NXT Brick Guide

Preparing the NXT Brick

Now that a functional program has been created, it must be transferred to the NXT Brick and then run. This is a perfect time to take a look at the NXT Brick in detail.

The NXT Brick

The NXT Brick is the brain of a LEGO® MINDSTORMS® robot. It boasts a powerful 32-bit microprocessor and flash memory.

The NXT can receive input from up to four sensors and control up to three NXT or several TETRIX® DC and servo motors, all via its seven ports. It also has an LCD display and four buttons. The buttons are used to navigate through the NXT menus. The NXT is powered by six AA batteries or a rechargeable battery pack.

The two gray arrow buttons are used to navigate through the NXT's menus. The orange button is used to select objects from the menu, and the dark gray rectangle button is used to end a program or navigate to the main menu on the NXT.

Programs can be transferred from a computer to the NXT using USB or Bluetooth®.

Using a USB Cable:

If a USB cable is being used to connect:

1. Connect one end of the USB cable to the NXT Brick.

2. Connect the other end of the USB cable to the computer's USB port.

Note: It is important to be patient as the operating system can take a few minutes to install the drivers the first time an NXT is connected to the computer,

Using Bluetooth:

If Bluetooth is being used to connect:

1. Ensure that Bluetooth is enabled on the NXT. To do this, turn on the NXT and select Bluetooth from the main menu.


2. Ensure that Bluetooth is turned on by selecting the On/Off icon and selecting On. Once Bluetooth is turned on, the NXT will return to the main menu where Bluetooth must be selected again.

3. Ensure that the NXT's visibility is enabled so that the computer is able to see it. To do this, go into the Bluetooth menu again, select Visibility, and then select Visible.

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Connecting to the NXT using ROBOTC®

Go to **Link Setup** under **NXT Brick** in the **Robot** tab. This will open a window similar to the one shown below.
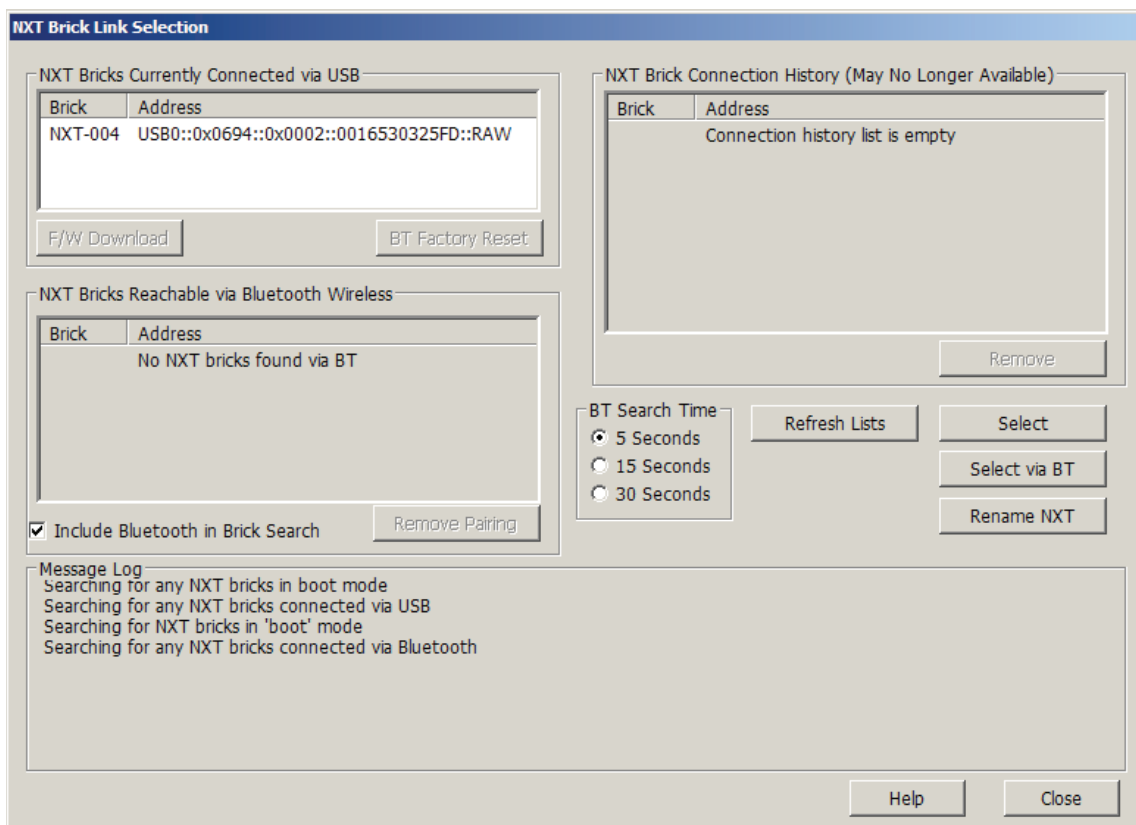
a. Using USB with ROBOTC

