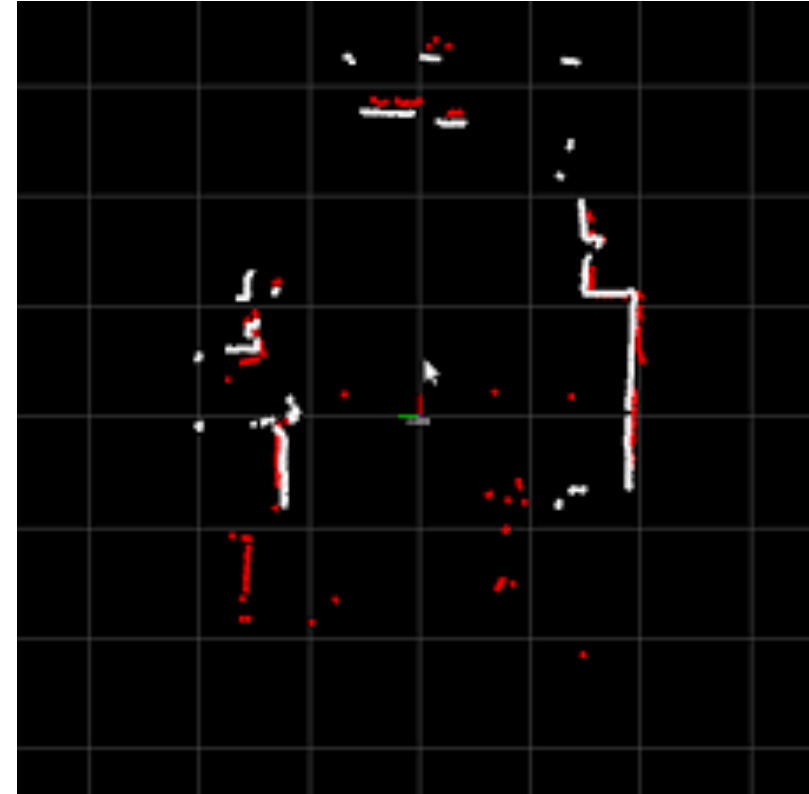
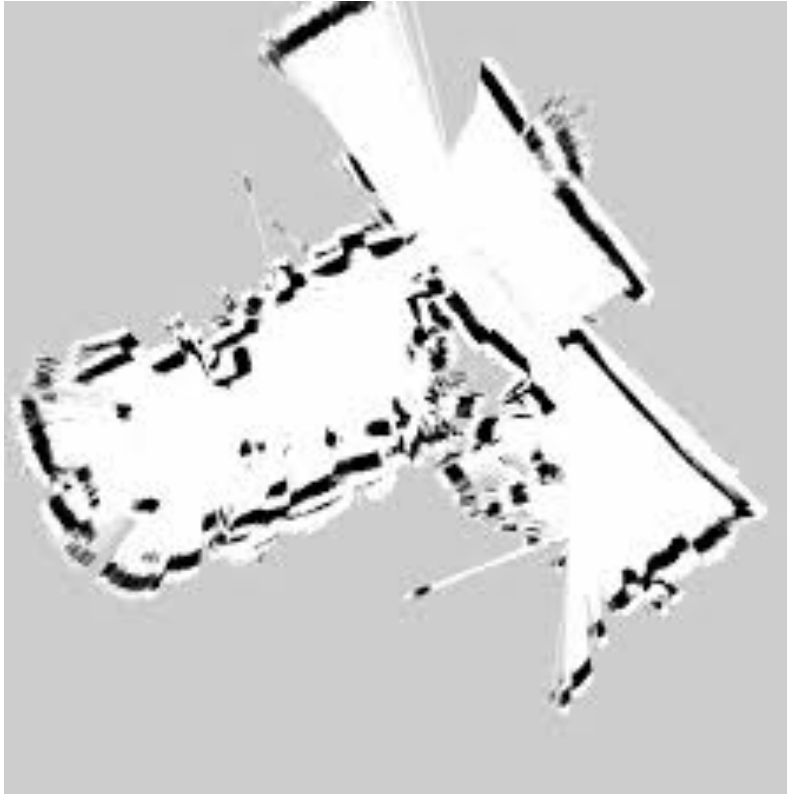


