L-Acoustics L-ISA Studio 3.0

By: Mark Johnson

You're surrounded! We're all surrounded! In what seems like the blink of an eye, a multitude of loudspeaker manufacturers have developed immersive technology for live performance. We are immersed in immersive audio systems.

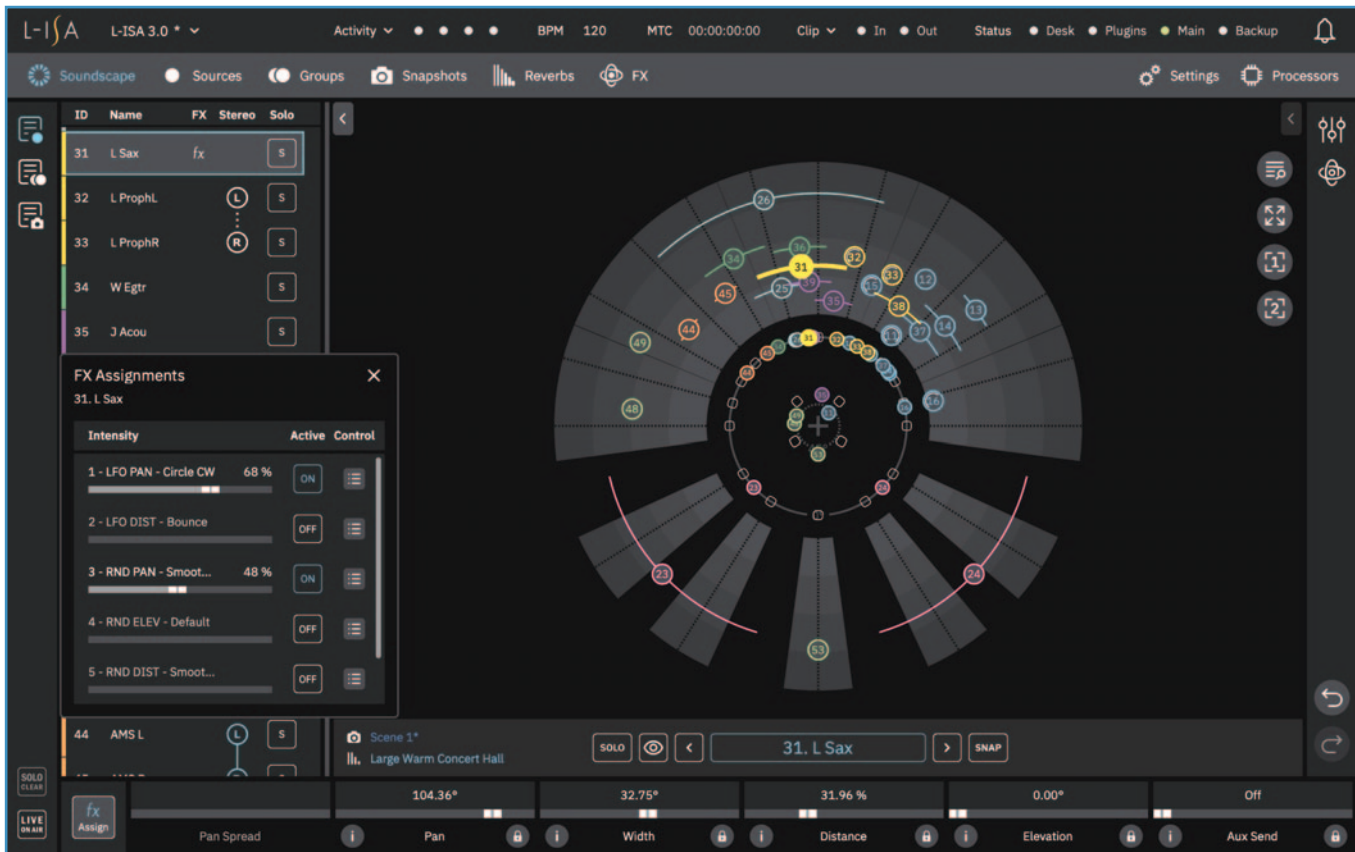In fact, surround sound systems have been in use for quite some time;

