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# MEEVA: A SMART SYSTEM TO ESTIMATE AND MITIGATE STRESS EFFECTS DURING ANALOGUE ASTRONAUTS EVAS.

**Abstract**

Space exploration missions present many challenges for astronauts, such as extreme temperatures and psycho-physical stress. Developing advanced life support equipment in the context of analogue missions is essential to address these challenges, allowing for a safer and more efficient task completion during the mission. Furthermore, the life support system must transmit real-time information to the Mission Control Center (MCC). This action will increase the situational awareness of the MCC for safer management of analogue astronauts. Therefore, an objective assessment of the astronaut's physiological parameters and stress level can give the MCC a more accurate understanding of the situation, increasing the probability of a successful outcome and decreasing the risk of unexpected issues regarding the astronaut's health. In this paper, we outline the Medical Equipment for Extra Vehicular Activities (MEEVA), a system designed to measure the astronaut's vital parameters and inform the MCC directly, thanks to a physiological stress estimator. The MEEVA system includes an undervest and a helmet. The undervest acts as a cooling

garment, with integrated tubes where a liquid flows for thermal regulation. The vest has integrated sensors, providing a real-time measurement of the astronaut's physiological stress indicators, such as heart rate, skin and core temperature, range of motion and breathing. The helmet embeds a telemetry and telecommunication system, which exploits a set of repeaters and receivers to enable a link between the MCC and the astronaut. The data are collected and sent to the internal data processing system to be forwarded wirelessly to the MCC. Therefore, integrating all these subsystems enhances situational awareness of physiological stress and enables temperature control mitigation strategies to be tested.