Avionic Developer System –
A customizable and multi-purpose System

http://www.youtube.com/watch?v=WJFMj162AJo

The Avionic Developer System is a next generation generic engineering simulator to support you in most of the avionics software development and testing phases. Its reconfigurable and modular full glass touch-panel cockpit is the best solution to establish any HMI concepts, is flexible and easy to customize, and is scalable for new solutions to include controls and displays, information/data processing and communication, navigation and/or safety and surveillance systems.

Thanks to the configurable software architecture, the user is able to extend the system to a cockpit procedure trainer. The implementation of the efficient communication/Real-time framework in a full flight simulator system is realizable with less effort.

The SW development process can be guided when required according the standards of DOD178B/C and DO278 when the system is completed by the use of our CUBES³ - a process model for the development of your functions and products in line with given standards.

Key Features

➢ Operational on multiple platforms
➢ Adaptable for various missions
➢ Customizable and scalable

Technological boon and bane

With the exponential advancements in airborne computing power in recent years, aircraft systems have become available offering greater and greater capabilities to the operator.

However, that increased capability has come at the cost of increased crew workload and complexity of integration.

As avionics suites have evolved, expanding from a core of essential flight systems to include communications, sensor data, digital mapping, obstacle warning, augmented reality, aircraft management, weapons and countermeasure management, the current digital cockpit display systems have become cluttered and work-intensive to control.

The required information is shared over a multitude of independent interface devices that are scattered across the entire cockpit. As such, data selection and input can be time-consuming thus leading to the pilot becoming distracted from their originally designated role and therefore marking an impact on efficiency and, more importantly, a safety hazard.

Future Trends

As a result of the technological advancements and the ever changing demands of the industry, the pilot's role has changed from that of a pure aviator to that of a systems manager. This fundamental change has led to the cockpit environment becoming no longer optimally designed for the new set of tasks that this entails. The established fundamental principles of cockpit design need to be reassessed such that an efficient design can be developed in line with this new role.

As older generation flight crew retire to be replaced by their younger counterparts, the tendency to accept the introduction of these new human machine interaction (HMI) concepts has increased. As such, avionics suppliers are now able to produce more flexible display designs allowing de-cluttering of the information presented to the aircrew. It is now possible to restrict the level of information density presented within the cockpit thus allowing the flight crew to focus on their current tasks.

Based upon an assessment of current and near-future technology, it can be seen that there is a significant trend towards large, multi-function displays. The capability to display uninterrupted, seamless views with greater scale and detail than previously possible helps to promote the flight crew's situational awareness. There is a simultaneous trend towards the use of touch-screen technology to control information selection and data input, and to select the display content of the larger screens. Several suppliers have proposed large format touch-screens, consolidating operational inputs and display outputs into a single device, which allows the operator to navigate between tasks and information groups just as a person might use a modern smart-phone or tablet PC to navigate between applications

More intuitive control and display techniques have been developed to improve perception and operation of touch-screens within avionics suites, entailing an increase in their usability, efficiency and safety. This is a step into the right direction towards solving some of the aforementioned problems. However, the introduction of new, previously unforeseen issues relating to touch-screen implementations within the cockpit environment provides a barrier to their successful application.

In the civil and military aviation, you need products and systems that are not only in line with today's technology but tomorrow's as well, designed smart to produce most benefit by low invest.

Avionic Developer System –
Technical Information

Communication and Real-Time Framework

The Avionic Developer system is based on a more efficient communication and real-time framework compared to most existing simulator frameworks. All the experiences we made in the development of simulator systems, frameworks and simulation models have been considered in the design of this new high performance framework. The communication and real-time software architecture enables you to connect different hardware platforms via different standard interfaces like MILBus, Arinc429, Ethernet etc. to it.

The current setup is mostly based on commercial hardware to avoid high investment costs. The system uses several commercial 22'' touch-screen monitors to form the instrument and the inter-seat console; these are controlled by one computer to execute all the cockpit-panel applications and hardware drivers to allow communication to external equipment via the avionic developer network.

Connected to a high performance computer three commercial 46'' TVs builds the 180 degree video screen. A modified and extended commercial flight simulator software generates image, sound, environmental conditions, produce flight loop data by a selectable flight system, provides sensor and equipment data on the network. Custom simulation models are running on a dedicated computer in real-time.

