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DESIGNING A TECHNOLOGY ECOSYSTEM FOR THE INTEGRATION OF ENVIRONMENTAL ANALYSIS AND HEALTH DIAGNOSTICS TO ASSIST HUMANS IN THE COLONISATION OF MARS

Abstract

The necessity for assistive technologies is incremental to the colonisation of Mars. Why? Because humans are being removed from an environment favourable to their existence and placed into one which is incompatible with human life - and the baseline for danger increases exponentially over time.

This research will influence and shape the future development of technologies with the purpose to assist in activities and sustain human life during the colonisation of Mars.

Application of assistive technologies (hardware, software and UI) will be challenged, to meet the changing human physiology and environmental demands on Mars.

This research explores:

1. Human centred design and effective integration and deployment of automated diagnostic and health monitoring technology into personal devices
2. A technology ecosystem integrating real time data of environmental conditions from rovers, drones and habitat to inform the planning of colonisation activities
3. Minimisation of technological dependencies on Earth
4. Management of safety critical incidents in real time and remotely on Mars
5. Long term evolution/ lifecycle of technology

Due to the futurist nature of this research an agile and iterative methodology has been used to keep up with the fast-paced nature of the space industry.

1. Astronaut and Martian activities during the three phases of Mars colonisation- voyage, early colonisation and long-term evolution are researched, documented and kept up to date as the foundation of the research.
2. These activities are analysed and disassembled to create highly detailed scenarios. These scenarios validate and hold the results of the research accountable.
3. These activities translate into requirements for functionality and inform a set of principles for the creation of technology.
4. Prototypes both hardware and electrical are created as a solution demonstrating the proposed principles. These are tested against the scenarios to validate the results of the research as a reliable reference point.
5. Rigorous user testing is conducted on the prototypes with relevant users and within environmental simulation of the three phases of colonisation.

The results from technical, diagnostic and sensory data tests and accuracy are published in quantitative form. The human centred design and tests of product within context are qualitative.

The conclusion presents final design principles, technology application and environmental integration recommendations towards the future development of wearable, symbiotic and assistive technologies for the colonisation of Mars.