Mobile Robot Lab: NEATO



Installing Wifi Drivers

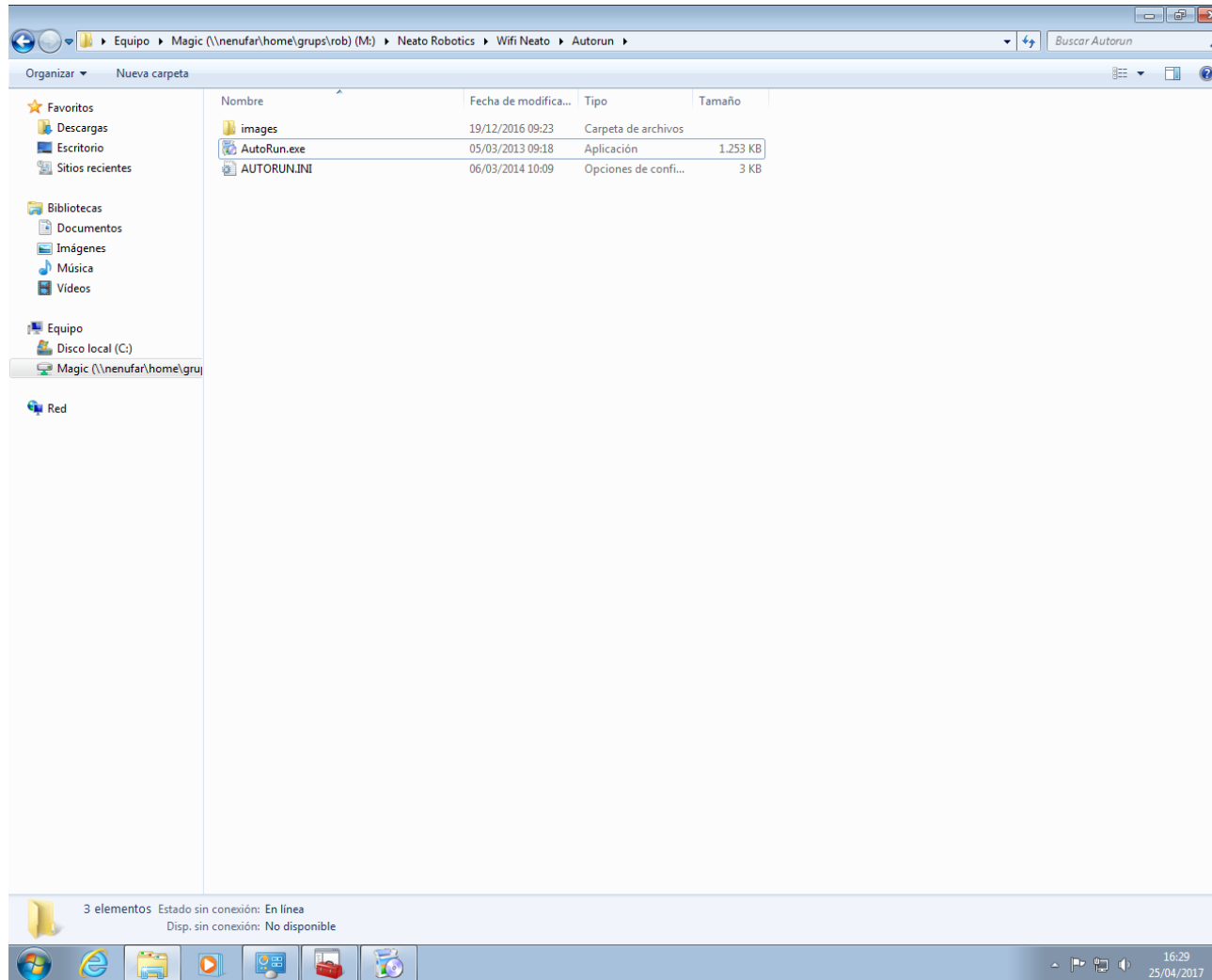
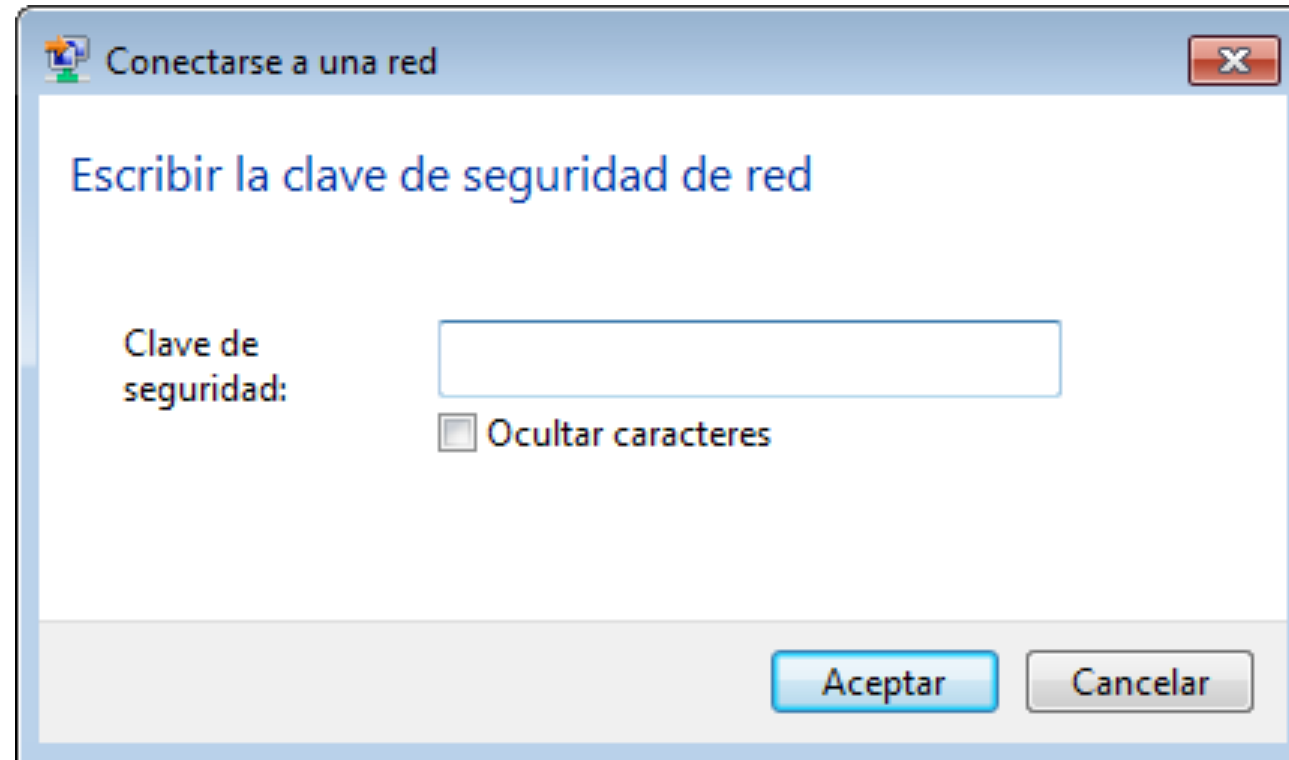


