



LEGO® WeDo (IV)

Programming in Scratch

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One step closer to world domination, one brick at a time!
Today we will be introducing the basics of programming using the LEGO® WeDo designs but with Scratch explanations. In the previous issues we described how the WeDo software works and the basics operations with the open source Scratch software, the free platform.

Since we only exposed the tip of the iceberg with Scratch last time, we will explain how to program the Amazing Mechanism robots included with the WeDo software and how to do it in Scratch. This will cover the first three out of twelve designs: Dancing Birds, the Smart Spinner and the Drumming Monkey robots (the first three on the image below).



Let's start with the Dancing Birds. The basic program consists just of turning on the motor. Although simple enough, there are



a number of experiments that can be done with this design. Once built and programmed, the birds can rotate in different ways and music can be programmed for dancing as well.

Users will discover by playing what happens when the pulleys and rubber band are changed. They will learn experimenting while changing pieces and observing the effect; how fast or into what direction it rotates.

They will explore what happens if the pulleys are of different sizes or if the belt is placed in a different way. Who would think that playing with LEGO® bricks could arouse enough motivation to study engineering? Pretty clever, isn't it?

A simple program keeps students focused on what happens when you change the pulleys or place the yellow rubber band in a different position. This is the combination used in the WeDo software



In Scratch, similar code will look like



The second design to investigate is the Smart Spinner. This is a spinning top to be programmed with several clever options. The main objective of this model is to observe the spinning behavior when using different sizes of gears.

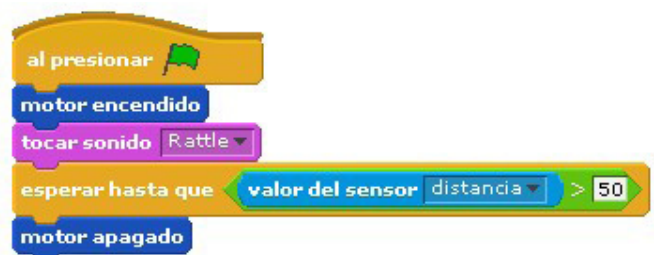
For the programming, the level of complexity increases for this one. We could use the previous code since we just need to activate the motor, but we need to turn it off as well. What about adding a sound to let us know it is moving? What about using a sensor to stop the motor?

In WeDo software, in addition to the start and the motor block we need blocks for sound, wait time, for the sensor and to stop the motor. So the idea is that after the motor starts moving, it will play a sound and wait until we lift the handle to turn off the motor. The last part is done with the proximity sensor. The proximity sensor is used to detect when handle is far from the surface.



The Scratch code differs slightly. A "play sound" block is required (I used the rattle sound). This is found under the Sound menu. On the working area choose the Sounds tab to import a new sound. You have to navigate to the folder named Effects to find the Rattle sound, but you are free to choose from the huge variety. You need a "wait until" block from the Control menu and the "motor off" block.

To program the sensor to stop the motor is a bit tricky: you need a "_>" block (greater than) found under the Operators menu and a "sensor value" block under the Sensing menu. You need to choose distance from the drop down menu for the "sensor value" block. Later you need to place it on the left side of the "_>" block and type 50 on the right side. The code is shown below



The Drumming Monkey basic programming is quite simple; it is fairly similar to the first one. This creation uses the monkey arms as levers to hit the drums. You need to get creative for a nice set of drums. Usually a couple of paper or plastic cups produce the best sound. You need to play with the cams (the grey ovals) positions to get a rhythmic percussion. The basic program also consists of turning on the motor. The experiments are related to the change of positions of the cams. The code for the WeDo software is presented below.



In Scratch, similar code will look like this



Stay tuned for the advanced programming of these creations.

You can find more information, and building and programming instructions for the designs presented here and many more at:

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