L-ISA 3.0 in a laptop screen.

experiments in surround sound date back to the 1930s. In 1940, the first use of surround sound commercially came in the form of "Fantasound" created by Disney sound engineers for, you guessed it, *Fantasia*. The system was made up of three audio channels and 54 loudspeakers. The surround sound effect was created by using the sum and the difference of the phase of the sound. In 1952, the film *This is Cinerama* applied a discrete seven-channel system (Who remembers seeing that? I do). Surround sound for live

performance was applied by composer Karlheinz Stockhausen in the 1950s for electronic compositions *Gesang der Jüngling* and *Kontakte* using discrete and rotating quadraphonic sound.

In 1957, artists Jordan Belson and Henry Jacobs produced *Vortex: Experiments in Sound and Light,* a series of concerts performed in the Morrison Planetarium in San Francisco's Golden Gate Park The system comprised approximately 40 multidirectional loudspeakers, which could be precisely controlled. They were invited to reproduce it at the 1958 Brussels World's Fair.

Poème électronique was created by Edgard Varèse for the Phillips Pavilion at the Brussels World's Fair, incorporating 425 loudspeakers.

In 1967, Pink Floyd debuted their custom quadraphonic speaker system

for a concert at "Games for May" at Queen Elizabeth Hall in London. The control device, the Azimuth Co-ordinator, is displayed at the Victoria and Albert Museum. Live sound engineer Buford Jones would mix in quad for Pink Floyd's *Delicate Sound of Thunder Tour* in 1989. Pink Floyd continued to perform concerts in quad until 1994. Jones also utilized a quad system for David Bowie in 1974–1975 for the *Young Americans Tour*.

A 5.1 system was seen (or heard) at the French cabaret Moulin Rouge in 1987, designed by Dominique Bertrand using a specially designed SSL 5000 series console.

The prolific sound designer Jonathan Deans founded the LCS (Level Control Systems) digital mixing system and software in 1991 with Steve Ellison. It was developed to track actors' movement across the stage for sound source localization. The system was first applied in John Adams' contemporary opera *The Death of Klinghoffer*, and *George Lucas' Super Live Adventure Tour*. The Variable Room Acoustic System (VRAS), an acoustic enhancement system for controlling room acoustics electronically, was developed by Mark Poletti in the mid-'90s, and incorporated into LCS in the early 2000s. Deans continued to incorporate LCS into his designs, including numerous Cirque du Soleil productions and multiple Broadway shows.

Scott Sugden, director of product management from L-Acoustics, provided this developmental timeline: "Development for L-ISA began actively in 2013, with the first experiments happening in L-Acoustics' shipping warehouse. Since the warehouse wasn't built for live sound, they took over a section of it where they lined the walls with hay bales for audio treatment in

