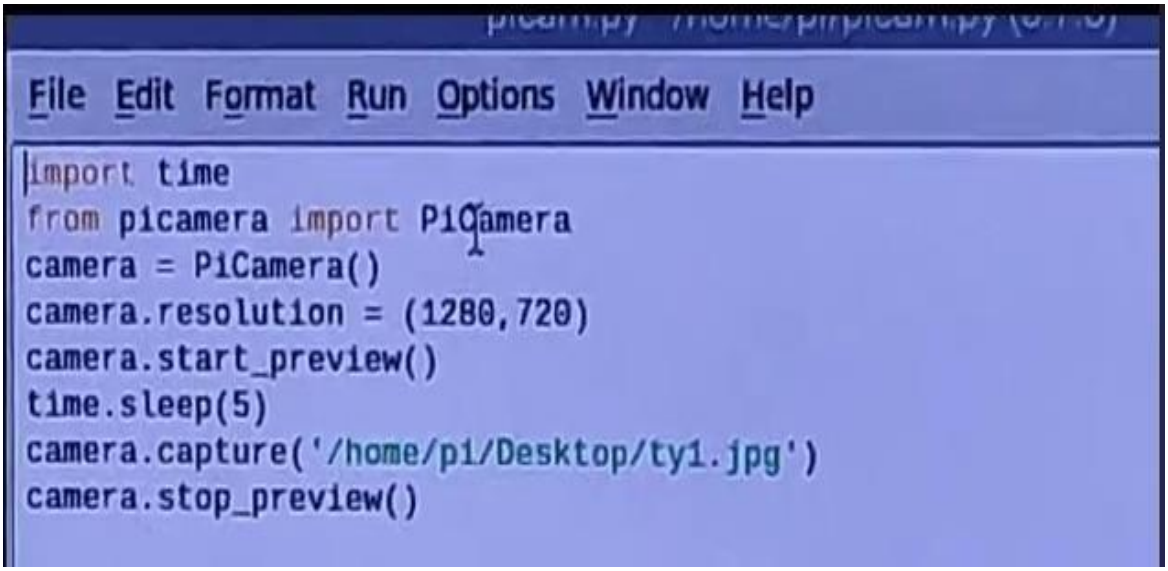
Step 2 :- Install Pip 3 on IDE

Syntax: - sudo apt-get install python3-pip

Step 3: Install "Picamera" library on it

Syntax: - pip3 install picamera

Step 4: Write the Following code on Thonny IDE and run the code.



SAMIKSHA HALVE - 14

PRACTICAL NO – 6

AIM :- Capturing video by connecting camera using Raspberry Pi.

Step 1 :- Insert Camera strip into CSI connector and power on the Raspberry Pi.

Step 2 :- Install Pip 3 on IDE (if don't have)

Syntax: - sudo apt-get install python3-pip

Step 3 :- Install "Picamera" library on it (if don't have)

Syntax: - pip3 install picamera

Step 4 :- Write the following code on python IDE and Run the code.

```
import time
from picamera import PiCamera
camera = PiCamera()
camera.start_preview()
camera.start_recording('/home/pi/Desktop/video1.h264')
camera.wait_recording(5)
camera.stop_recording()
print("Finished Recording")
```

SAMIKSHA HALVE - 14

PRACTICAL NO – 7

AIM :- Interfacing seven segment display with Raspberry Pi.

Step 1:- Connect 4 jumper wires to 4 digit 7-segment display.

Pins of seven segment display:

I. CLK – Clock Pin

II. DIO – Data Input Output Pin

These two pins are used to transfer the data.

III. VCC

IV. GND

These two pins are used to connect the power.

Step 2 :- Connect these pins to GPIO pin of raspberry pi with the help of jumper wire.

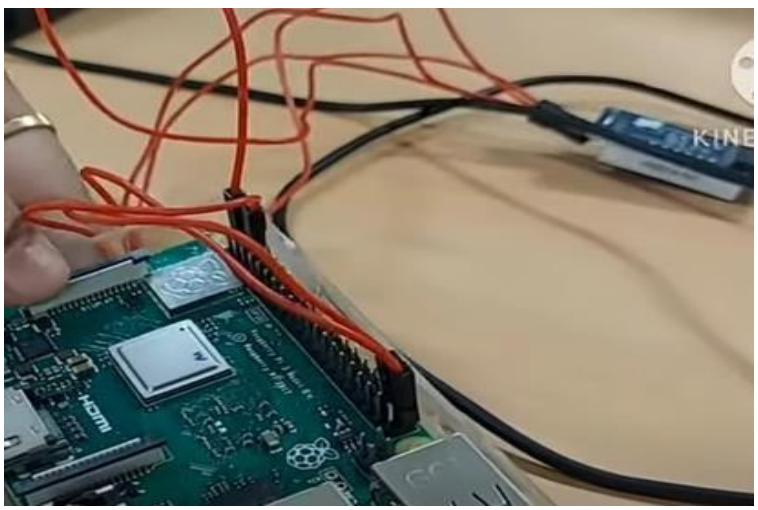
Connections are as follows:

