

14TH IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND
DEVELOPMENT (D3)Strategies & Architectures as the Framework for Future Building Blocks in Space Exploration and
Development (1)

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O'MOON: MODULAR AUTONOMOUS POWER INFRASTRUCTURE SOLUTION FOR FUTURE
MOON AND MARS EXPLORATION AND COLONISATION**Abstract**

Recent years have seen a greater interest placed on the exploration of the Moon and Mars reminiscent to the times of the Moon Landings. This is shown by the increase in the number of missions planned by national agencies, with a growing number of countries joining the exploration and science efforts.

This paper proposes to free science and exploration missions from the technical and financial burden of power production by developing and providing a dedicated power infrastructure. This as-yet inexistent infrastructure could be built on the moon poles with the use of a swarm of novel autonomous solar generator unit dubbed O'Moon. Thanks to its deployment mechanism, optimised for the respective gravities of the Moon and Mars, it can deploy a large surface of solar arrays while remaining compact enough when folded to be transported through space. It is equipped with modular batteries to store power until required by other missions. The units can be easily interconnected, so as to create a smart electrical grid to provide larger quantities of power. This also ensures the safety and reliability of the infrastructure, as the use of several interconnected O'Moon units provides a level of redundancy to avoid single point failures.

A conceptual design of the O'Moon unit was performed, including analyses and considerations of its configuration, structure and power systems. A study of its deployment as part of a wider utilisation on the Moon or on Mars was also conducted, including elements such as its autonomous deployment, connexion to other O'Moon units and interactions with exploration rovers or manned missions.

It was determined that the O'Moon concept may constitute an important step in the development of planetary exploration, as it would provide a number of advantages to the types of missions that are currently being planned and undertaken. However, it is also in line with two growing trends in space exploration. The first is the construction of a permanent infrastructure on the surfaces of the Moon and Mars, with numerous suggestions such as the Moon Village suggested by ESA. The second is the growing privatisation of space, as O'Moon has the potential to be implemented as a service provided by private companies to exploration missions.