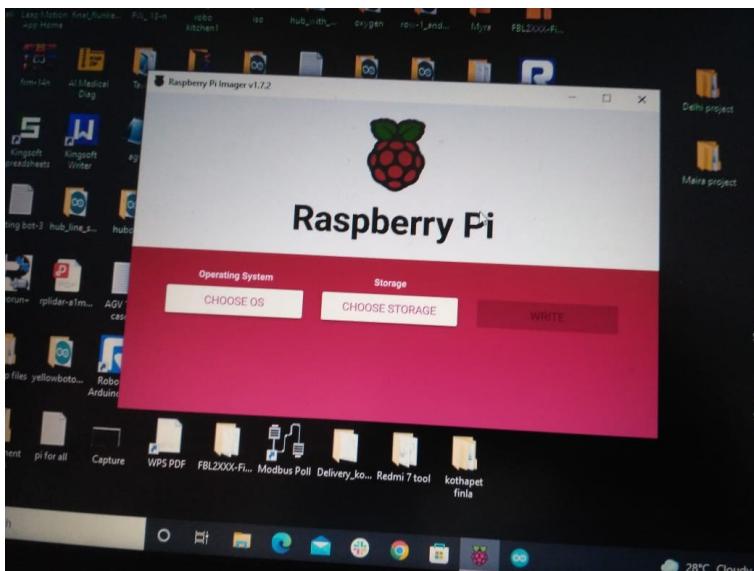


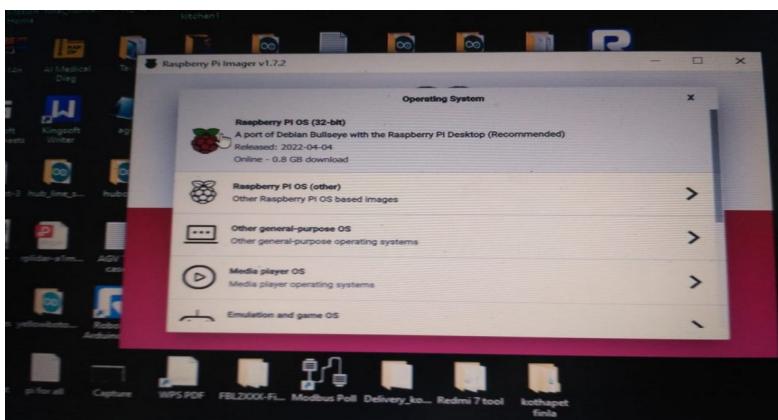
Installation Document

1. Rpi Imager

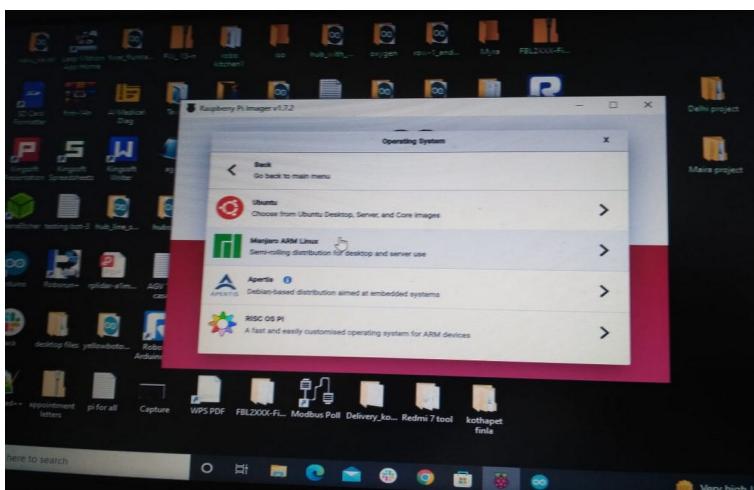
- Open Rpi imager, select the OS and flash it. (follow the below steps)



- Click on the **CHOOSE OS** option



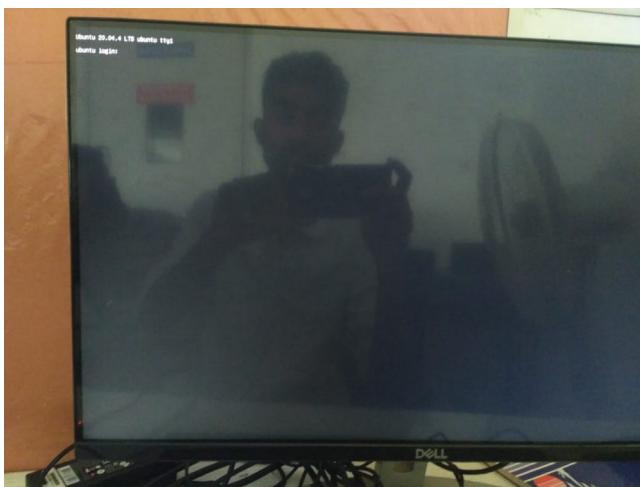
- Click on the **Other general-purpose OS**



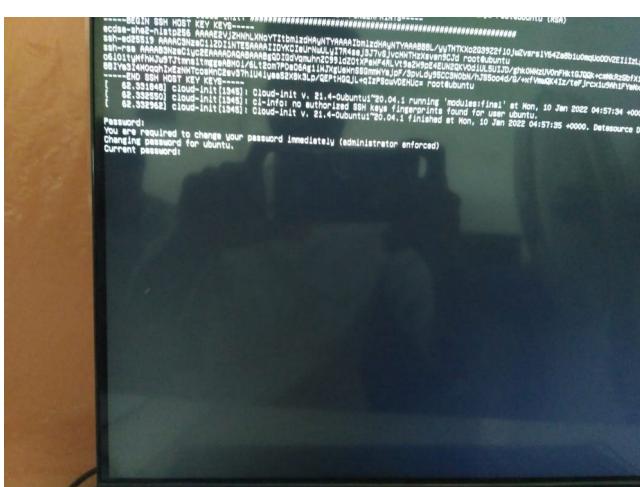
- Click on the Ubuntu and Select **Ubuntu Server 20.04.4 LTS(RPi 3/4/400) with 64-bit server OS**
 - Click on the storage option and select memory card location(128GB memory card)
 - Click on the **WRITE**
 - Wait for the process to complete