Figure 1 Go to Magic; M:\Neato Robotics\Wifi Neato\Autorun

Connecting to Neato= RaspberryPi

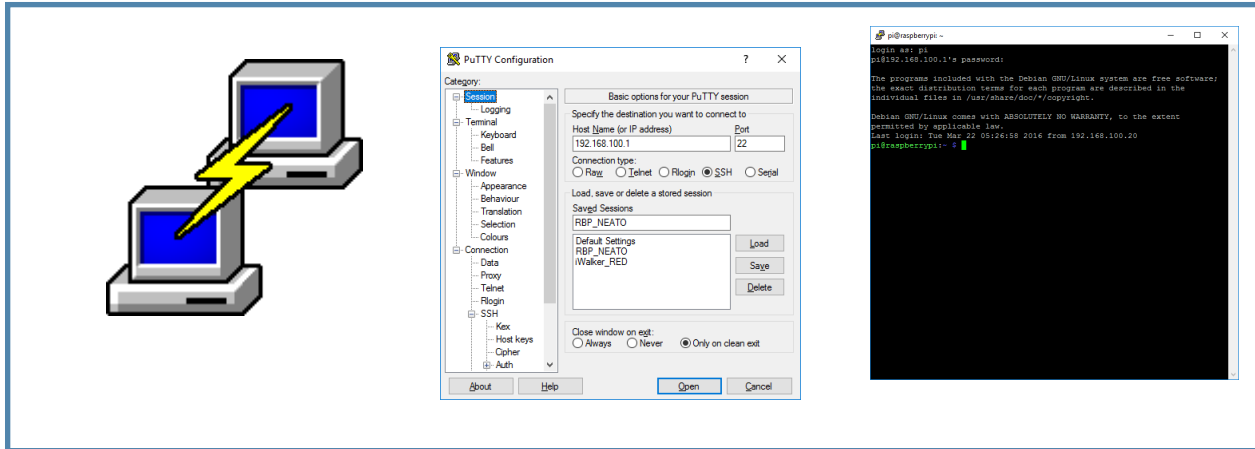


Select the SSID Wifi:
NEATO_{ A B C D E F K }

Password: neato2016

Enviroment

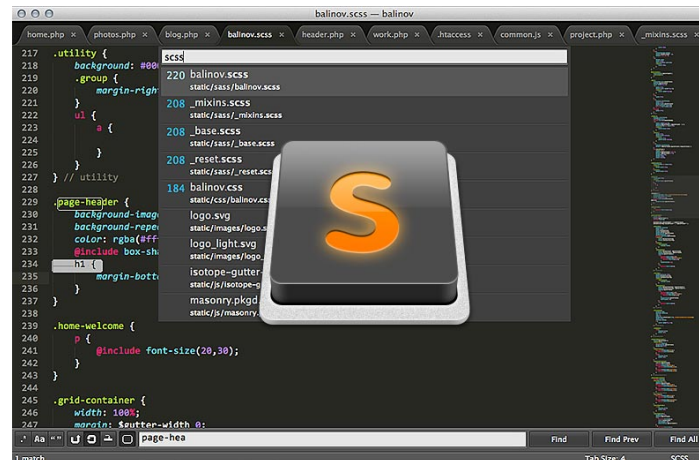
Putty → connect remotely to RPI and execute



