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Author: Mr. Haiyang Chu
China Academy of Space Technology (CAST), China, chuhy_sean@126.com

Mr. Shaohua Bai
China Academy of Space Technology (CAST), China, baishaohua1976@163.com
Mr. Xiaoyu He
China Academy of Space Technology (CAST), China, he.xiaoyu@163.com
Mr. Hongjiang Song
China Academy of Space Technology (CAST), China, shj830207@163.com

WRDMS: WEB-BASED REAL-TIME DATA MONITORING SYSTEM FOR MULTI-SPACECRAFT

Abstract

Real-time telemetry monitoring is one of the keys in the spacecraft's AIT (Assembly, Integration, and Test) and on-orbit operation. The telemetry data has large variety, large number of parameters and the transmission frequency is always high. Traditionally, one spacecraft is configured with one system, and the data monitoring software only serves a single spacecraft. This has been unable to meet the requirement of multi-spacecraft centralized monitoring due to the current surge in the number of spacecraft, especially the explosion in the number of low-orbit constellations. In addition, previous data monitoring software is mostly presented in the form of desktop applications, which cannot meet the requirements of the increasingly diverse types of monitoring terminals, such as emergency data monitoring through tablets or smart phones. Benefiting from the development of technology, a web-based real-time monitoring system for telemetry data of multiple spacecraft named WRDMS is proposed in this paper. The browser-based technical base allows it to adapt to more terminals, the standard data interface allows it to quickly adapt to any mission control system and the ability of multi-spacecraft data centralized monitoring support makes it more vigorous, thus better suited to the future needs of the commercial space age. Based on html5 and canvas technologyit implements vectorized configuration page editing, through component drag-and-drop and data binding, it can quickly draw a task-oriented data monitoring web page without programming. By binding telemetry parameters to page elements and display settings, it can meet different spacecraft data monitoring requirements, such as switching actions driven by parameter values and intuitive display data using instrumentation, color and text changes. Through web-socket push initiative, it can adapt to different frequency of data update. And hash addressing and two-level load balancing provide a high-performance distribution and display solution for multi-spacecraft telemetry data. As the number of spacecrafts being monitored increases, this solution can meet the dual challenges of having an extremely large number of telemetry parameters and multiplying monitoring terminals. As the core component of STS4000Spacecraft Test System 4000, it has been widely used in China's lunar exploration project, manned space program and several low-orbit remote sensing satelliteswhich well meets the mission needs. In this paper, the design and implementation of WRDMS will be discussed in detail from the aspects of architecture, functional composition, page editing, data binding, display settings, data push, load balancing and etc.