

Neato Turtle RPi3b/1GB Ubuntu 22.04 Server ROS2 Humble-Base Oct 22, 2022
 /Users/Ross/Documents/ROS Projects/Cheatsheets & Install/Botvac/

Based on https://github.com/cpeavy2/botvac_node (that was written for RPi4.4GB)

Install on ROBOT (my SD R11) Humble Server

SD Card Suggest a higher speed 4k Ultra HD version, such as Kingston Canvas React 32GB
 ubuntu-22.04.1-preinstalled-server-arm64+raspi.img

Burn with Raspberry Pi Imager, configure SSH & WiFi Credentials
<https://linuxhint.com/install-ubuntu-22-04-lts-raspberry-pi/>

Boot up and wait for the Network Connection. Determine IP Address from connected monitor (\$ ap a),
 Router or Desktop WiFi Survey App.

From Desktop, ssh into Raspi > ssh ubuntu@IPADDRESS .

Update & Upgrade: \$ sudo apt update && sudo apt upgrade

Install \$ sudo apt install avahi-daemon to use hostname instead of IP Address in the ssh command.

Enable on ROBOT \$ /etc/init.d/avahi-daemon restart . This should be persistently permanent.

Disable unattended upgrades

Open automatic update setting file.

\$ sudo nano /etc/apt/apt.conf.d/20auto-upgrades

Change the update settings as below.

APT::Periodic::Update-Package-Lists "0";

APT::Periodic::Unattended-Upgrade "0";

\$ sudo reboot

Set the systemd to prevent boot-up delay even if there is no network at startup.

\$ systemctl mask systemd-networkd-wait-online.service Disable Suspend and Hibernation

Install 4GB Swap File

<https://www.digitalocean.com/community/tutorials/how-to-add-swap-space-on-ubuntu-22-04>

\$ free -h

\$ df -h

\$ sudo fallocate -l 1G /swapfile

\$ ls -lh /swapfile

\$ sudo chmod 600 /swapfile

\$ ls -lh /swapfile

Output

```
-rw----- 1 root root 1.0G Apr 25 11:14 /swapfile
```

\$ sudo mkswap /swapfile

Output

Setting up swap space version 1, size = 1024 MiB (1073737728 bytes)

no label, UUID=6e965805-2ab9-450f-aed6-577e74089dbf

\$ free -h

Output

	total	used	free	shared	buff/cache	available
Mem:	981Mi	123Mi	644Mi	0.0Ki	213Mi	714Mi
Swap:	1.0Gi	0B	1.0Gi			

sudo cp /etc/fstab /etc/fstab.bak

echo '/swapfile none swap sw 0 0' | sudo tee -a /etc/fstab

\$ cat /proc/sys/vm/swappiness

Install python3 libraries

\$ sudo apt install libpython3-dev

\$ sudo -H pip3 install --upgrade pip setuptools python3-wheel

\$ sudo apt install python3-argcomplete python3-colcon-common-extensions libboost-system-dev build-essential

Install ROS2 Humble ros-humble-base from the ros.org ROS2 Debian Install Documentation or suggest using linorobot2 ros2me <https://github.com/linorobot/ros2me> .

Installs ros-humble-base (barebones) on non X86 machines, i.e. arm64/aarch64 from Linorobot2 Github, select master.

\$ sudo apt update

\$ git clone <https://github.com/linorobot/ros2me/>

\$ chmod 755 ./install

\$ bash ./install

```
$ echo 'export ROS_DOMAIN_ID=0 #Neato Turtle' >> ~/.bashrc
```

Configure Empty Workspace, e.g. botvac_ws/src
<https://docs.ros.org/en/humble/Tutorials/Beginner-Client-Libraries/Colcon-Tutorial.html>
 cd ~/ (Home Directory)
 mkdir -p botvac_ws/src
 cd botvac_ws
 \$ colcon build --symlink-install --parallel-workers 2

Configure .bashrc
 echo 'source /opt/ros/humble/setup.bash' >> ~/.bashrc
 echo 'source ~/botvac_ws/install/setup.bash' >> ~/.bashrc
 echo 'ROS_DOMAIN_ID=0' >> ~/.bashrc
 From /home/username ,(~/) \$ source .bashrc

Check things look ok with \$ printenv|grep ROS

Update python3, OpenCV, & setup tools
 python3 -m pip install --upgrade pip setuptools python3-wheel OpenCV

If using USB Webcam
 pip install opencv-python

Based on Neato Turtle by Camp Peavy
 Note: These scripts assume navigation2 is installed on the Desktop Workstation from Debian Repository and map.yaml files are saved at /home/ubuntu/Desktop/maps where Username = ubuntu > change these scripts if username is different
 Location to save maps: mkdir -p /home/ubuntu/Desktop/maps
 Location for Game Controller configuration .yaml files: mkdir -p /home/ubuntu/Desktop/config

INSTALL botvac packages on WORKSTATION Desktop (except kobuki_velocity_smoother) and ROBOT (all except na2 & nav2_bringup)
 cpeavy2/botvac_node https://github.com/cpeavy2/botvac_node

