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"CLOUD-POWERED SOLUTION FOR RELIABLE SATELLITE OPERATIONS: A FOCUS ON SATELLITE FORMATION FAULT PROGNOSIS WITH DIGITAL TWINS"

Abstract

Satellite formation flying(SFF) has become increasingly common in modern space missions, providing advanced capabilities for Earth observation, communication, and scientific research. However, ensuring the reliability and safety of satellite formations during changing operational conditions remains a significant challenge. Fault prognosis, the process of anticipating and addressing faults before they occur, is critical for maintaining the integrity and functionality of satellite formations. This paper highlights the importance of deploying a cloud-based digital twin framework for fault prognosis in SFFs. By integrating real-time telemetry data, sophisticated analytics, and cloud computing resources, the digital twin framework offers a scalable and adaptable platform for detecting anomalies, forecasting potential failures, and enhancing mission outcomes. This paper discusses the key advantages of adopting a cloud-based digital twin framework, including enhanced accuracy in fault detection, proactive maintenance strategies, and improved collaboration among mission stakeholders in comparison to other methods.