

LEGO® WeDo (VIII)

Programming in Scratch

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How can we conquer the world if we forgot to put up the advanced Scratch instructions? We were busy playing with our LEGO, ahem, planning our strategy for world domination and didn't have a chance to be on time for the previous issue of HispaBrick. That is what happens when you keep staring at your programmable bricks! After learning some Scratch programming it's difficult not to want to spend hours and hours marveling at our creations.

Up until now, in previous issues of HispaBrick we have made the comparison between the basic commands of the WeDo program and the equivalent coding instructions in Scratch. We have also discussed the Amazing Mechanisms (Dancing Birds, Smart Spinner and Drumming Monkey), the Wild Animals (Hungry Alligator, Roaring Lion and Flying Bird) and the Soccer game (Goal Kicker, Goal Keeper and Cheerful Fans). From here on out we will revisit the 12 discussed WeDo designs, looking now at the advanced programming instructions for Scratch.

Today the Amazing Mechanisms are back: Dancing Birds, Smart Spinner and Drumming Monkey



First we will revisit the Dancing Birds with the advanced programming version.



The advanced version of the Dancing Birds created using the WeDo software is shown below. With the expertise acquired thus far, it is a good idea to try to recreate the program on your own.



We need a loop to run the cycle indefinitely. Inside the loop we have the icon that selects the motor's power level with random numbers (the dice below). This helps to choose a different power level each time. After that, we need the icon to turn the motor



one way, the music button, the wait time with a random input, turn the motor the other way, another sound file, wait again for another random amount of time, play another different sound and repeat the cycle.

```

when clicked
  forever
    motor power pick random 1 to 100
    motor direction this way
    play sound WaterDrop until done
    wait pick random 2 to 5 secs
    motor direction that way
    play sound Plunge until done
    wait pick random 2 to 5 secs
    play sound Ripples until done
  
```

In Scratch the above code becomes really interesting, really challenging but not impossible. Below you will find one of the possible solutions. You will need the repeat indefinitely loop under the Control menu and the command of "wait __ secs" , also found in this menu. You will also need the power motor and motor direction (don't forget to change the direction for the second command). The pick random number function is also required (found under the Operators menu). You can choose the numbers that work best for you here. In order to finish, it is required that there be a command to play a sound until done (to avoid finishing quickly). After that you have the most important task pending: choosing your preferred sounds to play. The selected sounds (under the Sounds tab on the programming area) were WaterDrop, Plunge and Ripples (under the Effects folder). You can choose the ones you prefer or you can even record your own sound for a custom program.

Now we will continue with the Smart Spinner to learn more techniques.

The WeDo code for advanced programming is shown below. It is a good challenge to try to recreate the code without looking at our version.



The programming in Scratch is more challenging than it looks since we need to create a new variable for this one. One possible solution is shown below trying to keep a similar format to the one used in the WeDo code. When the green flag is clicked, the motor is turned on, a sound is played (WaterRunning as in this example, found under the Effects folder), a wait command follows until the distance sensor detects it is far from the surface. You need to look for the command de "_ >_" (greater than, from the Operators menu) and the command sensor value for the distance sensor (found under the Sensing menu). Don't forget to select the distance sensor from the drop down menu and fill in with the number 50 on the right cell (or another number you find that works for your situation). Once the distance sensor detects it is far from a surface you need to turn the motor off. Here comes the most critical part of the coding, you need to create a new variable. In our example we called it time. Under the Variables menu you need to select "Make a variable", write the name that you like. After that part is done, you will see new commands with the name of your variable. With those commands we need to set the time to zero before repeating the loop. Inside the loop you need to include the option of wait for 1 second from the Control menu. After that you need to include the change time by 1 (to increase the count by one second each time it runs).

```

when clicked
  motor on
  play sound WaterRunning
  wait until distance sensor value > 50
  motor off
  set time to 0
  forever
    wait 1 secs
    change time by 1
  
```

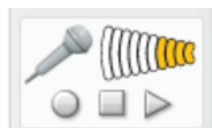
When you configure a new variable, you will see an empty cell in the white canvas with the name you have chosen. This cell will change in increments of 1 according to the programmed time, similar to the figure below.



Now we learn how to complete the advanced programming for the Drumming Monkey.



The Drumming Monkey program in WeDo uses the computer microphone option (if you have one in your PC) to record your own sound. This way the monkey can play the music you want. You need to click on the microphone icon on the top left corner. If you have a mic, click over the circle figure to start recording and click over the square to stop the process. Once you record your own sound, it will be stored using the position 1 in WeDo. This new sound will temporarily replace the whistle-like sound from the music icon with the number 1. We will assign this sound to the letter "C" as shown in the figure below. Once you do a new project, the original whistle-like sound will return and your recorded sound will only be available in the original project.



In WeDo, the In Scratch, the code may end up as shown below.



Within the Sounds tab there are sound files that you can import for instruments and music (Instruments and Music Loops). There are several drum sounds to choose from. As mentioned before, you can also record your own sound.

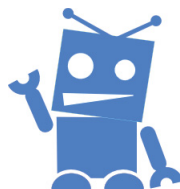


And that's it for now. Remember, if you want to conquer the world with LEGO bricks, always keep in mind that those bricks are so tempting that you may end up forgetting your objective. Spending hours and hours designing your next creation can make you forget your plans, as has happened to us!

That's all for now this time folks, keep tuned in for the advanced programming of these creations in the next issues of HispaBrick magazine. You can find more information, building and programming instructions for the designs presented here and many more at:

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The unofficial blog for LEGO® WeDo designs