L-ISA 3.0 with position of sources with the 360° Soundscape. It also includes effects assignments, reverbs applied, and other overall information.
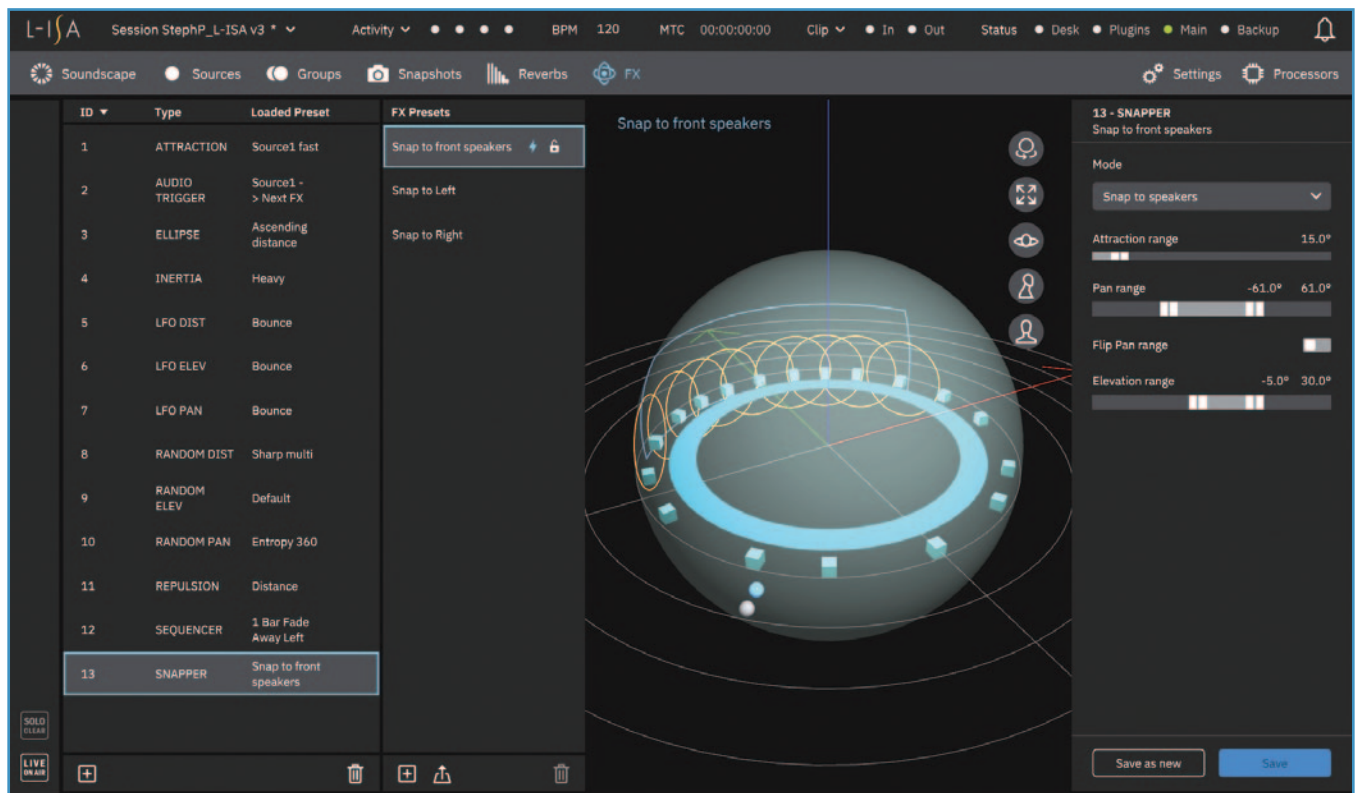
L-ISA 3.0 FX navigation tab. Displays loudspeaker layout and effects list.

the beginning before they moved to a more permanent R&D structure. L-ISA was first released commercially in 2016, and the first live event to deploy it was the Jazz à La Villette Festival (in Paris, August/September 2016). Initially for large-scale PA application L-ISA was utilized on productions, including Ennio Morricone, Mark Knopfler, alt-J, and the Lorde *Melodrama Tour*, among others. L-ISA was also utilized in [the] theatrical productions *Here Lies Love* [see *LSA*, August, 2023] and *The Secret Garden*. L-ISA Studio was introduced in 2021."

L-ISA technology was developed to create and deliver a scalable immersive experience for live and recorded applications; L-Acoustics dubs this "Immersive Hyperreal Sound."

Follow closely now

There are a number of elements required to provide Immersive Hyperreal Sound. Let's break L-ISA down. L-ISA provides design tools and guidelines for designing loudspeaker systems. It also requires the L-ISA Processor and L-ISA Controller, the interface between the sound engineer and the L-ISA Processor, allowing for mixing using sound objects. L-ISA Studio is the laptop version of the L-ISA Processor and Controller and can be used to prepare a live show or to write to immersive platforms such as Apple Spatial or Dolby Atmos.

