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TECHNOLOGY-MEDIATED HUMAN-PLANT INTERACTION AS A PSYCHOLOGICAL  
COUNTERMEASURE IN MANNED SPACE MISSIONS**Abstract**

One of the most pressing issues that the scientific community will need to face in order to assist future deep space astronauts in enjoying their work and their life away from Earth is the need to mitigate a range of detrimental psychological effects that may include a possible frustration due to nature deficit. The role of horticulture and agriculture in psychological therapy has already been acknowledged in terrestrial cases, e.g. in the case of elderly people, and young children, while the published literature also confirms the beneficial effect that human-plant interactions can have on the astronauts' psychology. In this work, we investigate the mediation of such interactions through a novel plant-computer-human interface that can both augment a typical plant with audiovisual actuation and pseudo-decisions and interpret human-generated stimuli to make them relevant to the plant. Since the proposed hybridized interaction includes both living and artificial components, it may convey the advantages of both worlds: the natural and the cybernetic. It is particularly hypothesized that the plant-side part of this computer mediation may produce an augmented companion plant that can prove to be at least as good as robotic pets that have been proposed as possible countermeasure alternatives. Astronauts have already mentioned the soothing feelings they experience when they care for higher plants aboard the ISS, and the aforementioned augmented companion plants could further enhance this effect. Neither human-computer nor plant-computer interfaces are entirely novel. Already published examples of cybernetic interactive and/or robotic plants include, among others, "My Green Pet", "PotPet", "Project Florence", "EmotiPlant", "InfoPlant", "IO Plant", "Flora Robotica", "Botanicus Interacticus", etc., while the human-computer interaction literature is even richer. However, to the best of our knowledge, the proposed kind of plant-

computer-human interaction with augmented companion plants has never been explored in the past for the niche field of subjects that live and work in isolated and confined environments and experience extreme stressors, as is the case of astronauts. Specifically, this work investigates the integration of already commercially-available off-the-shelf subsystems into a novel system architecture that receives plant electrophysiological signals and human biomedical signals as inputs. The facilitation of the interaction is accomplished through a set of custom-made interactive experiences that engage both the plant and the human subject. Finally, the psychologically therapeutic effects of this computer-mediated plant-human interaction to the human subject are explored through a combination of different evaluation methods.