

FOSSBot Hardware Diagnostics Manual

At first you need to:

- power on the robot
- connect it to the Wi-Fi
- establish ssh connection with the robot using **ssh pi@fossbot-000.local** with the password 'raspberrypi'.

All the above steps are explained [here](#).

1. Once you've successfully established the SSH connection and accessed the FOSSBot, use the **'ls'** command to inspect the contents.

```
pi@fossbot-000:~ $ ls
data  diagnostics  docker-compose.yaml
```

2. Run the command **'cd diagnostics'** to enter the diagnostics directory. Use again the **'ls'** command to inspect the contents of the directory.

```
pi@fossbot-000:~/diagnostics $ ls
admin_parameters.yaml  diagnostics.py  proccesing  r2d2.mp3  run_diagnostics.sh
```

3. Execute the **run_diagnostics.sh** script by running **'./run_diagnostics.sh'**.

```
pi@fossbot-000:~/diagnostics $ ./run_diagnostics.sh
Running diagnostics on physical FossBot...
Starting diagnostics container...
root@1c697cd12773:/#
```

4. Now execute the diagnostics python script by running **'python diagnostics.py'**.

```
root@f8ed6ec9c4b3:/# python diagnostics.py
Options menu:
1. Test Accelerometer & Gyroscope
2. Test Left & Right motors
3. Test light sensor
4. Test line sensors
5. Test RGB LED
6. Test Odometers
7. Test Speaker
8. Test Ultrasonic sensor
9. Test Noise sensor
0. Exit
Select an option: 
```

From here you can execute diagnostic checks for all the sensors and hardware components of the robot.

Select option 1:

Press **1** and then **'Enter'**

You will see some metrics about the Accelerometer and Gyroscope sensors.

Check:

If you move the robot with your hands, left and right and the metrics change this means that sensors are working correct.

```
Accelerometer:
8.734047656249999
0.8595183959960937
-2.518700146484375
8.734047656249999, 0.8595183959960937, -2.518700146484375
Gyroscope:
-8.17557251908397
11.15267175572519
10.648854961832061
-8.17557251908397, 11.15267175572519, 10.648854961832061
█
```

Exit check:

Press Ctrl and C to exit this option.

Select option 2:

Press **2** and then **'Enter'**

In this option you can check that the motors are working correctly.

Check:

At first the left motor moves the robot forward.
Press Ctrl and C to continue.
Now the left motor moves the robot backwards.
Press Ctrl and C to continue.
Now the right motor moves the robot forward.
Press Ctrl and C to continue.
Now the right motor moves the robot backwards.

Exit check:

Press Ctrl and C to exit this option.

```
Select an option: 2
Motors test
Press Ctrl+C to stop
Left motor forward...
^CLeft motor stop
Left motor backward...
^CLeft motor stop
Right motor forward...
^CRight motor stop
Right motor backward...
█
```

Select option 3:

Press **3** and then '**Enter**'

In this option you can check that the light sensor is working correctly.



Check:

At first cover the light sensor. Now that the light sensor is in the dark the output should be a low integer number.

```
ADC 0: 9
9
ADC 0: 9
9
ADC 0: 9
9
ADC 0: 8
8
```

Then use a flashlight and point it to the light sensor. Now you should see the integer value increasing.

```
ADC 0: 478
478
ADC 0: 483
483
ADC 0: 488
488
ADC 0: 479
479
```

Exit check:

Press Ctrl and C to exit this option.

Select option 4:

Press **4** and then '**Enter**'

In this option you can check that the IR sensors are working correctly.

Check:

At first the indications refer to the middle IR sensor.

If you cover the sensor with your hand, you must see a low integer number like on the left picture.

If you uncover the sensor and allow it sufficient you should observe the number increasing like on the right picture.

ADC 1: 40	Center: 397
Center: 40	ADC 1: 396
ADC 1: 39	Center: 396
Center: 39	ADC 1: 394
ADC 1: 40	Center: 394
Center: 40	ADC 1: 391
ADC 1: 40	Center: 391
Center: 40	ADC 1: 394

Press Ctrl and C to continue.

Now the indications refer to the right IR sensor.

If you cover the sensor with your hand, you must see a low integer number like on the left picture.

If you uncover the sensor and allow it sufficient you should observe the number increasing like on the right picture.