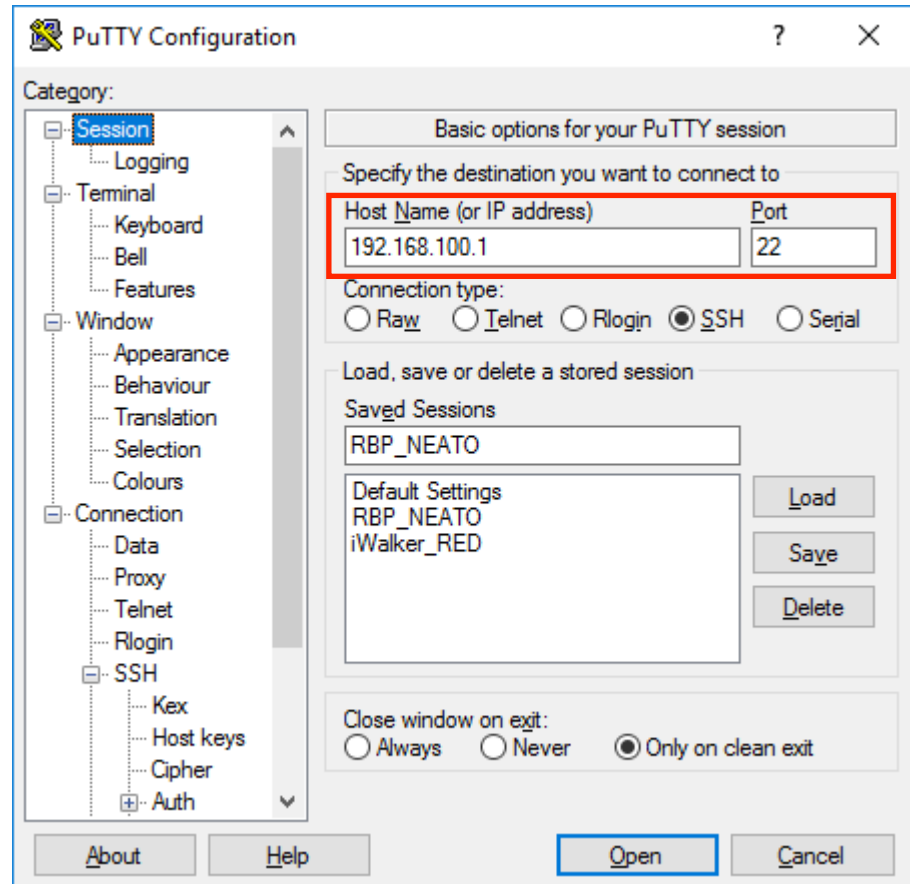
FileZilla → To transfers files to the RPI



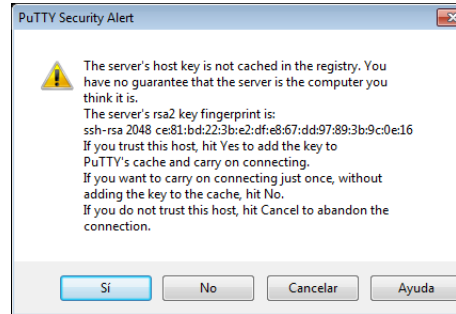
Sublime Text → For editing



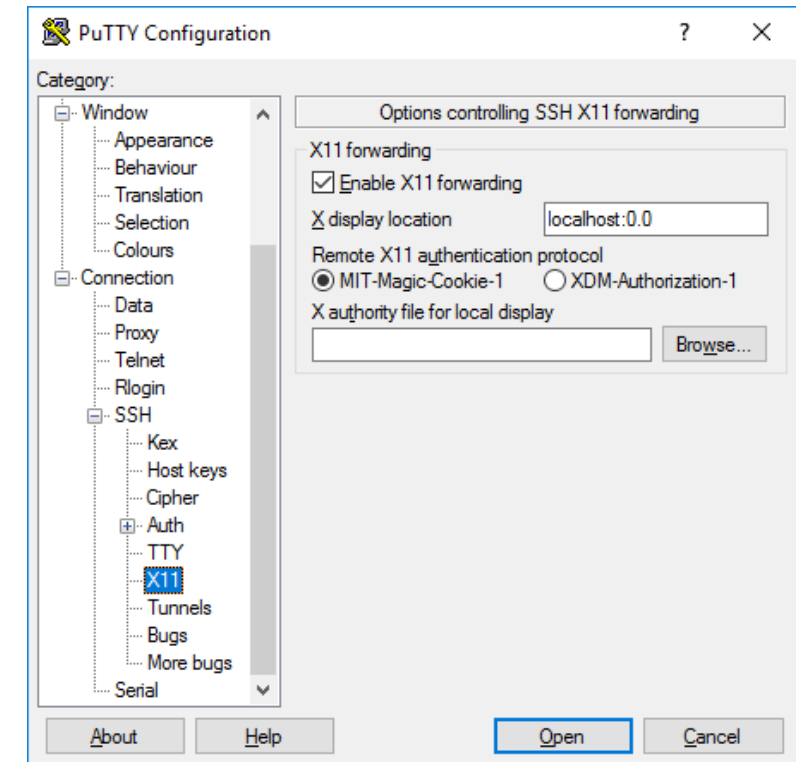
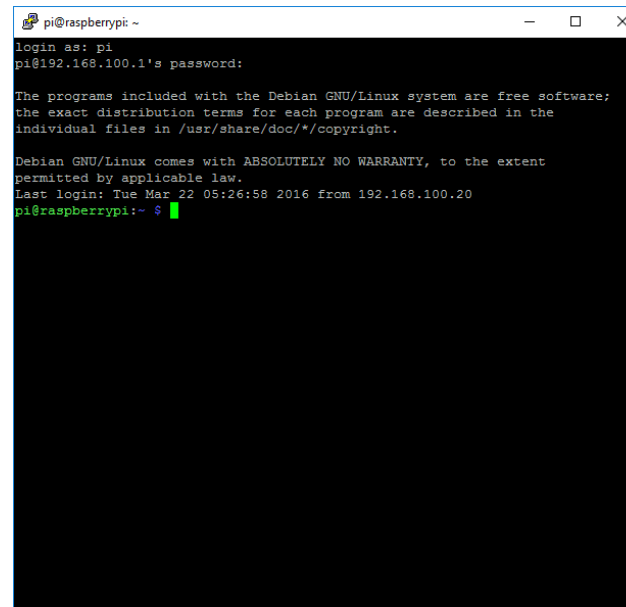
Config Putty (user: pi / pass: raspberry)



