ECRobot Installation Instructions:

Prerequisites:

1. Make sure MATLAB is installed in a directory with NO SPACES in the directory structure
    a. "C:\MATLAB" **is good**
    b. "C:\MATLAB R2010a" **is bad**
2. Make sure you have at a minimum installed MATLAB, Simulink, Real-Time Workshop and Real-Time Workshop Embedded Coder

Install auxiliary tools:

This section covers the installation of 6 tools and although slightly arduous should go smoothly if you follow every instruction verbatim.

1. Install Cygwin / GNU Make

    a. Download Cygwin 1.5.x or newer version (we use 1.5.24) from Cygwin website: http://www.cygwin.com/
    b. Install Cygwin into "C:\cygwin" – see figure 1-1
    c. Select "make" under the "Devel" tree node.

Fig. 1-1 Cygwin installer

2. Install GNU ARM

    a. Download GCC-4.0.2 binary installer from FILES section of GNU ARM website: http://www.gnuarm.com/
    b. Execute installer and install GNU ARM into C:/cygwin/GNUARM
    c. Configure installation dialog as shown in figure 1-1
    d. UNCHECK Install Cygwin DLLs because of Cygwin was already installed (Figure 1-2)
    e. At the end of installation, you are asked to add the installation directory to the Path, do NOT do this

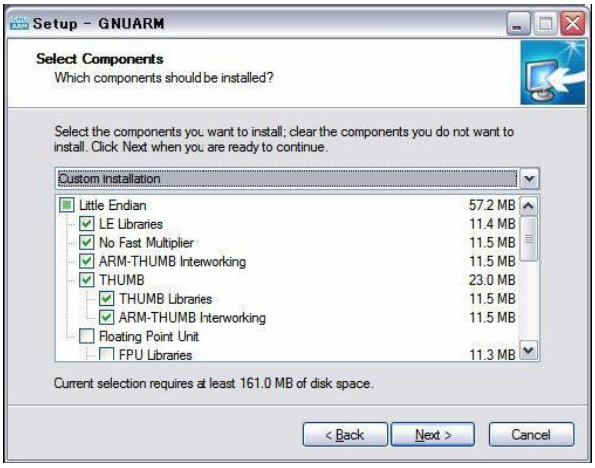

Fig. 2-1 GNU ARM installer(1)

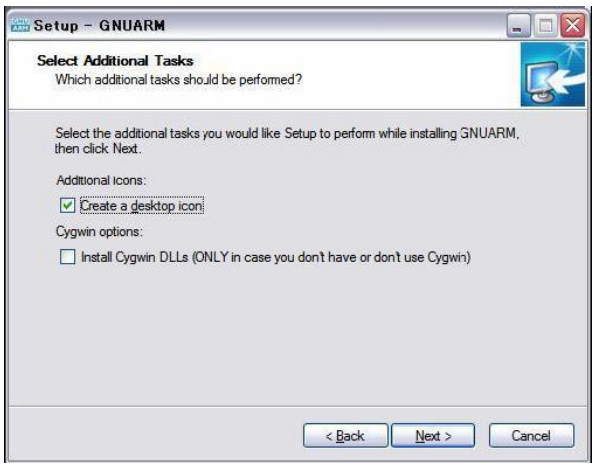

Fig. 2-2 GNU ARM installer(2)

3. Install NXT USB Driver
    a. (If LEGO standard programming software was already installed in the PC, skip this step) Download MINDSTORMS NXT Driver v1.02 from LEGO software update website: http://mindstorms.lego.com/Support/Updates/ - see Fig. 3-1 Mindstorms Driver

