

Technologies for Complex Systems Automation and Autonomy in Deep Space Exploration

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Abstract

This presentation will survey several major technologies developed at JPL, which have reached maturity for product development and deployment in service of JPL's space flight missions. The discussion will include the "Mission Data System", a unified architecture and reliable software framework for autonomous closed-loop control which is base lined to fly on the Mars Science Laboratory mission; "Fault Detection and Isolation" technology for hard real-time diagnostics and interpretation of system state; and the "Common Automation Engine", a diagnostics, reasoning and controlling component used for selecting, executing and monitoring system commands as well as re-planning recovery scenarios. All three technologies are targeted for automation of planning, command, monitoring, and control automation of JPL's worldwide Deep Space Network. These technologies, while developed for our space and ground systems applications, have substantial applicability and relevance to manufacturing and commercial products.