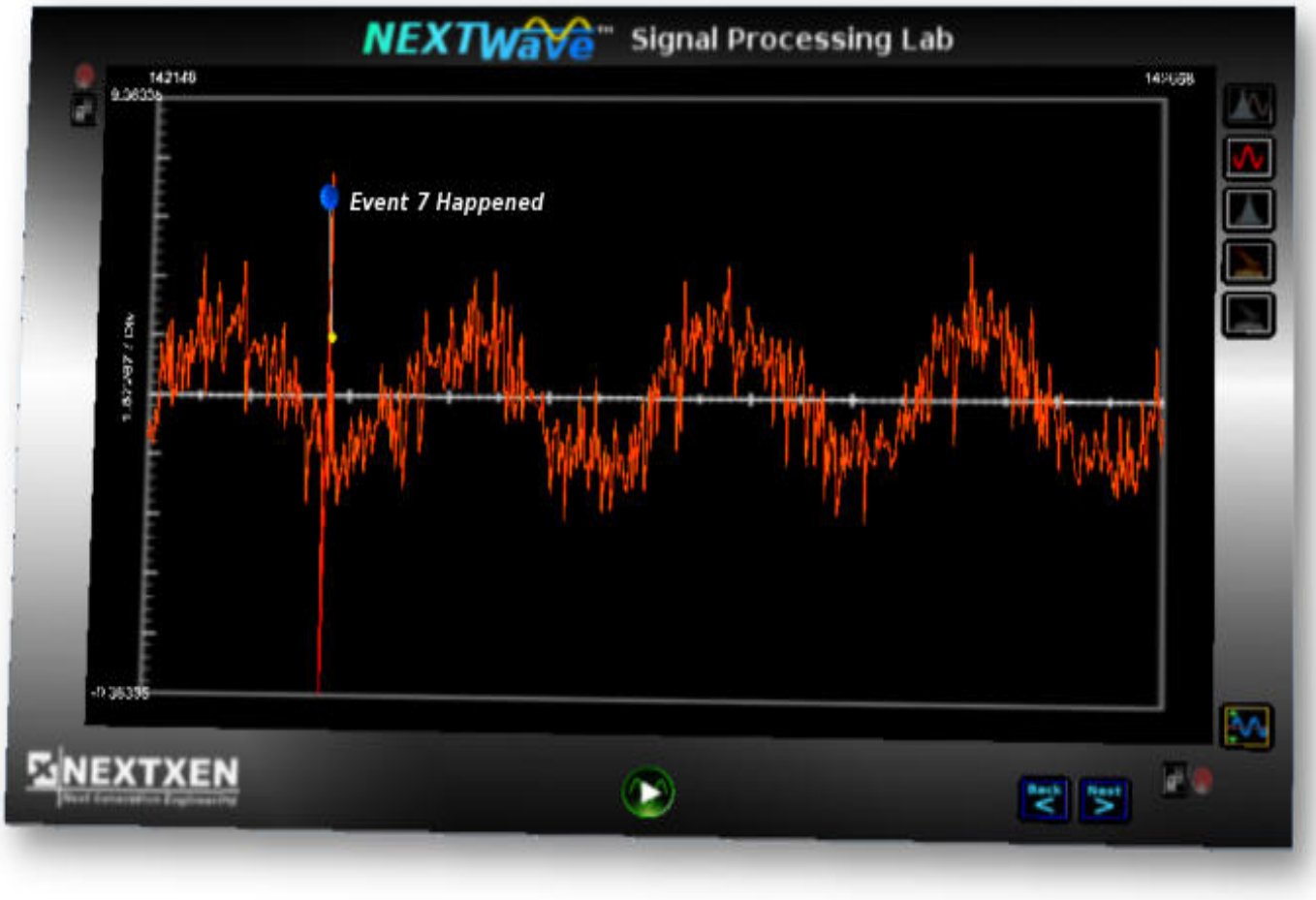
NEXTWave™
Signal Processing Lab

Overview

# Software for Analysis, Processing, and Creation of Signals and Related Applications




***Technology is always evolving - isn't it time your data analysis evolved as well?***

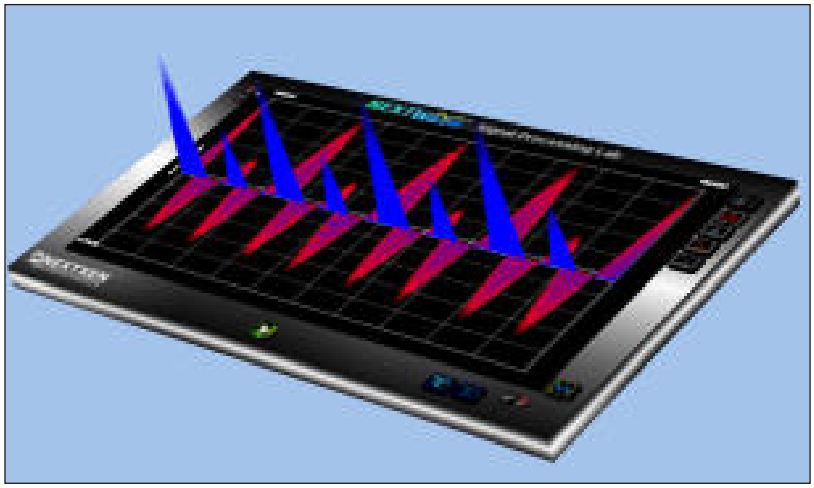
NEXTXEN

# An Amazing
# 3D Virtual World for Signals

## So Much Data, So Little Time

Tools exist today to implement DSP, synthesize signals and display data. However, the ability to visualize data fast, easily, and on-the-fly is not a primary goal of many of these tools. As such, the software architecture they offer may not provide the optimal "extension of thought" intuitive interface that would allow novice and expert users to immediately visualize data in the fashion they desire. With many **conventional approaches** to working with signals you will **often spend a lot of time just trying to learn how to use the tool** - an effort that detracts from your goal of actually working with your data to achieve a sought-after end result. In addition to relatively high learning curves, the standard data visualizations may also come up short when you seek deeper insight into your data. **Traditional approaches to signal analysis** may suffer from dated interfaces that can result in **poor user experiences** and **missed analysis** opportunities. NEXTWave Signal Processing Lab (SPL) provides a solution for these issues and can also add value to your current data analysis activities.

