

Innovative Design Considerations for Adaptive Spacecraft

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Abstract : Space technologies have changed the way we live in the present day society and manage many aspects of our daily affairs through Remote sensing, Navigation & Communications. Further, defense and military usage of spacecraft has increased tremendously along with civilian purposes. The number of satellites deployed in space in Low Earth Orbit (LEO), Medium Earth Orbit (MEO), and the Geostationary Orbit (GEO) has gone up. The dependency on remote sensing and operational capabilities are most invariably to be exploited more and more in future. Every country is acquiring spacecraft in one way or other for their daily needs, and spacecraft numbers are likely to increase significantly and create spacecraft traffic problems. The aim of this research paper is to propose innovative design concepts for adaptive spacecraft. The main idea here is to improve existing design methods of spacecraft design and development to further improve upon design considerations for futuristic adaptive spacecraft with inbuilt features for automatic adaptability and self-protection. In other words, the innovative design considerations proposed here are to have future spacecraft with self-organizing capabilities for orbital control and protection from anti-satellite weapons (ASAT). Here, an attempt is made to propose design and develop futuristic spacecraft for 2030 and beyond due to tremendous advancements in VLSI, miniaturization, and nano antenna array technologies, including nano technologies are expected.

Keywords : satellites, low earth orbit (LEO), medium earth orbit (MEO), geostationary earth orbit (GEO), self-organizing control system, anti-satellite weapons (ASAT), orbital control, radar warning receiver, missile warning receiver, laser warning receiver, attitude and orbit control systems (AOCS), command and data handling (CDH)

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