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"REVOLUTIONIZING SPACECRAFT ENERGY EFFICIENCY: HARNESSING ARTIFICIAL INTELLIGENCE FOR SUSTAINABLE LONG-DURATION MISSIONS"

Abstract

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Revolutionizing Spacecraft Energy Efficiency: Harnessing Artificial Intelligence for Sustainable Long-Duration Missions

Abstract

In the era of advanced space exploration, improving energy efficiency presents a significant challenge for long-duration missions that rely on limited resources such as fuel and solar energy. With the continuous development of artificial intelligence (AI) technologies, it is now possible to optimize energy consumption in unprecedented ways through intelligent systems powered by machine learning. This paper aims to explore how AI technologies can enhance energy efficiency in spacecraft through advanced strategies such as smart resource management, autonomous system control, and optimization of solar cell performance, in addition to fuel management improvements. By leveraging predictive algorithms and intelligent data analysis, more efficient energy distribution and reduced waste can be achieved, extending mission lifespans and increasing their potential for scientific and technological success. This research provides a roadmap for sustainable energy use in space and highlights the pivotal roles AI can play in redefining energy consumption strategies for future spacecraft.