



# ATlab NXT Control App setup guide and user' s manual



University of Alberta  
Assistive Technology Lab

This manual describes the functioning of the Lego robot control program. This application works with a Lego NXT robot and Windows PC connected via Bluetooth.

## Setting up the environment and installing ATlab NXT Control App.

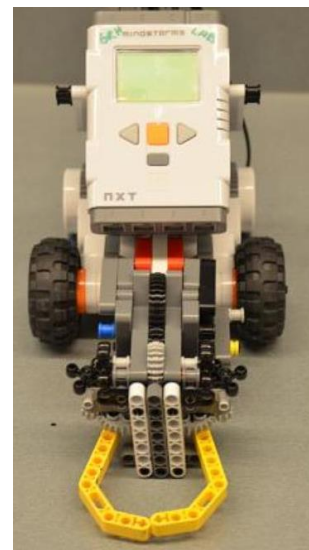
### 1. Build the NXT robot.

Since this application is designed for a specific robot design, you need to download the building instructions and build the specific robot. The instructions of the robot design can be found at

<http://www.us.lego.com/en-us/mindstorms/community/profile?builder=RobotLabGRH>

To open the building instruction files you need to have Lego Digital Designer software installed on your computer. If you don't have Lego Digital Designer, please download it from the following link and install it on your computer.

<http://ldd.lego.com/en-us/>



The Lego robot design for ATlab NXT Control App

After building the robot, connect the motors to the motor ports on your NXT. The left wheel motor should be connected to the port A, the right wheel motor should be connected to the port B, and the gripper motor should be connected to port C.

## 2. Download and install the NXT Fantom driver.

The NXT Fantom driver allows your computer to connect to the NXT robot via USB and Bluetooth. If you already have the Fantom driver installed on your computer, you can skip this step.

Download the NXT Fantom driver to your computer from the following link. Scroll down to “NXT software download”, click on “Download NXT Fantom Driver”, and unzip the folder.

<http://www.lego.com/en-us/mindstorms/downloads>

If your computer is running a 32-bit OS, open the installer file called *LegoMindstormsNXTdriver32.exe*. The location of this file may change with updates, but at the time of writing, the file is found at:

*NXT Fantom Drivers\_Win\_1.2.0\_NEW\Products\LEGO\_NXT\_Driver\_32  
\NXT\_D01\LegoMindstormsNXTdriver32.exe*

If your computer is running a 64-bit OS, open the installer file called *LegoMindstormsNXTdriver64.exe*. The location of this file may change with updates, but at the time of writing, the file is found at:

*NXT Fantom Drivers\_Win\_1.2.0\_NEW\Products\LEGO\_NXT\_Driver\_64  
\NXT\_D02\LegoMindstormsNXTdriver64.exe*

## 3. Install the ATlab NXT Control App.

To install the ATlab NXT Control App on your computer, open the installer called *setup.exe* which can be found in the following location:

*ATlab NXT App Installer\Volume\setup.exe*

After completion of the installation process, you can find the installed files inside the folder:

- ✓ For 32-bit OS: *Local Disk\Program Files (x86)\NXT App\*
- ✓ For 64-bit OS: *Local Disk\Program Files\NXT App\*

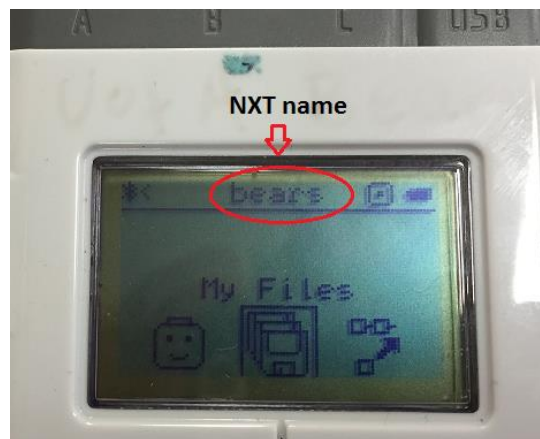
If you are asked to restart the computer after the installation, please reboot the computer.