## Intuitive SPL Philosophy



*3D Virtual World of NEXTWave SPL*

NEXTWave SPL is an innovative analysis software package that provides you with a **live 3D interactive signal environment** and programmable processing. It puts you at the center of events - firmly in control - when you are working with signals. Engineers will often want to (1) look at their signals (analyze/display), (2) modify their signals (process/store). NEXTWave SPL is streamlined with these key elements in mind so you can concentrate on your data - it is always displaying and storing the data innately. In addition, **interoperability with other standard tools** has been designed in, thus allowing the user to choose which tool works best for different situations.

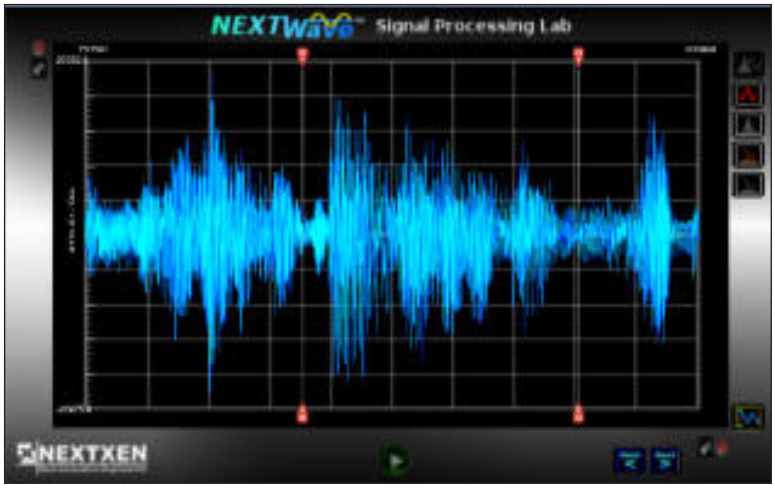
Designed by engineering professionals with **over 50 man-years experience** in DSP software tooling, NEXTWave SPL was created to improve the way signals are studied while also **drastically reducing the associated learning curve.** The user is provided with **exceptional data visualization** which is derived from real-world engineering savvy.

