

SOMA SUITS.

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Introduction: Team Walk Space Suit IST lab – “SOMA” suits project brings together students with different background and skillset to prepare to help launch a sustainable human presence on the Moon and beyond. The subject of Space Exploration is always an opportunity not only to think about our future, but also to reflect on our present. Ideas of the everyday life find their way out into space and return solutions for a better living on Earth.

In the framework of the interfaculty IST Lab at KABK, Royal Academy of Art, The Hague [1] we asked students to think about one of essential elements of a space habitat – a spacesuit. Astronauts must wear it whenever they leave a spacecraft and are exposed to the space environment. Its main function is keeping human alive in the harsh environment of outer space, vacuum and temperature extremes. Besides that, space suit should facilitate comfortable temperature, pressure and atmosphere, but not limit agility and dexterity of the suit wearers, so that they can carry out various physical & technical tasks. Thinking of the permanent presence of human in space, we can imagine that importance of a spacesuit will only grow as well as the need to widen it’s functionality.

Team Walk Space Suit should remain functions of the space suit focusing on smart technology integration and human factor analysis. Space suit as astronaut’s second skin that lets him/her experience sense of touch, perceive environment, involve in social interactions. Is astronaut alone in the great nothingness? Instead of being an isolation chamber space suit can merge with human body & mind offering new experience of oneself, and relationship to the others.

In response to the department year theme “Garden”, each student team was challenged to select a material or organism found in nature as a starting point to derive technical solution for their spacesuit subsystem design. In extreme environments, spacesuit becomes a component of bionic ecosystems. Like any other component, it shapes the ecosystem and creates synergy between users and space to improve interactions, adaptability and situational awareness.

Biomimetic design generated new technologies inspired by solutions found in nature at macro and mi-

cro scales answering to various engineering problems such as self-healing, self-cleaning, environmental exposure tolerance and resistance, harvesting solar energy, etc. Our main objective is to ease the team cohesion, communication, decision making. Spacesuit as a custom and adaptive interface device with environment, other craft or equipment and various other support agencies in order to complete a mission successfully.

Spacesuit design was approached from the crew – lunar (extreme) environment ecosystem stand point. Suit enables astronauts to adapt their bodies: skin, lungs, vision etc. to the new conditions. These new cyber species - inhabitants of lunar environment can have their own characters and roles within the ecosystem. Hence spacesuit can assist CRM (crew resource management) by enhancing specific senses and skills to guide behavioral activities associated with teamwork. Certain senses can be dynamically altered for a specific task or role, for example visible spectrum from human to honey bee like robot vision allowing to see UV light patterns and use polarized light as a navigating system.

In collaboration with ILEWG [2] we develop concepts for MoonMars analogues to improve field research and foster a strong collaboration between different art, science and engineering disciplines. Field research partners including HI-SEAS, Hawaii [3] and Asclepios [4] are interested by smart analogue space suit designs, who can support project realisation and tests.

References: [1] <https://www.kabk.nl>

[2] <https://moonbasealliance.com/ilewg>

[3] <https://moonbasealliance.com/hi-seas>

[4] <https://www.epfl.ch/campus/associations/list/spaceat/spaceyourservice/our-events/mission-asclepios-do-it-yourself-space-mission-2/>