University of Stuttgart
Institute of Space Systems

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Task Description Master's Thesis

Implementation of the science laboratory Columbus in the MATLAB-based simulation system V-HAB

Motivation:

The next generation of human space exploration missions will take crews farther away from Earth than ever before. This results in increasingly sophisticated life support systems (LSS) to keep the astronauts alive, happy and healthy. Mission scenarios of this kind therefore require greater autonomy, utilizing modern machine learning methods for early detection and warning of anomalies and faults. Such models must be trained on large datasets, including both nominal and off-nominal cases.

One possible solution for generating the necessary data is to use the Virtual Habitat (V-HAB) simulation. The objective of this master's thesis is to model the Columbus module as part of the ISS within V-HAB. The individual onboard life support systems must be identified and potential failure modes must be incorporated. The aim of this thesis is to create the Columbus model, conduct tests and evaluate the model based on real data.

Task Description:

- Familiarization with life support system technologies and the Columbus module
- Familiarization with V-HAB
- Identification of requirements and constraints
- Development of models for all LSS systems inside Columbus
- Implementation and test of the Model using V-HAB
- Validation with real Columbus data
- Documentation

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Start date: Choose Date