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CONCEPT OF A MODULAR EXPERIMENT PLATFORM FOR MICRO-GRAVITY PAYLOADS

Abstract

Currently experiment developments often have to start from scratch and do not follow a common design approach. A standardized modular experiment platform (MXP) is proposed that offers major experiment functionalities like sensor/actuator control, data acquisition, video processing, data transmission and experiment control. These functionalities are covered by standardized units and components in a flexible and modular design approach.

The platform offers the opportunity to design the experiment interfaces and functionalities against the MXP system while the interfaces to a specific micro gravity platform does not need to be serviced by the experiment developers themselves. This enables the experiment developers to use the same development for use in laboratories, parabolic flight campaigns, capsules, and the space station.

The modular design approach is based on building blocks dedicated to specific functionalities. The main building blocks provide standard services which are used by most experiments like power management, experiment control, or data management. MXP additionally offers exchangeable cartridges for experiment specific functionalities.

MXP is based on industry interface standards (e.g. GigE Vision for HD video) which are well known to experiment developers and scientists. The use of Commercial, Aviation, and Military (CAM) equipment is a key stone for the MXP design. It ensures the use of reliable components at reasonable costs.

Due to the modular design future upgrades of performance or functionalities can be implemented easily. Upgrading an experiment with additional functionality is possible and the same hardware can be reused for follow-up experiments.