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AUGMENTED COGNITION: SUPPORTING ASTRONAUT PERFORMANCE DURING
MISSION-CRITICAL TASKS**Abstract**

Augmented Cognition (AC) is a constellation of neuroscience, engineering and psychology. It has the potential to enhance human performance by monitoring and adapting to individual cognitive and physiological states, as well as supporting performance that might be compromised by complications such as disorientation, fatigue, or task overload. Although this technology has been applied in mission-critical contexts such as operating rooms and power plant control rooms, its potential to assist astronauts during space missions has yet to be fully explored. To address the research gap, developing AC systems that can monitor and adapt to astronauts' cognitive and physiological states in real time is essential. These systems can quickly assess changes within astronauts that may impact their performance, and provide task support that optimizes their decision-making, problem-solving, and overall performance. By leveraging AC, astronauts can work more efficiently, even in high-pressure situations, thus minimizing the risk of errors and accidents. This research will review the current literature on AC in mission-critical conditions related to space flight and illustrate common challenges that astronauts may face. It will also summarize future research directions to mitigate these risks, specifically, by focusing on how AC can improve cognitive functions that are crucial for performing critical tasks in space. The expected contribution and ultimate goal of this research is to evolve effective interventions that can help astronauts perform at their best and increase the likelihood of success for space missions. By improving human performance in space, AC has the potential to revolutionize space travel, while contributing to the solutions for future deep space missions, making it safer and more successful. In conclusion, AC is an interdisciplinary domain that can enhance the performance of astronauts while minimizing risks associated with their work. Continuous research and development can identify strategies for ensuring the success of future space missions. By prioritizing the support Astronauts need to perform well, we can ensure the safety and success of future space missions. This study is performed by the Deep Space Initiative (DSI). DSI is a non-profit entity for which the goal is to increase accessibility and opportunity to space research, and its main focus is to help enable deep space exploration for the benefit of all Humankind.