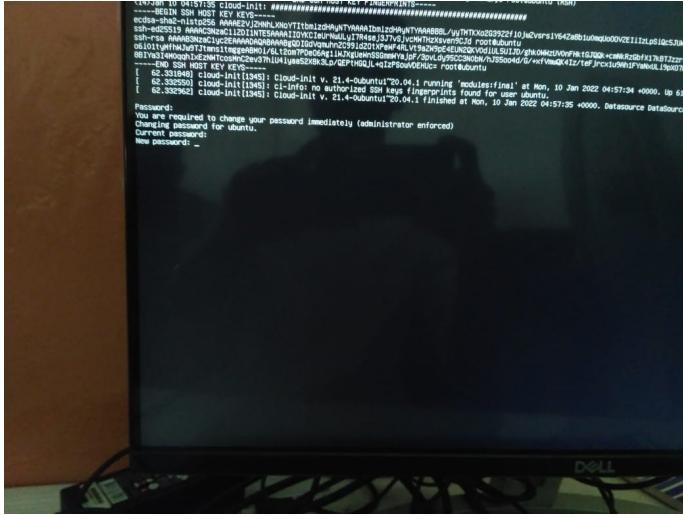
2. Desktop Installation

- Remove the memory card from the laptop and place Rpi4 memroy card slot. Connect to the monitor using Rpi4 Hdmi cable.
 - when Rpi4 booting is completed. login window will come. you need to enter login name and password.
 - **Enter ubuntu login:ubuntu**
 - **password:ubuntu**



- Change the password.
new password:**welcome1**(for all autonomous bots(flunkey))





- First you need update. Type the following command

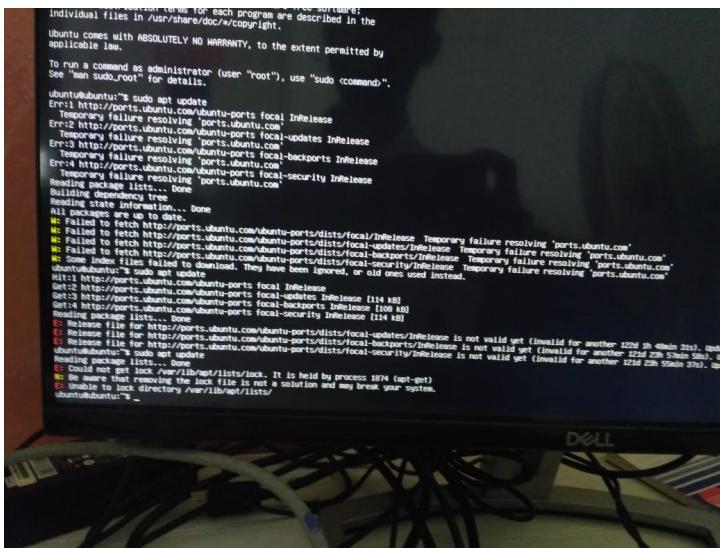
`sudo apt update`

- If update process is completed. then you need to upgrade it. if any errors occurs follow the below procedure to solve it.

ERRORS LIKE:

- If any reference if you don't understand follow the below link for these errors.

<https://itsfoss.com/could-not-get-lock-error/>



- Type the below commands to solve the errors.

`sudo rm /var/lib/apt/lists/lock`

`sudo rm /var/cache/apt/archives/lock`

`sudo rm /var/lib/dpkg/lock`

- After that type below command for upgrade

sudo apt upgrade

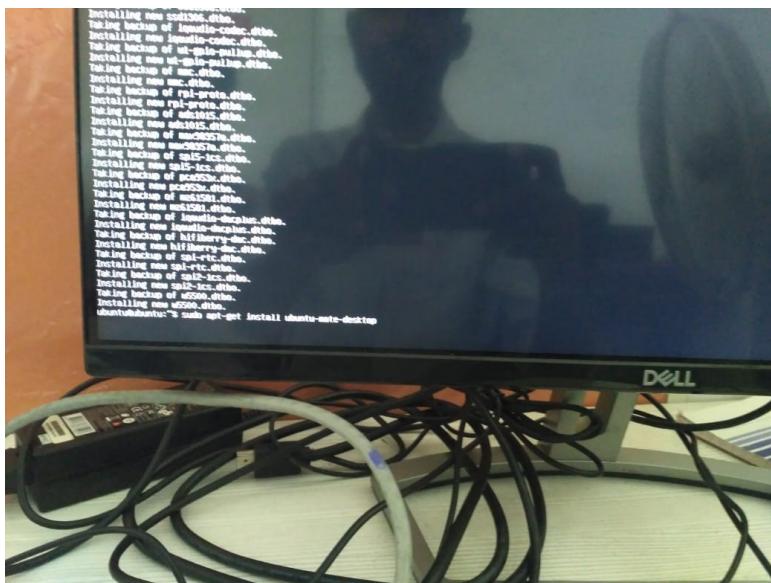
- If any errors comes in upgrade process.type below command

