Paper ID: 12749
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Technology Roadmaps for Space Exploration (09)
Enabling Technologies for Exploration (3)

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SEARCH FOR AFFORDABLE AND SUSTAINABLE AVIONICS FOR DECADES OF EXPLORATION

Abstract

The development of human-rated avionics for long-term deep space missions is a key element of any technology roadmap for exploration. Previous human-rated missions and long-term space programs have struggled with creating avionics that are affordable, capable, and can at the same time be maintained or upgraded over decades of a program's life.

Like previous human-rated programs, the new exploration programs will likely have lifetimes measured in decades. In a budget constrained environment, it's important to develop a technology roadmap that can realistically deliver affordable and upgradeable avionics over the lifetime of the program.

In this paper, we focus on a method to develop those affordable avionics. There is no shortage of papers discussing the best technical approaches for human-rated avionics systems. In this paper, we instead focus on the EEE parts industry and from that determine what an affordable avionics system could look like for exploration.

Instead of determining the technical requirements for exploration avionics and then creating a roadmap to get to those goals, we reverse the process. We assess the roadmaps in the parts industry and work our way back to requirements for an exploration avionics system.

Starting at the beginning of the process, we survey several of the foundries in existence today, their applicability to an exploration program, and at the likely long-term directions of some of these foundries. From there we expand our view to look at key technologies and the likelihood that they will remain in existence and affordable for the foreseeable future. It is then possible to determine many of the capabilities and requirements of an exploration avionics system.