IP: 192.168.100.1
Port: 22

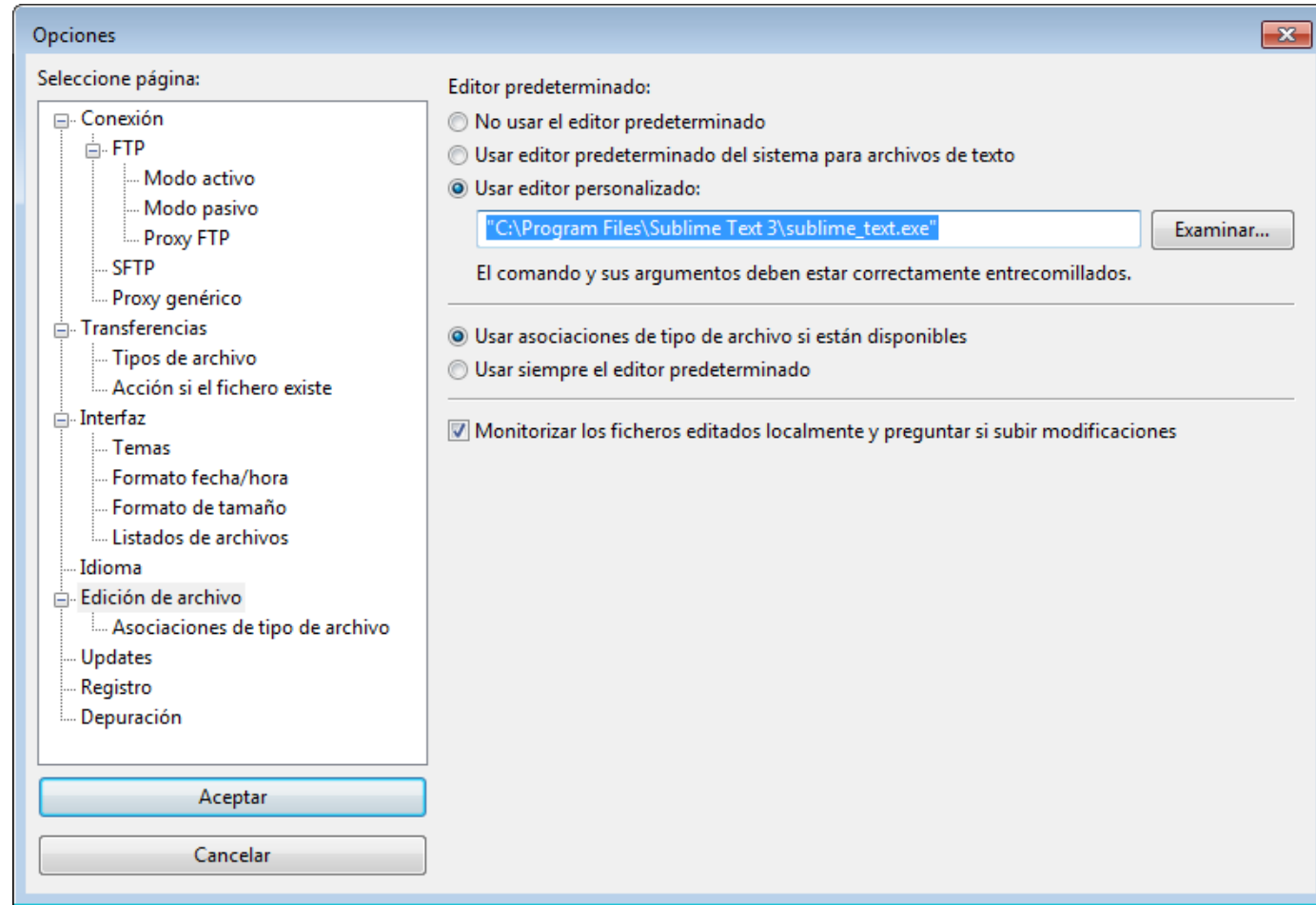
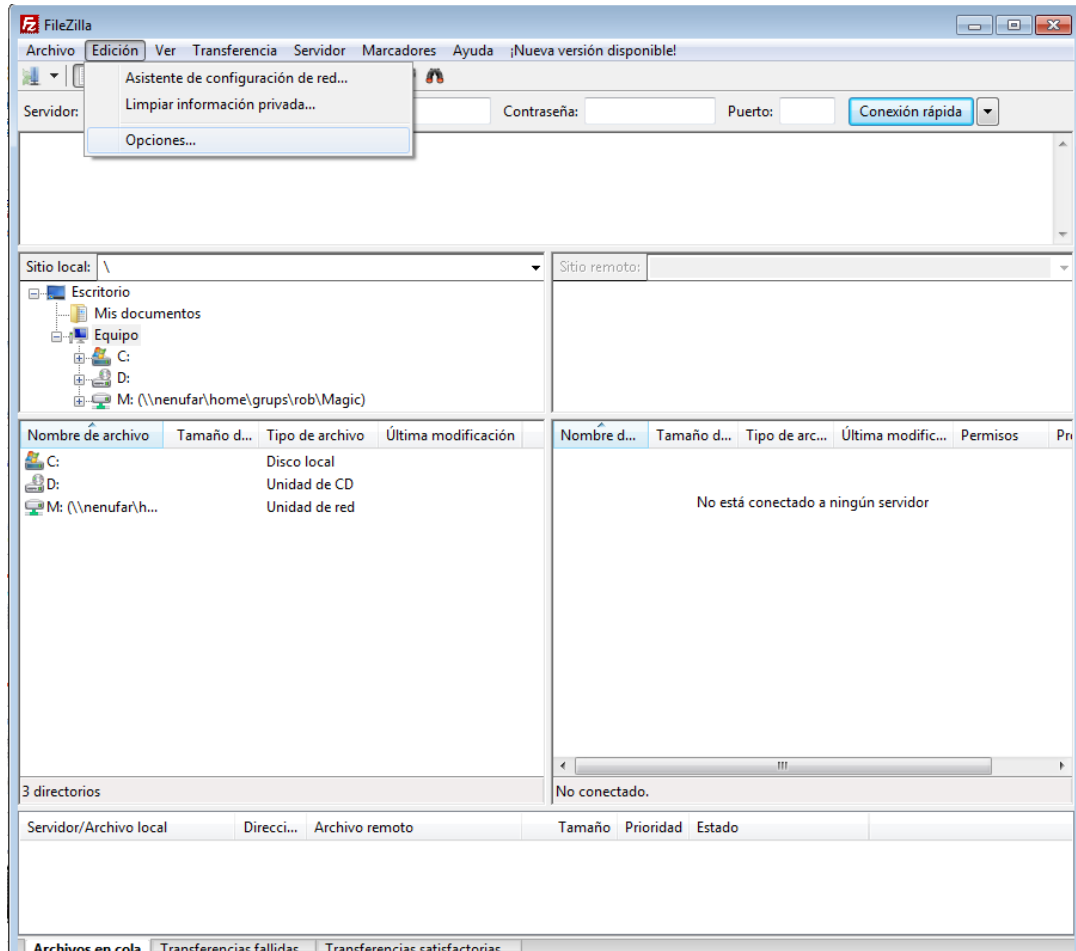


