

IAF HUMAN SPACEFLIGHT SYMPOSIUM (B3)  
Advanced Systems, Technologies, and Innovations for Human Spaceflight (7)

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LEVERAGING AI-DRIVEN GENERATIVE DESIGN METHODOLOGIES TO DEVELOP A  
LIGHTWEIGHT PRIMARY LIFE SUPPORT SYSTEM (PLSS) FOR SUSTAINABLE LUNAR AND  
INTERPLANETARY EXPLORATION

**Abstract**

In 2024, NASA will send humans to the moon for the first time in over 50 years, setting the stage for future crewed missions to Mars. To get astronauts back to the moon, the space suits from NASA's last lunar mission in 1972 required a complete redesign. These suits lacked mobility and were not designed for extended periods in space, making them unsuitable for NASA's vision of sustainable human spaceflight. With each kilogram costing approximately 10K to launch, reducing the weight of the suit would also be critical, as longer missions driven by generative design methodologies to design the next generation Primary Life Support System (PLSS). Generative design