



## Robotics with LEGO® WeDo (II)

*An introduction to robotics for the young with LEGO® WeDo*

*By Diego Gálvez*

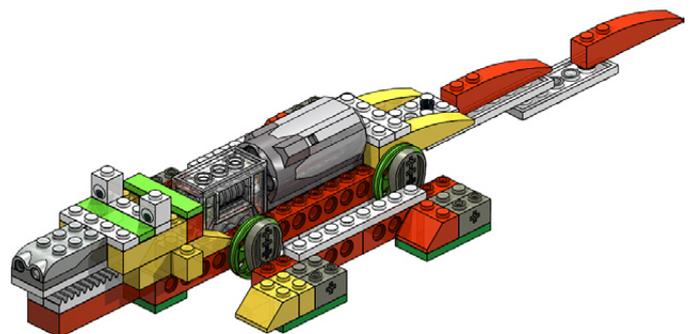
In the first part I talked about the characteristics of the LEGO® WeDo set and the steps to follow when designing a model using this set (Design, Build, Program, Test and Document). In this part I will focus mainly on programming, exploring the programming environment of the WeDo software, how it works and we will end with a first program.

To develop this activity we are going to go through the following development phases.

### Design

Since we are going to program the motor, we will need to design a prototype that allows us to observe the behaviour we will program for the motor.

This is where you decide what to build: a wheeled vehicle, a walker, etc. The objective is that it uses a motor to function. As an example I will use my crocodile design.



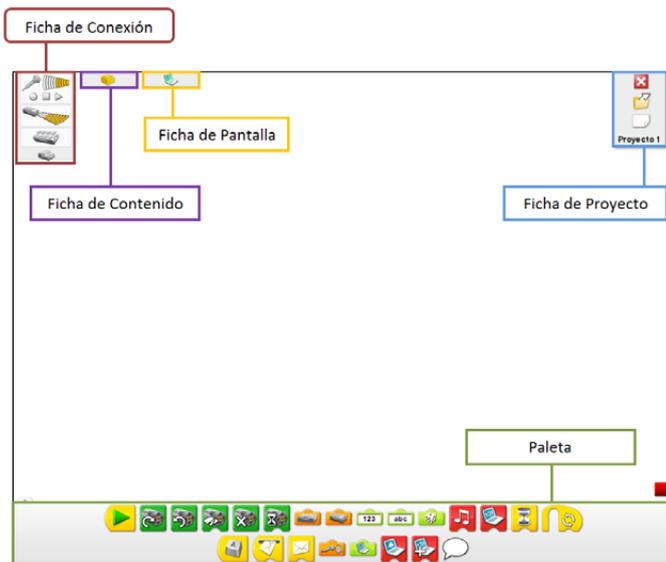
### Build

After you have built your prototype it is time to build it. If you would like to follow my design, the building instructions are on my blog.

## Program

Before we start programming our prototype we should have a look at the programming environment and how it works.

When you open the WeDo programming software you will see the following window.



The window consists of 6 areas.

### Connection tab

Here you can see which hubs, actuators (motors) and sensors (inclination, movement) are connected to the computer and also record sounds.

### Content tab

This contains a basic building guide called "First Steps". It also contains 12 constructions guides with their corresponding programs. Together these are called "Activities".

### Screen tab

This allows you to visualise numbers, letters and images that must have been previously programmed.

### Project tab

This allows you to do the following tasks: Exit, Open a project and start a New project.

### Palette

This shows all the programming blocks. To visualise all the icons, click as indicated below:



## Working area

All of the white area is the space where we will develop our programs.

## Drag and Drop

The LEGO® WeDo programming environment is iconographic software as it allows you to create programs using blocks that represent instructions.

Dragging and dropping blocks into the working area, programs are built.

Let's do a first activity in the software, dragging the first block (start block). First, place the cursor over the block:



Then, click and hold the left mouse button. You will see the cursor icon has changed:



Now if you move the mouse you will see the block is dragged along. Once you are over the working area, let go of the left mouse button. You will observe the cursor returns to its original image and the block no longer moves.



If you need to delete a block from the working area, you can do a left click on the block (without letting go) and drag it to the palette, until you see the cursor change again:



When the cursor icon changes, you can let go of the left mouse button and the block will have been deleted.

## Connecting blocks

Blocks are connected or linked to make a program.

To explain how this works, first place a Start block on the working area

Now drag a Turn motor clockwise block to the working area. Don't let go just anywhere: if you want to connect it to the block that is already in the working area, you need to drag it to a valid connection point, in this case to the right of the start block. You will see a shadow appear:



Once you see the shadow you can let go of the block.

How do you know if the blocks are correctly connected?

To check the blocks are connected you can left click on the first block in the program and drag it over the working area. When you do so, you will not only drag the first block, but also all the blocks that are connected to it. If you see that one or more blocks don't move, these have not been correctly connected.

In the example, if you drag the first block, the second block will also come along



Ready! We have just made our first program in the WeDo software; now it is time to test it.

## Testing

In order to test the program we need to connect the motor to the hub and the hub to the computer. When you do this you will see the following change in the Connection tab:



You can now see the connected devices: A motor and a hub.

After this, the only thing that remains is to make your prototype (or the crocodile in case you have followed the building guide) is to click on the Start block.



To stop the program, you must click on the Stop block, which is located in the lower right corner of the interface.

To change the direction of the motor, simply click on the Motor block in the working area and you will see how the direction of the motor changes.



## Documenting

If you have built a new prototype you can document it taking pictures or making a construction guide using special software.

Since the programs are automatically saved by the software, if you want to copy one you need to go to the following path on your computer:

User/My Documents/LEGO Creations/WeDO/Projects

In the next part we will have a closer look at the other programming blocks, which will allow us to make more and more complex programs.

You will find multimedia material (images and videos) of the creations of the author, some of them with building guides, at [notjustbricks.blogspot.com](http://notjustbricks.blogspot.com).

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