AI Impact & Autonomy on Space Exploration (14)
AI Impact & Autonomy on Space Exploration - IP Session (IP)

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AUTONOMOUS SPACE MISSIONS: REVOLUTIONIZING ACCURACY AND RISK MITIGATION IN EXTRATERRESTRIAL EXPLORATION"

Abstract

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Autonomous Space Missions: Revolutionizing Accuracy and Risk Mitigation in Extraterrestrial Exploration

Abstract

Autonomous space missions are increasingly critical in reducing human intervention, particularly in unmanned missions to Mars and deep space explorations. The shift towards autonomy minimizes the delays and errors associated with human control by enabling spacecraft to make decisions in real-time. This paper explores how autonomous technologies improve the accuracy of operations, lower risks, and reduce the costs of space missions. Key advancements such as adjustable autonomy, AI-driven decision-making, and autonomous hazard avoidance systems have been instrumental in enhancing mission efficiency and safety. By delegating complex tasks to onboard systems, these technologies mitigate the risks inherent in space exploration while ensuring high precision and operational reliability. This review synthesizes recent developments in autonomy for space missions, highlighting the potential of these technologies to transform future planetary exploration and long-duration missions.