

pixel-driving techniques. Her slide presentation began with a discussion of the physiology of vision, showing the human retina as a "camera chip" with an imperfect design for imaging, as the eye's receptors translate photons into images in the brain. She explained the relationship of the colors received to the various ways colors are processed as signals in the optical path, and the sampling that takes place in the vision process. Having laid that foundation in perception, she discussed her theories about how we can present improved images for viewing, both as bandwidth-limited and unlimited, as well as the concepts associated with color rendering as produced by red, green, and blue subpixels on displays.

Elliott explained how existing technology presents pixels, and how we perceive those images. She then showed various refinements of pixel and subpixel arrangements and shapes to demonstrate how more resolution can be obtained with fewer subpixels, or better resolution with the same subpixel count. The basis of her technique centers on restructuring the RGB pixel arrangements on a display, to better allow addressing of individual subpixels to move the center of the perceived pixel less than the whole pixel. She also displayed, via her slides, enlarged representations of various subpixel patterns she has developed to demonstrate the effects

of these improvements in subpixel technology. A video should be preprocessed to take advantage of the subpixel resolution. ClairVoyante calls its line of patterns the "PenTile Matrix."

Attendees were encouraged to walk around the room and observe images at different distances, simulating the view a typical user might have of an image with subpixel patterns. Elliott showed ways of improving projection displays, including LCD (liquid-crystal display), OLED (organic light-emitting diode), and DLP (digital light processing). Displacing the projected subpixel positions for each color diagonally, by only one-half pixel, allows additional degrees of freedom with which to reconstruct the image. The resulting increase in "addressable points" allows high spatial frequencies at and just below the traditional Nyquist limit to be reconstructed over the full positional phase space, without aliasing or phase error, increasing observable image quality. The modulation-transfer function limit is extended, adding image detail. She also explored the implications for electronic digital cinema and HDTV.

The meeting ended with a lively Q & A session. Details about ClairVoyante and the subpixel techniques can be found on their website at [www.clairvoyante.com](http://www.clairvoyante.com).  
—John Goodell, Section Manager

## Engineering News

### SMPTE Television Engineering Committees Meet in Portland, Maine

SMPTE Television Engineering committees met in Portland, ME, on June 2-5, 2003. Sean Long, marketing manager, Wired Comms Group at National Semiconductor Corp., served as host for the four-day series of meetings, which included the following committees:

Television Recording and Reproduction Technology (V16) • Television Systems Technology (S22) • Television Image Technology (I23) • Video Compression Technology (C24) • Metadata and Wrapper Technology (W25) • File Management and Networking Technology (N26) • Data Essence Technology (D27) • Television Audio Technology (A29) • Registration and Identification Technology (R30)

An important ongoing item concerning the Material Exchange Format (MXF) and its applications was addressed. MXF files are based on SMPTE KLV coding according to SMPTE 336M.



SMPTE Engineering Vice-President Peter D. Symes (l) thanks Sean Long (r) for serving as host of the meetings.

Work also continued on two proposed videotape formats:

**SMPTE 398M** Proposed Standard for Digital Video Recording—1/2-in Type D-14 Component Format—525/60 and 625/50 and **SMPTE 399M** Proposed Standard for Digital Television Recording—1/2-in Type D-15 High-Definition Compressed Video Data Format.

The next series of meetings will be held September 17-20, 2003, in Geneva Switzerland, with the European Broadcasting Union (EBU) serving as host.

—Carlos V. Girod, Jr., P.E., Director of Engineering

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