

## **Instructional Video Project Script – Video 2 – Parts 3 and 4**

[title displays and disappears as camera pans back]

[music plays for approximately 7 or 8 seconds before fading to a soft background loop]

[slowly transitions to next scene]

### **Part 3 – Scene 1**

[video transitions to Chad sitting next to the table with the NXT software CD in his hand]

Chad: Now that we've built a simple robot, we'll need to program it to do what we want. To do this, we'll use the LEGO Mindstorms NXT software that is provided with the kit. In order to show you how to use it though, we'll need to first take a look at it on the computer screen.

### **Part 3 – Scene 2**

[video transitions to a view of the LEGO Mindstorms NXT software on the computer screen]

Chad: When you first open the software, you'll be presented with an easy-to-use interface. To begin a new program, simply type the name of the program into the Start New Program text box, and then click the Go button.

[Chad types "TestBot" into the box and clicks Go]

Chad: Programming an NXT robot with this software doesn't require you to have any previous programming knowledge. Everything you do is really just a simple drag and drop process with a few extra clicks here and there.

Chad: In the workspace shown, you can see there is a starting point for the program. On the left of the screen, you'll see a series of blocks. By default, only the Common palette of blocks is shown, which consists of actions your robot will frequently perform such as Move [cursor to move block], Play a sound [cursor to sound block], Wait [cursor to wait block], and Loop [cursor to loop block]

Chad: Other blocks are available if you view the Complete palette by selecting its tab.

[Chad clicks Complete palette tab]

Chad: Here you'll again see the Common blocks [cursors to common blocks], and you'll also find more blocks dealing with motor actions, Bluetooth, Data manipulation, and much more. For our simple program, we will only use the Common palette.

[Chad clicks Common palette again]

Chad: As a simple first action for our robot to perform, we can tell it to move forward for a set amount of time. To do this, I'll simply drag a Move block onto the Starting Area. I'll then check its settings by looking below in the Move block's options. [moving cursor to the options menu below] It's already configured to the correct motor ports of B and C. I want it to drive forward, and I want it steering straight, which are both already set. Instead of a power of 75, I'm going back it down to 50 because that should be sufficient. Instead of rotating for one duration, I want to change the duration to be that of seconds and enter in 3 seconds. For the next action, I'm okay with the motor braking to a stop.

Chad: After our robot has driven forward and come to a stop, let's make it wait for a couple of seconds before doing anything else. To do this I'll simply drag a Wait block dealing with Time after the Move block. Instead of waiting for 1 second by default, I'll change this to 2 so it will be more noticeable.

Chad: Next, let's make the robot turn to the right. To do this I'll again drag another Move block down after the Wait block. Instead of steering straight, I want to steer to a hard right. Again, I'll adjust the power to be that of 50 because that's still sufficient. And instead of rotating once, I want the motors to be active for 1 second. And as a next action, braking again is fine.

Chad: Now that our robot has turned to the right, let's make it wait again, but this time for 3 seconds before playing a sound.

Chad: I'll again drag a Wait block down after the Motor block, and adjust it's time to be that of 3 seconds, and then I'll drag a sound block over after the second Wait block, and adjust it to play a tone. I'm fine with the rest of the settings, which is to play the note A for half a second.

Chad: If we were to make our robot run this exact program, it would perform these actions from left to right one time and then exit the program. Instead, let's make our robot loop repeatedly through these actions until it detects something in front of it. This is where we'll get to use that ultrasonic sensor that I attached earlier. To do this, I'll first drag a Loop block onto an empty space on the program sequence beam. I'll then highlight all the other blocks and drag them inside the Loop block. Instead of looping forever, as it is currently configured, I want the Loop block to only loop until the Ultrasonic sensor has detected something within 10 inches from it. To do this, I'll change the Loop control to be that of a Sensor, and then I'll change the sensor to be that of the Ultrasonic sensor. Finally, I'll change the Loop Until condition to be less than 10 Inches. This means the loop will keep looping until it sees something less than 10 inches in front of it. Note that the loop block will only perform this ultrasonic sensor check immediately after the blocks inside of it have finished running. In our case, this will be right after the sound block.

Chad: When the robot finally sees something in front of it, it will exit the Loop Block and the program will come to an end. As a way of letting us know this has happened, I'll drag a separate sound block outside the loop block, and I'll configure it to play the following sound file

[Chad clicks the sound file "Goodbye" and it plays aloud]

Chad: We've now finished programming our robot.

### **Part 3 – Scene 3**

[transition video to a close-up of NXT robot sitting on table]

Chad: To download this program onto the NXT, I'll first turn on the NXT brick,

[Chad turns on NXT]

Chad: and then plug it into the computer with the provided USB cable.

[Chad plugs USB cable into the robot, and the computer plays the USB "plug-in" sound]

### **Part 3 – Scene 4**

[video transitions back to the software]

Chad: With the NXT robot now connected to the computer, I'll select the Download button to download the program onto the NXT brick.

[Chad clicks the Download button]

[The software pops up a window showing the program compiling before finishing and playing a tone]

### **Part 4 – Scene 1**

[video transitions to close-up of NXT robot sitting on table]

Chad: Now that we've built and programmed a robot, it's time to test it and see if it works. To do this, I'll simply turn on the NXT, select My Files, then Software Files, and then I'll select the program that was just downloaded, which is TestBot. Pressing the orange button one more time will make the robot immediately start running the program, so I'll set it down first and make sure it has plenty of room to drive forward and make a right turn. I'll know when it finishes one loop of the program because it will play that Sound block before starting over. To stop the robot, I'll just have to move my hand within 10 inches of the ultrasonic sensor.

### **Part 4 – Scene 2**

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[Video transitions to a view of cleared off table top with the NXT sitting in the top left corner facing to the right]

Chad: Here it goes!

[Chad reaches in from the left and presses the orange button one final time]

[The robot runs through the program 4 times, with each action shown as an overlay on the table]

[Chad holds his hand in front of robot while it plays the sound block on the end of its 4<sup>th</sup> loop]

[The robot plays the sound file “Goodbye”]

Chad: Looks like it worked!

### **Closing**

[video transitions to Chad sitting next to the table with the LEGO Mindstorms NXT box on it and the robot that was just built and tested]

Chad: I’ve now given you a brief introduction and tutorial to LEGO Mindstorms NXT. I showed you what comes with the basic kit, how to build a simple robot, how to program that robot, and finally how to test run the robot. Thanks for watching!

[music fades up]

### **Video 2 – Closing Credits**

In case you missed it, check out:

LEGO Mindstorms NXT  
A Brief Introduction and Tutorial  
Part 1 of 2  
at  
[www.chadcardwell.net](http://www.chadcardwell.net)

For more information, check out:

<http://mindstorms.lego.com>

Music

“Sun Red Sky Blue”

From: Make Sure They See My Face

By: Kenna

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“When It Falls”

From: When It Falls

By: Zero 7

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[www.chadcardwell.net](http://www.chadcardwell.net)