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Various aspects of situation awareness with respect to human-machine-interaction while using opto-avionic cockpit instrumentation in aircraft

Situation awareness (SA) is one of the prime human factors contributing to success of flight operations. The concept of glass cockpit has also been introduced in the fighter aircrafts to improve SA of pilots. The glass cockpit is primarily composed of optronic instruments such as head-up display (HUD), multifunctional displays (MFD), standby display (SDU), head-mounted display (HMD), optical gun sight, laser designator payload, etc. These display systems involve multitude of optronic technologies such as spherical, aspheric, micro-optics, freeform mirror and holographic optical components, multilayer optical anti-reflective, wavelength specific reflective, protective and electromagnetic interference coatings and image sources based on the end requirements as well as associated electronic specifications. For achieving SA, it is important to have a good perception of surroundings at a given time and space frame. Since, perception involves gathering information about operational environment, it is critical for a pilot to be aware of outside environment and flight details simultaneously. The majority of cockpit instruments are based on optronic technologies involving the principle of visual perception. Visual activity of pilot needs to be essentially free from any source of distraction leading to loss of SA. The major factors contributing to loss of SA due to hampered perception are mis-accommodation, misconvergence, information and work overload, symbology position, clutter, salience, luminance and brightness non-uniformity, contrast ratio, field of view (FOV), etc. The discussion focuses on various aspects of human machine interaction while using opto-avionic cockpit instrumentation for improved SA during critical piloting operations.

Biography

Vinod Karar has completed his PhD in Electrical and Instrumentation Engineering at Thapar University, Patiala, India. He is currently working as Chief Scientist, Head, Optical Devices & Systems and Coordinator-AcSIR, CSIO Chandigarh, India. He has over 150 publications in referred journals and conferences, one book chapter, over 175 technical reports/documents, one patent filed, five technologies and 10 prototypes. He is a Fellow of many professional bodies: IEI, IETE, OSI and member of EMC Society for Engineers, AeSI, OSA and IEEE. He is a recipient of several national awards in his area of research.

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