Answer: YES

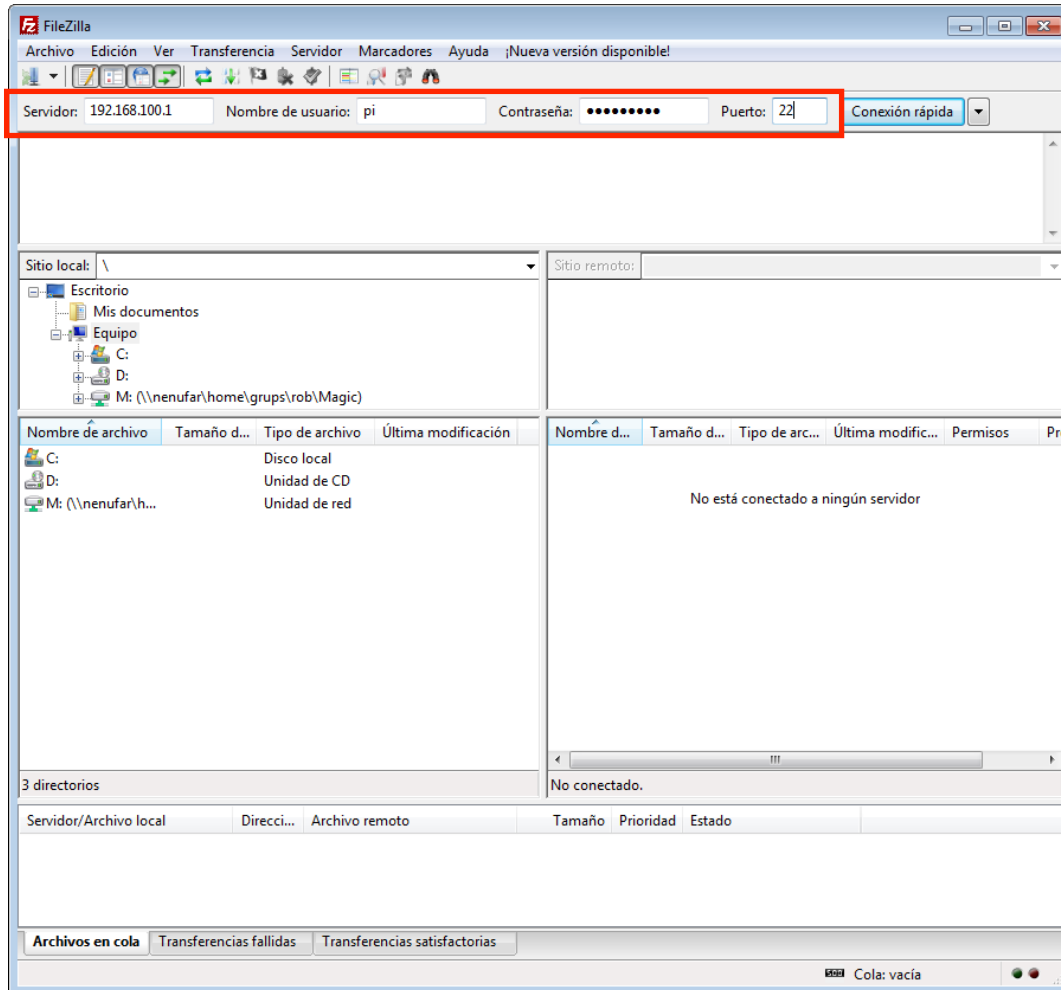


Login as: pi
Psw: raspberry

Configuring Filezilla



Connecting Filezilla to Raspberry



IP: 192.168.100.1 / usr: pi / psw: raspberry / Port: 22

Executing: test_DrivingNR.py and test_NeatoCommands.py

```
pi@raspberrypi: ~/GRUPO_A
drwxr-xr-x 2 pi pi 4096 Mar 18 08:58 Music
drwxr-xr-x 2 pi pi 4096 Mar 18 08:58 Pictures
-rw-r--r-- 1 pi pi 675 Mar 18 08:09 .profile
-rw-r--r-- 1 pi pi 1132 Mar 18 14:21 prova.py
drwxr-xr-x 2 pi pi 4096 Mar 18 08:58 Public
drwxr-xr-x 2 pi pi 4096 Jan 1 1970 python_games
-rw-r--r-- 1 pi pi 5461 Mar 20 02:16 script1.py
-rw-r--r-- 1 pi pi 5661 Mar 20 02:21 script23.py
-rw-r--r-- 1 pi pi 5726 Mar 20 02:22 script23.pyc
-rw-r--r-- 1 pi pi 2339 Mar 20 02:22 script3.py
drwxr-xr-x 2 pi pi 4096 Mar 18 08:58 Templates
drwxr-xr-x 3 pi pi 4096 Jan 1 1970 .themes
drwxr-xr-x 2 pi pi 4096 Mar 18 08:58 Videos
-rw----- 1 pi pi 113 Mar 20 02:17 .Xauthority
-rw----- 1 pi pi 353 Mar 20 02:17 .xsession-errors
-rw----- 1 pi pi 353 Mar 20 02:17 .xsession-errors.old
pi@raspberrypi:~$ ls GRUPO_A/
4follow_wall_distance.py
pi@raspberrypi:~$ rm GRUPO_A/*
pi@raspberrypi:~$ ls GRUPO_A/
pi@raspberrypi:~$ rm GRUPO_B/*
pi@raspberrypi:~$ rm GRUPO_C/*
rm: cannot remove 'GRUPO_C/*': No such file or directory
pi@raspberrypi:~$ rm GRUPO_D/*
pi@raspberrypi:~$ rm GRUPO_E/*
pi@raspberrypi:~$ rm GRUPO_F/*
pi@raspberrypi:~$ rm GRUPO_G/*
