

An introduction to Robotics with LEGO® MINDSTORMS (VI)

Programming tools for the NXT

Text and images by Koldo

When LEGO® launched the first generation of LEGO MINDSTORMS it was hard to imagine wealth of programming tools that would become available. A community started to grow on the Internet, developing ideas and tools of their own. When the company realized that offering this community the necessary information to develop its full potential, they published documentation to develop new programming tools.

8 years later a new MINDSTORMS generation was launched: the NXT. By then the community had become very important to LEGO, so they enlisted the help of MINDSTORMS users through development programs in which people with a certain level of expertise in different aspects related to building and programming LEGO robots. When the NXT was launched, LEGO published the necessary information to enable others to develop new programming tools and sensors to be used with the NXT.

There are numerous programming tools available, so there is something to cater for all needs and interests. You may even develop your own tools if you know enough about that. This article aims to provide a general overview for a newcomer and includes some recommendations.

Selection criteria

There is no doubt that in order to learn something, certain basic conditions must be met: you need to want to learn it, have the necessary time and be willing to experiment. Practice, make mistakes and try again. It is the best way to learn. And something that is of great help is being able to share what you do with others, so the existence of a community is an important factor.

You can learn in your room, in a classroom or university or anywhere else. If we are in charge of the learning process, having good documentation to help us along is another factor to keep in mind.

Not all programming environments have the same learning curve or require the same level of previous knowledge. NXT-G, for example, requires no previous knowledge and allows you to create working programs from the very first moment.

Another important factor, in some cases the most important one, is the reason why we want to learn to program. Is it a hobby? Will we learn something at school or university? DO we build and program robots to test out solutions to problems I some cases the choice of programming language will be a given.

Introduction to robotics

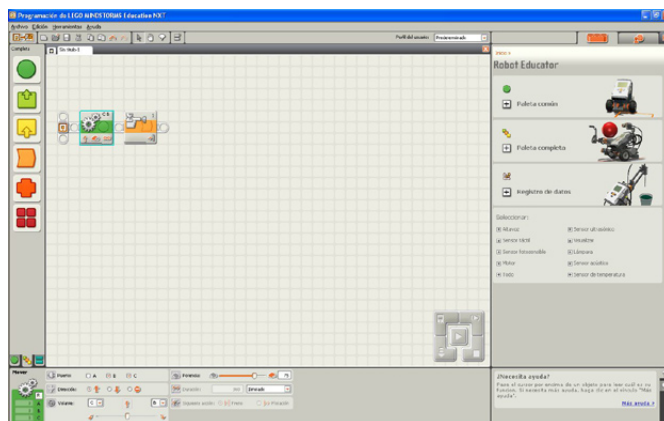
I will start out with the group of people between 0 and 99 who

start with LEGO MINDSTORMS without any prior experience. In many cases these people don't have anyone to ask questions in their immediate surroundings while others may resort to parents, siblings etc. But even in the case of someone who can count on some help the starting point may be the same.

Although it is not its official name, the original LEGO software is usually called NXT-G (G for graphic). NXT-G is great to get started. It has been specifically designed to start out with programming and be able to create a program to make a robot move in less than 5 minutes. Not a bad start.

NXT-G comes with a guide to build and program the official models and there are many different models and programs available on the Internet that can help you in your learning process. A great source is NXTprograms [1].

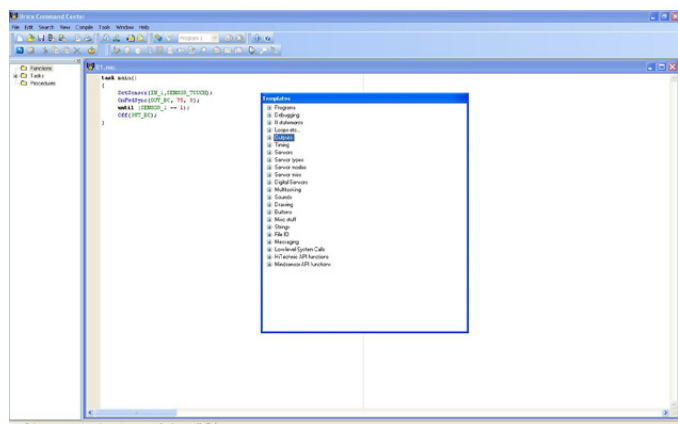
On the other hand, NXT-G provides the programming structure of the traditional programming languages: use of variables, multitasking, conditionals, loops... in other words, it is a good start even if you want something different afterwards.



