NAB TV TechCheck

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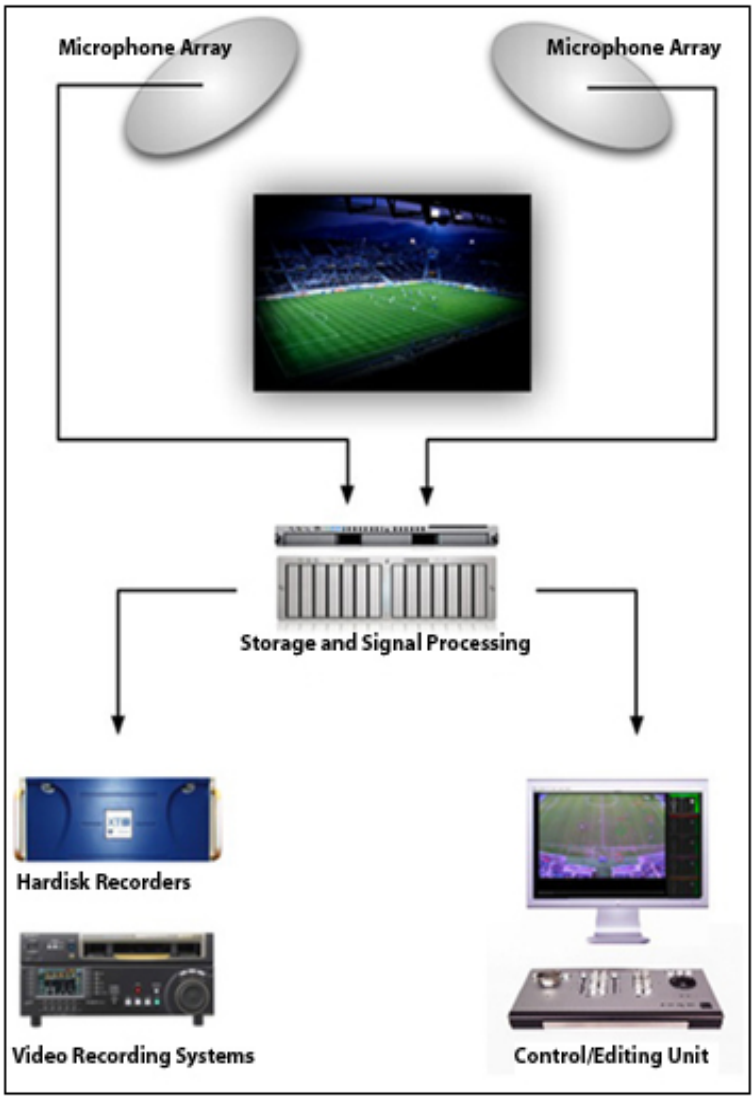
New Technology for Audio Zoom Microphone

While high-power zoom lenses have been available for many years to enable close-up images to be acquired from long distances, the traditional shotgun microphones and parabolic reflectors used to improve the directivity of sound pickup have always had somewhat limited capabilities in noisy environments. New technology for an extremely high-performance zoom microphone system was demonstrated for the first time in the United States at the recent Hollywood Post Alliance (HPA) Technology Retreat held in Palm Springs, February 20-22, 2008. The AudioScope system developed by Norwegian company SquareHead Technology was described in a paper presented by SquareHead CEO Vibeke Jahr. The description below is based on the HPA paper and demonstration and discussions with Mr. Jahr.



AudioScope System Overview

The AudioScope uses one or more arrays of 300 small microphones, each mounted in a thin two meter diameter disk that is typically suspended over the area of interest. As shown in the diagram to the left, a small wide-angle color TV camera is mounted in the center of the disk to provide a live video signal to the system control unit, showing the area covered by the microphone system. The base station, remote from the microphone array, comprises a signal distribution unit, a signal processing unit and a storage system. A video monitor shows the area of interest picture from the camera and the system operator is provided an intuitive interface with a track ball to move a cursor around the image and zero in on the subject of interest. The audio originating from that location is isolated and amplified and can be clearly heard even in a noisy general environment.

Although details of how it works have not been revealed, it is known that the system uses phase delay and spatial filtering, with massive signal processing power to provide real-time processing of audio from the hundreds of microphone elements in the array. Audio characteristics in the current system are currently optimized for speech rather than music or wideband audio. As the cursor is moved on the monitor, the system automatically adjusts the phase delay of the microphones to isolate the audio from selected subject. For signal processing, the system at HPA had four high-end Apple computers working in parallel.

The system has been demonstrated to work well in large exhibit halls and sports venues and in outside stadiums with pickup distances over hundreds of feet. Multiple microphone arrays can be ganged together to cover even larger areas. In a large and noisy exhibit space at the HPA event, one could track and pick up the conversation of anyone in the hall from a remote location and the subject had no idea they were being monitored. The system is customized for broadcast users and is being promoted particularly for use at sporting events to get close up audio from players, coaches, and fans, but many other uses are clearly possible both for broadcast and other purposes.

One particularly impressive feature is that picking out of individual "zoomed" audio does not have to be done live but can be done in replay later – for any source of audio in the covered area. The system uses hard disk recording to capture the raw output from the microphone array, with the associated video picture, for later playback and analysis.

Key functions, as described on the SquareHead Web site are:

- High directivity. Attenuates audio sources outside the audio focus with up to -30 dB.
- Real-time zoom. Zoom in on players or regions on the field where the action is.
- Post-event zooming for replay. Full functionality in post-processing gives the producer the freedom to go back in time to capture an incident.
- Multiple static sound regions. Listen to the comments from the coach-bench.
- Integration with industry standard cameras and tripods that deliver coordinates of the camera lens focus and zoom.
- Multi-channel system for 5.1 surround sound for HDTV.

The AudioScope is undergoing final development and will be available as a commercial product in a few months, with an expected cost in excess of $200,000. As is common for expensive broadcast equipment products it is understood that the system will be available for rental from a specialist broadcast equipment company. More information on the AudioScope is available at http://www.sqhead.com/.

2008 NAB Broadcast Engineering Conference Summary of Presentations

Check out the papers that will be presented at the 2008 NAB Broadcast Engineering Conference in Las Vegas, April 12 -17, 2008. Find registration, housing or additional information on the NAB Show at http://www.nabshow.com/.