#### 4. Bluetooth communication.

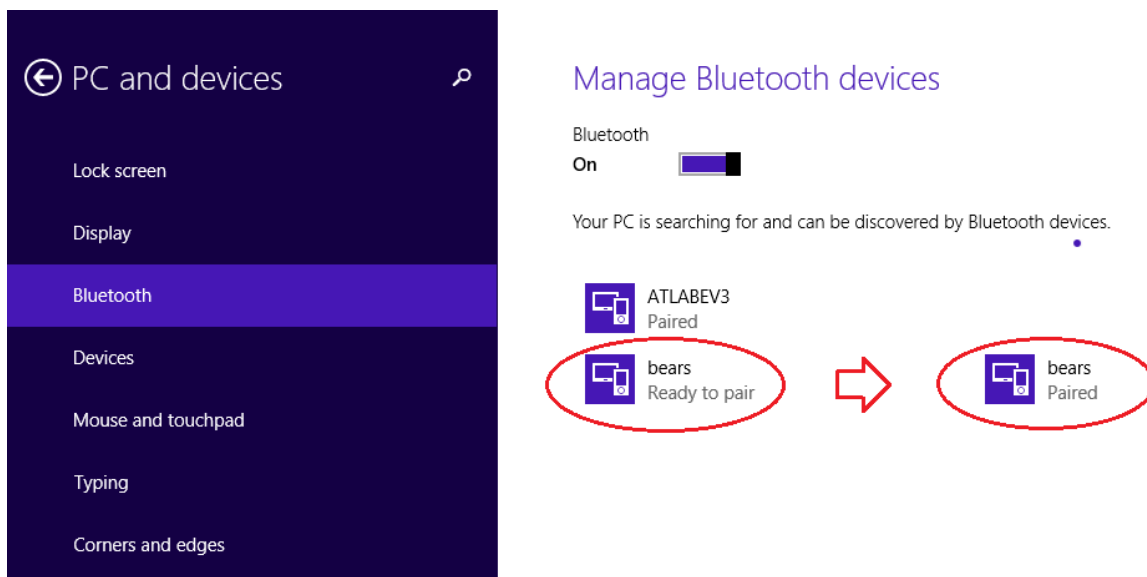
This step is required if the Lego NXT is not already paired with your computer.

Note: If your computer does not have Bluetooth feature built-in, you will require a Bluetooth adapter. To connect to the NXT, Bluetooth communication needs to be enabled on the Lego NXT.

Go to Bluetooth setting on your computer and find your NXT name in the device list. The name of your NXT can be seen on the NXT display shown in picture below. Once the pairing is completed, the status of the device change from **Ready to pair** to **Paired**. Default password for paring is **1234** (See NXT User Guide for details).



NXT name shown on the NXT display



Bluetooth setting for Windows computer

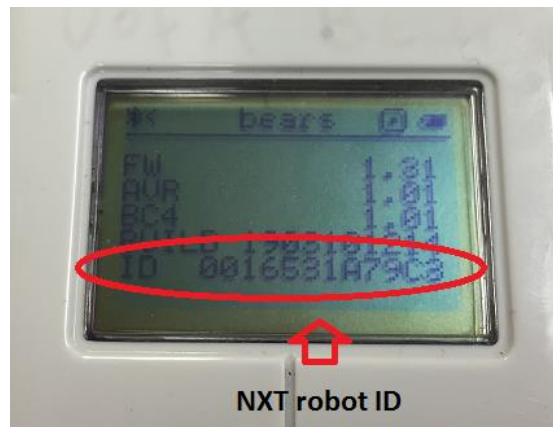
## ATlab NXT Control App user's manual

This section explains how to use ATlab NXT Control App software.

Turn on the Lego NXT. Remember NXT Fantom Driver and ATlab NXT Control App must be installed, and Bluetooth communications must be established before this step.

