

What is nxtOSEK? (Updated: January 2009)

nxtOSEK is an open source platform for LEGO MINDSTORMS NXT. nxtOSEK consists of device driver of [leJOS NXJ](#) C/Assembly source code, [TOPPERS/ATK](#) (Automotive Kernel, formerly known as TOPPERS/OSEK) and [TOPPERS/JSP](#) Real-Time Operating System source code that includes ARM7 (ATMEL AT91SAM7S256) specific porting part, and glue code to make them work together. nxtOSEK can provide:

- ANSI C/C++ programming environment by using GCC tool chain
- C API for NXT Sensors, Motor, and other devices
- C++ API for NXT Sensors and Motor which include many third party sensors
- TOPPERS/ATK provided real-time multi tasking features proven in automotive industry
- TOPPERS/JSP provided real-time multi tasking features complied with Japan original open RTOS specification [μITRON 4.0](#)
- Fast execution and less memory consumption
(nxtOSEK program is executed natively on the ARM7 and nxtOSEK itself consumed totally just about 10Kbytes)
- There are three ways to upload nxtOSEK application to the NXT
 1. Using John Hansen's Enhanced NXT firmware
(multiple nxtOSEK programs can be uploaded to a NXT. However, a nxtOSEK program has to be less than 64Kbytes)
 2. Using NXT BIOS (max. 224Kbytes single nxtOSEK program uploaded to Flash)
 3. Direct boot from RAM (max. 64Kbytes single nxtOSEK program uploaded to RAM, no Flash write)
- Many examples (include NXTway-GS and NXT GT...)

NOTE: Porting TOPPERS/ATK to the NXT was done by Professor [Masaaki Mizuno](#), Department of Computing and Information Sciences, Kansas State University.

NOTE: Porting TOPPERS/JSP to the NXT was done by [Monami Software Limited Partnership, Japan](#)

NOTE: Using C++ with nxtOSEK was made possible by Dr. Robert Kramer, Department of Computer Science and Information Systems, Youngstown State University.

nxtOSEK - The new project name (May 2008)

The change of the project name is not due to legal issue. LEJOS(leJOS) seems to make many people misunderstand LEJOS OSEK as "an alternative Java VM" or "an add-on of leJOS NXJ". Therefore, we have decided to change the name, this change would not affect the backward compatibility of APIs and existing users applications.

CAUTION:

According to LEGO MINDSTORMS NXT Hardware Developer Kit,

"Important note: When the NXT is disassembled or when third party firmware is used with the NXT, all warranties are rendered invalid"

It means that if you uploaded a nxtOSEK program (or any other third party firmware) to your NXT, your NXT may be out of any warranties provided from LEGO. Therefore, please be sure that the authors of nxtOSEK do not take any responsibility for any loss or damage of any kind incurred as a result of use or download of nxtOSEK and related third party tools.

Quick Look in nxtOSEK

Following to [Steve Hassenplug's NXT Programming Software table](#), let's check the latest features of nxtOSEK.

Features	Description
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Language type	nxtOSEK: ANSI C/C++ using GCC (GNU ARM) Embedded Coder Robot NXT: Graphical modeling/simulation/code generation environment based on nxtOSEK and The MathWorks MATLAB & Simulink products
Firmware	John Hansen's Enhanced NXT firmware or nxtOSEK NXT BIOS
IDE (included?)	Eclipse CDT
Windows	Windows XP SP2 Windows Vista (Enhanced NXT firmware and NXT BIOS)
MAC OSX	No
Linux	Unofficially supported (still challengeable)
Events	Yes (i.e. OSEK supports Event synchronization)
Multithreading	Yes (i.e. OSEK supports Preemptive/Non-Preemptive multi Task, mutually exclusive access)
Bluetooth (Brick to PC)	Yes (NXT GamePad provides R/C and Data Logging features)
Bluetooth (Brick to Brick)	Yes (but, only one NXT to one NXT)
Bluetooth (Brick to other Devices)	Never tested
USB	Yes. nxtOSEK v2.05 uses LEGO Famtom driver on PC side
I2C Support	Yes (Ultrasonic Sensor, HiTechnic Acceleration/Color Sensor, LATTEBOX's NXTe...)
RCX Sensor support	Yes
File System	Yes. Enhanced NXT firmware or NXT BIOS(single file system). NOTE that BMP file for LCD graphic and WAV files for sound generation are also supported
Floating Point	Yes
Dynamic memory manipulations	Yes, but not thread safe and it consumes more memory than static memory manipulations. C: malloc/free supported C++: new/delete and smart pointer supported
Datalog	Yes (saved as a CSV file by NXT GamePad)
Make robots move without learning to program	At least, need to learn C/C++ (tons of material are available)
Learn to Program using the NXT	Good for learning embedded C/C++ software programming
Write "Fast" programs	Yes (application is natively executed)
Write programs "Fast"	Depending on the skill
Learn Advanced Programming concepts	Yes (especially, embedded C/C++ programming, RTOS, and control software)
Suited For...	Embedded software programmer, C/C++ programmer
Test Program Speed (loops/min)	76K (with full LCD display update for each variable), 1864K (without LCD display)
Test Program Memory (bytes)	18.7kbyte (includes nxtOSEK platform)
Test Program (Time to write)	30 minutes

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