pi@raspberrypi:~$ rm GRUPO_H/*
pi@raspberrypi:~$ rm GRUPO_K/*
rm: cannot remove 'GRUPO_K/*': No such file or directory
pi@raspberrypi:~$ ls GRUPO_K/
pi@raspberrypi:~$ cd GRUPO_A
pi@raspberrypi:~/GRUPO_A$ ls
test_DrivingNR.py test_NeatoCommands.py
pi@raspberrypi:~/GRUPO_A$ python test_DrivingNR.py
```

Python test_DrivingNR.py
Python test_NeatoCommands.py

How Neato 'firmware' interpret: set_motor command

Command: SetMotor

Description: Sets the specified motor to run in a direction at a requested speed. (TestMode Only)

Usage: SetMotor [LWheelDist <LWheelDist_value>] [RWheelDist <RWheelDist_value>] [Speed <Speed_value>] [Accel <Accel_value>] [RPM <RPM_value>] [Brush] [VacuumOn] [VacuumOff] [VacuumSpeed <VacuumSpeed_value>] [RWheelDisable] [LWheelDisable] [BrushDisable] [RWheelEnable] [LWheelEnable] [BrushEnable]

Options:

Flag	Description
LWheelDist	Distance in millimeters to drive Left wheel. (Pos = forward, neg = backward)
RWheelDist	Distance in millimeters to drive Right wheel. (Pos = forward, neg = backward)
Speed	Speed in millimeters/second. (Required only for wheel movements)
Accel	Acceleration in millimeters/second. (Used only for wheel movements. Defaults to 'Speed'.)
RPM	Next argument is the RPM of the motor. Not used for wheels, but applied to all other motors specified in the command line.
Brush	Brush motor forward (Mutually exclusive with wheels and vacuum.)

