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Behaviour, Performance and Psychosocial Issues in Space (1)

Author: Prof. Konstantinos-Alketas Oungrinis
Technical University of Crete, Greece

Ms. Marianthi Liapi
Aristotle University of Thessaloniki, Greece
Ms. Despoina Linaraki
Technical University of Crete, Greece
Mr. Dimitris Mairopoulos
Technical University of Crete, Greece
Ms. Georgia Voradaki
Technical University of Crete, Greece

SENSPONSIVE DESIGN AS A TOOL TO ADDRESS HUMAN COMFORT IN HABITABLE SPACECRAFT MODULES.

Abstract

The proposed paper presents an ongoing research project that focuses on a human-centered design approach to habitable spacecraft modules. The objective is to plan for the spatial, physiological and psychological needs of the people living and working in such confined spaces that entail long-term environmental threats to human health and performance. The approach focuses mainly on the relationship between the built environment and its users rather than on the building type itself. In other words, it takes for granted the creation of a safe, functional structure and focuses on the interior, artificially supported, environment targeting people's bodily and psychological comfort as a measure toward a productive and successful mission.

The method used to achieve our aims follows two parallel directions. On the first one, we identify the relation between specific spatial features and their effect on human psychology through neurophysiology. We have examined the connections between neuroscience, human behavior and space focusing upon the ways in which stimulants from the artificial environment affect the senses and consequently produce hormonal changes and corresponding emotions. In this way we can affect human psychology to maintain a sense of comfort and reduce stress and seclusion-related disorders. The second direction aims at the technical requirements to apply and control these spatial stimulants. The most efficient design medium to achieve such a goal is a flexible, transformable, technology-mediated architecture where sensponsive systems can be seamlessly incorporated into an environment that is already dependent on mechanical and chemical support systems. "Sensponsive" is a certain path of responsive design where the integration of sensor-actuator systems in space can identify the emotional state of people, through patterns of their activity, and enable an appropriate response. The difference lying in the sensponsive approach is that it does not rely only in a momentarily response but it analyzes the situation in the long run, creating a database of "behavioral" decisions, through a neuro-fuzzy programming approach.

We have tested the two paths individually, establishing the spatial ability to affect the emotional state and setting up a working sensponsive system. We can achieve then the creation of confined intelligent spaces, for specific use in isolated, extreme environments that have the programmed abilities to evaluate human activities and respond to them with sense, exhibiting adaptability, character and behavior. Concluding we believe that such an approach is viable and can significantly facilitate space missions of the near future.