CLK Pin to 40th GPIO pin

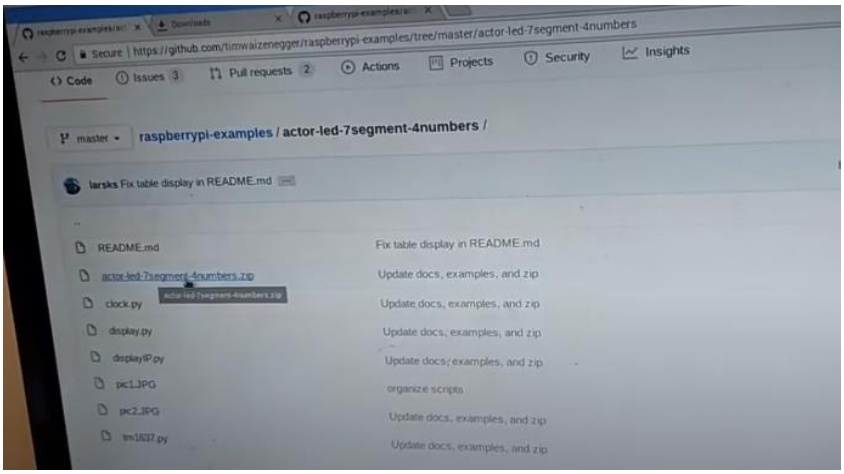
DIO Pin to 38th GPIO pin

VCC Pin to 2nd GPIO pin

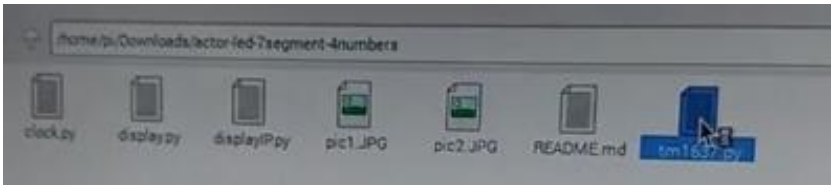
GND Pin to 6th GPIO Pin



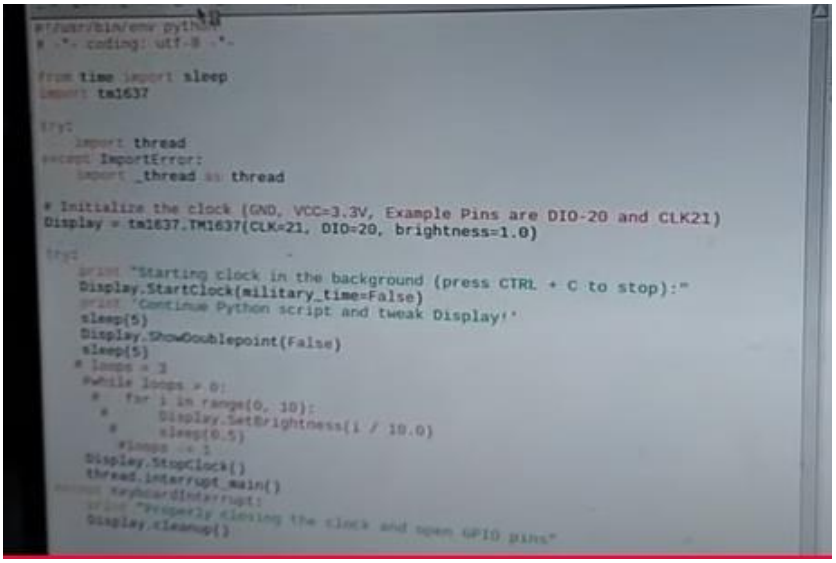
Step 3 :- Download the file required to do operation from github desktop.



Step 4 :- In this folder use package “tm1637” to write the code.



Step 5 :- Write the following Code.



```
from time import sleep
import tm1637

try:
    import thread
except ImportError:
    import _thread as thread

# Initialize the clock (GND, VCC=3.3V, Example Pins are DIO-20 and CLK21)
Display = tm1637.TM1637(CLK=21, DIO=20, brightness=1.0)

try:
    print "Starting clock in the background (press CTRL + C to stop):"
    Display.StartClock(military_time=False)
    print 'Continue Python script and tweak Display!'
    sleep(5)
    Display.ShowDoublepoint(False)
    sleep(5)
    # loops = 3
    #while loops > 0:
    #    for i in range(0, 10):
    #        Display.SetBrightness(i / 10.0)
    #        sleep(0.5)
    #    loops -= 1
    Display.StopClock()
    thread.interrupt_main()
except KeyboardInterrupt:
    print "Properly closing the clock and open GPIO pins"
    Display.cleanup()
```

Step 6 :- Run the code the will display on seven segment display screen.