

Coordinating lighting operation with audio and video

Why should you coordinate your production elements? And how can you go about doing it? **John Black** explains

NOT LONG AGO, A WORSHIP

service, live music concert or theatrical production relied solely on the tight, manual coordination of many individual operators working together to manually execute cues to keep all of the various technical elements of an event coordinated. Though console operators and stage managers are still an integral part of technical operations, the technical complexity of many events – even in the house of worship sector – has required the integration of digital synchronisation and coordination systems to ensure cues happen together on time, in sync and that the event is accurately repeatable. Lighting, audio, video,

MEET THE AUTHOR

John Black serves as the theatre manager for Seoul Foreign School in Seoul, South Korea. Holding a degree in Theatre Design, he provides technical production support and design in three state-of-the-art performance venues on campus for over 40 major concerts and productions a year in the areas of sound, lighting, video and staging. John especially enjoys sharing his passion for entertainment technology with high-school students each year through his student production team, *Crusader Live!*, giving students the opportunity to learn and work with



John Black, theatre manager for Seoul Foreign School

professional-level technologies in a demanding production environment.

Starting with audio, one important use for a coordination system is for keeping a live band in time/tempo by utilising a click track. Usually fed to the drummer and anyone else requiring it through personal IEMs, the click track will keep the band in time with each other, and therefore any other production elements that depend on that. I've utilised a click track to synchronise a live band when needing to play back certain audio effects or additional pre-recorded or pre-programmed musical parts with the band in real-time. For example, if only one drummer is available but I've wanted to include additional auxiliary percussion parts in a live performance, it's essential to have the band in time with the playback track(s) containing those parts. Synchronising a band with a click track also opens up the possibility of integrating pre-recorded backing vocals or other audio effects desired during a live band's performance.

As lighting production has become increasingly more complicated with automated fixtures and LEDs becoming standard in many HOWs, lighting control and cue programming has become more complex. In simple systems with relatively little programming, there may not be a need to sync lighting cues with audio events. However, if your service uses a lot of lighting programming with multi-part cues and there is a need for an audio event to be in sync with a lighting cue, coordinating the audio and



Sound Research's SFX 6 main interface screen

motion control and effects can be tied together to execute the complex, multi-faceted sequences that today's audiences have come to expect.

In houses of worship, the coordination system used between production departments varies across the whole spectrum – from non-existent to sophisticated show control systems commonly found on today's largest music tours and theatrical productions. We'll take a look here at some reasons why coordinating production elements can be useful, examples of

how I have coordinated production elements and what some of the common technologies and systems for coordination are. Let's dive in!

Why coordinate

There are a number of reasons why it may be useful to coordinate the lighting, audio and video operation in your house of worship, but let's first look at why you may choose not to. Coordination systems can be complicated. If you are a small HOW

with little 'production' in your services, coordination may not be right for you. If you don't require a band to play perfectly in time over and over, or with backing tracks, if lighting and audio cues don't have to happen in sync, or you don't record and/or broadcast multiple video sources, chances are a coordination system isn't right for you. Programming a system and making sure all of the elements work together – or troubleshooting when they don't – may not be worth your effort and instead you can rely on a trusted stage manager and operators to coordinate the execution of all elements by hand. If you do require these or other coordinated events, then using a coordination system can be extremely helpful – especially when working with volunteer technicians.

C#	Elapsed	Remaining	Title
1	00:00:07.5	00:00:29.0	Radio Broadcast Music
2	00:00:16.1	00:01:08.5	Fog horn - distant
3	00:00:30.0	00:00:00.4	DOG2
4	00:00:10.7	00:00:32.7	airlift
	00:00:30.0	00:00:30.0	Wait
	00:00:30.0	00:00:00.0	Cartoon2
5	00:00:00.0	00:00:12.0	Voltsme - Q 3
6	00:00:00.0	00:00:15.1	CopSiren
7	00:00:00.0	00:00:13.1	general traffic noises
8	00:00:00.0	00:00:15.4	Sound Effect - Dog Aggressive Barking
	00:00:00.0	00:00:18.4	Autofollow
	00:00:00.0	00:00:19.7	Sound Effect - Dog Barking 03
	00:00:00.0	00:00:19.7	Autofollow
	00:00:00.0	00:00:20.6	Sound Effect - Dog Bark 02

Multiple overlapping sound cues can be played by Sound Research's SFX 6 audio layout system



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lighting operation is hugely beneficial. Aside from the ability to programme and trigger complex cue sequences automatically from the coordination system, it eases the burden on the lighting operator and allows volunteer lighting operators to operate consoles, even for complicated events. For example, I rarely will have a volunteer operator rehearse enough times with a band to manually follow and trigger cues during any single song – let alone a worship set, which may contain 100 or more cues. By synchronising the lighting console with audio, the operator can focus on the manually operated elements of the event with no pressure to stay in sync with the live band.

