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Space Architecture: Habitats, Habitability, and Bases (1)

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FROM THE EARTH TO SPACE: NOTES FOR A PLANETARY SPACE HABITAT CATALOGUE

Abstract

During the 2002 AIAA Space Architecture Symposium in Huston, Texas, with the drafting of the Millennium Charter, terms were defined that officially gave rise to the discipline of Space Architecture. Numerous design experiments have been carried out since then, some commissioned by the international space agencies, others as a result of calls for ideas and competitions. This paper describes a research that attempted to organise the available design cases by tracing a path of study and analysis through eighteen case studies among the proposed extra-terrestrial habitats. The desire to understand how to live for extended periods of time beyond Earth was the driving force behind this research.

It has been crucial to comprehend the state-of-the-art and recognise the similarities and differences between the proposed habitat solutions. The study was organised using an architectural and functional analysis method, emphasising the types of construction, structural, and aggregative, through re-drawings, images collection and organisation, and drafting analytical descriptions required to clearly understand each case study. Simultaneously, an identification code was required so that we could better frame and organise all of the case studies under consideration. Finally, aspects of comfort and liveability of habitats for future settlers were examined, with special emphasis on the presence of natural light, the balance between common and private spaces, the distribution of these environments, and the presence of supporting structures. In short, the anthropological aspects and assistance systems hypothesised in the multifunctional use of Artificial Intelligence-based technologies were also relevant.

In conclusion, this paper will highlight the housing solutions beyond the Earth, providing an opportunity to have a clear picture of this new way of thinking architecture, with the aim of presenting a guide to architects on new opportunities. In this way, they will be able to experiment spatial solutions of orbital and planetary habitats, extending some architectural concepts to extreme environments such as the Moon and Mars.