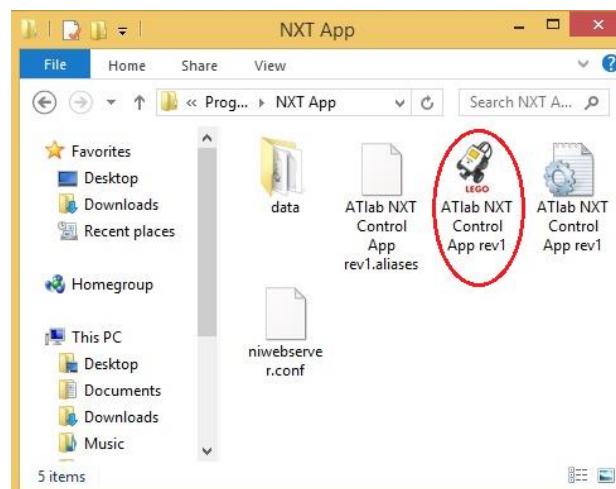
### 1. Enter your NXT information.

You need to enter the device information of your NXT in order to use this application. Before starting the application, check the robot ID of your NXT. The robot ID can be found by following steps: Select **Setting** from NXT Main Menu and then choose **NXT Version**. After selecting **NXT Version**, you will be able to see the robot ID shown on the NXT display.

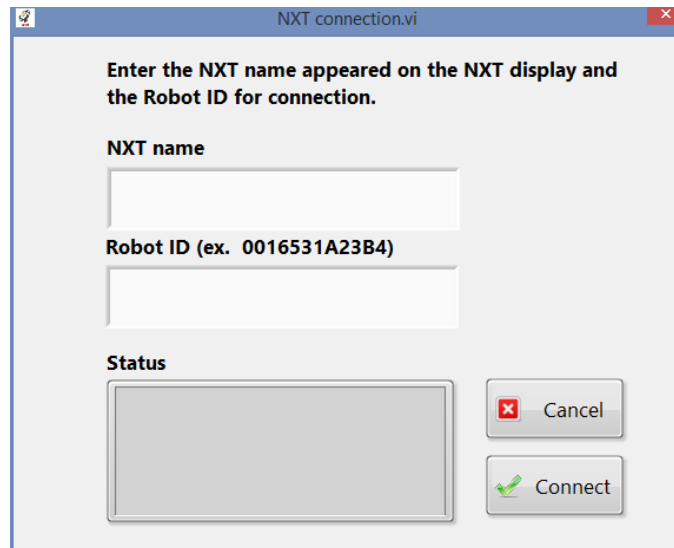


One example of the robot ID shown on the NXT display

Now, you can launch the application. In order to start, double-click on the Lego NXT icon named *ATlab NXT Control App.exe* located in the *NXT App* folder.



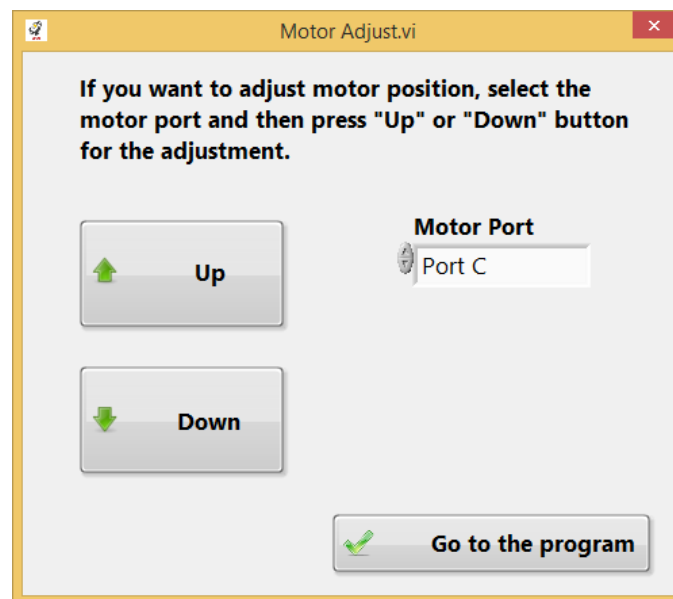
You will see the following pop-up window after launching the application. Enter the **NXT name** and **Robot ID** and then click on the **Connect**. If the connection fails, check that the robot ID you entered is correct. If there is nothing wrong with the robot ID, there might be an issue with the Bluetooth communication. Check the Bluetooth communication and try it again.