　　1.　If the NXT is already connected via USB, it will be listed under **NXT Bricks Currently Connected via USB**.

　　2.　Click it once to highlight it and click the **Select** button to link it to ROBOTC.

　　3.　Click **Close** to close the window.

b. Using Bluetooth® with ROBOTC

　　1.　If Bluetooth is being used and the NXT does not show up in the box below NXT Bricks Reachable via Bluetooth Wireless, select **Include Bluetooth** in the **Brick Search** option and click the **Refresh Lists** button.

　　2.　Once the NXT is visible, click it once to highlight it and click the **Select via BT** button to link it to ROBOTC. A prompt will appear to enter a passkey into the NXT Brick. The default should be 1234. If it is not, use the grey arrow keys and the orange select button on the NXT Brick to enter it. Select the check mark to select the passkey.

　　3.　Now click the **Close** button on the computer to close the window.

Once the NXT is connected, programs can be downloaded by selecting **Compile and Download Program** under the **Robot** tab or by pressing **F5**.

To run the program, select **Start** in the **Program Debug** window that appears in ROBOTC or find the file on the NXT and select **Run**.

The NXT has now been successfully connected to the computer and programs have been downloaded and run.
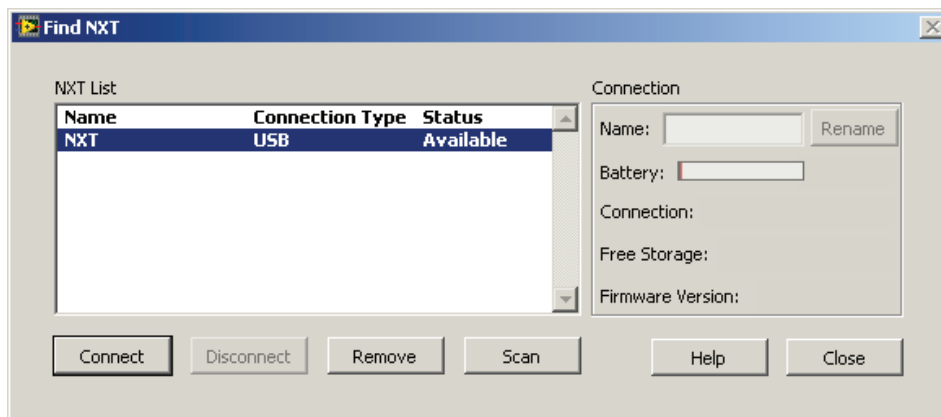
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Connecting to the NXT using LabVIEW™ for LEGO® MINDSTORMS®
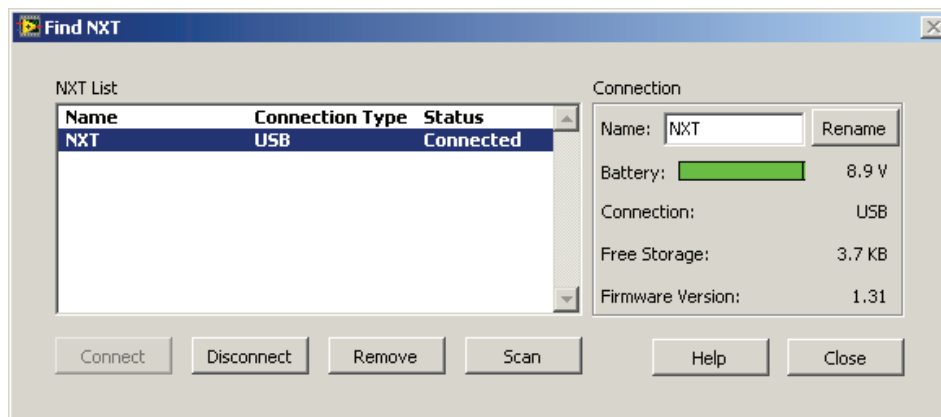
Tell LabVIEW for LEGO MINDSTORMS how to find the NXT.

