Fiscal Year:	FY 2019	**Task Last Updated:**	FY 03/29/2019
PI Name:	Robinson, Stephen K. Ph.D.		
Project Title:	HCAAM VNSCOR: Enabling Autonomous Crew Task Performance with Multimodal Electronic Procedure Countermeasure		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:			
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **HFBP**:Human Factors & Behavioral Performance (IRP Rev H)		
Human Research Program Risks:	(1) **HSIA**:Risk of Adverse Outcomes Due to Inadequate Human Systems Integration Architecture (2) **Team**:Risk of Performance and Behavioral Health Decrements Due to Inadequate Cooperation, Coordination, Communication, and Psychosocial Adaptation within a Team		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Zip Code:	95616-5270	**Congressional District:**	3
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	2017-2018 HERO 80JSC017N0001-BPBA Topics in Biological, Physiological, and Behavioral Adaptations to Spaceflight. Appendix C
Start Date:	04/15/2019	**End Date:**	01/14/2020
No. of Post Docs:		**No. of PhD Degrees:**	
No. of PhD Candidates:		**No. of Master' Degrees:**	
No. of Master's Candidates:		**No. of Bachelor's Degrees:**	
No. of Bachelor's Candidates:		**Monitoring Center:**	NASA JSC
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Flight Program:			
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Hillenius, Steven M.S. (NASA Ames Research Center) Joyce, Richard Ph.D. (San Jose State University Research Foundation) Karasinski, John M.S. (NASA Ames Research Center)		
Grant/Contract No.:	80NSSC19K0657		
Performance Goal No.:			

Performance Goal Text:	
Task Description:	This task is part of the Human Capabilities Assessments for Autonomous Missions (HCAAM) Virtual NASA Specialized Center of Research (VNSCOR). Future long duration exploration missions (LDEM) conducted by NASA will have an increased need for crew autonomy during routine and emergency procedures, due to the increased distance from Earth causing time delays in communications. Presently, many procedures are completed with constant communication between the crewmembers and mission control personnel. This need for increased autonomy will lead to a need for more information being stored on board and accessed by crewmembers in a timely and context appropriate manner during procedural execution. Emergent technologies in multimodal interaction such as augmented reality (AR) visual displays, spatial audio, and tactile feedback are likely to play a role in mitigating this need, leading to what we define as "enhanced electronic procedures." In this proposal we outline a research study which will use a multimodal enhanced electronic procedure to determine the best tasks and cues to pair with sensory channels for procedural execution tasks. Past efforts by our group have investigated procedural tasks using new technologies such as augmented reality and haptic cues. A ground-based research study will determine the effects of crew performance, situational awareness, and trust with the use of multimodal enhanced electronic procedures compared to traditional unimodal electronic procedures. The results of the ground-based study will lead to deployment in an analog mission for validation in a flight-like environment. From the lab and analog results, we will formulate recommendations for updated standards and guidelines for multimodal interaction and electronic procedures.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2019.
Bibliography Type:	Description: (Last Updated: 01/29/2024)