A screenshot of a Windows-style pop-up window titled "NXT connection.vi". The window has a light gray background and a blue title bar. Inside, there is a bold instruction: "Enter the NXT name appeared on the NXT display and the Robot ID for connection." Below this, there are two text input fields. The first is labeled "NXT name" and the second is labeled "Robot ID (ex. 0016531A23B4)". Below the input fields is a large, empty rectangular box labeled "Status". To the right of the status box are two buttons: "Cancel" with a red 'X' icon and "Connect" with a green checkmark icon.

Pop-up window for connection

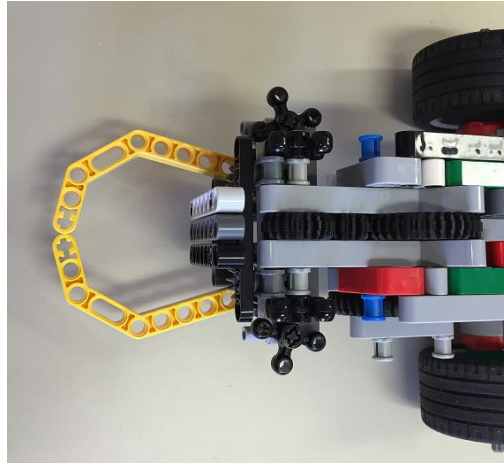
## 2. Adjust the robot arms position.

After the connection is successfully established, you will see the pop-up window. This window allows you to control all the motors connected to your NXT. The main reason for this step is to set the robot arm at the initial position before the application starts.

A screenshot of a Windows-style pop-up window titled "Motor Adjust.vi". The window has a light gray background and a yellow title bar. Inside, there is a bold instruction: "If you want to adjust motor position, select the motor port and then press 'Up' or 'Down' button for the adjustment." Below this, there are two buttons: "Up" with a green up arrow icon and "Down" with a green down arrow icon. To the right of these buttons is a "Motor Port" label and a text input field containing "Port C". At the bottom right of the window is a button labeled "Go to the program" with a green checkmark icon.

Pop-up window for motor adjustment

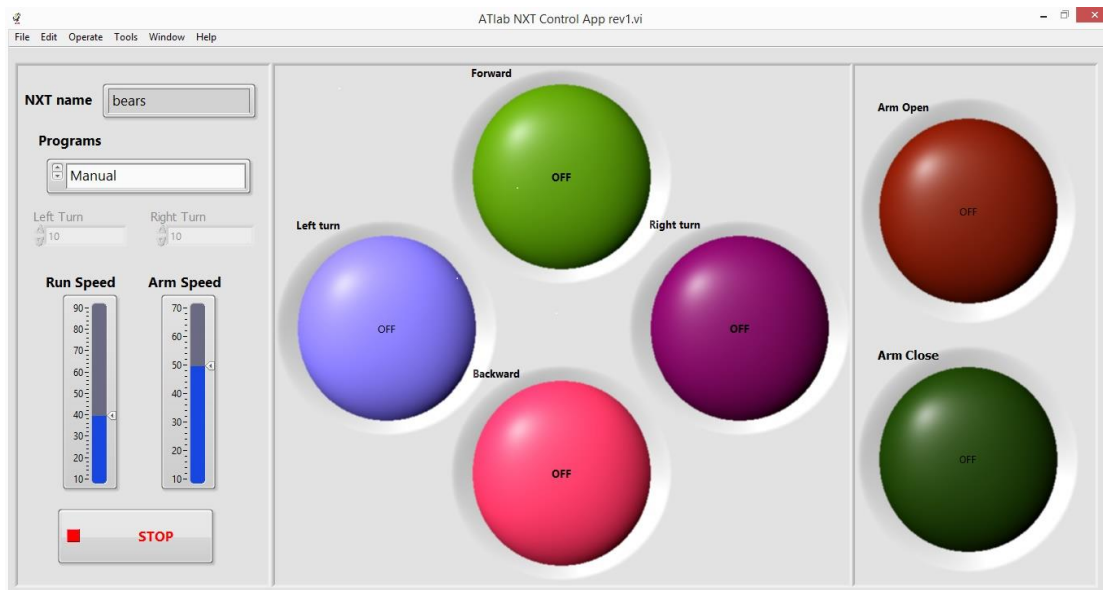
The initial position of the robot arms is shown in the picture below. The arms should be fully closed position before starting. This is an important step for the proper robot control and avoid for breaking the arms during the operation. After placing the robot arms in the initial position, then click on **Go to the program**.



