Real-Time Toolbox — from Humusoft™

For Real-Time Control and Hardware-in-the-Loop applications using MATLAB® and Simulink®

T he Extended Real Time Toolbox brings the power of MATLAB and Simulink to the real world. Adding new and enhanced Simulink features to Humusoft's original Real-Time Toolbox for MATLAB,[i] it allows access to external analogue and digital signals, with almost no prior hardware knowledge.

You can experiment with signal processing, control system design, hardware-in-the-loop and similar tasks directly from Simulink, using a powerful block library and *without the need for additional tools!*

Based on a high performance real-time kernel and drivers for popular I/O boards, *The Extended Real Time Toolbox* unlocks the real-time and data acquisition capabilities of your personal computer.

KEY FEATURES

- Complete off-the-shelf solution.
- Optional bundling with a Humusoft data acquisition board *at a reduced price!*[ii]
- Drivers available for more than 100 popular industry-standard data acquisition boards and devices, including A/D, D/A, digital I/O, quadrature encoders, counters, mouse, joystick and more!
- PCI and PCMCIA support.
- Serial communication support in MATLAB and Simulink.
- Real-time kernel supports simulation sampling frequencies up to 66 kHz, with no external clock source required.
- Data acquisition sampling rates are supported at data acquisition board frequencies in excess of 1 MHz.
- Simulink block library for creating real-time simulations and control loops.
- Triggered blocks for Stateflow® applications.
- Level-triggered data acquisition with pre-triggering.
- Frame based blocks significantly improve the performance of DSP applications in Simulink.

REAL-TIME SIMULATION

Real-time working is one of the most challenging tasks in simulation engineering; but it is easy with *The Extended Real Time Toolbox*: just create a normal Simulink block-diagram, and then add real-time blocks from *The Extended Real Time Toolbox* library!

Data acquisition boards are represented by configurable Adapter blocks. Separate input and output blocks allow a different sampling period to be specified for each, to support multirate simulation and control.

The Humusoft approach preserves most of the advantages of Simulink, such as fully interactive working, extreme ease of use and 100% compatibility with Stateflow and Simulink Blocksets®.
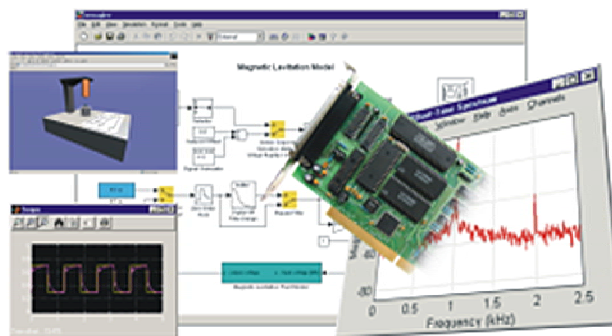
A wide range of buffered, frame-based and triggered blocks offer the best solution for different applications. They are able to run at about 1 kHz and are suitable for most laboratory experiments.

SYSTEM REQUIREMENTS

The *Extended Real Time Toolbox* is available as standard for MATLAB running under Microsoft Windows. Supported versions of Windows include Windows 2000, Windows XP and Vista.

MATLAB/Simulink R14sp3 or above is required.
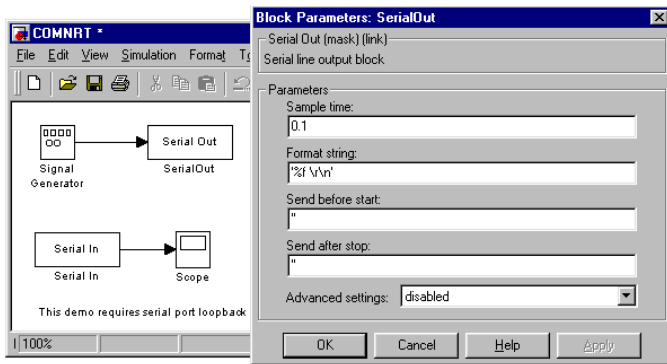
SERIAL COMMUNICATIONS

The *Serial Communication* component integrates seamlessly into the MATLAB environment to connect to the computer's serial communication (RS-232) ports using the object-oriented features of MATLAB R12. Communication between MATLAB and other devices over a serial link is no longer a problem requiring specialized software.

Commands for serial input and output are almost identical to their file I/O counterparts, and the serial communications link is treated almost identically to a file. You can use any data format, by specifying an appropriate format string. The parameters of the serial line can be changed using the built-in GUI, or as with all MATLAB objects, from the command line using get and set.

