IAF SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 2 (2B)

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SOLUTIONS FOR CONSTRUCTION OF A LUNAR BASE – ISU SSP21 LUNAR TEAM PROJECT

Abstract

Returning to the Moon and establishing a permanent human presence is the next step in human space exploration. This necessitates the development of lunar infrastructure capable of sustaining a permanent human presence. This team presents a supporting framework for rapid, cost-efficient, and supporting construction of a permanent and modular lunar base within the scope of what is technically feasible today in space law paradigms.

The proposed lunar base concept uses the SpaceX Starship Human Landing System as base infrastructure which will be placed horizontally on the lunar surface and transformed into a habitable volume. A crew of modular rovers will aid astronauts by supporting the construction process. Countermeasures are presented to protect the astronauts from the effects of exposure to radiation, lunar dust, extended hypogravity are identified. Psychological and psychosocial factors are included to enhance individual well-being and crew dynamics. Physical and cognitive workloads are defined and evaluated to identify countermeasures, including specific spacesuit parameters.

The construction is to be organized as a multi-national public-private partnership to establish an international authority, a concept that has been successful on Earth but has yet to be applied to space activities on a multi-national level. A public relations and communications strategy built around the value proposition is provided as a way to ensure sustained public, private, and political support for the project. A roadmap is provided, incorporating each part of the construction from human and technical perspectives. Other aspects which are critical to mission success include the cultural significance of the project, legal aspects, developments, budget, financing, and potential future uses. These solutions rely mainly on existing technologies and limited modifications to the lunar lander vehicle, making it a viable solution for the construction of a lunar base in the near future.