In the video world, your services may include video content playback – live or pre-recorded – including the display of song lyrics, or they may involve recording the service from multiple camera sources for broadcast or later editing. In complex systems, media content used as backdrops or for other production purposes will typically be integrated through a media server and is often triggered by the lighting



Audio cues and level control in Figure 53's QLab show control software

One technology used for coordinating technical operations, and the most common for live events, is timecode, either SMPTE/LTC (linear) or MIDI (Musical Instrument Digital Interface). SMPTE timecode metadata is added onto video and audio material and provides time references for that material. LTC encodes SMPTE data in an audio signal. Finally, MIDI timecode

Another technology used for coordinating technical operations is MIDI, a widely used communication standard due to its flexibility. There are a number of adaptations in use, including MIDI Show Control (MSC). MSC messages allow all types of entertainment control devices to talk with each other and with computers to perform show control. There are numerous show control software packages available for Windows and macOS that utilise MSC for controlling other devices. Instead of utilising a clock, the show control software sends out a message to devices identified through a device ID and provides additional commands of what action to take. While timecode is used for synchronisation of device clocks, MSC allows remote control and triggering of cues or commands of devices in the system. This is particularly useful for situations not requiring, or dependent on, timecode. For example, if you want to synchronise a lighting effect with an audio effect for a drama (for instance, thunder and lightning), MSC can be used to trigger cues at precisely the same time without the risk of a lighting

additional hardware- and software-based solutions that can be used for coordinating lighting, audio and video operations.

On the hardware side, a generator can be used to generate timecode signals in a number of different formats and then distribute that signal to the production equipment. Often referred to as the House Clock, this device becomes the central unifying clock source for synchronising and coordinating the devices in the system. There are a number of hardware sync products on the market such as the TASCAM CG-1800 for multi-format digital clock generation and synchronisation, or Avid's Sync HD that adds timecode generation and sync capability to a digital word clock and other sync signals.

On the software side, there are a number of show control programs available that can be run on a Windows and/or Apple computer that send signals to AVL devices. The advantage of a software-based show control platform is that multiple methods of coordination can be used simultaneously from a single machine, generating timecode as needed as well as sending MSC messages. There are a number of products on the market, including SM-Designer, SFX, QLab and others at a number of price points.

As you can see, coordinating lighting operations with audio and video can hugely benefit your technical



TASCAM's CG-1800 digital master clock

console. Cues are written for playing back specific files on the server, as well as other control data, all of which is synchronised with the lighting fixture cues, working together to create the combined visual experience for the audience. One way that I've used synchronisation of video elements with audio operations is with the display of song lyrics for a congregation to follow. It is sometimes difficult for volunteers to follow a song they may not know and change to the next lyric slide in time for the congregation to follow. If the band is synchronised, then I am able to synchronise the lyric presentation system so that lyric slides play back automatically at exact, programmed points.

carries data on a MIDI connection. Using timecode technology, there is a clock that runs – whose signal is distributed to all of the technical systems needing to be in sync – and cues/events are triggered by programming into each cue list the timecode value at which the event is triggered. The timecode clock itself is started by either an audio operator or a live band member who starts the click track for the song. From there, all of the production elements that are listening for the timecode to run will execute their cues as programmed. Timecode is also used for multi-camera video production to ensure correct colour framing of camera sources and to embed timecode metadata. This is especially useful when doing postproduction work as the recorded media from multiple sources can be synched for editing. For this reason, timecode also allows the user to specify a frame rate. All electronic devices have internal digital clock sources, so the overall purpose for using timecode is to synchronise devices in the system to a single clock source.

Coordination technologies

So it's not difficult to see how coordinating the lighting, audio and video operations can be very useful. There are two common technologies that can be used to accomplish coordination and bring all of these production systems together for your service or event.



An event list from Stage Research's SFX 6 sound playback software



Avid's Sync HD generates both digital clock references and timecode

operator pressing the "Go" button after the sound effect has already been played.

Coordination systems

I've given several examples of ways that I've coordinated lighting operations with audio and video in my own work. There are a number of

workflow. It's not for everyone or every situation, and it is most often combined with the need to maintain manual control over certain service components. However, when working with a large, complex system and with volunteer technicians, coordinating the operations can allow you to achieve great results without worrying about elements falling out of sync.

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