Data communication takes place in the background, without slowing down MATLAB operation. You write your data to the output buffer and the system does the rest of the work. You read any incoming data from the input buffer, with or without waiting for a whole message. The incoming message boundary can be specified in a variety of ways – such as by number of characters, by termination string or multiple termination strings. Simulink blocks for serial communication are also available.

EASY ACCESS TO HARDWARE

One of the most difficult tasks in engineering a real-time data acquisition system is setting the hardware options of the data acquisition board. The Extended Real Time Toolbox simplifies the task: the only thing you need to do is to set the parameters in the driver's

Serial communication in Simulink

GUI. If you use your board with factory-default settings, then you don't need to change anything at all!

Humusoft boards may be purchased at a discount as part of a software and hardware bundle.

A wide range of data acquisition boards is supported, including those by Advantech, Analog Devices, Axiom, Computer Boards, Data Translation, Humusoft, Keithley, MetraByte and National Instruments. Drivers are available for more than 300 industry-standard data acquisition boards.

Specialized devices, such as stepping motor controllers and quadrature encoders, are also supported.

Humusoft's own range of data acquisition boards (see separate flyer) is designed for optimal performance and integration with *The Extended Real Time Toolbox*.

Humusoft boards may be purchased at a discount as part of a software & hardware bundle.

FOR TEACHING LABORATORIES

For use in classroom education and teaching laboratories: *The Extended Real-Time Toolbox* can be licensed as a classroom kit.
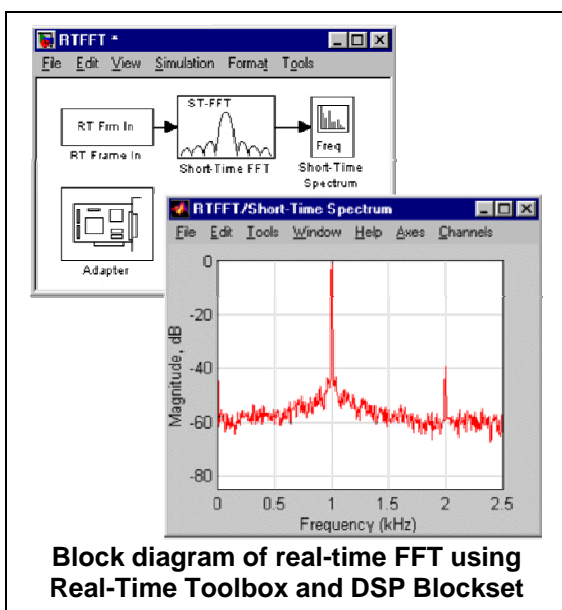

Block diagram of real-time FFT using Real-Time Toolbox and DSP Blockset

Each *Classroom Kit* provides for installation throughout a teaching laboratory or classroom, with an additional tutor's license for course preparation.

The Extended Real-Time Toolbox Classroom Kit, especially when combined with quantity discounts on

Humusoft's low-cost data-acquisition cards, offers an exceptionally economical route to providing every student workstation with real-time and hardware-in-the-loop capabilities direct from standard MATLAB & Simulink.
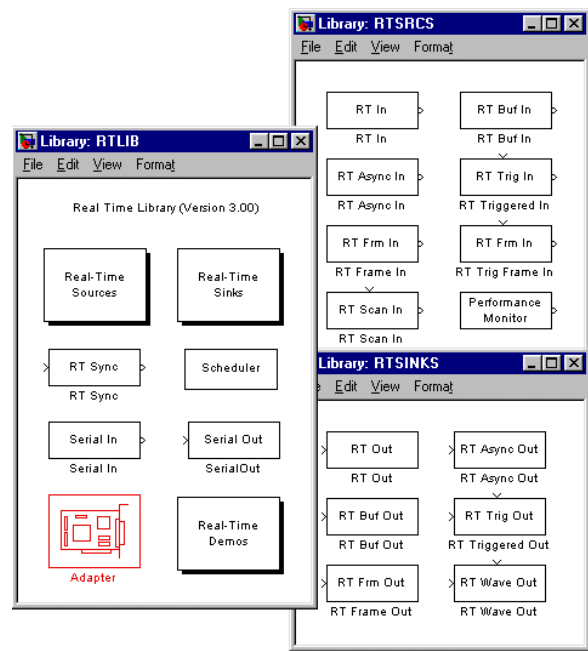
Simulink real-time block library

FURTHER INFORMATION

Additional information is available on-line at:

http://www.khace.com/products/humusoft

For any other information, including pricing for both UK & Ireland commercial and educational users, please contact KHACE directly at the address below.

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i The original Real-Time Toolbox was for MATLAB only. The Extended Real-Time Toolbox introduced Simulink blocks and features.

ii Some conditions apply. Please contact us for more information.

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