An L-ISA system is based on a horizontal arrangement of arrays (called a frontal system) situated across and, frequently, beyond the width of the stage area. They are designed to overlap in coverage for the audience to hear as many of the arrays as possible. Three sub-systems make up the frontal system: scene system, subwoofers, and extension system. Variations can be applied, depending on source content. An L-ISA Wide scene design utilizes identical, evenly spaced arrays. It will support the majority of source content, for example, jazz, contemporary, and classical. For rock and electronic music (EDM)
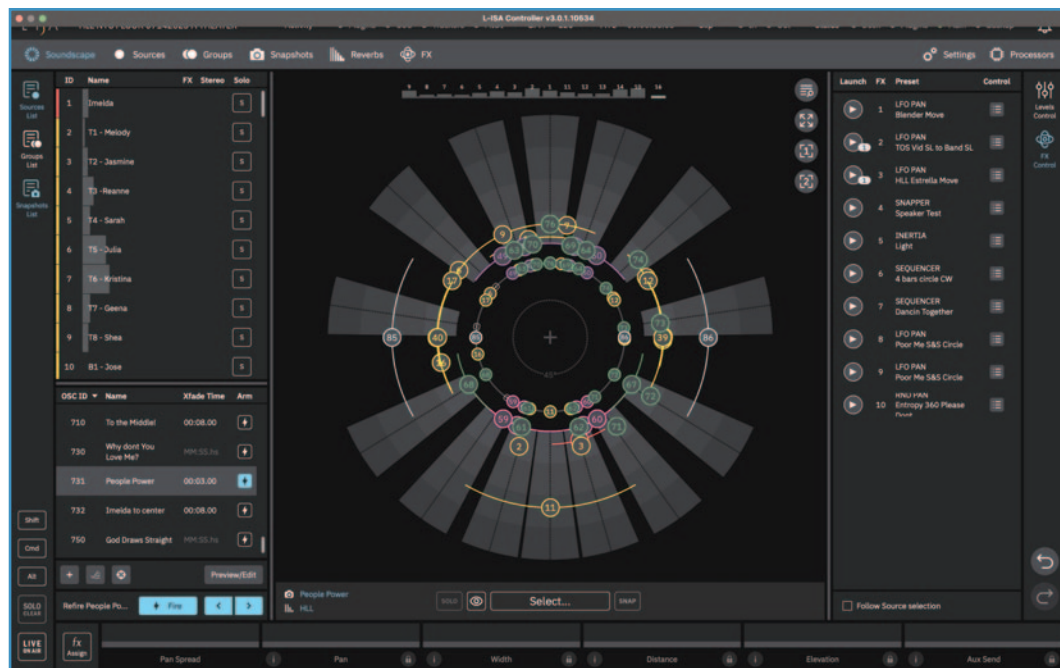
Above and opposite: Screen shots for the Broadway production of *Here Lies Love*.

that would typically require the ability to reproduce greater low-frequency material, an L-ISA Focus system is the order of the day. This employs somewhat different placement and dimensioning from a Wide system. L-Acoustics claims either of these would typically reduce the need for delay systems.

It's all about the bass

In either case, L-Acoustics recommends a central subwoofer configuration. The purpose is to maximize the consistency of low-frequency response and SPL throughout the listening area. Cardioid and end-fire configurations can be employed to help with reducing on-stage low frequencies as well as sound pressure level distribution.

An extension array can be optionally applied to further expand the soundscape to the width of the venue. This exaggerates the width of the sonic panorama and provides improved envelopment of the sound that reinforces the hyperreal experience.

Immersive Hyperreal Sound is accomplished by the addition of surround systems and can include over-

head speakers to complement the frontal system. SoundVision by L-Acoustics is used to help design and incorporate these systems and achieve specific sound pressure level requirements in relation to the frontal system, throughout the performance facility. Some benefits here would be the ability to electronically achieve an environment for, say, an orchestra, or an electronic music production where different instruments and sounds can be panned throughout the "environment." Overhead "height systems" can be deployed to create a sense of vertical space. The elevation parameter in the L-ISA Controller is used to accomplish this.

