

## **A Real-Time Simulation Environment for Avionics Software Development and Qualification**

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**Abstract :** The development of guidance, navigation and control algorithms and avionic procedures requires the disposability of suitable analysis and verification tools, such as simulation environments, which support the design process and allow detecting potential problems prior to the flight test, in order to make new technologies available at reduced cost, time and risk. This paper presents a simulation environment for avionic software development and qualification, especially aimed at equipment for general aviation aircrafts and unmanned aerial systems. The simulation environment includes models for short and medium-range radio-navigation aids, flight assistance systems, and ground control stations. All the software modules are able to simulate the modeled systems both in fast-time and real-time tests, and were implemented following component oriented modeling techniques and requirement based approach. The paper describes the specific models features, the architectures of the implemented software systems and its validation process. Performed validation tests highlighted the capability of the simulation environment to guarantee in real-time the required functionalities and performance of the simulated avionics systems, as well as to reproduce the interaction between these systems, thus permitting a realistic and reliable simulation of a complete mission scenario.

**Keywords :** ADS-B, avionics, NAVAIDs, real-time simulation, TCAS, UAS ground control station

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