sudo rm /var/lib/dpkg/lock-frontend

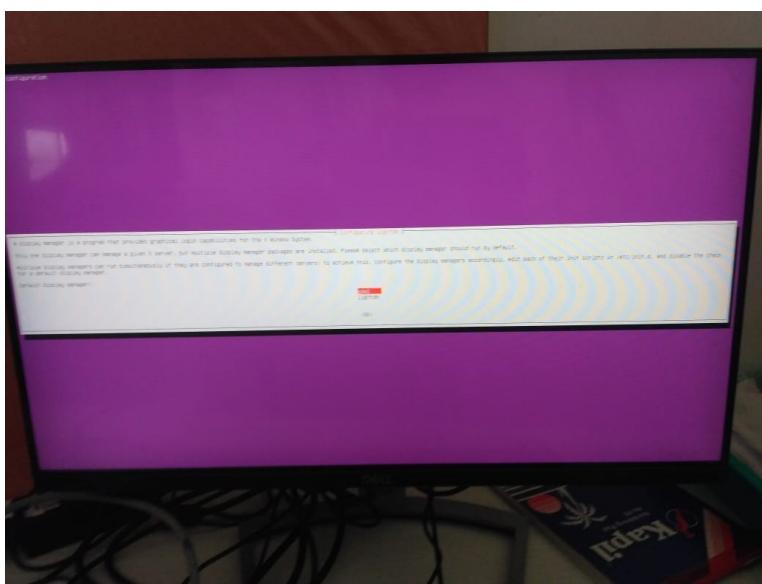
sudo dpkg --configure -a

- You need install desktop environment for that type below command

sudo apt-get install ubuntu-mate-desktop



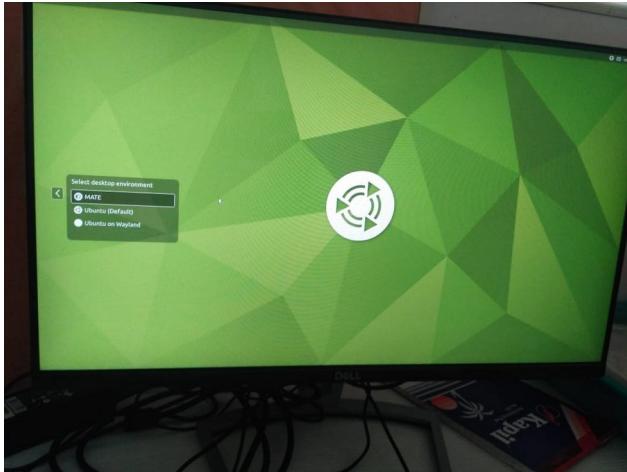
- In installation process you will get two options for GUI creation. Select **lightdm** option.



- After installation process completed.then type below to command get desktop or you can power off and power on the rpi4

startx

- You will get a window like this



- Enter login password(welcome1) to open login

3. Remove the Multiple desktop environment

- If you any doubt regarding removing the multiple desktop environment please follow the these link.

<https://www.youtube.com/watch?v=jfpBxSWMdIE>

- When we install Ubuntu20.04, another desktop environment will also get installed automatically. But it is not suitable for us. So we are installing ubuntu mate desktop. We need to remove ubuntu desktop from the system. Follow the below the steps to remove the desktop environment.
- Open terminal and change the directory to see the desktop environments. type below command terminal.

cd /usr/share/xsessions/

- You are in that directory. To find the desktop environments, type the below command.

ls

- You will get a window like this



- To remove ubuntu.desktop file type the below command

```
sudo rm ubuntu.desktop
```

- After that if restart the pi4 you will get a screen like this.

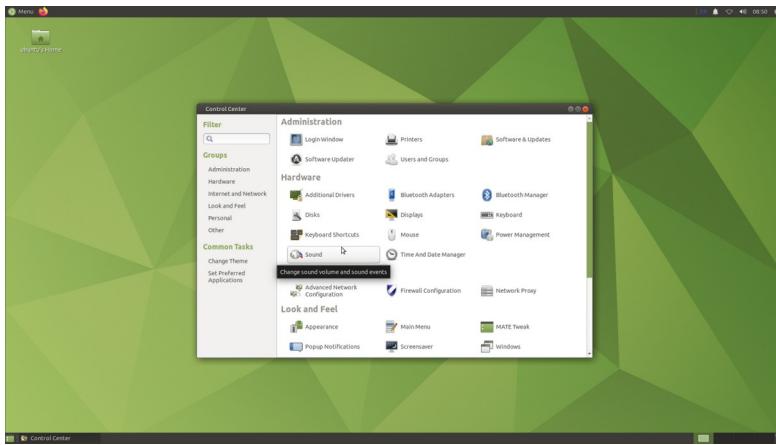


4. Auto-login

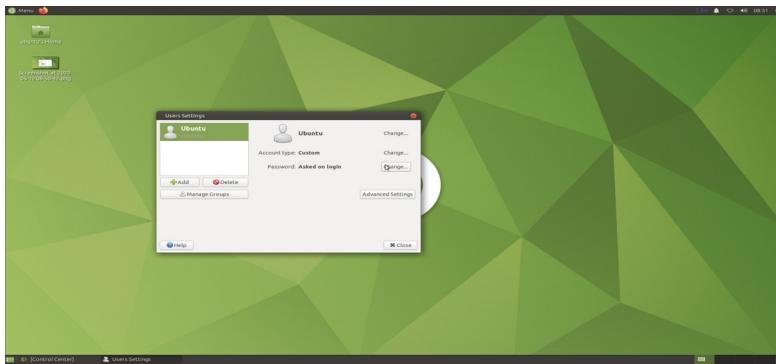
- If you any doubt regarding these. follow the below link.

<https://forum.odroid.com/viewtopic.php?t=25595>

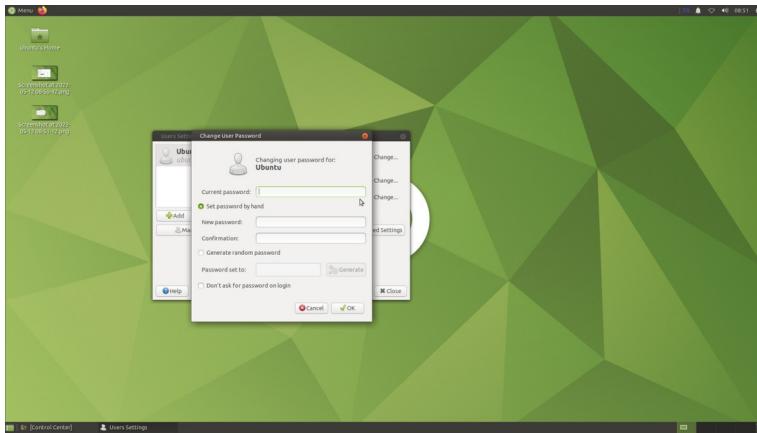
- The system should be unlocked when we do on booting. that is why we need to create auto login.
- First go to settings -> user and groups

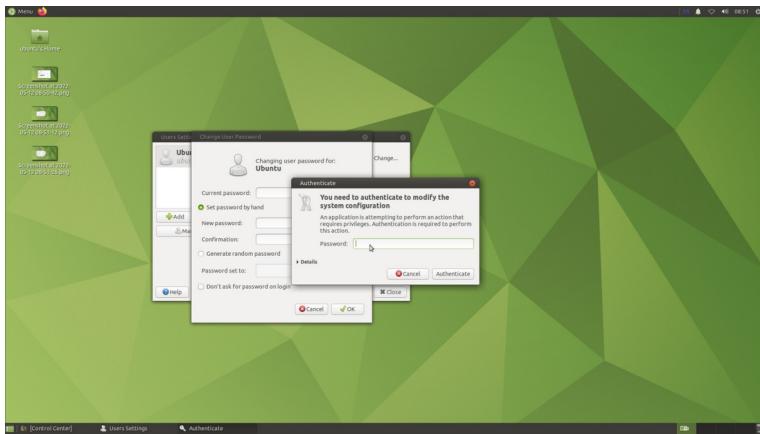


- Click on the user and groups, then one window will pop up.



