IAF SPACE POWER SYMPOSIUM (C3)
Space Power System for Ambitious Missions (4)

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SELF FOLDABLE LUNAR LANDER SOLAR PANEL: DESIGN CONCEPT

Abstract

In the current era, going to the Moon is getting more attention in the space field: many companies have already designed their own landers with their launches scheduled in this decade. Projects proposed from mentioned companies are capable to land in previously selected zones on the surface and execute different types of exploration or research functions (such as releasing littler rovers): none are designed to perform multiple operations with the same lander in the sense that it is "monolithic" in function and the mass sent up only executes one task.

In this context, a reusable, low cost and completely autonomous lander capable of performing multiple tasks on the Moon's surface can help to accomplish the objective of demonstrating new technologies that could help build self-sustaining outposts off Earth. LEAPFROG (Lander Earth Approach Platform For Research On Ground) it is a hands-on project from the Space Engineering Research Center (SERC) that simulates flight and ground activities which will occur in the lunar environment with further generations and is a repeatable flight system that uses a jet-air breathing engine to simulate flight in lunar gravity.

To demonstrate multi-purpose mass used on a lander to enhance overall functionality, SERC is proposing a solar panel that is based on an origami-based structural mechanism to reduce space and deploy when needed solar panel is based on an origami structure mechanism which helps to save space on the lander and it can be deployed only when it needed. This will be managed by an onboard robotic arm that will handle different tools such a driller, a shovel, a gripper to perform soil activities or the solar panel when none activity is performed. Each of the individual origami elements, referred to as "Tassel's mechanically connected by a series of gears and hinges and the main one, will carry the stepper motor. Solar cells are linked to a PCB board which will be installed on the top of the origami tassel, while solar array will be connected to a battery charge regulator to properly manage overloading problems and recharge onboard Li-Ion battery package.

Nowadays, SERC is working on the solar panel testbed to prove the concept and its technology.