

PROCEEDINGS OF SPIE

Head- and Helmet-Mounted Displays XVII; and Display Technologies and Applications for Defense, Security, and Avionics VI

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Symposium Cochair

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3D Displays, Body-Worn Displays, and Systems

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Introduction to Conference 8383B: Display Technologies and Applications for Defense, Security, and Avionics VI

Due to a number of unfortunate cancellations, this year's conference witnessed a high of 24 abstracts, yet a presentation of only 17 papers, being a 15% decrease relative to 2011. Thanks to the breadth of our conference committee members, however, those papers did reflect new and diverse sources, to include Aeronautical Systems Center, NASA Glenn Research Center, Barco (Netherlands), Schott North America, Infoscitex, and Fraunhofer-Institut für Optronik (Germany). Our one-day conference included 10 papers from industry, six from government and one from academia.

Invited presentations focussed on improvements to rapid insertion of innovative display and peripheral technology, and technical evaluation of a commercial 15-inch active-matrix organic light-emitting diode display modified to include a sunlight-readable resistive touch panel. These papers were presented by the Naval Surface Warfare Center and Rockwell Collins, respectively, demonstrating industry's ability to leverage civil markets to provide innovative displays for military applications, but also the military user's concern for earlier test and integration.

The cockpit avionics and vetrionics session discussed an electronic flight bag for next-generation avionics intended to address the Federal Aviation Administration's launch of the Next Generation Air Transport System initiative, an avionics control-display concept utilizing a multi-touch Touch Screen Control Unit prototype, an identification of display challenges and tradeoffs regarding the use of wide field-of-view, high situational awareness imagers, and a high-performance approach (a Matlab simulation tool) for minimizing competing in- and out-bound helmet signals. A final paper in this session discussed display optical designs using coherent taper fiber modules for enabling faster lens speed and improving light flux collection efficiency to reduce optical packaging volume.

Session 7 regarding technical and application advances for Active Matrix Organic Light Emitting Diode (AMOLED) devices began with a review of recent AMOLED advances, to include improved red, green, and blue color efficiency, pixel patterning and thin film transistor backplanes. Further advances were announced in yet another paper regarding microdisplays for helmet-mounted applications, e.g., 1280 x 3 x 1024 resolution with a 2.7 x 8.1 pixel pitch, and an output brightness of >3000 fL for addressing see-through and daylight imaging requirements. A most unusual paper by Infoscitex spoke to bio-kinetic energy harvesting using electro-active polymers, achieving reductions in battery weight

by using hybrid power systems that recover energy from a warfighter's movements. With hindsight, this paper might have been better placed in our session on systems supporting body-worn displays, but nevertheless served to stimulate lively discussion before the lunch break.

The streaming/wireless video for security and defense session began with a presentation from the Fraunhofer Institute which discussed a geographic information system that provides the merging of spatial data from various sources where the user is provided the appropriate data depending on actual task. Yet another paper from the Naval Surface Warfare Center spoke of means for reducing the human resources necessary to perform security tasks through use of haptic devices, automated cueing, detethering, and more effective visual display usage.

Our final session regarding "3D displays, body-worn displays and systems," was in fact a cornucopia of several disparate papers. For example, Aeronautical Systems Center spoke about the integration of a Head-Up Display developed for an existing fighter cockpit adapted to a new production cargo aircraft, where the focus was on maximum optical efficiency and pilot accommodation. That was followed by a more thematic Air Force Research Lab paper, "What is 3D good for?," which reviewed a large body of human-factors literature to present a frank look at where stereoscopic 3D displays appear to have merit, e.g., judging absolute and relative distances, performing spatial manipulations of objects, navigating, but also where they do not, e.g., when other strong cues to depth can be utilized, or for depth tasks that lie outside the effective viewing volume. Yet another paper discussed a prototype rugged 3D laptop computer for defense applications to include robot tele-operation, mission planning, enhanced 3D data interpretation, and simulation. Two other papers came to this session as stand-alone papers: one on military display performance parameters for avionics, vetronics, dismounted soldier and command and control, and one on ARINC 818 Express for high-speed avionics video and power over coax. This latter paper presented the results of a technology demonstration program to marry the physical layer from CoaXPress with the ARINC 818 protocol, providing a path to 3 and 6 Gbps ARINC 818 copper interfaces for rugged applications.

Best Paper: We would like to extend our sincere congratulations to Ihor Wacyk, Amal Ghosh, and Olivier Prache of eMagin Corporation and Russell Draper and David A. Fellowes of U.S. Army Night Vision & Electronic Sensors Directorate as winners of this year's Best Paper award: Ultra-high resolution and high-brightness AMOLED (paper 83830Q [8383B-25]). Please join us in congratulating Ihor, Amal, Olivier, Russell and David on this fine achievement!

As a final note, we wish to express our delight in seeing everyone at this year's first conference in Baltimore. Renewing old acquaintances is always one of the highlights in coming together as we do each year. Despite last year's attendance numbers in Orlando, SPIE was generous in affording a larger and more

comfortable room and you can ensure we fill this space next year by giving thought to a paper for 2013. Some 18 are needed for a full-day conference, but we are ever looking to expand with additional and worthy papers. Please read the Call which shall be issued late June to see our conference's wide range of topics and be sure to alert your colleagues and co-workers. Thank you – and see you in 2013!

Daniel D. Desjardins
Kalluri R. Sarma