- Click on the **password: asked on login -> change** button. after one window will pop up. Click on **don't ask for password on login** and you need enter the password(welcome1) for changes.

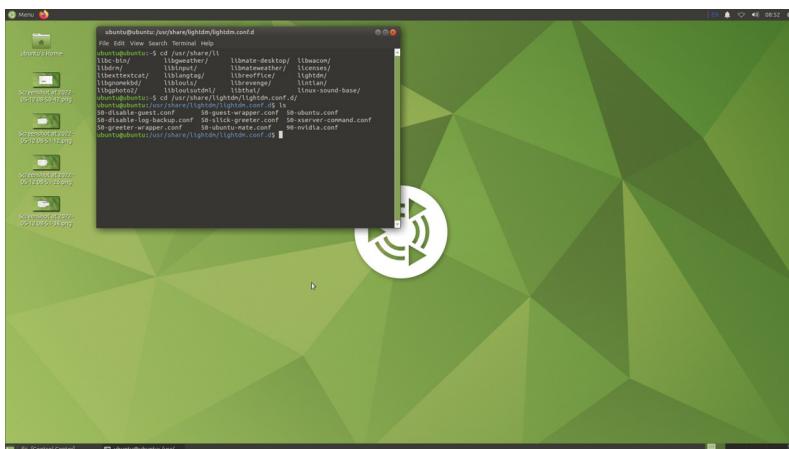




- Open a terminal and change the directory using below command line.

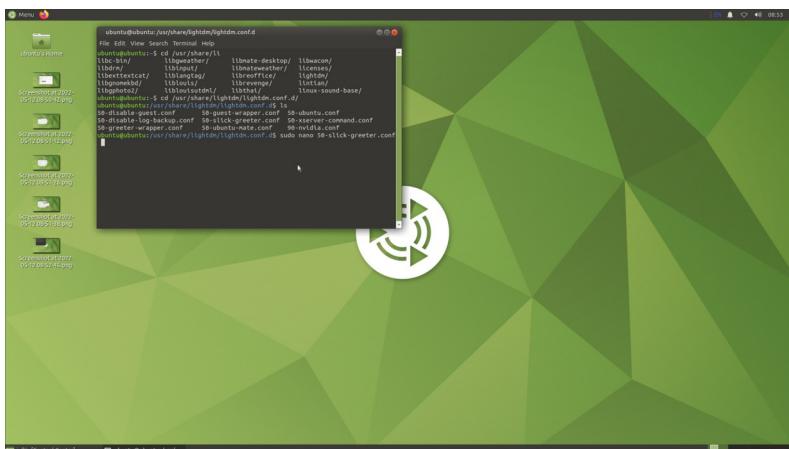
cd /usr/share/lightdm/lightdm.conf.d/

- To see the list of files in that type **ls** command in the terminal



- open the 50-slick-greeter.conf file using below command

sudo nano 50-slick-greeter.conf



- Add below line in that file and save the file by using **Ctrl+x**

autologin-user=ubuntu

- After that restart the system then you directly get main window page.



5. ROS Installation

- Follow the below link for installing ROS

<http://wiki.ros.org/noetic/Installation/Ubuntu>

- We are going install ros noetic. ubuntu 20.04 is supports ros noetic. please follow the below steps for noetic installation.
- open the terminal

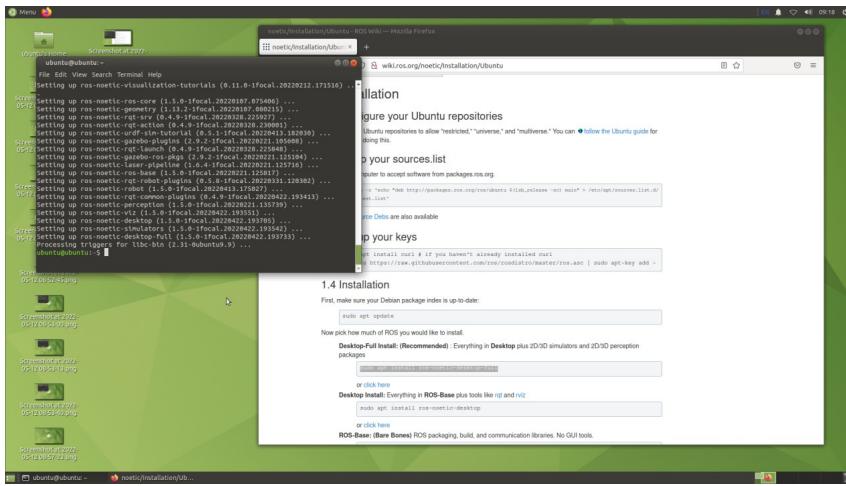
```
sudo sh -c 'echo "deb http://packages.ros.org/ros/ubuntu $(lsb_release -sc) main" > /etc/apt/sources.list.d/ros-latest.list'
```

```
sudo apt install curl # if you haven't already installed curl
```

```
curl -s https://raw.githubusercontent.com/ros/rosdistro/master/ros.asc | sudo apt-key add -
```

```
sudo apt update
```

```
sudo apt install ros-noetic-desktop-full
```

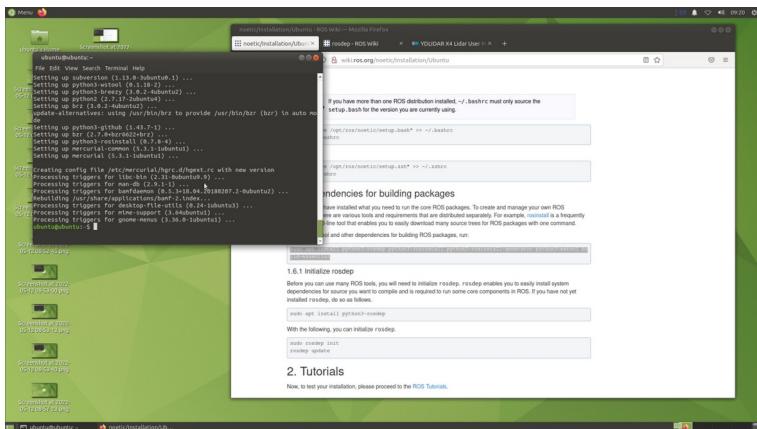


```
source /opt/ros/noetic/setup.bash
```

```
echo "source /opt/ros/noetic/setup.bash" >> ~/.bashrc
```

```
source ~/.bashrc
```