On Ubuntu 22.04 Gnome Desktop WORKSTATION
 \$ sudo apt install python3-argcomplete python3-colcon-common-extensions libboost-system-dev build-essential

Install ROS2 Humble ros-humble-full following the ros.org ROS2 Documentation Debian Install, or using linorobot2 ros2me <https://github.com/linorobot/ros2me>
 Installs ros-humble-desktop (GUI apps) on X86_64 machines from Linorobot2 Github, select master.
 cd ~/
 \$ sudo apt update
 \$ git clone <https://github.com/linorobot/ros2me/>
 \$ chmod 755 ./install
 \$ bash ./install

```
$ echo 'export ROS_DOMAIN_ID=0 #Neato Turtle' >> ~/.bashrc
```

Configure Empty Workspace, e.g. botvac_ws/src
<https://docs.ros.org/en/humble/Tutorials/Beginner-Client-Libraries/Colcon-Tutorial.html>
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 cd ~/ (Home Directory)
 mkdir -p botvac_ws/src
 cd botvac_ws
 \$ colcon build --symlink-install
 \$ cd botvac_ws/src

Configure & source workspace
 Configure .bashrc
 echo 'source /opt/ros/humble/setup.bash' >> ~/.bashrc
 echo 'source ~/botvac_ws/install/setup.bash' >> ~/.bashrc
 echo 'ROS_DOMAIN_ID=0' >> ~/.bashrc
 From /home/username ,(~/) \$ source .bashrc

sudo apt install ros-humble-xacro python3-rosdep
 sudo apt install ros-humble-navigation2
 sudo apt install ros-humble-nav2-bringup

```

git clone https://github.com/cpeavy2/botvac_node.git
git clone https://github.com/cpeavy2/neato_robot.git
git clone https://github.com/kobuki-base/cmd_vel_mux.git
git clone https://github.com/stonier/ecl_tools

cd .. (You should be in ~/botvac_ws directory)
If not already installed by ROS2 procedure: $ sudo rosdep init ! ONLY DO 1 TIME per installation
$ rosdep update
$ rosdep install --from-paths src --ignore-src -r -y
And finally, go back to your workspace directory and compile the code.
$ cd ~/botvac_ws
$ colcon build --symlink-install
From /home/username ,(~/) $ source .bashrc

```

On ROBOT

```

sudo apt install ros-humble-xacro python3-rosdep
$ sudo apt install ros-humble-v4l2-camera

```

```

$ cd ~/botvac_ws/src
git clone https://github.com/cpeavy2/botvac_node.git
git clone https://github.com/cpeavy2/neato_robot.git
git clone https://github.com/kobuki-base/cmd_vel_mux.git
git clone https://github.com/kobuki-base/kobuki_velocity_smoother.git
git clone https://github.com/stonier/ecl_tools

```

Edit the botvac_node/launch/include/velocity_smoother_launch.py with \$ nano velocity_smoother.launch.py,
 revised line 12 to pkg_name = 'kobuki_velocity_smoother' ,
 add a new line 13 exe_name = 'velocity_smoother'
 revised line 41 executable = exe_name

```

cd .. (You should be in ~/botvac_ws directory)
If not already installed by ROS2 procedure: $ sudo rosdep init ! ONLY DO 1 TIME per installation
$ rosdep update
$ rosdep install --from-paths src --ignore-src -r -y
And finally, go back to your workspace directory and compile the code.
$ cd ~/botvac_ws
$ /botvac_ws
$ colcon build --symlink-install --parallel-workers 2

```

See: <https://answers.ros.org/question/368249/colcon-build-number-of-threads/>

Builds in about 10 mins.

Source new code

```

cd ~/
. .bashrc

```

Since there is no "Desktop" folder on this server, configure a folder for the Game Controller config . yaml file

```

cd ~/
mkdir -p Desktop/config
Copy f710.config.yaml from the USB32 Drive to this folder

```

Set RasPi Serial Permissions

```

$ sudo adduser ubuntu $(stat --format="%G" /dev/ttyACM0 )

```

Optional Logitech F710 Gamepad based on https://github.com/ros2/teleop_twist_joy
 Configure Gamepad config on Robot, from my USB32 Drive with a custom f710.config.yaml and file described below

```

Mount USB Drive
$ sudo blkid
$ sudo mkdir /media/usb
sudo mount /dev/sdb1 /media/usb

```

Unmount

```

sudo umount /media/usb

```

ROBOT RP3 LAUNCH

With cable plugged between USB Ports on RasPi Robot and Neato Botvac Diagnostic port (ls -l /dev/ttyACM0)

```
$ ros2 launch botvac_node botvac_base.launch.py
```

Optional provided ps4.config.yaml or f710.config.yaml are saved to /home/ubuntu/Desktop/config folder

```
$ ros2 launch teleop_twist_joy teleop-launch.py config_filepath='/home/ubuntu/Desktop/config/  
ps4.config.yaml'
```

```
$ ros2 launch teleop_twist_joy teleop-launch.py config_filepath='/home/ubuntu/Desktop/config/  
f710.config.yaml'
```