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Author: Mr. Jixiang Cui

Beijing Institute of Tracking and Telecommunication Technology (BITTT), China, cjxhs@163.com

Mr. Bin Wu

Beijing Institute of Tracking and Telecommunication Technology (BITTT), China,
whisperme_net@163.com

Mrs. Ping Li

China, cuijixiang.01@163.com

AN AUTOMATIC PLANNING SYSTEM FOR SMALL SPACE OBSERVATION SATELLITE

Abstract

Small space observation satellite (SSOS) could get the size and shape information of satellites, rockets and space debris in a near distance. In order to reduce the operation cost and improve the output in quality and quantity, the paper proposes an autonomous planning system for the daily operation and task planning of SSOS. The planner is composed of four subsystems: rendezvous prediction(RP), system model (SM), automatic planner (AP) and user interface (UI). The rendezvous prediction subsystem uses the two-line elements(TLE) of on-orbit objects to predict the timing and angle information of their rendezvous with the space observation satellite. The system model consists of camera model, memory model etc. The camera model provides rotation range, rotation rate and pixel constraints of the onboard camera. The automatic planner uses the information provided by RP and SSM to generate the action sequence automatically. The user interface allows users to input their observation requests, and then denotes the generated plan to operators. The planning system could deal with temporal and resource constraints and adjust the plan according to the priority of the observation mission when memory conflicts occur. The generated plan consists of picture mode, rotation of camera, downlink of data, etc. The planning system could satisfy the daily operation and mission planning of small space observation satellite. About 50 percent of technical stuff can be cut down after the application of the system and the cost of long term running is largely deduced.