The next step

Whether because you have the feeling you have outgrown NXT-G or simply because you want to learn to use a more powerful tool you may find yourself wanting to choose a new programming environment. There is an ever larger selection of tools and choosing the right one may seem difficult, but it really isn't very much. Unless you have strong professional or educational reasons, it is convenient to select just one and forget about the rest, at least for a time. Concentrating on a single language will allow you to reach a better level without getting sidetracked.

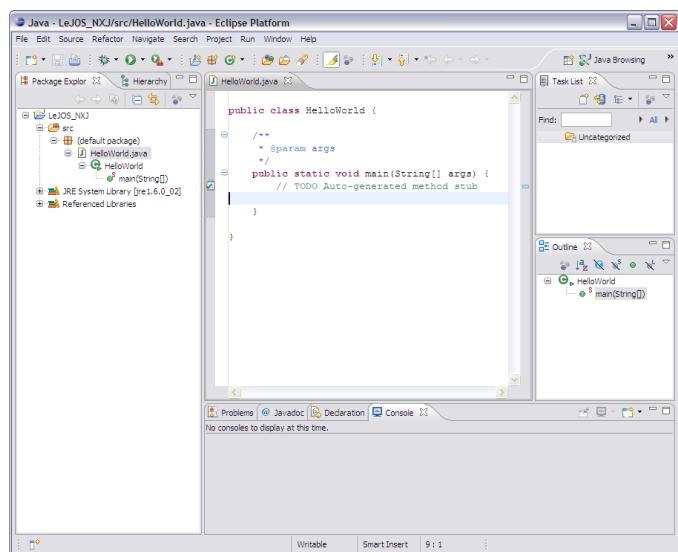
When choosing one or another, an important factor is the online community that can help you out when you get stuck, and another one the economical aspect. In this article I will not mention any commercial programming environments and concentrate on just two free tools: NXC and LeJOS.



NXC is based on C and enjoys a large tradition among LEGO® MINDSTORMS fans. It has an editor that makes developing programs for the NXT easier: Bricx Command Centre [2]. There is good documentation and a large community around it, and several books have been published on the subject, including one by Daniele Benedettelli [3] and his surprising projects

As for LeJOS, I have to say I have never used it, even though Juan Breña Moral [4], who is a big fan of Java, has often tried to get me to. Learning LeJOS is learning Java and learning Java is learning to use a tool used in servers, mobile equipment... It's an interesting option, although in my case I have not yet tried it because I cannot do everything.

On the Lrobotikas forum [5] there are people who can help you in your decision to use one or the other.

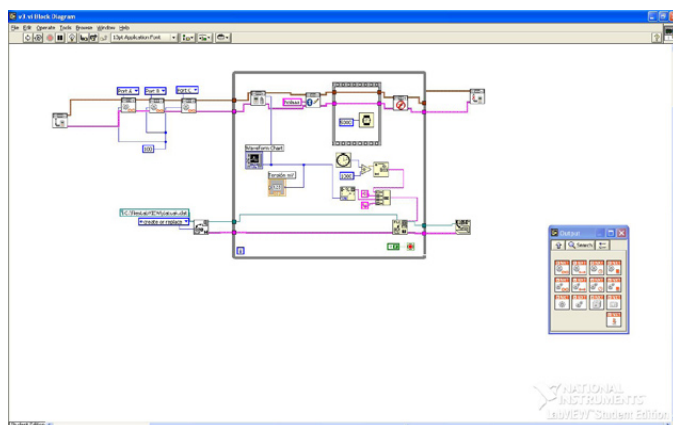


Advanced users

This group contains mostly engineering student, professionals and similar people who at some time have learned to program and in some cases in several different programming languages.

There is a wide range of option to choose from and the final decision depends on the objective and in many cases on the curriculum or the teaching needs.

From LabVIEW (with a free version for students that can be used with the NXT), to Microsoft Robotics Studio and Java, RobotC, Urbi, Matlab, etc. there is an ample range of possibilities that responds to virtually any need.



On the Lrobotikas wiki [6] you can find information and links for the different tools mentioned in this article.

- [1] <http://www.nxtprograms.com/>
- [2] <http://bricxcc.sourceforge.net>
- [3] <http://robotics.benedettelli.com/>
- [4] <http://xurl.es/lejos>
- [5] <http://foro.lrobotikas.net>
- [6] <http://xurl.es/NXT>

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