Paper ID: 85703
student

22nd 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)

Author: Mrs. İnci İbadova
Azerbaijan Architecture and Construction University (SABAH groups), Azerbaijan

Mrs. Leyla Aliyeva
Azerbaijan Architecture and Construction University (SABAH groups), Azerbaijan

SUPERSTRUCTURES ON MARS

Abstract

Space exploration has captivated humanity's attention for a hundred years, yet the idea of establishing human habitation away from the Earth seemed impossible before the significant technological advancements. But as a result of the critical successes and fruitful researches in this field in the last 100 years, when we think of living on another planet, the first place that comes to mind is Mars. And there're many reasonsforthis: essential components for life, plenty of carbon, oxygen and hidden water ice, safe radiation level for plants, good daylight circle, all metallic sources and etc. Somehow we'll have to clarify how to build protective and durable structures to guard us against solar radiation, cosmic rays and extreme temperature swings. There're amazing aspects of building on Red planet: the gravity there is 38 percent of that on Earth, it means 100 kilos on Earth equals to 38 kilos on Mars. That all of the materials that we know can suddenly carry more. Another fascinating fact is: 1 meter thick layer of water is more than the radiation protection of 7 meters of regolith. Accordingly, in our concept we propose to use water in many partitions as a shield, and we also think that it'll provide a more interesting and aesthetic designsolution. Learning from various Earth vernaculars: excavations, 3d printing with local materials and inflatable membranes would be techniques to look into.But each of these 3 methods has its advantages and disadvantages.Inflatable structures is ideal for breathable, pressurized indoor environment but it has little defense against radiation.3d printing method would provide more protection but wouldn't be airtight. And excavated structures would give you the full shielding but less desirable habitat in terms of daylight and spaciousness. But as a result if we build 3d printed building with the help of local materials (such as regolith) on underground excavated sites and cover them with a gigantic inflatable structures, we'll create the hierarchical indoor environment in which people can breathe, be protected from radiation ,be in a safe environment and lead a life outside of monotony. Such a vertical layout is more efficient for humanity, as you get a sense of scale, hierarchy, surprise, curiosity and it creates atmosphere. This hybrid structure concept overcomes the shortcomings of theirseparation. These are principal factors for keeping people's psychology healthy. Let's not forget that we need to design for people to thrive not just survive.