

SPACE EXPLORATION SYMPOSIUM (A3)
Space Exploration Overview (1)

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STUDY ON INTELLIGENT REMOTE SENSOR FOR DEEP SPACE EXPLORATION

Abstract

At present, deep space exploration missions are facing the following problems: Communication Delay. For example, Mars exploration delays about dozens of minutes, so it is impossible to conduct real-time control and adjustment of remote sensor, significantly reducing the ability of science observation; Mission Complexity. Deep space exploration means to explore an unknown area in the universe. It is hard to develop a proper exploration program, so the remote sensor with a traditional operating mode may result in a low probability of detection success; High Risk and Low Benefit. Deep space exploration requires substantial investment of resources, and subjects to launch window limitation. In the history of Mars exploration, the rate of success is less than 50%. Problems listed above are huge challenges to traditional remote sensors. The sensors with fixed imaging mode, spectral range, temporal resolution and spatial resolution, have the low flexibility, so it is unable to meet the requirements of deep space exploration for access to information in real-time and effectively. The development of intelligence technology brings new ideas to address the above problems. Combining traditional remote sensing technology with intelligent technology can construct an intelligent remote sensing system with automatically optimizing imaging mode, adjusting parameters and processing information onboard. Applied to deep space exploration, it can greatly improve the detecting capacity of this new system. Therefore, we proposed the concept "intelligent remote sensor system for deep space exploration", and discussed the key technologies involved. This paper presents the design of the intelligent remote sensor system, which consists of 9 modules, include imaging module, DB module, data processing module, data management module, planning&scheduling module, resource management module, parameter adjustment module mode switching module and fault diagnosis module. This system is of great autonomy, and can automatically optimize system parameters of the remote sensor according to the feedback information among modules. It also can greatly reduce the requirements of ground operation. Taking advantage of the features, we can solve the above problems encountered in deep space exploration, improve the reliability and the benefit of deep space exploration mission and speed up the pace of exploration in deep space.