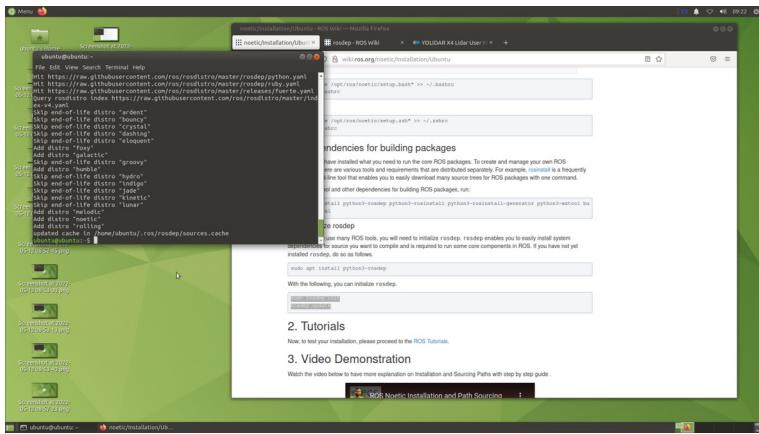
```
sudo apt install python3-rosdep python3-rosinstall python3-rosinstall-generator python3-wstool build-essential
```



```
sudo apt install python3-rosdep
```

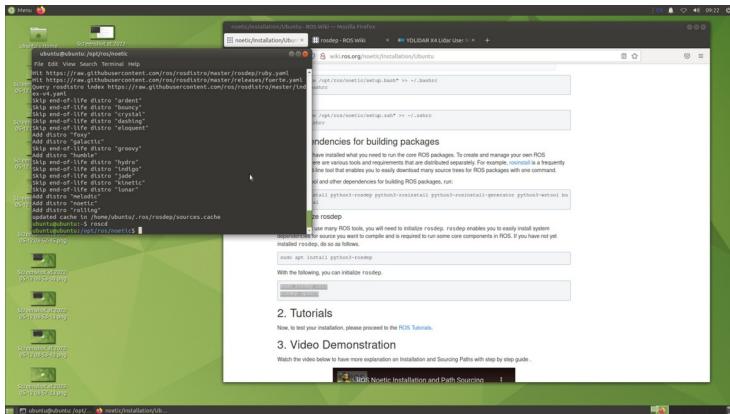
```
sudo rosdep init
```

```
rosdep update
```



- ROS noetic installation is completed. If you want check ros installation type below in terminal.

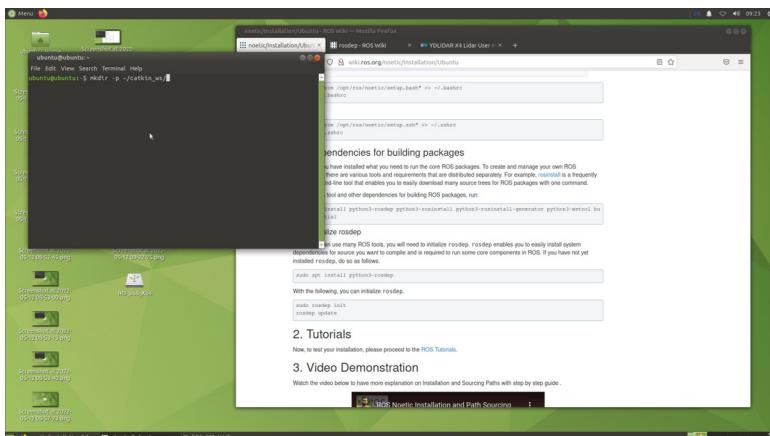
roscore



6. Create workspace

- To create workspace type below the commands in terminal

mkdir -p ~/catkin_ws/



```
cd catkin_ws
catkin_make
cd
sudo nano ~/.bashrc
```

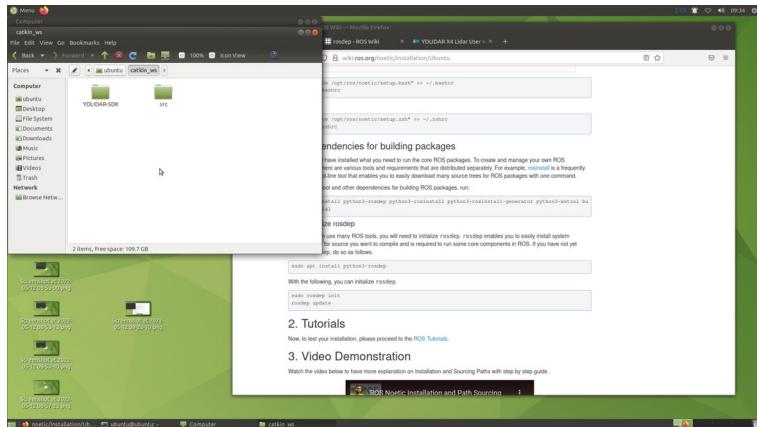
- Enter the below lines of code to source the workspace

```
source ~/catkin_ws/devel/setup.bash
```

- Save the baschrc file (CTRL+x)
 - Close all the terminals and open a new one

7. Copying src folder and Ydlidar-SDK from pendrive(blue-office) into src folder

- In blue color pendrive (office) noetic folder is there. in that src folder and ydlidar-SDK folder copy that and paste in the workspace in the rpi4.