NEXTXEN is confident that its NEXTWave software product line is of great value to virtually all engineers and scientists involved commercially in signal processing and data analysis, and that it also serves as a useful tool in academic arenas for conveying underlying signal processing principles and concepts to students. ***Technology is always evolving - isn't it time your data analysis experience has evolved as well?***

# Analyze, Process, and Create

## NEXTWave SPL Approach

NEXTWave SPL allows an exciting interactive 3D experience. The 3D 'virtual world' supports analyzing existing waveform data "as-is", in addition to allowing number crunching on the data. New signals may be easily created or acquired in real-time, and your existing signals can be quickly introduced into this environment via standard data files. With NEXTWave SPL these signals can then be subsequently analyzed, processed, and studied in detail.




*Dragging an external file on top of SPL will result in the waveform data being loaded automatically*

## Analyze Data - See Your Signals in a New Light

NEXTWave SPL allows for sophisticated time/frequency domain analysis, including powerful spectrographic displays. Options include a variety of advanced features such as topographical markers, tags, 3D rotation, gesture-based panning, and more. Analyze your existing data with a convenient drag-and-drop interface. Drag your waveform data files into the SPL environment for visualization in time and frequency, or simply measure real-time data from supported acquisition hardware.

## Process Data - Extract or Enhance

When you need to play with your data NEXTWave SPL is there, ready to help. A large variety of functions to filter, extract, discriminate, and enhance raw data are provided within the SPL environment. Equally important, all these abilities are provided in real-time, allowing immediate visualization of the modified data. Select from an extensive library of standard functions, or easily add your own custom functions with the open software architecture.

## Create New Signals - Synthesize or Capture

SPL makes it simple to create new signals from scratch using built-in signal generators and functions to provide virtually limitless waveforms. Use them for comparison or testing, or combine these waveforms with processing and use them in a variety signal applications. In addition, Analog-to-Digital and Digital to Analog functions support hardware (such as a sound card or acquisition boards) to allow live data to/from SPL.

## User Experience

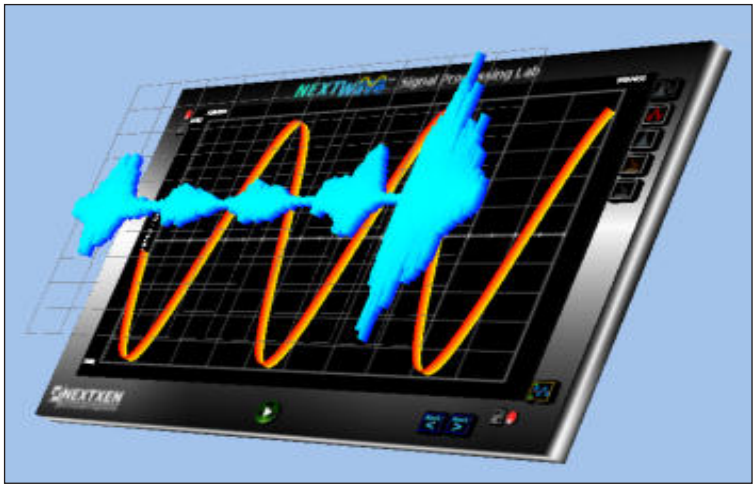
NEXTWave SPL attempts to be an extension of your thought process. A key philosophy of SPL is to make it easy to get started and still allow the ability to go as far as your application needs take you. And SPL is exceptionally fast - to ensure a live, animated, exciting user experience.

In the following sections, we will take a look at each of the key features of NEXTWave SPL, as well as consider the attention paid to making the user's experience better.

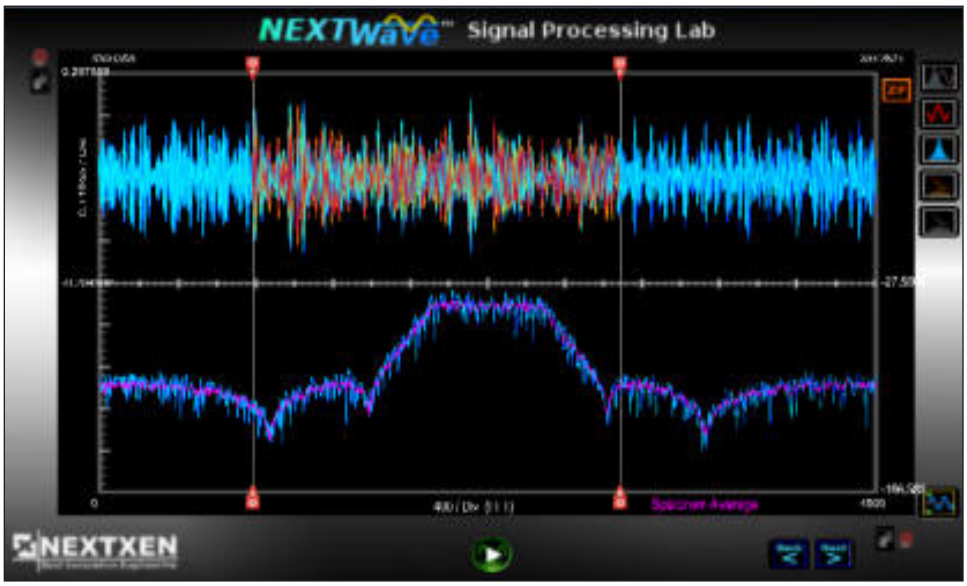
# Analyze your Existing Data in Time and Frequency