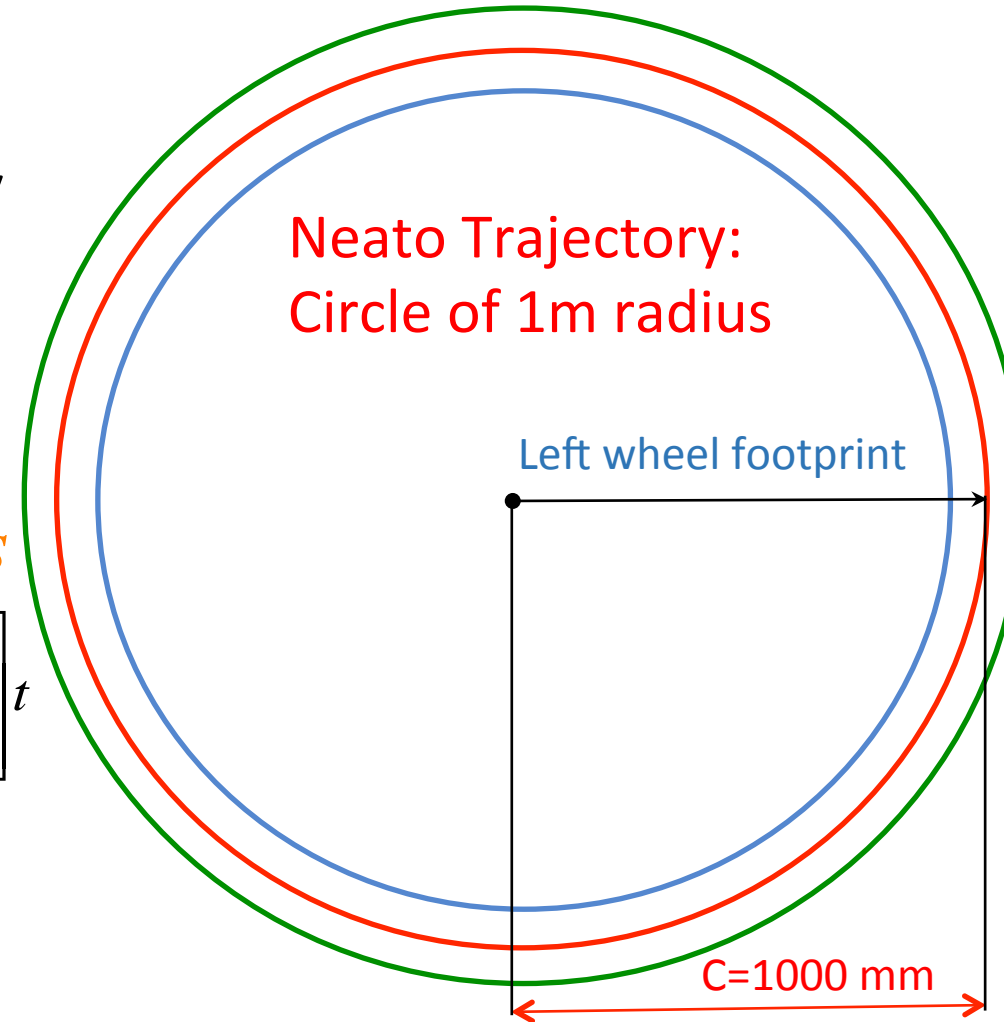
How Neato 'firmware' interpret: set_motor command

Understanding test_DrivingNR.py

Inverse Kinematics

$$\begin{bmatrix} \dot{R} \\ \dot{L} \end{bmatrix}_t = \underbrace{\begin{bmatrix} 1 & S \\ 1 & -S \end{bmatrix}}_{\text{Jacobian}} \begin{bmatrix} v_C \\ \dot{\theta} \end{bmatrix}_t$$

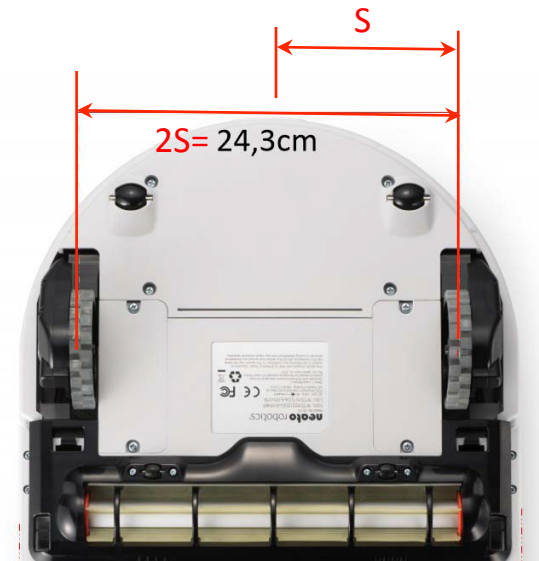
$$\begin{bmatrix} R \\ L \end{bmatrix} = \begin{bmatrix} 1 & S \\ 1 & -S \end{bmatrix} \begin{bmatrix} C \\ \theta \end{bmatrix}$$



$$R = 2\pi \left(1000 + \frac{243}{2} \right) = 7047 \text{ mm}$$

$$L = 2\pi \left(1000 + \frac{243}{2} \right) = 5520 \text{ mm}$$

Right wheel footprint



```
distancia_R = (((speed * pow(-1, direccion) ) + (S * tita_dot)) * tiempo) * pow(-1, direccion)
distancia_L = (((speed * pow(-1, direccion) ) + (-S * tita_dot)) * tiempo) * pow(-1, direccion)
```

```
comando = 'SetMotor LWheelDist ' + str(distancia_L) + ' RWheelDist ' + str(distancia_R) + ' Speed ' + str(speed * pow(-1, direccion))
envia(ser,comando, 0.2)
```