8. Installing Ydlidar-SDK

(Reference (Page no :11) :

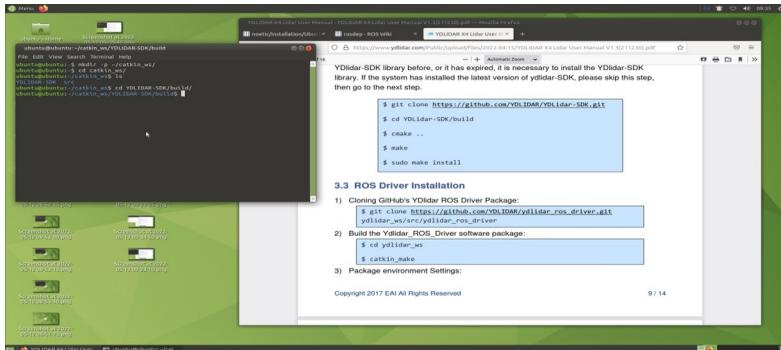
[https://www.ylidar.com/Public/upload/files/2022-04-15/YDLIDAR%20X4%20Lidar%20User%20Manual%20V1.3\(211230\).pdf](https://www.ylidar.com/Public/upload/files/2022-04-15/YDLIDAR%20X4%20Lidar%20User%20Manual%20V1.3(211230).pdf)

- Open terminal go to catkin_ws using below command

```
cd catkin_ws
```

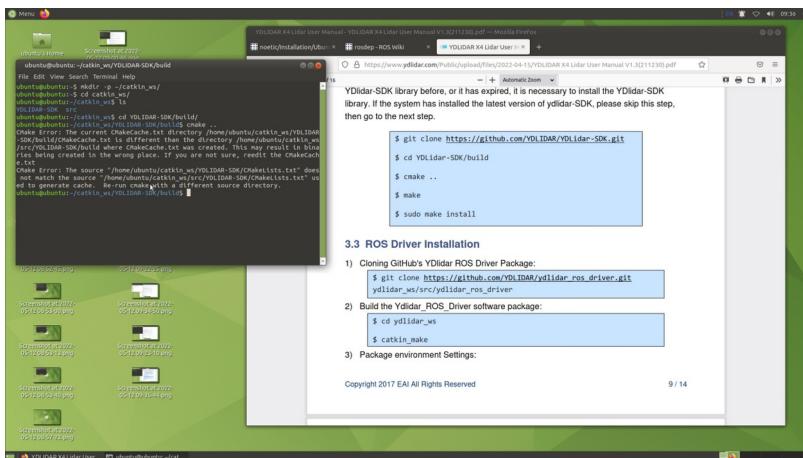
- Check the folders by using **ls** command
- Go to the Ydlidar-SDK folder by using below command

cd YDLidar-SDK/build

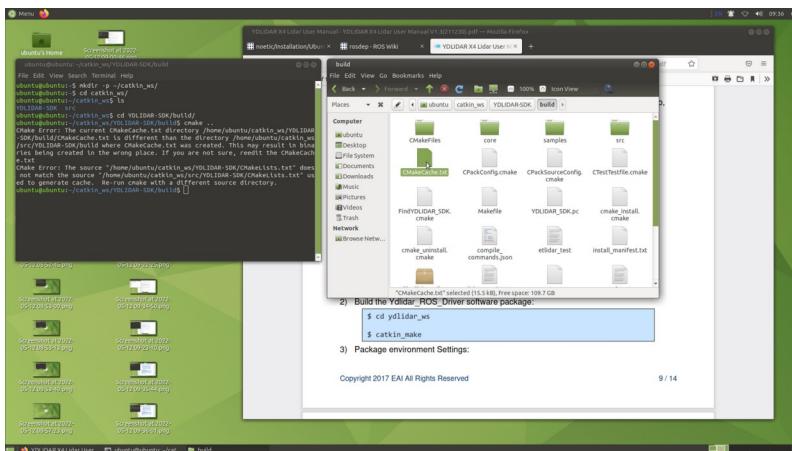


- Type below command to cmake

cmake ..



- When doing cmake it you will get some errors so go to YDLidar-SDK/build folder and delete **CMakeCache.txt** file



- Then again type cmake .. command to complete the installation process. After that you can see output like this.

```

$ git clone https://github.com/YDLIDAR/YDLidar-SDK.git
$ cd YDLidar-SDK/build
$ cmake ..
$ make
$ sudo make install

```

3.3 ROS Driver Installation

- 1) Cloning GitHub's YDLidar ROS Driver Package:
\$ git clone https://github.com/YDLIDAR/ydlidar_ros_driver.git
ydlidar_ws/src/ydlidar_ros_driver
- 2) Build the Ydlidar_ROS_Driver software package:
\$ cd ydlidar_ws
\$ catkin_make
- 3) Package environment Settings:

- Type the below command to make

make

```

$ git clone https://github.com/YDLIDAR/YDLidar-SDK.git
$ cd YDLidar-SDK/build
$ cmake ..
$ make
$ sudo make install

```

3.3 ROS Driver Installation

- 1) Cloning GitHub's YDLidar ROS Driver Package:
\$ git clone https://github.com/YDLIDAR/ydlidar_ros_driver.git
ydlidar_ws/src/ydlidar_ros_driver
- 2) Build the Ydlidar_ROS_Driver software package:
\$ cd ydlidar_ws
\$ catkin_make
- 3) Package environment Settings:

- Type below command for make install. ydlidar-sdk installation process is completed.

sudo make install

```

$ git clone https://github.com/YDLIDAR/YDLidar-SDK.git
$ cd YDLidar-SDK/build
$ cmake ..
$ make
$ sudo make install

```

3.3 ROS Driver Installation

- 1) Cloning GitHub's YDLidar ROS Driver Package:
\$ git clone https://github.com/YDLIDAR/ydlidar_ros_driver.git
ydlidar_ws/src/ydlidar_ros_driver
- 2) Build the Ydlidar_ROS_Driver software package:
\$ cd ydlidar_ws
\$ catkin_make
- 3) Package environment Settings:

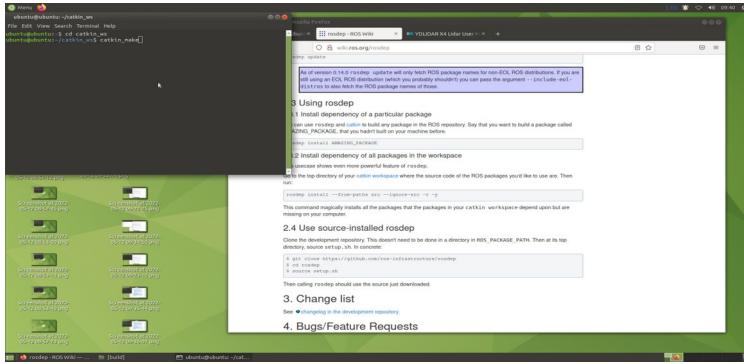
9. catkin_make (<http://wiki.ros.org/rosdep>)