The initial position of the robot arms

### 3. Control the NXT robot.

Now you will see the NXT robot control interface shown in the picture below. It has four buttons for the robot mobility (i.e., Forward, Backward, Right turn, and Left turn) and two button for the robot arms control (Arm Open and Arm Close) on the interface.



Robot control interface for ATlab NXT Control App

You can also control the NXT with a keyboard (or the physical switches with a keyboard emulator).

- ✓ Forward – Up arrow key
- ✓ Backward – Down arrow key
- ✓ Right turn – Right arrow key
- ✓ Left turn – Left arrow key
- ✓ Arms open – Space key
- ✓ Arms closed – Enter key

For example, Don Johnston Switch Interface Pro 6.0 (<http://donjohnston.com/swip/>) is a USB keyboard emulator which converts switch inputs to key entries and allow us to use multiple push-button switches for the robot control.



Don Johnston Switch Interface Pro 6.0 and push-button switches

If you want to use physical switches such as push-button switches, two Don Johnston switch interfaces will be needed for this application. One switch interface can be used for the mobility control (i.e., Forward, Backward, Right turn, and Left turn), and the other switch interface for the robot arms (Arm Open and Arm Close). Make sure that the green light is on at the switch interface for mobility control and the blue light is on at the switch interface for the robot arm control.

The mobility speed is adjustable using the **Run Speed** slide control, and the speed of the robot arms is also adjustable with the **Arm Speed** slide control on the NXT robot control interface.

The different control modes were pre-stored in this application. You can select a control mode you prefer from the **Programs** section on the interface. Following is a list of the control modes you can choose:

- ✓ **Program1 L-45, R-45** : 45 degree Left turn & 45 degree Right turn with single button or key press
- ✓ **Program2 L-45, R-90** : 45 degree Left turn & 90 degree Right turn with single button or key press
- ✓ **Program3 L-90, R-45** : 90 degree Left turn & 45 degree Right turn with single button or key press
- ✓ **Program4 L-90, R-90** : 90 degree Left turn & 90 degree Right turn with single button or key press
- ✓ **Manual**: Keep rotating while you press the button or key
- ✓ **Tuning**: You can adjust degree of the rotation by changing the values of **Left Turn & Right Turn**.



You can stop the application anytime by clicking on the **Stop** button. If you want to turn the application back on, click on the white arrow button appeared on the upper left of the interface or select **Run** from the **Operate** menu.

## Trouble shooting.

If the NXT does not respond, poor Bluetooth connections often cause the issue. If you cannot find anything wrong with the settings, remove the **paired** NXT from Bluetooth setting and re-pair the device. Note: The pairing process usually take several seconds to complete, please wait until the pairing process is completely before running the application.