Using a USB with LabVIEW

1. If a USB cable is being used, click the **Connect to an NXT** drop-down menu on the **Robot Project Center** window and click **Find NXT**.


> **Note:** Because the NXT is already connected via USB, it will be listed. Click it once to highlight it and click **Connect** to link it to LabVIEW.

2. The window is updated to show the name, battery level, and other information about the brick that is connected.

Using Bluetooth® with LabVIEW for LEGO MINDSTORMS

> **Note:** To connect to the NXT via Bluetooth, ensure that either the computer has built-in Bluetooth capabilities or that a USB Bluetooth adapter has been installed. Enable Bluetooth from a computer or a Bluetooth adapter.
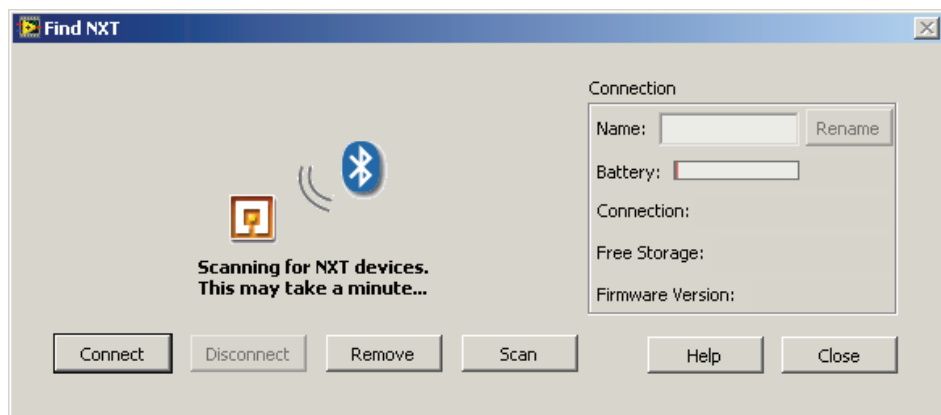
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Now that Bluetooth® is active on the computer and the NXT, connect to the NXT via Bluetooth®.

1. To connect to the NXT, click the **Connect to an NXT** drop-down menu on the **Robot Project Center** window and click **Find NXT**.

2. Click **Scan** to search for Bluetooth devices and notice that LabVIEW for LEGO® MINDSTORMS® is searching for Bluetooth devices.

3. After about 10-15 seconds, the NXT will be found.

4. Click once on the name of the NXT to highlight it and then click **Connect**.

   Note: If this is the first time this NXT is connecting to a computer, a prompt will appear to enter a passkey before the NXT can pair with the computer.