- Open a terminal and change the directory using below command

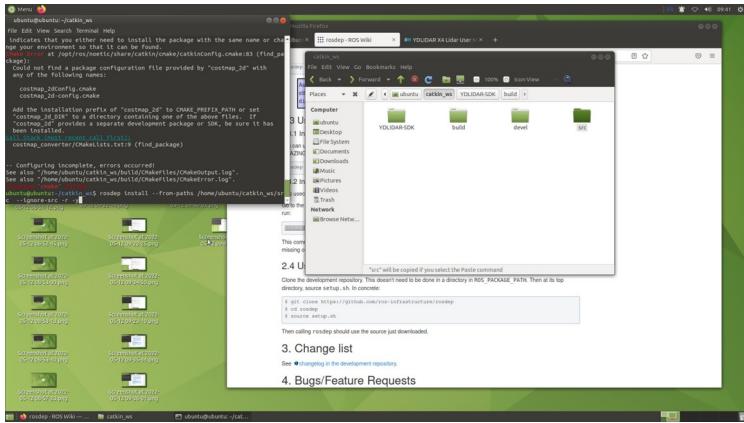
```
cd catkin_ws
```

- For catkin_make type below command

```
catkin_make
```

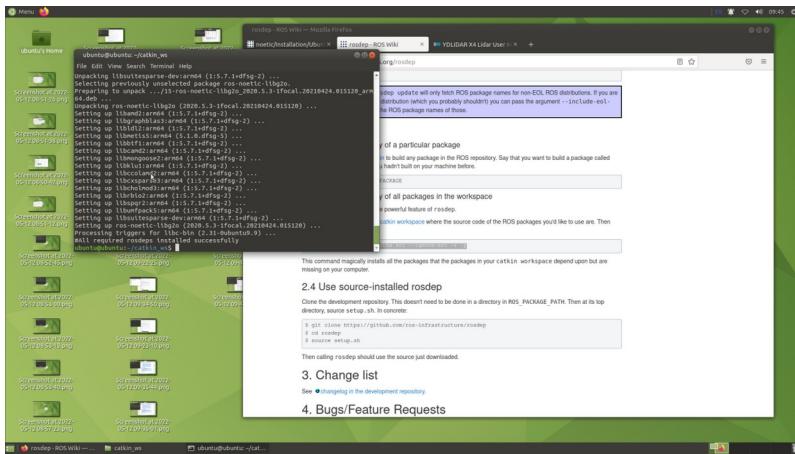


- When doing catkin_make you will get some errors



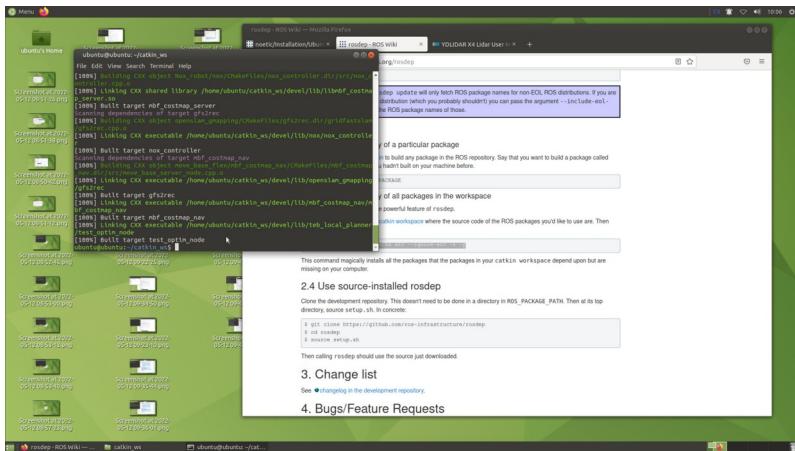
- There are dependencies packages to install to solve the catkin_make errors. Type below command

```
rosdep install --from-paths /ubuntu/catkin_ws/src --ignore-src -r -y
```



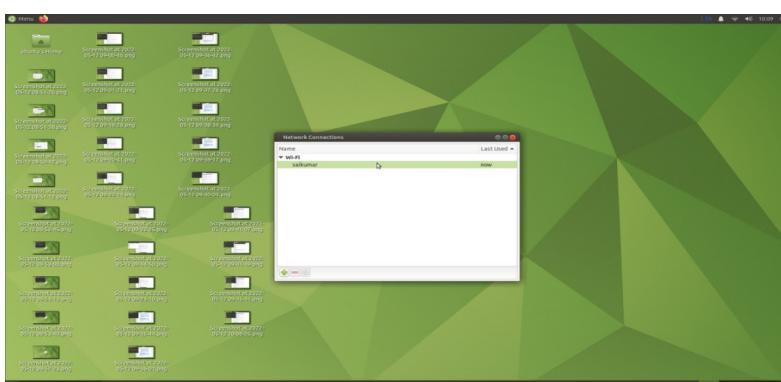
- Dependency packages are installed and type catkin_make to completed the process

catkin_make

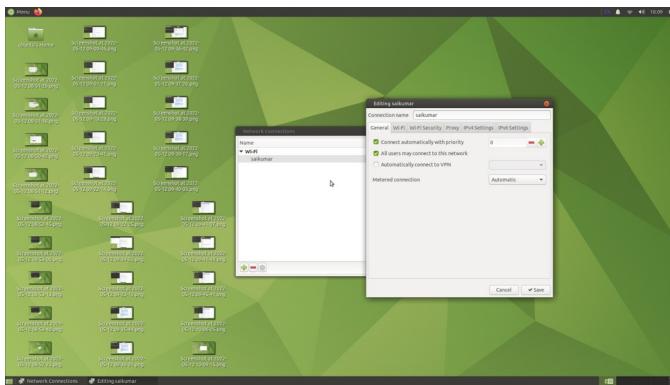


10. WiFi settings

- For WiFi settings you need to connect particular network and make some modifications to connect WiFi automatically when on booting the system
- Follow the below procedure for WiFi settings and modifications
- Go to WiFi settings -> edit connections in that network name will come



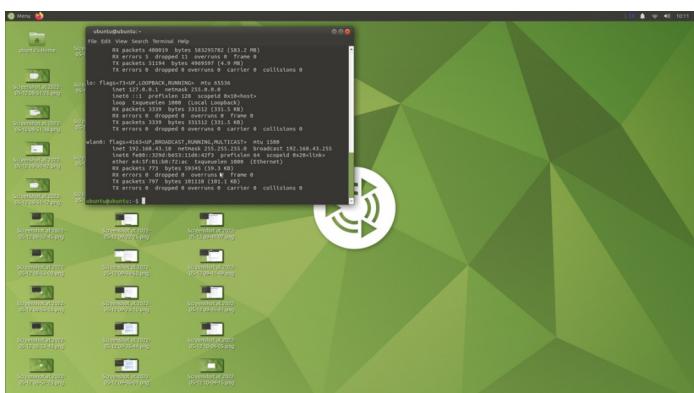
- To change WiFi modifications click on setting symbol below the window. then one window will pop up



- Click on the **All users may connect to this network** option. Save the modifications.

