

# Mobile Robotics

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# BeagleBoneBlue introduction

When you don't move the robot, keep 12V power ON to activate battery charge so you can have sufficient energy when you experiment your code.

Each BeagleBone is like a WIFI AccessPoint with a different SSID named like « BeagleBone-XXXX ». The last part XXXX is written on the robot, so you can select the good one.  
The password is BeagleBone (be careful on capitals)

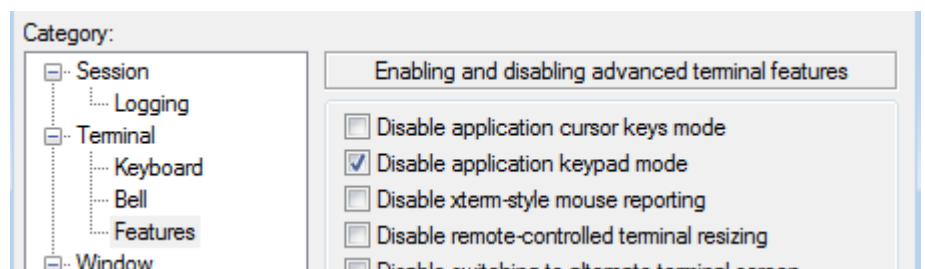
Each BeagleBone has the same IP address 192.168.8.1 (by WIFI)

You can access it with an SSH Connection with PUTTY

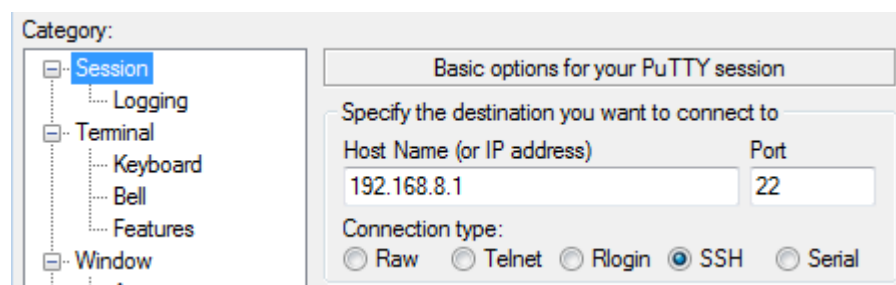


Program

Check « Disable application keypad mode » in Terminal/Features to have normal access to the keypad.



And launch connection to the BeagleBone



Connect with user debian, and password temppwd

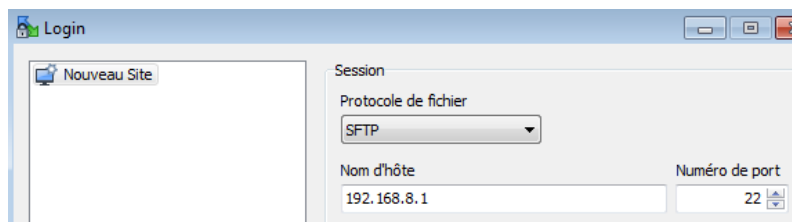
Congratulation if you see this prompt, you are in !

```
debian@beaglebone:~$
```

# File manipulation with WINSCP and NOTEPAD++

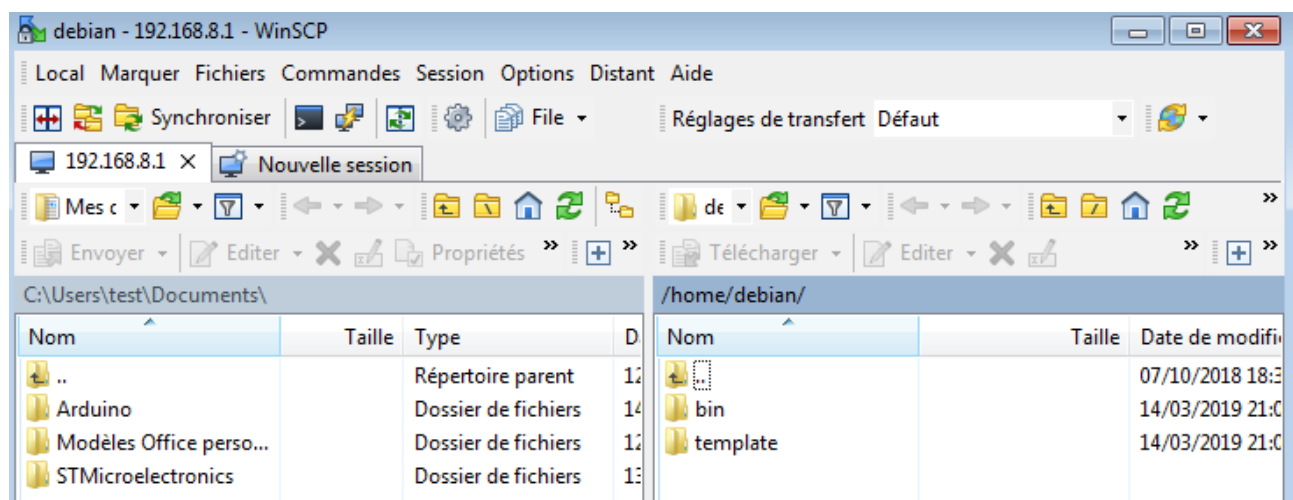
If you are a regular linux user, feel free to do file edition/manipulation as you want. If you are not, here are some Tips to do folder navigation, file copying, and file editing simply on your Windows computer.

