Paper ID: 51379
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IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)
Medical Care for Humans in Space (3)

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ARTIFICIAL INTELLIGENCE AS A BEHAVIOURAL COUNTERMEASURE

Abstract

The requirements of space medical technology and devices build on the level of care (from 1 to 5), which are based on the duration of the mission and its objectives. For example, Lunar and planetary surface crewed missions have a level of care equal to 4, as long-term missions lasting hundreds of days, like one of the most dangerous and complex scenarios of medical assistance and treatment. In contrast to specialised medical devices, future medical systems are expected to be used in diagnosis and treatment accounting of data from different domains (as emotions and environmental conditions). These systems shall actively assist the crew in decision making and in the management of their health and safety. Intelligent in-flight medical systems are thought to be the most appropriate solution for integrating multidomain data. However, the use of AI in aerospace medicine may be questionable as AI builds on large data about known medical conditions, while there is little data about long-term missions in space and only a reference population, the astronaut population. Commercial crewed and space tourists might have inferior physical and mental performance than current formal astronauts. Therefore, astronaut-based AI might not be directly applicable to commercial astronauts, as this is population is exposed to a higher risk undergoing medical conditions in space. There is a need for addressing the use of AI from the phase-design to guarantee integration of AI-types when space flights will be opened to commercial astronauts. Thus, the innovation shall be addressed to a different end-user, which, in turn, may lead to a revision of standards and safety requirements. This work presents the development of an in-flight AI medical system built by design for allowing its application to both formal and commercial astronauts. The purpose of this project aims at establishing an autonomous bioelectric treatment for terrestrial and in-flight brain medical care for counteracting hazards of human behavioural and mental health. Here, AI builds on multiple databases which include brain mapping of multi-domain data for the identification and recognition of functional and structural alterations of the brain at multiscale. The platform aims at controlling setting parameters of transcranial brain stimulation (tDCS), as the neuromodulation technique through which a non-invasive painless treatment can be provided. The significance of this work is in its translational potential and applicability to both terrestrial and space medicine.