

# IMMERSIVE AUDIO AND BEYOND

*The inspiring 2016 Bernard Happé annual lecture gave a taste of audio's future. Mark Trompeteler reports*

## HAPPÉ'S LEGACY

The annual BKSTS Bernard Happé Memorial Lecture was inaugurated in 1991, after the death of this major figure in the technology of the film industry and the life of the BKSTS.



Bernard Happé was technical manager at Technicolor, and was responsible for many ground-breaking developments in motion picture processing technology, prior to his retirement in 1974. He authored many books on film technology, including *Your Film and the Lab*, and was co-editor of the *Focal Encyclopaedia of Film and Television Technology*. Technical editor of *Screen Digest* and *Video and Film*, and he regularly contributed papers to international conferences.

Bernard was elected Fellow of the BKSTS in 1961, and Fellow of the Royal Photographic Society in 1962. A hard-working member of the BKSTS Council from 1969, he became vice-president of the society from 1970 until 1972. In 1976 he received the Kalmus Gold Medal, the SMPTE award for outstanding contributions to colour film technology. Bernard was President of the BKSTS from 1985 to 1986. Members of his family continue to attend the lecture each year.

The choice of subject for the BKSTS 2016 Bernard Happé Annual Lecture was inspired. The first of these lectures under the Society's new branding of The International Moving Image Society focused on cutting-edge audio techniques. A lecture on "Immersive Audio and Beyond: New Experiences in Broadcasting" promised a lot and delivered just that.

Held in November 2016, when the BBC was celebrating the 80th anniversary of the birth of the world's first regular domestic television service, the fact that the lecture was being delivered by a team from the BBC was particularly apt. Delivering the lecture were Simon Tuff, one of the BBC's principal technologists, specialising in audio; Chris Baume, a senior research engineer at BBC R&D in London; and Chris Pike, a senior scientist in the audio research team at BBC research and development. Chris leads BBC R&D's work on spatial audio for broadcasting and virtual reality.

An audience of some 70 assembled at the



▲ HereEast, the lecture venue in the Olympic Park

lecture theatre in the London campus of Loughborough University. Situated on the Queen Elizabeth Olympic Park, adjacent to the BT Sports TV Production Centre, the whole building complex is the former 2012 London Olympics Media Centre, now part of a university, media, technology, and business innovation hub in this area of London, called HereEast. The lecture that Simon and the two Chrisses delivered was extremely practical and well-presented. It was informative, entertaining, and full of demonstrations using headphones distributed to the audience.

The lecture started by pointing out how we have the ability to assimilate lots of different images presented to us, the fact that images are bordered and framed helps us do this. However, this contrasts with how we find it difficult to assimilate and process lots of different sound sources being presented to us simultaneously. The choreographed instruments of an orchestra are a rare exception. It was also pointed out how sound can create an emotional response in us in a way that is often far more effective than what can be achieved with mute images.

## PIONEERS OF AUDIO

The audience enjoyed a whistlestop tour of some of Simon's audio heroes: Clement Arder, the inventor of stereo; Alain Blumlein, who went on to perfect stereo; Michael Gerzon, who developed Ambisonic concepts that have helped us create the immersive and object based sound ideas that are being worked on today.

We were introduced to "Ed the Head", a

life-size artificial head with a microphone array embedded within, in key positions. Ed the Head plays a critical role combining the morphology of the human head and acoustics to give a life-like binaural recording of sound. Vivid, amusing demonstrations were played into the audience's headphones and we were informed that Andrew Sachs's 1978 radio play *The Revenge* was amongst the first radio broadcasts to use such a microphone array.

The presenting team led us to the idea that audio broadcasting was working towards bringing spatial audio/object-based techniques to the immediate future of broadcasting. In part, this is reminiscent of the important uses of metadata and encoding that has been developing in the use of DCPs in cinema exhibition.

### TODAY'S LINEAR APPROACH

Currently a radio programme is made using traditional techniques and turned into a piece of linear media. It is broadcast and content is played in the same way on all devices that receive it; e.g. portable radios, Hi-Fi systems, possibly with surround capability, mobile phones, headphones, computers and so on. Compromises have to be made on some of the receiving devices. *Cinema Technology* readers are familiar with immersive sound systems such as Dolby Atmos which rely on object-based audio to enable sounds to be placed precisely in an auditorium, so it was no surprise to learn that BBC researchers are developing techniques that produce programmes as a collection of media objects. This will be transmitted with metadata to describe how it should be assembled. The collection is broadcast and the device in the listener's home, or on their person, will re-assemble the objects according to metadata.

The team concluded by giving a glimpse of the BBC Salford-based 34 speaker experimental radio studio lab and production facility where such techniques are being developed — they played some fascinating prototype materials.

## Object-based broadcasting

1

The programme is made in the traditional way



2

The programme is turned into a collection of media objects with some metadata to describe how it should be assembled. All of the data is broadcast to everyone

3

The device inside the viewer's home re-assembles the media objects according to the metadata



4

The objects can be assembled differently (based on the original metadata), optimising the experience depending on local factors relating to the device, environment and viewer.

Simon Tuff, Chris Baume and Chris Pike demonstrate concepts they are working on in audio research



### ORPHEUS: A NEW WORLD OF AUDIO

Lastly, we were introduced to Orpheus — a European research project involving 10 collaborative partners including programme producers and equipment manufacturers as well as researchers — which points to the future. The project is attempting to develop a production, transmission and reception chain for this exciting new world of broadcast audio in which audience expectations and media usage patterns are changing. Users want content on demand, with immersive and interactive elements that adapt to them.

### A WIDER AUDIENCE

Bryan Cook, Chief Operating Officer of IMIS, is to be congratulated for arranging an excellent live stream of the event. This allowed additional audience members in eight different countries to watch the Bernard Happé Lecture live — and a video recording of the event is on the Society's website,

[www.societyinmotion.com](http://www.societyinmotion.com). **CT**

## TUNED FOR DIFFERENT DEVICES

Utilisation of metadata means that sound objects can be assembled differently to optimise the experience depending on the device and its component parts, the listening environment and the listener's preferences. Such advances in broadcasting will make the audio:

- ◆ More accessible: some listeners might prefer an alternative balance between dialogue and effects/music,
- ◆ More personalised: a listener may choose their preference for dynamic range and compression,
- ◆ More responsive: depending on the time the listener has available, she or he may be able to alter the length of the programme to suit their availability — a précised programme will still make some sense,
- ◆ More interactive: as a viewer may choose their location in a stadium or event venue and then zoom in on specific areas of personal interest, so the audio perspective will match the visual perspective,
- ◆ More immersive: while surround and immersive audio tries to give the feeling that you are actually there, (though, if you were actually "there", the real audio might not always be that good), the use of object-based/immersive and spatial sound techniques can create the illusion of a kind of hyper-audio reality, giving the impression they might be "there."