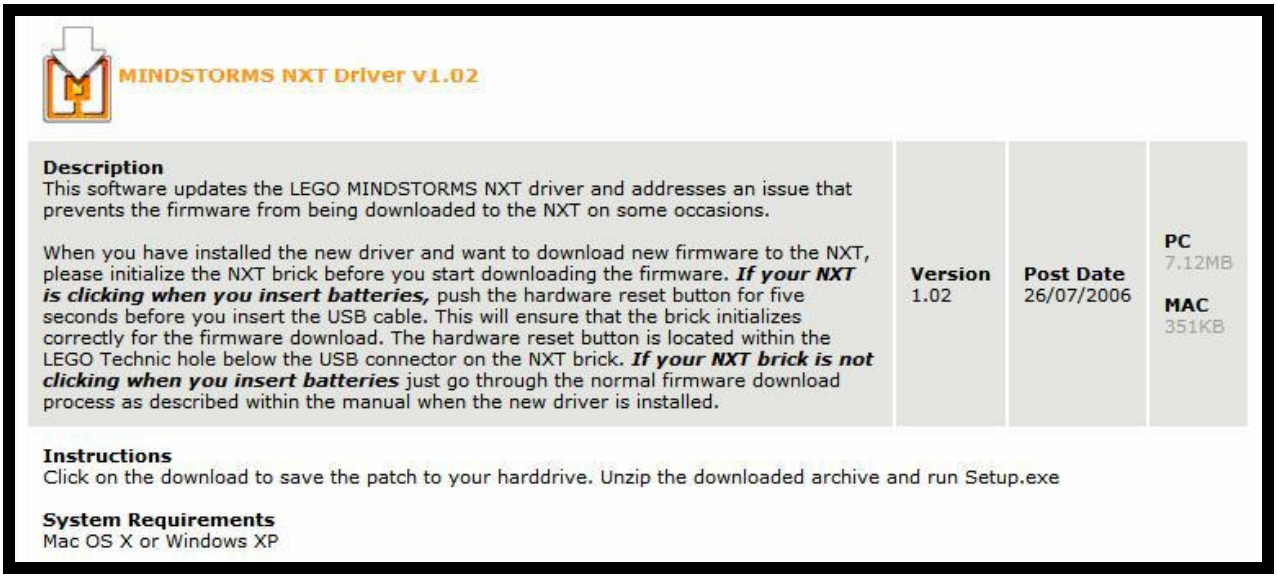

Fig. 3-1 Mindstorms Driver

Troubleshooting:
If ATMEL SAM-BA was already installed, it needs to be completely uninstalled before installing LEGO standard USB driver.

4. Install NeXTTool
    a. Download John Hansen's NeXTTool from: http://bricxcc.sourceforge.net/utilities.html and extract the files to "c:\cygwin\nexttool"

5. Install NXT standard firmware

a. Download John Hansen's enhanced NXT standard firmware and install using steps below: http://bricxcc.sourceforge.net/lms_arm_jch.zip (version 106 or later)
b. Extract it into the "c:\cygwin\nexttool" folder – you should see a file with a name like "lms_arm_nbcnxc_**X**.rfw" with **X** = 106 for version 1.06
c. **Open a command Prompt** – In Windows go to Start => Run => and then type "cmd" and select ok
d. Type "c:" at the prompt
e. Type "cd cygwin\NeXTTool" at the prompt
f. Connect the NXT brick to the USB port and turn it on
To install the firmware, type (do not copy and paste)the command below, where "`lms_arm_nbcnxc_106.rfw`" is the filename that you downloaded in step b..

```
nexttool /COM=usb -firmware=lms_arm_nbcnxc_106.rfw
```

Troubleshooting:
Verify that this worked by typing

```
nexttool /COM=usb -versions
```

You should see the following at the prompt, where the firmware version should match what you downloaded:

```
Protocol version = 1.124
Firmware version = 1.06
```

6. Install Embedded Coder Robot NXT
   a. Download and extract the ECROBOT NXT from MATLAB Central to the top level of the MATLAB installation directory.

7. Install nxtOSEK and run `ecrobotnxtsetup.m`
   a. Download and extract the nxtOSEK 2.12 from nxtOSEK web site to the ecrobotNXT/environment directory.
   Note that, Since Embedded Coder Robot NXT v3.18, nxtOSEK folder is created under the environment directory to include TOPPERS/ATK1 sg.exe which has been excluded from nxtOSEK v2.12, so you can simply overwrite existing nxtOSEK folder by nxtOSEK v2.12.