First launch WINSCP application. And connect to the BeagleBone :



And use same login/password as SSH connection.

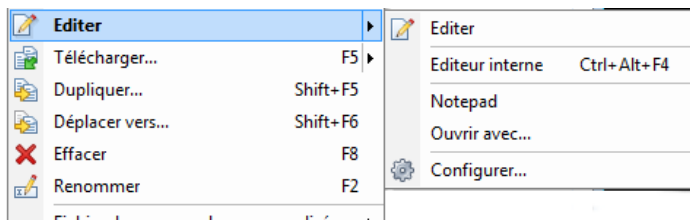
When connected, you can see a window with two parts :



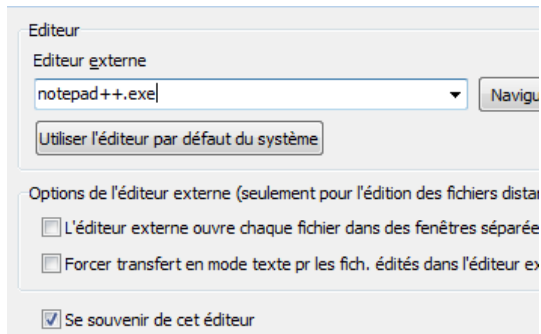
The left one is your local computer, the right one is the 'distant' folder on the BeagleBone. You can transfer from one to the other when you want. Remember to make a backup of your work regularly...

The code is inside the « **template** » folder.  
You need to edit the file **rob.c**

Select the file to edit : RightClick / **Editer** / **Ouvrir avec**



Then enter **notepad++.exe** and check « **Se souvenir de cet editeur** »



You just have to do this one time, and all your other files can be now edited by **notepad++**, which is better for coding than Notepad...

## Template Project

In the **/home/debian/template** folder, you can find  
a **Makefile**  
a C file (**rob.c**) with a code template

BeagleBoneBlue comes with a special library to control all devices called **librobotcontrol**.  
The online documentation is here if you want  
<http://www.strawsondesign.com/docs/librobotcontrol/index.html>

Sources and examples are inside the BeagleBone in this  
folder : **/opt/source/librobotcontrol/**

I'll now prepare a skeleton to help you start coding.

First, there is a simple function (not optimum) for motorspeed regulation : DON'T modify it, but you can write another one if you want a better one...

This function controls regulation speed in background every 50ms . you will initialize the values you want in global variables already defined **w1, w2, w3, w4** . And your program can modify these values when you want...

Then, in the main function, you can place your code between the two marks

```
/* Place your code here */  
...  
/* End your code here */
```

The example inside the template :

```
set value in w1  
activate regulation  
wait 2s  
set value 0 in w1  
wait 0.5s  
deactivate regulation  
and exit
```

Save your code. Go to Putty application. At the first time do

```
debian@beaglebone:~$cd template
```

You also can compile and run your program by :

```
debian@beaglebone:~/template$ make clean && make && sudo ./rob
```

If your code is OK, it will create the executable program named rob inside the same folder.

After that, the wheel number 1 should turn slowly for 2s

## And then, Your Work...

I gave you enough information in the course to be able to control your robot.

Your mission, if you accept it :

### **For two-wheeled robots :**

make first simple functions :

- move straight forward/backward (with time/speed parameters)
- move on a circular arc (with time/speed/radius parameters)

When basic functions are ok, try to make your robot follow some paths like these :



### **For holonome and mecanum robots**

First perform simple functions :

- move straight forward/backward/left/right (with time/speed parameters)
- move on a circular arc (with time/speed/radius parameters)
  - the robot still keeps its face in front of you
  - the robot still keeps its face in front of the circle center

And try some paths too..

Have FUN !