Fiscal Year:	FY 2015	**Task Last Updated:**	FY 06/18/2015
PI Name:	Strangman, Gary E Ph.D.		
Project Title:	Sleep Electroencephalography and Near-Infrared Spectroscopy Measurements for Spaceflight and Analogs		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:	NSBRI--Neurobehavioral and Psychosocial Factors Team		
Joint Agency Name:		**TechPort:**	No
Human Research Program Elements:	(1) **HFBP**:Human Factors & Behavioral Performance (IRP Rev H)		
Human Research Program Risks:	(1) **Bmed**:Risk of Adverse Behavioral Conditions and Psychiatric Disorders (2) **Sleep**:Risk of Performance Decrements and Adverse Health Outcomes Resulting from Sleep Loss, Circadian Desynchronization, and Work Overload (IRP Rev F)		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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PI Web Page:			
City:	Charlestown	**State:**	MA
Zip Code:	02129-2020	**Congressional District:**	7
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	2014-15 HERO NNJ14ZSA001N-Crew Health (FLAGSHIP & NSBRI)
Start Date:	08/01/2015	**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: End date changed to 5/31/2017 per NSBRI (Ed., 8/30/16) NOTE: End date changed to 12/31/2016 per NSBRI (Ed., 5/24/16) NOTE: Period of performance corrected to 8/1/2015-7/31/2016, per NSBRI (Ed., 4/14/16) NOTE: End date change to 5/31/2017 per NSBRI (Ed., 9/16/15) NOTE: Change in Period of Performance to 8/1/2015-7/31/2016 (formerly 6/1/15-5/31/16), per NSBRI (Ed., 7/8/15)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Zhang, Quan Ph.D. (Massachusetts General Hospital)		
Grant/Contract No.:	NCC 9-58-NBPF04202		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	Spaceflight is known to reduce sleep duration and negatively affect sleep quality. While actigraphy can be used to identify such sleep changes, the underlying physiology or causes of such disturbances remain to be understood. Brain assessments can be useful in this context, for sleep staging, sleep quality assessments, and identification of alterations in cerebral functioning related to sleep disturbance. However, the Earth-standard technologies for brain imaging—CT (computed tomography), MRI (magnetic resonance imaging), PET (positron emission tomography)—are not suitable for spaceflight. Electroencephalography (EEG) and near-infrared spectroscopy (NIRS) are amenable to packaging in small, lightweight and low-power devices. Importantly, they provide complementary electrophysiological and hemodynamic windows into brain physiology. Dr. Strangman has been developing the NINscan series of devices for mobile (including 24-hour) brain assessment. The most recent such device, NINscan-M, is a multi-use brain imaging system that includes a 64-channel NIRS imaging system and has the potential to support 8-channel EEG, as well as device-chaining to enable 16 or more channels of EEG, plus the potential to support other analog and/or digital sensor inputs. Dr. Strangman has also recently completed a software platform project, called SpaceMED, which can provide integrated data collection, management, and real-time data viewing from biomedical and environmental devices. In this project, we will enhance our current NINscan-M device to create NINscan-SE (a version specialized for sleep and EEG). NINscan-SE will provide up to 8-channel EEG alongside the 64-channel NIRS imaging, require minimal training for use, and allow up to 4 additional sensors considered key for sleep research and complementary to those available in spaceflight and the various analog environments. In addition, the new NINscan-SE device will be made compatible with SpaceMED and NASA's Exploration Medical System Demonstration (EMSD) middleware project, to provide data management and real-time monitoring capabilities. We will also consolidate a suite of data analysis tools to be used with the potentially large NINscan-SE datasets generated by sleep applications. This suite will facilitate data format conversions, as well as standard research and clinical EEG data analysis on the NINscan-SE datasets. Finally, we will collaborate with a research team scheduled to conduct Human Exploration Research Analog (HERA) experiments to test the NINscan-SE system in an operational environment. This effort will provide a device plus software tools that will significantly advance the brain- and sleep-assessment capabilities for spaceflight and Earth-based analogs.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	This effort will provide a device plus software tools that will significantly advance the brain- and sleep-assessment capabilities for spaceflight and Earth-based analogs.
Task Progress:	New project for FY2015.
Bibliography Type:	Description: (Last Updated: 08/05/2022)