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New LCD technology counteracts spatial noise at pixel level

By: Douglas Page

Radiologists can say goodbye to spatial noise on liquid crystal displays with a new technology that performs real-time noise correction on images sent to high-resolution medical monitors.

One disadvantage of LCDs has been the existence of spatial noise, expressed as measurable stationary differences in the behavior of individual pixels. A medical display with built-in noise compensation at the pixel level addresses this problem (J Digit Imaging 2005; Jul 6 [Epub ahead of print]).

The display employs a technology called per pixel uniformity, or PPU, that maps the noise behavior of each of the millions of individual pixels in LCDs for a special device installed inside the monitor. This device then performs real-time correction, or precompensation, of all images that are sent to the display.

"This real-time system removes all display noise transparently to the user," said Tom Kimpe, president of Barco Imaging. "If one knows exactly the noise pattern that will be superimposed to the medical image, then it becomes possible to change -- or precompensate -- the image so that the noise pattern is canceled."

PPU technology has evolved as LCDs rapidly replace CRT monitors for medical imaging. Some aspects of LCD technology have raised questions regarding its usefulness for subtle clinical diagnosis such as mammography.

The millions of individual pixels used in active matrix medical LCDs all behave differently. Each pixel is a separate element with its own characteristics, which depend on factors such as local thickness of the glass and the tolerance of the transistor driving that specific pixel, Kimpe said.

"Even if all pixels were driven with exactly the same pixel data, there would still be a measurable difference in luminance between individual pixels," he said.

Kimpe said PPU also increases DICOM conformance over the entire surface of the display.

Without individual compensation, most pixels would be outside the tolerance recommended by the American Association of Physicists in Medicine and the European Reference Organization for Quality Assured Breast Screening and Diagnostic Services.

PPU increases uniformity and decreases spatial noise to a level superior to noncompensated LCDs and even better than CRT devices built for mammography,

according to Kimpe.

“Especially for subtle mammography diagnosis, PPU could be an important step forward. Noise compensation almost completely removes all systematic static noise patterns from the display, thereby reducing the risk of false positives and increasing the probability of detection of true structures in the image,” he said.

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