

# Using AI To Simulate Spacecraft and Automate operations

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## ABSTRACT

Software simulation is playing an increasing role in the entire product development life cycle. However, traditional software simulation tools do not fit easily into the intergrated environment required. Recent AI techniques can alleviate the problems involved with intergrating simulation tools through out the development cycle so they can then become the basis for automated operations after the systems have been deployed.

Ford Aerospace has developed a software tool that interacts with the user to model the problem domain. The tool automatically provides a continuous, time-sliced simulation fo the modeled domain's behavior. Model-building is object oriented and requires no programming. The system uses a series of integrated graphic screens, controlled by mouse selection, and therefore requires only a few hours of training. Once developed, the domain model can serve as the knowledge base for trade studies made during the development process for V+V of the system during the testing phases and for automated analysis and fault diagnosis and correction during operations. Most complex functions required to be performed on the gorund to control spacecraft can be automated. The paper will discuss how PARAGON can be used (1) to help the spacecraft designer during the development process indentify the most useful set of telemetry points for TT+, (2) to help the test engineer validate performance against traditional software simulations and hardware prototypes, (3) to train and rehearse operators so a wide-variety of scenarios can be experienced interactively rather than a few pre-planned situations, and (4) to help the operator diagnose and correct complex, unexpected, anomalous situations.