Task Description Master's Thesis

State-of-the-art sensing instruments, their application and modelling for the IRS Life Support System Laboratory

Motivation:
The next generation of human space exploration missions will take crews farther away from Earth than ever before. These missions will necessitate increasingly sophisticated Life Support Systems (LSSs) to ensure astronauts stay alive, happy and healthy. Mission scenarios of this kind therefore require greater autonomy, relying on sensing instruments to detect off-nominal behaviour.

In order to be able to simulate these LSSs at the IRS, a small-scale laboratory is going to be constructed. To analyse the inner workings of the different systems, their parameters have to be measured. Various techniques and sensors can be used for this. In the future these sensors should be used to extract data from the laboratory and feed a Digital Twin of the LSS in the Virtual Habitat (V-HAB) model.

The aim of this thesis is to investigate possible sensor solutions for the IRS LSSs laboratory, conduct a trade study as well as outline the individual sensors' behaviour and problems. These sensors are then implemented in V-HAB, including modelling their characteristics and faults.

Task Description:
- Familiarization with LSS technologies and sensor systems
- Research on LSS laboratories and the sensors used as well as their modelling
- Identification of the different sensor types
- Development of a recommendation for sensors to be used in the LSS laboratory
- Outline of possible problems for each recommended sensor
- Implementation and modelling of the selected sensors in V-HAB
- Evaluation of sensor model performance
- Documentation

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Start date:	Choose Date