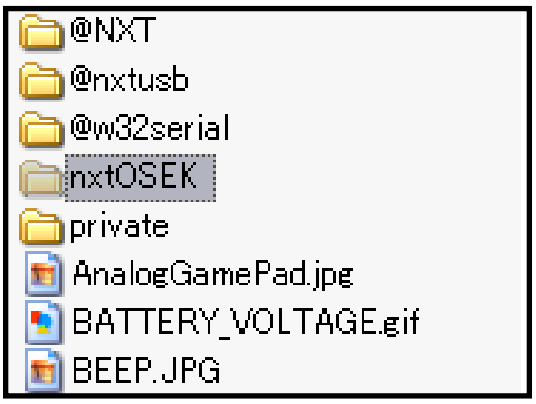

Fig. 7-1 nxtOSEK in ecrobotNXT/environment directory

b. Enter the directory and run the m-file `ecrobotnxtsetup.m` shown below. It will walk you through the rest of the installation

Fig. 7-2 ecrobotnxtsetup

Congratulations you are now ready to develop applications in Simulink for your NXT!

8. Example: TestMotorOSEK.mdl

TestMotorOSEK.mdl is used to describe code generation and program upload to the enhanced NXT standard firmware in the NXT.

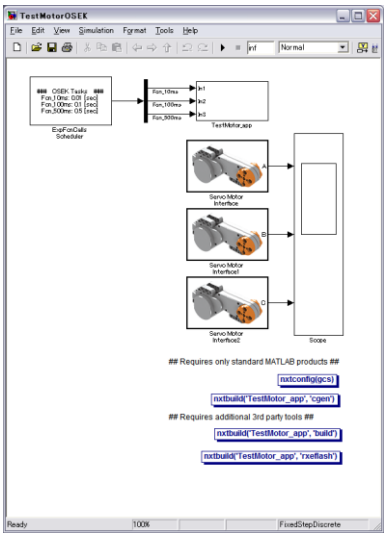

Fig. 8-1 TestMotor.OSEKmdl

Generate target executables

a. Open TestMotorOSEK.mdl.
b. Single click nxtbuild('TestMotor_app', 'build') annotation to build target executables. If Embedded CoderRobot NXT was set up properly, target executables are created in nxtprj directory under the current directory.

Uploading program to the enhanced NXT standard firmware

c. Connect PC and NXT via USB cable.
d. Turn on the NXT which has the enhanced NXT standard firmware.
e. Click nxtbuild('TestMotor_app', 'rxeflash') annotation in TestMotorOSEK.mdl to upload the program to the NXT. nxtOSEK splash screen is displayed for 3 seconds and turned to main screen. If program is executed into RAM, [R] is displayed in the main screen.

Fig. 8-2 nxtOSEK splash screen and main screen

f. Press RUN (right triangle button) to start the uploaded application. Once Embedded Coder Robot NXT(nxtOSEK) application is started, the NXT is fully controlled by the Embedded Coder Robot NXTapplication.
If STP button (left triangle button) is pressed, application program is stopped and back to main screen.
If EXIT button (gray colored rectangle button) is pressed, the NXT is turned off.

The enhanced NXT standard firmware provides a file system; hence, multiple nxtOSEK application programs can be uploaded to the NXT. The maximum size of an nxtOSEK application is 64Kbytes.

General Troubleshooting:

ISSUE #1: Can't build a target executable

a. Confirm settings of the installed third party software.
    a. Make sure that installation directory does not contain spaces or multi-byte characters.
    b. Make sure that Windows Environment Variable and Path are set correctly.
b. Confirm MATLAB current directory.
    a. Make sure that current directory path does not contain spaces or multi-byte characters.

ISSUE #2: Q2 Can't upload a program to the NXT

a. Remove the battery of the NXT for five seconds and insert it again, then try it again.
b. Confirm log-in user account
    a. Make sure that PC user account has an administrator proveleges.
c. Change the USB port on PC for program upload.
d. Hardware reset the NXT and then try it again.