Fiscal Year:	FY 2016	**Task Last Updated:**	FY 08/19/2016
PI Name:	Martin, David S. M.S.		
Project Title:	Autonomous Diagnostic Imaging Performed by Untrained Operators Using Augmented Reality as a Form of 'Just-in-Time' Training		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:	NSBRI--Human Factors and Performance Team		
Joint Agency Name:		**TechPort:**	Yes
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		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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City:	Houston	**State:**	TX
Zip Code:	77058-3607	**Congressional District:**	36
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	2015-16 HERO NNJ15ZSA001N-Crew Health (FLAGSHIP, NSBRI, OMNIBUS). Appendix A-Crew Health, Appendix B-NSBRI, Appendix C-Omnibus
Start Date:	06/01/2016	**End Date:**	05/31/2017
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:**	NSBRI
Contact Monitor:		**Contact Phone:**	
Contact Email:			
Flight Program:			
Flight Assignment:	NOTE: Element change to Human Factors & Behavioral Performance; previously Space Human Factors & Habitability (Ed., 1/19/17)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Laurie, Steven Ph.D. (Wyle Laboratories, Inc.) Lee, Stuart Ph.D. (Wyle Integrated Science and Engineering/NASA Johnson Space Center) Stenger, Michael Ph.D. (Wyle Laboratories, Inc./NASA Johnson Space Center) Wang, Lui Ph.D. (NASA Johnson Space Center)		
Grant/Contract No.:	NCC 9-58-HFP04503		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	Imaging technologies are key to diagnosis and treatment of medical conditions, which astronauts on an exploration mission might encounter and in research activities to characterize and understand the adaptations to micro- and partial gravity environments. A key limitation of currently available imaging capabilities is the complexity and operator dependency of the procedures to acquire high quality results. Currently, two imaging procedures critical to space medicine and research, ultrasound and optical coherence tomography (OCT), are performed on the International Space Station (ISS) by astronauts with the assistance of real-time communication with experts on the ground using a procedure called remote guidance. With this methodology astronauts have acquired diagnostic and research quality data that are central to our understanding of the physiological consequences of weightlessness, including altered cardiac function, muscle atrophy, and the newly-described vision impairment and intracranial pressure (VIIP) syndrome. However, with time delay in communications inherent in exploration missions while traveling great distances from Earth, remote guidance will no longer be a practical approach, particularly when one-way transmissions may take up to 10 minutes. To fill this gap, we propose the development of advanced audio-visual training modules, a form of “just-in-time” (JIT) training, to address medically necessary and research-relevant issues. Building on our extensive experience with remote guidance of ISS astronauts and previously demonstrated successful work with just-in-time training, we will employ an augmented reality system (Hololens), three-dimensional graphics of relevant anatomy, step-by-step audio instruction, reference adequate and inadequate images, and troubleshooting guides. The ability of untrained sonographers and OCT operators to acquire diagnostically adequate, high-quality images will be evaluated by expert reviewers and compared to current JIT techniques for quality and time efficiency. At the completion of this project we will deliver a JIT training system that can improve quality of medical procedures performed during spaceflight or when performing unfamiliar procedures on Earth.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2016.
Bibliography Type:	Description: (Last Updated:)