

Set up EV3 - System leJOS 0.9.1

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To program your robot with the Open Lab Roberta, some preparation is necessary. We have tried to describe these steps as simply as possible. If you have difficulties at any point, please read the FAQ first. If you do not find an answer to your question there, please send us an email with your questions.

If you have all of the listed components, setting up your EV3 will take about 30 minutes. First check whether you have everything prepared and available and then follow follow steps 1-4.

Components for Open Roberta®:

- A PC with an internet connection.
- A micro SD card (with at least 2GB of memory but not 32GB or greater memory; if your micro SD card has more than 16 GB of memory then you have to reduce the primary partition to a maximum of 16 GB; for details see [Reformatting the micro SD card](#)) and a micro SD card adapter.
- An SD card reader that fits your computer. Many computers already have an integrated SD card reader.
- A [USB Wifi adapter](#)

If there is no Wifi available, the USB cable can be used together with the small [Open Roberta Connector](#).

But first, the installation of the firmware for the EV3 robot should be done .

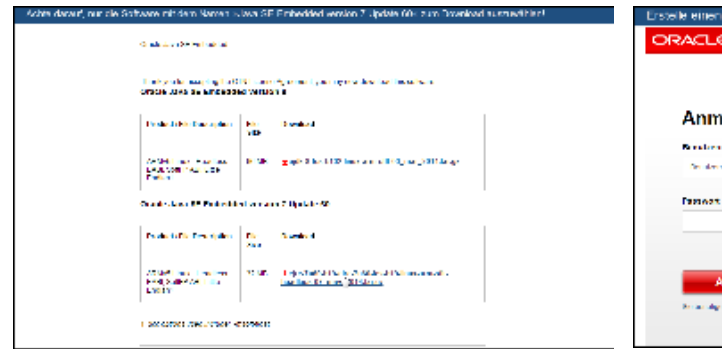
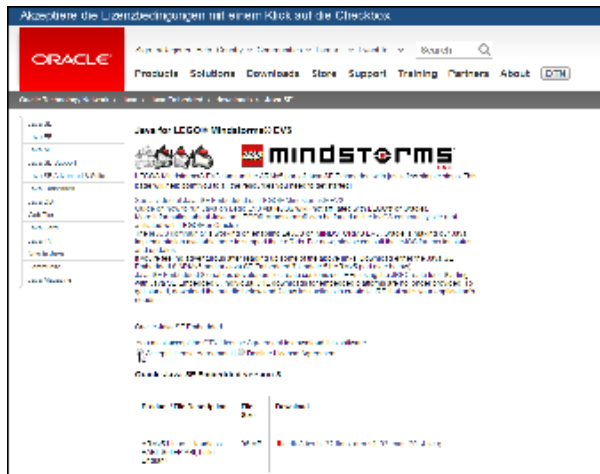


If you have a micro SD card which has an old version of the Open Roberta firmware installed or which contains old unused files, you should delete these first. See the [Reformatting the micro SD card](#) page to learn how to do this.

Step 1 The operating system for Open Roberta


The EV3 robot requires a special operating system to enable programming with the Open Roberta Lab. This operating system has been developed by the Open Roberta Team and has to be copied to a micro SD card. The EV3 robot can automatically start from the inserted Micro-SD card, much like PCs can be booted from a CD or USB stick. The firmware from LEGO on the EV3 will not be changed. By removing the micro SD card and rebooting your robot, the EV3 firmware will be used again.

- First, download the Open Roberta operating system **OpenRobertaFirmware-x.y.z-release.zip** for your EV3 robot. Follow this link: <https://github.com/OpenRoberta/robertalab-ev3lejos-v1/releases>
- Next, download the Java Runtime Environment using the following link: [Java SE Embedded version 7 update 60](#). The illustrated manual below shows you how to install this software. Just click on the first picture (far left) and then click on each additional picture by clicking on the right half of the picture.




