

Install Notes to Lego Mindstorms using ADA

Software Needed

It is highly recommended you run the following under Windows 7. Problems have been reported under Vista by the community. It has been determined as well that XP 64bit will not support the USB drivers required for the mindstorm. XP 32 SP3 has been known to work.

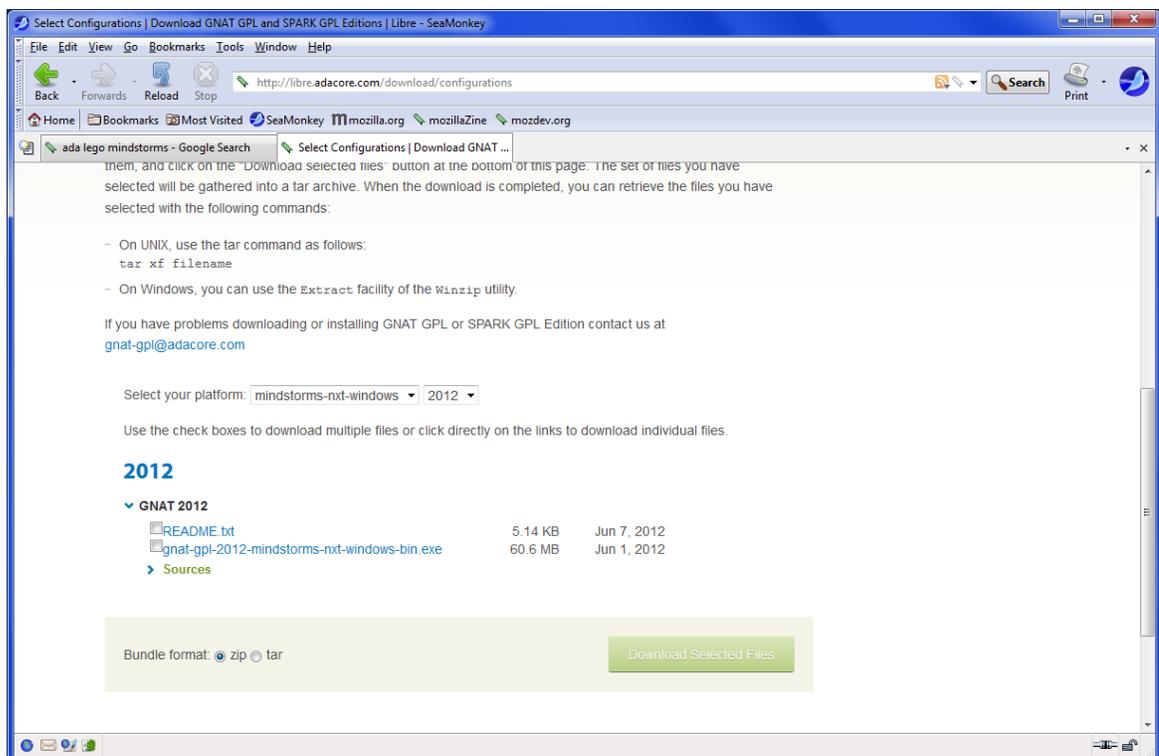
Most of what follows has been taken from the Readme.txt file which is down loaded with GNAT ADA as well as a series of web resources. If something does not work, please do not shoot the messenger.

The following software will need to be installed in the order given.

- 1) Download and install Cygwin. This is a Linux shell program which runs under a windows environment. Be sure to install the utilities package, which is not part of the default install. The utilities package contains the 'make' utility which is needed to compile the ADA mindstorm programs.

Here is a direct link to Cygwin, <http://www.cygwin.com/>

- 2) From the ADA Core Website, down load and install the 2012 version of GNAT ADA for Lego mindstorms. <http://libre.adacore.com/tools/mindstorms/>, under build your download package, choose 2012 version.

