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ARTIFICIAL INTELLIGENCE IN SPACE: CURRENT STATUS AND FUTURE CHALLENGES – A  
REVIEW

**Abstract**

In recent years Artificial Intelligence has gained large popularity and serves as a new standard in terms of system autonomy and modern technology. In many industries AI is not only widely researched and further developed but already commercially deployed. For example, in the automotive industry AI is enabling autonomous driving or in several other industry branches machine learning is utilized for predictive maintenance and health prognostics of technical and mechanical systems. Besides enabling autonomous system technology Artificial Intelligence is also present when it comes to analyzing a large amount of data. In the space industry Artificial Intelligence is slowly on its way from being researched towards being deployed onboard or within ground operations of spacecraft. Nevertheless, traditional methods based on manually programming and monitoring system functions are still predominant due to the year-long experiences, reliability and easy verifiability. Especially the black box characteristics as well as the lack of trustable and explainable results are one of the main critiques of systems based on Artificial Intelligence besides the large amount of data and time that is necessary to train such models.

This study serves as a survey on the current status as well as the future of Artificial Intelligence in spacecraft operations. It points out current shortcomings as well as opportunities and advantages of Artificial Intelligence for application in the area of spacecraft operations and onboard as well as on ground data analysis. Necessary next steps and solutions enabling and encouraging Artificial Intelligence in the space domain to facilitate high-autonomous spacecraft as well as efficient and reasonable use of the different methodologies are presented.