Step 2 Preparing the micro SD card

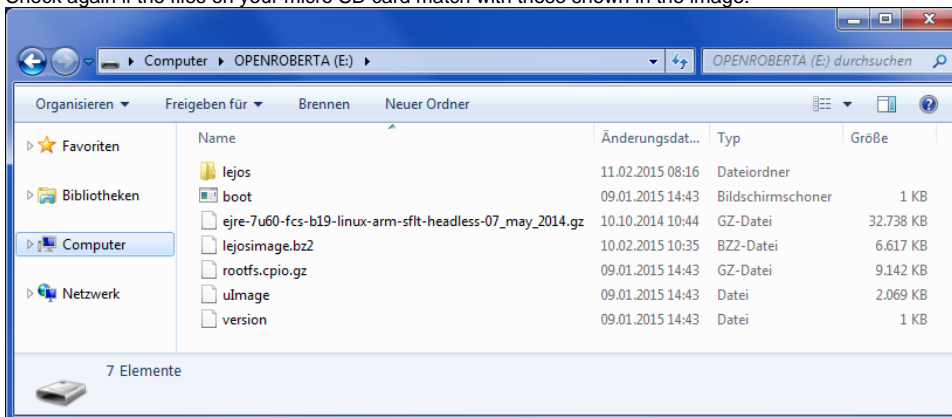
1. Put your micro SD card into the SD card adapter, then the adapter into the card reader of your computer. Connect the card reader to your computer.
2. Open the folder where you have previously downloaded both files (see Step 1). You should see the files **OpenRobertaFirmware-x.y.z-release.zip** and **ejre-7u60-FCS-b19-linux-arm-sFit-headless-07_may_2014.tar.gz**.
3. Extract the file **OpenRobertaFirmware-x.y.z-release.zip** onto the micro SD card:
 - a. Right click on the file **OpenRobertaFirmware-x.y.z-release.zip**
 - b. Now click Extract "All ..."
 - c. Select the drive of your micro SD card and specify the path of the micro SD card or chose "Browse" to select the path.

 **Example**, how the unpacking with winzip looks like.

4. Now copy the file **ejre-7u60-FCS-b19-linux-arm-sFit-headless-07_may_2014.tar.gz** to the micro SD card.

 **Attention: Do not unpack this file!**

5. Check again if the files on your micro SD card match with those shown in the image.



6. Finally, remove the micro SD card adapter (safely) from your computer and then take out the micro SD card.

Step 3 Installing the operating system on the micro SD card

The new operating system of EV3 robot is now available on the micro SD card. This will be installed automatically when you first start the EV3 robot containing the Micro-SD card.

1. Make sure that the EV3 robot is switched off
2. Insert the micro SD card into your robot EV3.
3. If you wish to connect your robot using a wireless network while operating the Open Lab Roberta in step 4, we recommend that you insert the WiFi USB Adapter into the side USB port of your robot EV3.
4. Now, start the EV3 robot by pressing the middle dark gray button.
5. The operating system will be installed automatically in the next 8 minutes and restart. You will know that the installation is complete when you hear a short melody. You should now see the main menu on the screen of your robot (see below).



i This can take a few minutes. In the meantime you may like to have a look at the [Open Roberta Lab](#).

After the operating system is installed on your EV3 robot subsequent starts will start faster. Normally the robot is ready for use in 1-2 minutes after switching on.

Step 4 Connect the Open Roberta Lab via WiFi or USB cable

We recommend you connect to the EV3 robot via WiFi with the Open Roberta Lab

- You can easily send new programs to the EV3 robot and you do not have to re-connect it again with a cable.
- Once the connection is established, no additional software has to be installed.
- This type of connection works with all kinds of devices you may want to use for programming, for example with a tablet or smartphone.

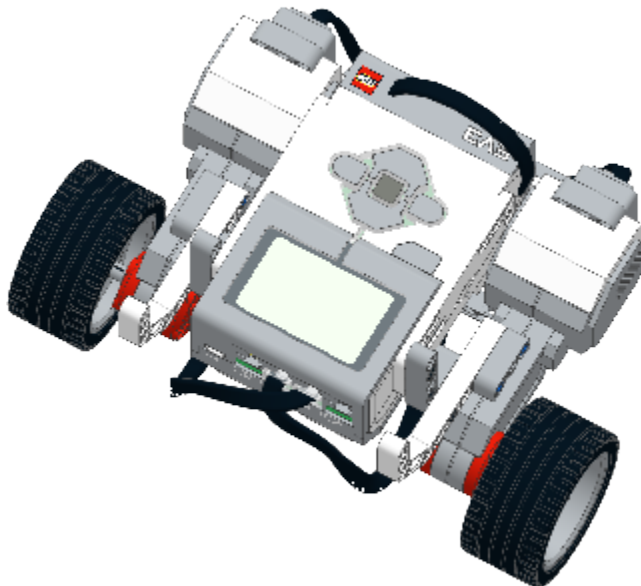
If you have a suitable USB WiFi dongle and access to a wireless network then [follow these instructions](#).