For the 5.1. 7.1.4 Dolby Atmos formats and NHK 22.2, L-ISA can be used initially for a studio project and then scaled up for larger applications. Here we're talking art installs, theme parks, and so on, where the space itself can be defined by the sound.

Are you still with me?

And that brings us to L-ISA Studio. The L-ISA Studio software suite allows users to produce immersive 3D sound with head tracking via headphones, or
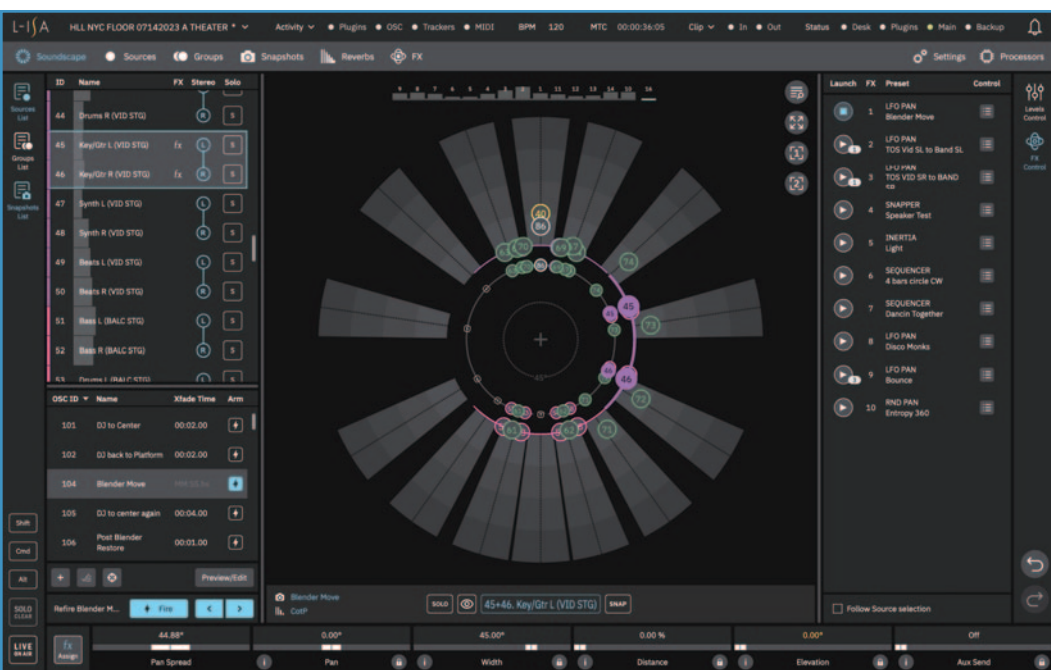
up to 16 loudspeakers, using a personal computer (Mac or Windows). The software has an L-ISA 3D control interface, audio processing, and a binaural engine. And the best news, you can get it for free for a permanent binaural version. (A paid version allows the use of up to 16 loudspeakers.) Premium plans are available in monthly and yearly licenses. There are also enterprise (up to five activations) and individual plans.

It all starts with downloading the free version (or, if you prefer to jump right in, one of the paid versions). You get L-ISA Studio v3.0.0 and the binaural calibration pack, which includes an instruction PDF, a Voice.wav file, and a link to L-ISA binaural calibration.lisa.

Calibration is an important step in setting up L-ISA Studio. The reason why is that things like head size influence how much sound will need to be delayed and dampened when it arrives at the ear opposite to the source direction. And, even the shape and orientation of the ears will affect the sound, which will be brighter or duller when coming from the front in comparison to the sound coming from the rear due to the pinna reflection or obstruction. This calibration proce-

dure impacts the accuracy of perceived localization as well as the extent of "externalization." This is how well the sensation of space is created in terms of distance and proximity. Basically, does the instrument or vocal actually sound like it's farther away from the listener in a 3D space? The idea is to create an aural experience that is representative of the sound's physical location and space.

L-Acoustics provides an extensive series of short Quick Start videos on its YouTube channel that offer help for signing up and installing the software. There are separate initial videos for Mac OS or Windows.