11. ssh connection

- In order to connect rpi4 to laptop using ssh, follow the below procedure.
- First we need to check the Rpi4 IP address. for that type below command to see the IP address. If is not installed please install the network tools.



- In laptop type below commands to connect Rpi4.

Note: laptop and Rpi4 should connected to same network

ssh ubuntu(user name of rpi4)@ip_address of rpi4

example: ssh [ubuntu@192.168.43.18](https://www.192.168.43.18)

12. USB Permissions

- We need to give Arduino port and lidar port permission in onboot to run the system perfectly.
- Please find below procedure to give the permission for USB ports
- Open a terminal and type below commands to change the directory

cd /etc/udev/rules.d/

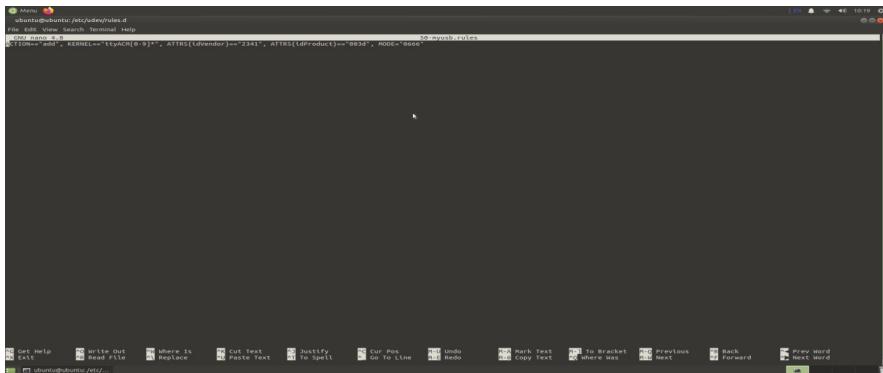


- You need create four .rules for USB port permissions
- Follow below procedure to create a files (1st file)

sudo nano 50-myusb.rules

- Copy the below lines in that file. to save press **cntrl+x**

```
ACTION=="add",           KERNEL=="ttyACM[0-9]*",           ATTRS{idVendor}=="2341",
ATTRS{idProduct}=="003d", MODE=="0666"
```



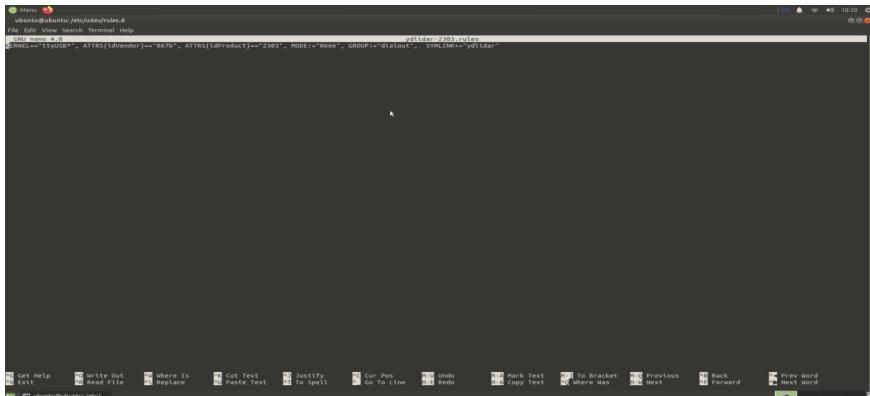
```
root@ubuntu: /etc/udev/rules.d
File Edit View Search Terminal Help
F12On= 067b", KERNEL=="ttyACM[0-9]*", ATTRS{idVendor}=="067b", ATTRS{idProduct}=="2303", MODE=="0666"
root@ubuntu: /etc/udev/rules.d
```

- 2nd file

sudo nano ydlidar-2303.rules

- Copy the below lines in that file. to save press **cntrl+x**

```
KERNEL=="ttyUSB*", ATTRS{idVendor}=="067b", ATTRS{idProduct}=="2303",
MODE=="0666", GROUP=="dialout", SYMLINK+="ydlidar"
```



```
root@ubuntu: /etc/udev/rules.d
File Edit View Search Terminal Help
KERNEL=="ttyUSB*", ATTRS{idVendor}=="067b", ATTRS{idProduct}=="2303", MODE=="0666", GROUP=="dialout", SYMLINK+="ydlidar"
root@ubuntu: /etc/udev/rules.d
```

- 3rd file

sudo nano ydlidar-V2.rules

- Copy the below lines in that file. to save press **cntrl+x**

```
KERNEL=="ttyACM*", ATTRS{idVendor}=="0483", ATTRS{idProduct}=="5740",
MODE=="0666", GROUP=="dialout", SYMLINK+="ydlidar"
```

```
shantik@shantik:~/etc/udev/rules.d
File Edit View Search Terminal Help
GNU nano 4.8
KERNEL=="ttyUSB*", ATTRS{idVendor}=="10c4", ATTRS{idProduct}=="ea60", MODE=="0666", GROUP=="dialout", SYMLINK+="ydldidar"
shantik@shantik:~/etc/udev/rules.d
```

➤ 4th file

sudo nano ydldidar.rules

➤ Copy the below lines in that file. to save press **cntrl+x**

```
KERNEL=="ttyUSB*", ATTRS{idVendor}=="10c4", ATTRS{idProduct}=="ea60",
MODE=="0666", GROUP=="dialout", SYMLINK+="ydldidar"
```

```
shantik@shantik:~/etc/udev/rules.d
File Edit View Search Terminal Help
GNU nano 4.8
KERNEL=="ttyUSB*", ATTRS{idVendor}=="10c4", ATTRS{idProduct}=="ea60", MODE=="0666", GROUP=="dialout", SYMLINK+="ydldidar"
shantik@shantik:~/etc/udev/rules.d
```