5. Enter "1234" as the passkey and select **OK**. A beep will be heard and a prompt will appear on the NXT Brick to enter a PIN. Select "1234" by navigating right and left with the gray arrow buttons on the brick and selecting with the orange button.
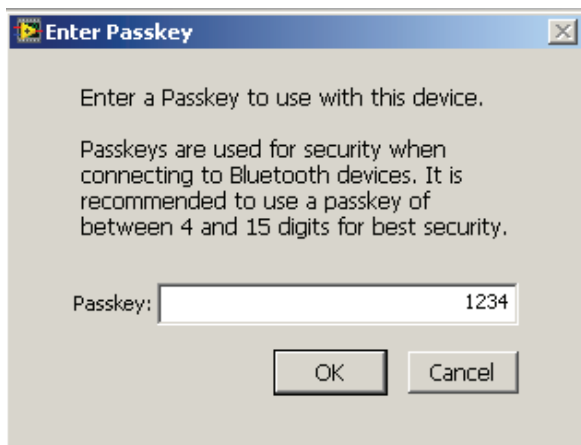
6. Once "1234" has been entered, navigate to the check mark icon and press the orange button.

7. Once this is complete, the operating system will take a few moments to form a connection to the NXT via Bluetooth®. It will now be possible to wirelessly compile programs onto the NXT.
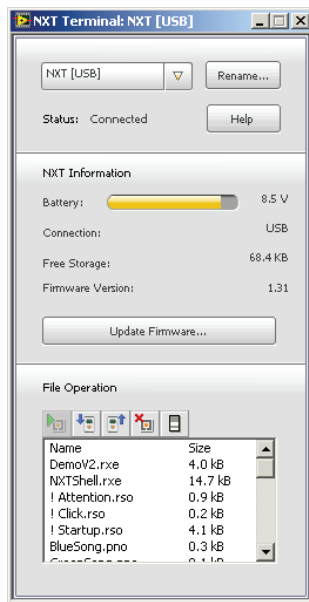
   Note: Many other options of the NXT can be explored using LabVIEW for LEGO MINDSTORMS via the NXT Terminal.

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The NXT Terminal

Access the NXT Terminal by selecting **NXT Terminal** from the **Tools** menu and then selecting **NXT Terminal**.

If there are multiple NXTs connected, select which one to communicate with by using the drop-down menu.

This window shows:

- The battery level of the NXT
- The amount of free space in its memory
- Its firmware version

Note: The first time an NXT Brick is run with LabVIEW™ for LEGO® MINDSTORMS®, make sure to update the firmware by clicking **Update Firmware**. This should only be done when connected via USB.

- At the bottom of this window, the File Operations will be visible. All of the files currently on the NXT will appear. It is a good idea to delete any old programs from the NXT that will not be used anymore. All of the software files are in ".rxe" format. Click the file once to highlight it and then click the **Delete File(s)** button to remove it.
- The **Defragment** button can also be clicked to clear up some memory.

Now programs can be run on the NXT. Look at the LabVIEW toolbar. Notice that there are three buttons to run a program, each of which runs the program slightly differently. These three buttons are Run, Deploy, and Debug.

- The **Run** button compiles the program onto the NXT and immediately runs it. If this is done with the code created in the lesson to make the robot move forward, LabVIEW for LEGO MINDSTORMS compiles the software onto the NXT and the robot immediately moves forward.
- The **Deploy** button compiles and downloads the program onto the NXT but does not run it until the buttons on the NXT Brick have been used to choose it. This is very helpful when compiling programs using USB without running the program immediately. For example, if the program involves the robot moving, the **Run** button will compile and run the program, causing the robot to start moving with the USB cable still attached. The **Deploy** button will only compile the program. The USB cable must be removed to run it.
- The third method for running a program is the **Debug** option. Essentially, Debug keeps the link between the LabVIEW program on the computer and the NXT Brick. Use this to debug the program and interrogate it to make sure it is working properly.

Select either the **Run** button or the **Deploy** button. A robot program has now been created and deployed.