UDC 004.5:629.735.05[53.087.61+681.178] (043.2)

Prosvirin D.A., Postgraduate student NAU

DEVELOPING AND DEPLOYING HMIS ON CRITICAL EMBEDDED GRAPHICS PLATFORMS FOR AFCS CONTROL

Critical embedded Human Machine Interfaces (HMI) play an important role within the aerospace and defense. Developing HMIs efficiently while adhering to specific safety standards like DO-178B/C is a challenging task.

Cockpit Display System (CDS) suppliers need to now prepare for the cockpits of the future. The architecture, design and ergonomics of the cockpits have to be reassessed in order to place the pilot at the center of the system, while taking into account the increasing complexity of the systems. Human Machine Interfaces (HMI) have to be simplified and made more intuitive. Thus, there is a need for dedicated HMI design tools and human-factor-oriented processes that are able to support both the required flexibility in the display creation for various types of interactive displays and the increasing demand for safety in avionics displays. This paper presents a COTS approach to these needs, which combines the SCADE model-based HMI software design solution, designed from the ground up for displays with safety objectives, with an associated prototyping and development process largely based upon human factors assessment. The paper concludes with a status of current research activities on the topic and a summary of the benefits provided by this approach for interactive aerospace displays. Today, interactive glass cockpit displays in the aircrafts look and behave very similarly to other computers, with windows and data that can be manipulated with point-and-click devices. As we see a growing adoption of natural (or post-WIMP, standing for post-―Windows, Icons, Menus, Pointer|) HMIs in the general market – such as in smart phones, tablets, music or video players – CDS suppliers are preparing now for the cockpits of the future, which shall place the pilot at the center of the system. This objective shall be achievable only if the proper engineering and design processes are deployed in conjunction with the proper development tools. This paper presents a combined approach to these needs. After a brief history of cockpit display systems, this paper first describes an anthropocentered prototyping and development process naturally fitted to the design of these natural interfaces. The second part of this paper explains the notions of post-WIMP and natural interfaces and details how COTS tools like SCADE can tackle the description of such interfaces by abstracting the interactivity concepts at model level, and allowing the automatic generation of HMIs on any virtually any target. The paper concludes with a status of current research activities on the topic and a summary of the benefits provided by this approach for interactive aerospace displays.

References
1. Software considerations in airborne systems and equipment certification (RTCA/DO-178B): DO-178B- [December 1. 1992]. - Washington. D.C. 20036 USA, 1992.-112p.
2. ARINC 661: ―Cockpit Display System Interfaces to User Systems, ARINC Specification 661-4, May 2010.

Supervisor – *Doctor of Engineering, professor Kharchenko V.P.*