Right: 41	Right: 600
ADC 2: 41	ADC 2: 599
Right: 41	Right: 599
ADC 2: 41	ADC 2: 602
Right: 41	Right: 602
ADC 2: 41	ADC 2: 597
Right: 41	Right: 597
ADC 2: 41	ADC 2: 598

Press Ctrl and C to continue.

Now the indications refer to the left IR sensor.

If you cover the sensor with your hand, you must see a low integer number like on the left picture.

If you uncover the sensor and allow it sufficient you should observe the number increasing like on the right picture.

Left: 41	ADC 3: 661
ADC 3: 42	Left: 661
Left: 42	ADC 3: 660
ADC 3: 41	Left: 660
Left: 41	ADC 3: 665
ADC 3: 41	Left: 665
Left: 41	ADC 3: 664
ADC 3: 41	Left: 664

Exit check:

Press Ctrl and C to exit this option.

Select option 5:

Press **5** and then **'Enter'**

In this option you can check that the LED sensor is working correctly.

Check:

Initially, the LED sensor emits a visible **red** light.

Press Ctrl and C to continue.

Now the LED sensor emits a visible **green** light.

Press Ctrl and C to continue.

Now the LED sensor emits a visible blue light.

Exit check:

Press Ctrl and C to exit this option.

```
Select an option: 5
RGB LED test
Press Ctrl+C to stop
red...
^Coff
green...
^Coff
blue...
_
```

Select option 6:

Press **6** and then **'Enter'**

In this option you can check that the odometers of the robot are working correctly.

Check:

In this image, you can observe the odometers. Manipulating the left wheel of the robot should result in an increase in the left number, while adjusting the right wheel should cause the right number to increment.

Exit check:

Press Ctrl and C to exit this option.

[illegible]

Select option 7:

Press **7** and then '**Enter**'

In this option you can check that the speaker of the robot is working correctly.

Check:

You should hear the r2d2.mp3 playing and see this:

```
Check the speaker
High Performance MPEG 1.0/2.0/2.5 Audio Player for Layers 1, 2 and 3
version 1.31.2; written and copyright by Michael Hipp and others
free software (LGPL) without any warranty but with best wishes

Terminal control enabled, press 'h' for listing of keys and functions.

Playing MPEG stream 1 of 1: r2d2.mp3 ...
Warning: Xing stream size off by more than 1%, fuzzy seeking may be even
more fuzzy than by design!

MPEG 1.0 L III vbr 44100 j-s

Title:   Star Wars Sounds           Artist: Star Wars
Comment: none                          Album:
Year:                                  Genre: Other

[0:02] Decoding of r2d2.mp3 finished.
Press any key to repeat the test.□
```

Exit check:

Press Ctrl and C to exit this option.

Select option 8:

Press **8** and then '**Enter**'

In this option you can check that the ultrasonic sensor is working correctly.

Check:

As you move your hand in front of the ultrasonic sensor, you will notice that the output value decreases as you approach it and increases as you move away.

Exit check:

Press Ctrl and C to exit this option.

```
Select an option: 8
Ultrasonic sensor test
Press Ctrl+C to stop
36.95937395095825
38.1819486618042
19.929194450378418
5.352342128753662
5.8470964431762695
5.250120162963867
6.051540374755859
7.016515731811523
8.312690258026123
5.282831192016602
□
```

Select option 9:

Press **9** and then '**Enter**'

In this option you can check that the noise sensor is working correctly.

Check:

The output value should be False and when you produce a noise, like clapping your hands, the value should instantly change to True.

Exit check:

Press Ctrl and C to exit this option.

```
False
False
False
False
False
False
False
False
False
True
True
True
True
True
True
True
False
False
False
False
False
False
False
False
```

Disconnect from the robot

Press **9** and then '**Enter**' to exit the python script.

Type exit and then '**Enter**' to exit from the diagnostics container.

Type exit and then '**Enter**' to logout from the ssh connection.

```
True^COptions menu:
1. Test Accelerometer & Gyroscope
2. Test Left & Right motors
3. Test light sensor
4. Test line sensors
5. Test RGB LED
6. Test Odometers
7. Test Speaker
8. Test Ultrasonic sensor
9. Test Noise sensor
0. Exit
Select an option: 0
root@1c697cd12773:/# exit
exit
Diagnostics complete.
Done.
pi@fossbot-000:~/diagnostics $ exit
logout
Connection to fossbot-000.local closed.
:~$
```