Business Cases

The system supports you to manage different business cases as such as Prototyping, Software/Software integration and requirements verification. The advantage of the Avionic Developer System is his customizability to the need of his user.

We simulate the flight dynamic characteristic of a flying system (helicopter, plane etc.) with its various sensors to place all flight parameters in realistic flight behavior on the data bus of the Avionic Developer System. Numerous functions - in particular, those that require an environment can be adjusted.

**SW/SW Integration Testing -
Stimulation of Simulation Models via Test Panels**

The system becomes a SW/SW integration platform for integrated simulation models or integrated operational software, such as vehicle health monitoring, flight planning, and mission management software. Thanks to the possibility to setup self-build flight-scenarios all testing can be proceeded much as dynamically and repeatable as needed.

**Streaming of Video or CAM Data in Multifunction Displays**

Configured as a Rapid Prototyper, the Avionic Developer System can support the early validation of software requirements.

When the Avionic Developer System is customized as a Cockpit Procedure Trainer, it facilitates a more intensive learning experience through the handling of control elements. Also, a number of system error incidences can be loaded to simulate routine handling.

Control & Display Unit Application and Page generation Tool compliant to ARINC 661 and ARINC 739

The availability of various cockpit panels and displays, as well as their adjustable set-up in the Avionic Developer System, allow for quick visualization of HMI solutions, which facilitates the practical testing of control concepts. The system gives the possibility to realize all kinds of cockpit designs as the limits are related to the availability on the market of bigger hardware screens only. By the use of the creation tool GL Studio by DISTI we are able to produce any multi-function page in 2D and 3D rapidly, furthermore it allows us to develop whole cockpits to visualize the layouts in 3D.
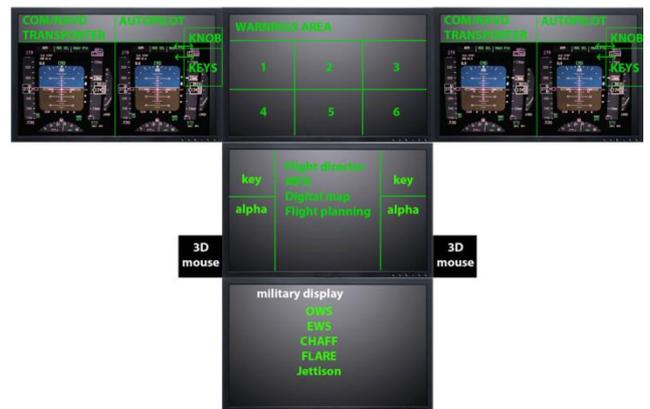
New generation Multi-Function Display concepts

Operator Station - a Portable Control Solution

To complete the system the portable Operator Station can be an optional solution to control the Avionic Developer System, the environmental conditions, or stimulate any malfunctions to produce and test failure indications on the specific warning panels. The application is running on a standard OS and commercial hardware and is connected to the system network.

Operator Station on Windows 8 Surface

CAPES2 – the Real-time software architecture

To allow the development of individual operational functions or complete functional chains as a plug-in, and their steering through available interfaces, such as MFDs, CDUs and others, the Avionic Developer System integrates a real-time software architecture called CAPES[2] (Configurable Avionic Platform for Embedded System & Software) based on the IMA / Arinc653 standard. To learn more about CAPES[2] a dedicated Whitepaper is available.

CUBES³ - process model for the development

The system is completed by the use of our CUBES³ - a process model for the development of your functions and products in line with given standards. ADS will show how your functions and systems can be developed to be verifiably airworthy, in accordance with standards such as DO-178B/C or Certification Specifications (CS), with the help of CUBES³ coupled with the Avionic Developer System. To learn more about CUBES³ a dedicated Whitepaper is available.

Conclusion

The Avionic Developer System is more than just a concept. The system has been already proven in the complete lifecycle of a project right through to realistic and detailed integration testing. The delivered software has been integrated successfully on the target platform where system integration effort was minimized. The Avionic Developer System enables you to produce quality software in an efficient manner.

References

Airbus Helicopter NH90, Tiger, CH53GA, EC145T2 and others
Airbus Defense & Space Eurofighter and others

Avionic Design Service delivers smart engineering solutions and technical expertise in the field of avionics.

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