## Unique Time Domain Displays

SPL has been designed to ensure quick, efficient display of time domain data, including very large sets of information. Maneuvering through the data is exceptionally easy. Similar to the gesture-based approach of tablet-based computers, waveforms in SPL are efficiently 'thrown' using a mouse-based movement to pan both horizontally and vertically. Auto-ranging and auto-scaling options conveniently keep the data right where you want it - in plain view at all times.



*Example of a Time Domain Display*




*Example of a Frequency Domain Display*

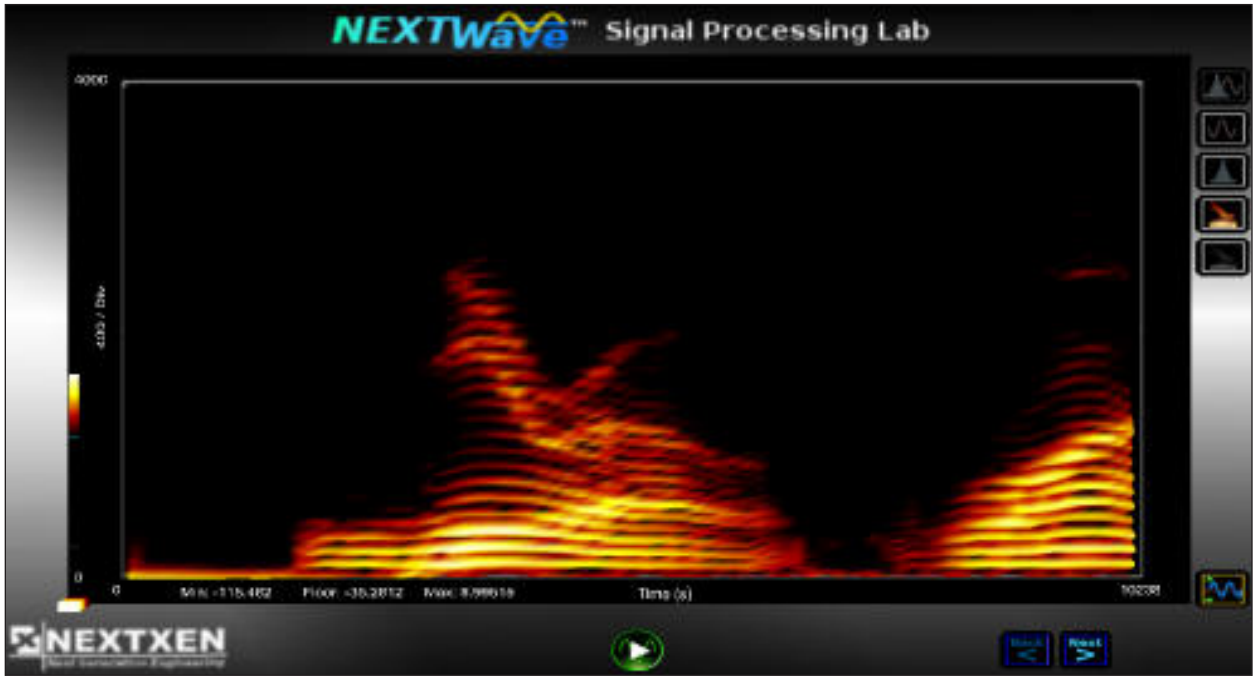
## Powerful Frequency Domain Analysis

Let's face it - many times the most important way to analyze your signal is in the frequency domain. SPL has given special attention to the frequency domain through choices of frequency domain transforms, windowing options, and even built-in spectrum averaging. In addition to magnitude types of displays, an innovative 2D-3D spectrogram is available for advanced frequency domain analysis.

