ROBOTIC SIMULATION

The L3 MAPPS robotic simulation development provides a flexible solution to your robotic simulations needs. We offer our customers a whole range of possibilities, from a standalone model development platform to a completely integrated end-to-end customized simulator with hardware-in-the-loop. Capabilities include:

- Real-time flexible multi-body dynamics
- Real-time contact dynamics
- Kinematic mode
- Control system simulation or stimulation
- Control interface (GUI) emulation or stimulation
- Force and moment sensors
- Visual renderer
- Camera effects
- Joint motor hardware models
- Environment models (external forces, lighting)
- Electrical power generation and distribution
- Thermal solver (radiation, conduction)

REAL-TIME DYNAMICS

Models of large flexible robots require small time steps in order to realistically simulate the dynamic behaviour and to maintain the stability of the control loop. The L3 MAPPS robotic simulation environment provides rates up to 1,000 Hz in real-time, with up to 100 flexible modes.

CONTROL SYSTEM SIMULATION/STIMULATION

The robotic control system can either be simulated, based on the controller specification, or the real vendor-provided software can be integrated and stimulated directly in the simulator. This controller software can be integrated in source code format or as a pre-compiled external library. The control system software can then be tested in a fully closed loop, with models of the environment, dynamics, sensors and actuators. This approach is also called a “software-in-the-loop” simulation.

HARDWARE-IN-THE-LOOP

Actual equipment can also be interfaced to the simulator via analog or digital interface models that call the specific hardware device drivers. In this manner, a hardware component can be stimulated and tested in a fully closed loop, with models of the environment, dynamics, sensors and actuators.

CUSTOMER-PROVIDED MODELS

Models from customers or equipment vendors can easily be encapsulated and integrated in the simulator. We can integrate models written in Fortran, Ada, C or C++. Code generated from MATLAB®/ Simulink™ can also be encapsulated in our simulation environment. This permits the integration of models that the customer has already developed and validated and maximizes the re-use of models developed in other phases of the space vehicle development cycle.

VISUAL RENDERER

A visual modeling and rendering environment is provided in order to generate a synthetic view of the robot operation. Camera effects can be added in order to realistically simulate views as seen through cameras either attached or external to the robot. These effects include depth-of-field focusing, exposure control, smearing, black and white, blooming, overlays and dynamic shadows.

COMPLETE LIFE-CYCLE SUPPORT

The simulator can be used from beginning to end of a robotic program:

- System/subsystem requirements verification
- System/subsystem design
- System/subsystem integration and testing
- Operations validation
- Operations support
- Training

MAPPS

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