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Architecture for humans in space: design, engineering, concepts and mission planning (1)

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ARCHITECTURAL TOOLS FOR INFLUENCING THE PERCEPTION OF TIME IN SPACE

Abstract

Space without the protective atmosphere is lethal for humans. Extra-terrestrial human missions are therefore carefully designed to support life on aboard of a spacecraft, isolated from harsh environmental conditions. Living in artificial environments, without an access to the natural solar light, has a strong influence on a circadian rhythm of humans. This manifests through the changes in sleep-activity cycles, homeostasis, immune responses and overall health of the body. Entrainment factors such as light-dark conditions, temperature, social rituals and a daily routine help to regulate the timing of biological rhythms. However, according to the research, these procedures alone are not efficient enough. Particularly olfactory treatment is not yet well investigated. In this study we discuss the importance of considering the element of time in an architectural design, as a key factor in simulating the natural environmental conditions in isolated interior spaces. By controlling the parameters such as the light intensity and wavelength, and the type and intensity of scents, it is possible to influence the human physiology and psychology. We propose generic architectural tools and methods which could be applied in the future designs of isolated spaces, to stimulate the sense of smell and to obtain optimal simulation of the solar light cycles. This, as a result, will synchronize the molecular, physiological and behavioural rhythms of the crew. In addition, a number of future concepts are proposed for the manipulation of a biological clock in order to decrease the metabolism during long-term space mission as a possible alternative for the hibernation.