## Frequency Transform Options

Several methods of calculating the frequency content of an input signal are provided when viewing data in the Magnitude or Spectrogram display modes. These methods allow for a variety of ways in which to analyze signals in the frequency domain. Transforms include the traditional Fast Fourier Transform (FFT), the Constant-Q Transform (CQT), and an arbitrary Frequency Band Transform. These three different transform options support the user as they study their signal from different vantage points, allowing for varying time-frequency domain resolution tradeoffs to be made while studying the signal.

# Gain Insight with Incredible Spectrographic Analysis




## Get a Feel for the Real Information

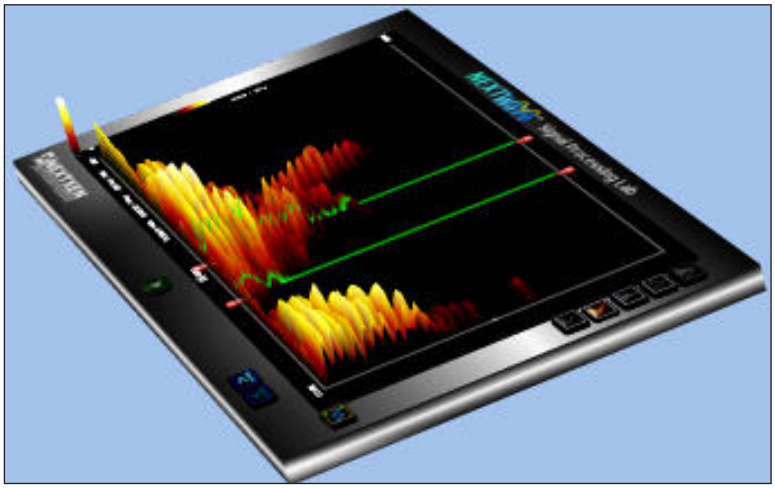
See the beauty in your signals with the advanced spectgrographic analysis offered by SPL. The professional nature of these displays (color/monochrome) gives incredible detail in the frequency domain and allows for the frequency content of large time spans to be seen at a glance. For more flexible insight, the user may change the range and the floor of the signal using a mouse scroll wheel, even while running. To see more detail in a particular dimension, simply grab the data with the mouse and rotate - one of the benefits of a 3D virtual analysis world!

## Live Playback

If the signal being studied is acoustic in nature, it can be heard in real-time as it is being displayed by being sent to the sound card. This 'live data' can give a researcher much more meaning to the information in their analysis.

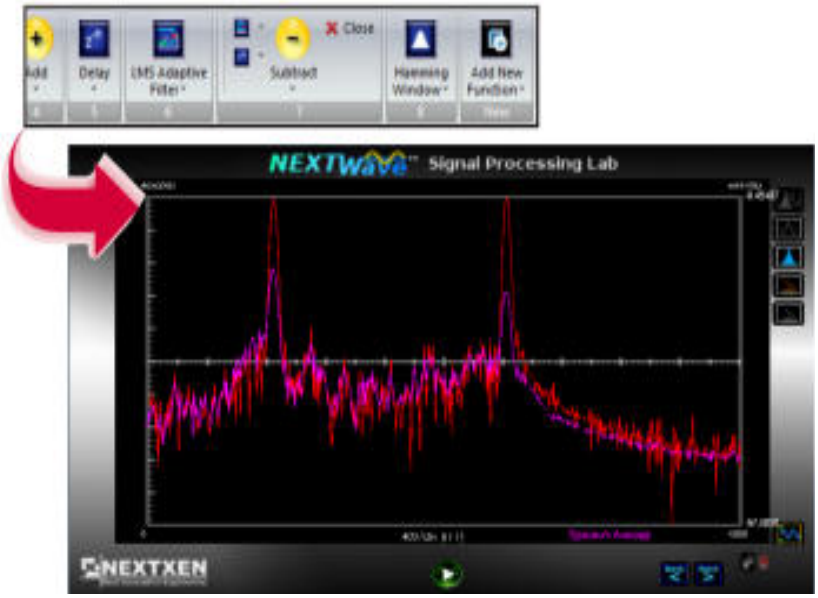
## Time Tracking

Moving back and forth from time to spectrogram maintains the signal in a time-aligned fashion, so analysis can be made of the information features contained in the signal from both domains.