Projects developed in L-ISA Studio are scalable; they can be initially started in L-ISA Studio and scaled up into a full-blown live L-ISA setup. This provides the ability to do pre-production work before getting to the production environment.

Phone a friend
There are actually a number of steps required to get L-ISA Studio up and running, so, in the interest of time, I opted to use my "Phone a Friend" lifeline.

I was connected with Jordan Tani,

product and technology marketing engineer, creative technologies, with L-Acoustics, who has an extensive background in theatrical sound design and multichannel loudspeaker systems.

L-ISA Studio requires a Digital Audio Workstation (DAW) to function, and while it works with a number of DAWs, unfortunately, the one I use isn't one of them. I downloaded Reaper on the recommendation of Tani, and with his help, got everything up and running.

By now I was quite anxious to listen to L-ISA. Since I was unfamiliar with Reaper and L-ISA, Tani was able to help me dial it in and guided me through the calibration process. Admittedly, I'm not up to speed on all the various surround sound and environmental audio technologies, but this is pretty cool for me, especially since I can do it all on my laptop. No external devices are needed. Okay, so it's "only" binaural processing for testing purposes, but L-ISA Studio also has the ability to do up to 16 channels.

There are a lot of working parts to this and we had to go back and forth between Reaper (for loading content and patching), L-ISA Controller, and L-ISA Processor to get set up. If you have a DAW that already works with L-ISA, you probably would have existing usable content, so that step could be avoided. However, it definitely takes a minute to get up to speed. I'd definitely recommend reviewing the videos that L-Acoustics makes available on its site.

My audio background is primarily in live production and the only recorded audio I have are the podcasts that I produce, so I didn't have much to move around in space other than voice. It would be nice if L-Acoustics was able to provide some license-free music tracks as demo material to use, though I imagine I am probably the outlier regarding available music content. It would probably also be helpful if L-Acoustics provided a list of DAWs that it will work with, or at least a list of ones that it won't work with.

A trip across the L-ISA Controller

Nav bar provides access to the moving parts of the software suite. Soundscape is where active sources are listed, such as instruments or voice, that you would want to be manipulated within the 360° soundscape, with control of positioning and movement. Sources identifies the source tracks and provides the ability to add more. Groups allows the grouping of some of the sources. Snapshots controls and stores the movement of the sources. Reverbs contain four different editable 3D room engines that can be used to help further define an environment. FX provides access to eight prebuilt effects. On the far right, Settings accesses a multitude of, well, settings, and Processors identifies the processor—in my case, my MacBook Pro as well as other information regarding connection, device info, and firmware version.

Since the deadline to turn in the review was looming, I only had a short time to work with L-ISA, in addition to minimal content to use. But I can say the ability to move things around (and above) my head, and then incorporate the reverbs to provide a sense of space, was quite impressive. Interestingly, the amount of reverb will increase as you move away from the head icon and decrease as you get closer to it, providing a sense of direct, as opposed to reflected, sound as the source moves away. Since I now have the perpetual license and the software suite loaded on my laptop, I'm looking forward to exploring it more. Maybe I'll be able to find some multichannel music content to use as well.

L-Acoustics also provides L-ISA training, which breaks down into three different tracks/topics:

- **L-ISA Technology** (general concept and understanding overview, available both in-person and online)
- **L-ISA Live Mixing and Preproduction** (mixing concepts and workflow, in-person only)
- **L-ISA Loudspeaker System** (technical system design for an L-ISA project, in-person only)

The cost for the course is approximately $250 and in-person courses typically happen in Los Angeles office. To get a schedule, it's recommended to contact the L-Acoustics Education department or your local L-Acoustics provider.

The L-ISA free license is perpetual and has all of the L-ISA functionality, but only for a two-channel binaural headphone experience. The L-ISA Studio License is $30 per month. A one-year license is $300, essentially saving two months as compared to the monthly plan.

These are exciting times for environmental audio and what's even more exciting is that this really powerful software suite is available for free for the downloading.

Go get you one! 🔊