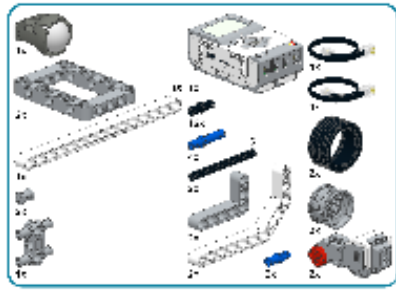
If you do not have a suitable USB WiFi dongle or you do not have an appropriate WiFi network in your area, you can connect the EV3 robot with the USB cable to the Open Lab Roberta. We show you how to establish the USB cable connection here:

- [Open Roberta Connector](#)

Robots

Building instruction





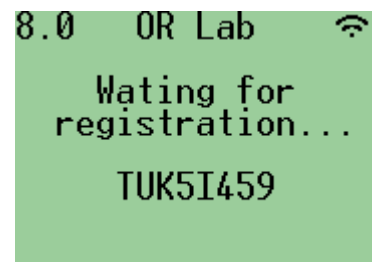
Connecting to EV3 robot

Before you can start programming and running programs on your robot, you have to connect your EV3 to Open Roberta Lab. The easiest way is to establish the connection at your robot.

Robot Open Roberta Lab

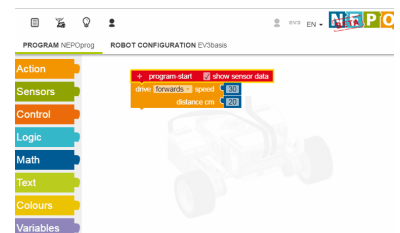
Is your robot powered on and connected to a wireless network or connected to your PC via the USB cable? If not, you may have a look [here \(WiFi\)](#) or [here \(USB\)](#) again to see how it is done exactly! In our example we will connect the robot via WiFi.

- Navigate by using the buttons of the robot to the Roberta con, if it is not in the middle of the EV3 display yet.
- Press the middle dark gray button.
- On the EV3 display a password appears, a so-called "Token". This password is valid for 5 minutes to connect your EV3 Robot to Open Roberta Lab.
- Now, continue at the Open Roberta Lab in your Web browser.



Your Browser Open Roberta Lab Robot

- Click in the left main menu on "Robots", then click "connect"
- Enter the password (token) visible on the EV3 robot display into the field "value".
- Click on "OK"
- Great! Now Open Roberta Lab knows, who belongs to your robot, you 😊



i Do you recognize Roberta's eyes at the top right corner of your robots display? This indicates that your robot is still connected to the Open Roberta Lab.



The EV3 Robot menu

This is what the Lejos firmware menu should show after the installation process or after the first start:

- First line leftmost, here 8.0 - the battery charge level in Volts
- First line in the middle - the name of the EV3. In submenus the name of the menu item is displayed
- First line rightmost - small icons indicating connections. Our EV3 is not yet connected, so nothing is there also appears
- Second line, 10.0.1.1 - the default IP that EV3 assigns to itself. For Open Roberta Lab, this is not relevant
- Third line - IP address of the wireless network is displayed if you are connected to one. For our robot, this is not the case yet.



To familiarize you with the menu control and the buttons we show how you can change the name of the EV3-brick for instance to "Roberta".

Menu »Change Name«

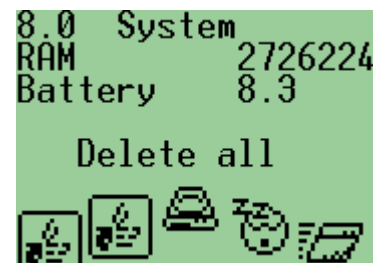
For navigation there are six different buttons available on the EV3. Just press in accordance with the following instructions the indicated buttons and check if you get the appropriate menu or submenu.