*In a virtual world, changing a 2D spectrogram into a 3D spectrogram (running waterfall) is as easy as rotating the viewpad!*

# Process Signals with DSP




*Create and process signals easily with the 'Design Waveform' interface*

## Play with Your Signal

When working with signals, many times analysis is not enough; you need to process the signal digitally (Digital Signal Processing, or DSP) - and SPL does this job well. Select processing algorithms from the included function library and immediately apply them to your signal in order to modify or extract information from it. And any work you do is automatically saved in disk files - ready to be exported in a variety of data formats to be used elsewhere - allowing for great interoperability with your existing tool sets.

## Example - Digital Filtering

In many applications it is desired to reduce or enhance certain aspects of a sampled signal - digital filtering, for example. Implementing a digital filter for your signal is as easy as selecting the filter type of interest and choosing the filter design parameters. The resulting signal can be seen running quickly, or 'live', in the time and frequency domains. Changing design parameters on-the-fly provides a dynamic analysis of your processed signal that can be of enormous benefit.

## Simple Interface

A simple yet powerful construct allows signal processing algorithms to be harnessed in a programmable fashion through the use of an intuitive user interface - the menu ribbon (the same interface used by recent Microsoft Office). NEXTWave SPL is easily learned and you can perform sophisticated DSP functions on your live data immediately - from simple implementations to complex designs. The straightforward means of data manipulation works with you to provide ease-of-use, as well as flexibility and speed when working with your signals. You don't have to be a programmer to be productive, and your designs can easily be understood and shared by those who consider themselves to be "non-programmers".

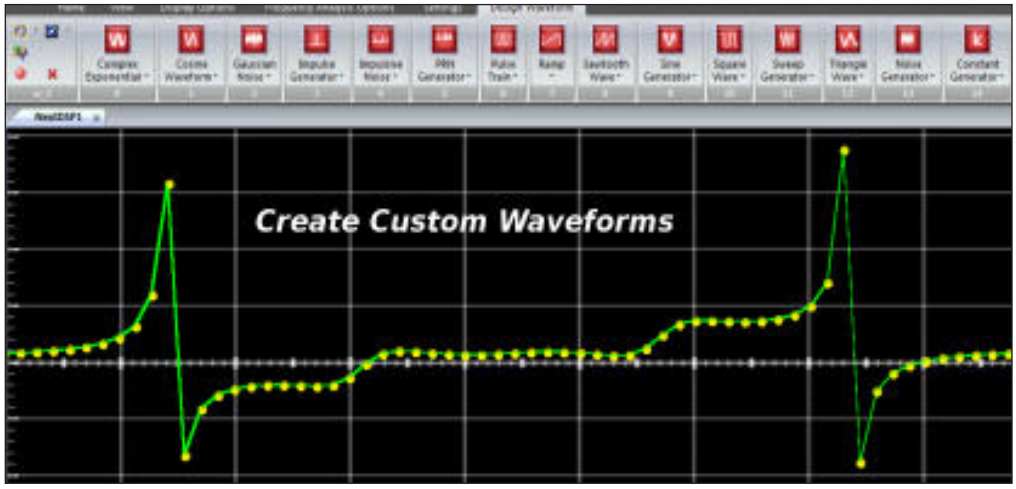
## Signal Processing Algorithms

In addition to filtering, NEXTWave SPL includes many other functions, such as signal transforms, communications algorithms, and more, that can be harnessed to work on your data. Of course, you can also combine functions to create your own advanced processing algorithms - all without having to write any source code or construct complicated block diagrams.

## Ability to Add Custom Functions

Adding your own unique functions to NEXTWave SPL is easily accomplished by using a standard C compiler - and source code templates are even included to get you started!