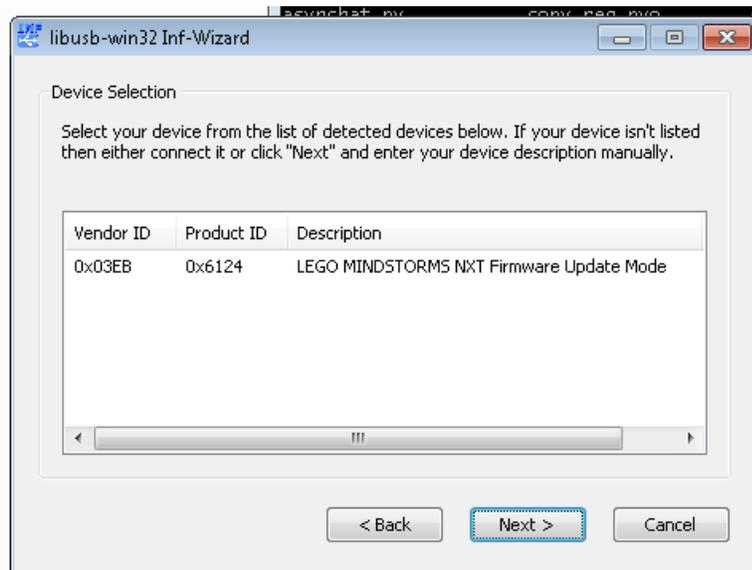


Install the GNAT ADA into the default directory, C:/GNAT

- 3) Install a Lego Mindstorm driver. This will allow Windows to see the Lego NXT. There are several versions of these drivers. The current one is Fantom 1.1.3 downloadable from the Lego website: <http://mindstorms.lego.com/en-us/support/files/default.aspx#Driver>

To test that Windows recognizes the NXT: Open the Device Manager in windows. Plug the powered up NXT into a USB port. It should appear in the device manager. If it appears as an unsupported USB device you will need to reboot and reinstall.

- 4) Cygwin will not recognize the USB ports on a windows machine. To solve this, a driver must be installed on the windows side so programs can be downloaded to the mindstorm from Cygwin. This driver is called libusb-win32 and can be downloaded from sourceforge <http://sourceforge.net/apps/trac/libusb-win32/wiki>. Once downloaded, unzip the archive and run the wizard in the **bin** directory. You must have the mindstorm plugged in to the USB port and turned on. You should see the NXT listed, and thus should be selected during the install. If installed correctly, the Device manager should now show the NXT running through the LibUSB driver.



Testing the complete install

Run Cygwin and navigate to the demos in the GNAT directory. The path will likely be similar to: `/cygdrive/c/gnat/2012/share/examples/mindstorms-nxt/demos/basic_tests`

The basic_tests will allow you to experience the functionality of the NXT. The default MakeFile should be good to go. Executing make, should build an image called 'tests'. The run this

program you need to put the NXT into download mode. Turn on the NXT and press the reset button on the back, (top left corner). You will need a small rod, or micro screwdriver to reach the button. Press this for 5 sec. The NXT will start to click indicating it is in firmware mode. Congratulations you have just voided the warranty of your Lego mindstorm. This process will only need to be done once. Subsequent downloads will only require the NXT to be turned on.

From Cygwin, type `<samba_run tests>`, this will download the image to the NXT. You should see the following on the screen.

```
bockusd@bockusd-PC /cygdrive/c/gnat/2012/share/examples/mindstorms-  
nxt/demos/basic_tests
```

```
$ samba_run tests  
Image download complete.  
Image started at 0x0020235c
```

You should have the sensors and the motors plugged into the NXT. A menu on the NXT will allow you to experiment.

Hello World

Included is an NXT version of a hello world. Plug a motor into A & B, and touch sensors into 1 & 2 of the NXT cube. Un package the attachment to a sub directory off of demos. The MakeFile is set, compile and run as follows:

```
make  
samba_run motor_test
```

This example uses tasks to define executable code blocks.

NXT API

There is no clean API which defines the NXT. Instead there are a series of drivers written in ADA as specification and body. The specifications contain all constants, functions and procedures which are needed to interface with the NXT. Unfortunately, there are about 20 files and finding what you need can be daunting. These files are located here:

```
/cygdrive/c/gnat/2012/lib/mindstorms-nxt/drivers
```

Suggest you print out all .ads files and keep them in a safe place for reference.

End. Enjoy!