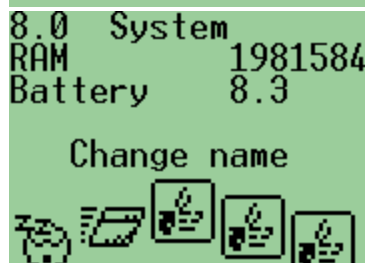
2x left



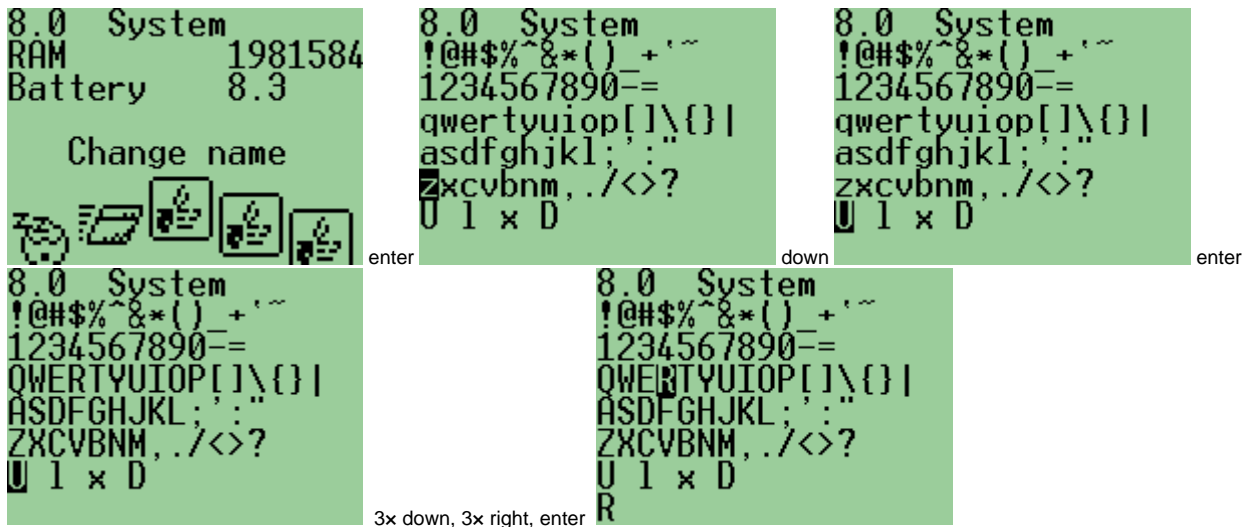
enter



3x right



Do not press the buttons too fast consecutively. It's best to wait until the display responds.



The second last line »U l x D« is prompting commands for the input screen.

Navigate to the character that you want to enter by using the buttons. Each time the current character is highlighted, click \ok {ok } until the desired name is written in the bottom line of your EV3 display.

- U *UPPER* activate uppercase letters (such as the shift key on the computer keyboard)
- l *lower* activate lowercase
- x *delete* to delete the last character entered
- D *done* ! The entered characters, which can be seen in the bottom line are sent to the system

We have already entered all the characters for our new name and we will send it now:



i After the new name has been sent, the leJOS-system updates the setting and it provides the new name to other services on your EV3. That takes a little time!

Open Roberta standalone server

You have a Raspberry Pi and you want to set up your own Open Roberta Sever with wireless access point? Our [Tutorial](#) shows you how it's done!

EV3 Robot configuration

We have modelled the EV3-Brick in the EV3 Robot Configuration menu. It is important to declare which motors and sensors are connected to the robot. It is also important to define the types of motors and sensors (e.g. large motor or color sensor), and the connection ports have to be correctly assigned (1 to 4 for the sensors and A to D for the motors) on your robot. The program will only be executed correctly if the robot configuration is defined exactly as your robot is constructed. If the robot construction & configuration does not match the program created, then the robot either will do nothing or it will throw an error.

Wheel diameter and track width

The wheel diameter and track width (the distance between the middle of the left and the middle of the right wheel) has to be assigned. This is important, because if you are using blocks from the Action category the distance parameter for the calculation of how much the robot has moved is based on this assignment.

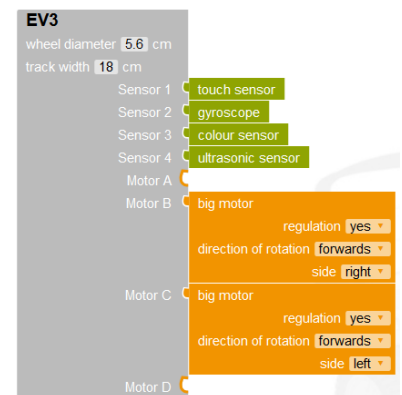
Standard configuration

To simplify the robot configuration, we have created a default configuration. This configuration contains one touch sensor (on sensor port 1) and one ultrasonic sensor (on sensor port 4), and two large motors (on motor ports B and C). The wheel diameter is 5.6 cm and the track width is 13.5 cm.

This configuration corresponds to the robot specified in the LEGO Education building instructions.

Your own robot configuration

You can save your own robot configuration so that you do not always have to reconfigure your settings. To do this you need to log in to the Roberta Open Lab. Then you go to the »Robot configuration EV3basis« menu to configure the settings so that they match your EV3 robot. When finished click the menu »edit« and »save« - or »save as«. Using »save as« you can give your robot configuration a new name. If you click only on »save«, the existing setting will be overwritten with the name »Robot configuration EV3basis«.



Sensors

This is where you declare which sensors connected to the sensor ports. To do this you need to drag one of the available sensors to the corresponding sensor port.

Motors

Drag the corresponding motor to the motor port, according to your EV3 robot. It is also possible for other power consumers to be connected to an engine port.