# Create New Signals and Acquire Real-time Signals




*Using the menu ribbon interface, simply select a signal generator*

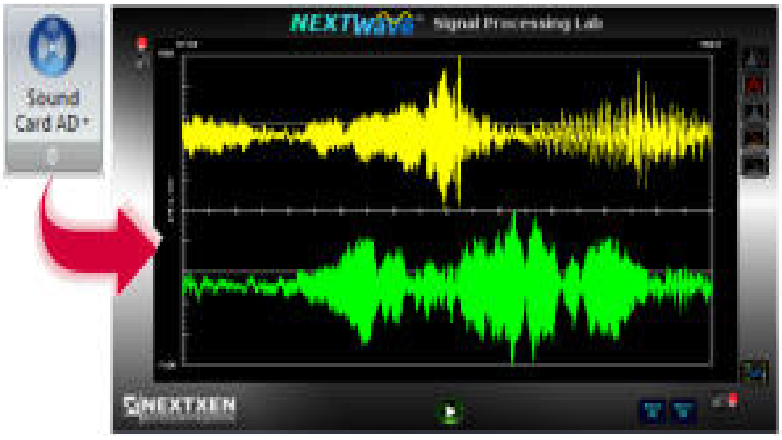
## Create New Signals

NEXTWave SPL makes it easy to synthesize new waveforms from scratch using built-in signal generators. In addition, these can be enhanced or modified via signal processing algorithms to provide virtually limitless waveforms. These can be used for comparison or testing, or process them with other waveforms to achieve a variety of analysis and/or signal effects. Export your new signals for use in other programs or generate live data via supported data acquisition hardware.

**Simple Operation**

Using NEXTWave SPL is easy - simply choose your desired functions from the menu ribbon and then you are ready to kick-start your signal processing and data analysis. Analyze your exisiting data, or create/acquire new signals to work with.

1. Select your desired function(s)
2. Push the Run button
3. Select your display and analysis modes
4. Watch the display as the signal is generated "live"
5. Analyze your data with ease
6. Generate a PDF file of your analysis session for historical archival purposes
7. Easily export your data results in a variety of file formats if you wish




*All NEXTWave SPL Software Editions include direct support for PC-based sound card*

## Acquire and Analyze Real-time Data

Included in all software editions of NEXTWave SPL is the ability to record and generate live data by using standard PC sound cards. This makes for quick and easy analysis and processing of acoustic data. A handy feature provided is the ability for you to select and send a section of a displayed waveform directly to the Sound Card D/A in real-time - thus allowing you to hear the portion of the signal that is being analyzed visually.

NEXTWave SPL allows the ability to acquire real-time data from popular data acquisition hardware. Support for standard acquisition hardware is possible and provides for a real world interface to signals. Additionally, functions may be created/added to SPL using a standard c compiler to allow for support of custom acquisition hardware.

## Have Signals to Analyze?


Traditionally software for signal processing and data analysis has been difficult to learn, cumbersome to use, and nearly impossible to master - and often times it does not even provide you with a gratifying analysis and visualization experience for your data. NEXTWave SPL was designed by engineering professionals to allow for exciting, sophisticated visualization of your data while providing a fresh dynamic user experience - all without ever requiring you to deal with a steep learning curve.

## NEXTWave SPL - a Low Cost Affordable Solution

NEXTWave SPL works as extension of your thought process where you can quickly take an idea from concept to realization. This approach makes it easy to import and create data to move you quickly through your project, and allows you to go as far as your application needs take you. Learn things about your data that you've never seen before. This environment is exceptionally fast and ensures a live, animated, exciting user experience for your application.

## Summary of Features

### Analysis

- Live Virtual 3D Signal Analysis
- Advanced Time and Frequency Displays
- Impressive Spectrographic Frequency Analysis

### Processing

- Extensive Algorithm Library
- Open Software Architecture
- Digital Filtering, DSP Transforms, and more

### User Interface

- Template Wizard to help you get started
- Convenient File Import and Export Capabilities
- Gesture-based Waveform Panning/Manipulation
- Direct PDF Export
- Support for Data Acquisition Hardware

## Benefits

- Gain new insight into your data as it relates to your application needs
- Reduced Learning Curve
- Reduced Project Risk
- Reduced Budget Concerns
- Ability to Work with Your Own Existing Data

### More Information

NXMK9010, NEXTWave SPL Implentation Details

### How to Order

Order online, call, or email/fax a Purchase Order.

NOTE: Academic institutions may qualify for a discounted price on software

## Software Editions

NEXTWave SPL software is available in 3 editions:

**Standard Edition (NXSD1000)**
Baseline version which includes standard analysis and processing capability and sound card support for live data.

**Professional Edition (NXSD2000)**
A more advanced package for research, teaching, and development which adds the Digital Filter Design Wizard.

**Enterprise Edition (NXSD3000)**
Adds the Digital Filter Design Wizard as well as CodeBox Professional Edition Software for source code development purposes.

Visit us on the web and find out more about NEXTWave SPL.

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