Task Book Report Generated on: 03/29/2024

Fiscal Verie				
Project Title: Sleep Electroeneephalography and Near-Infrared Spacetoscopy Measurements for Spaceflight and Analogs  Program/Discipline:  Program/Discipline:  Program/Discipline:  Program/Discipline:  Program/Discipline:  NSBRI-Neurobehavioral and Psychosocial Factors Team  Intra Research Program IElasics  (I) HFBP-Haman Factors & Behavioral Conditions and Psychiatric Disorders  Space Biology Flement:  Mone  Space Biology Flement:  None  PE andires  Part FY  Propertification Name:  PE andires  Backetor's Flement of Psychiatry  Per Jement of Psychiatry  Propertification Name:  Project Type:  Space Biology Revision of Psychiatry  Project Type:  Project Type:  Project Type			Task Last Updated:	FY 06/18/2015
Division Name:   Human Research   Program/Divisipline:   Program/Divisipline:   Research   Program/Divisipline:   Research   Resea		Strangman, Gary E Ph.D.		
Program/Discipline:	Project Title:	Sleep Electroencephalography and Near-Infrared Spectroscopy Measurements for Spaceflight and Analogs		
Program/Discipline-  Element Subdiscipline-  More   Tech Porr   No	Division Name:	Human Research		
Sements Notificipline:   No.   No.   No.	Program/Discipline:			
Human Research Program Elements (I) HBPH Imman Factors & Behavioral Performance (IRP Rev II) Human Research Program Risks: (I) BMedt Risk of Adverse Cognitive or Behavioral Conditions and Psychiatric Disorders Space Biology Cross-Element		NSBRINeurobehavioral and Psychosocial Factors Team		
Human Research Program Risks: (1) BMcd-Risk of Adverse Cognitive or Behavioral Conditions and Psychiatric Disorders  Space Biology Cross-Element  Space Biology Cross-Element  Space Biology Cross-Element  Space Biology Special Category: None  PI Email:	Joint Agency Name:		TechPort:	No
Space Biology Cross-Element Space Biology Cross-Element Space Biology Cross-Element Space Biology Special Category: None PI Email: Strang/framt meh.harvard.edu Fax: FY PI Organization Type: NON-PROFIT PI Address 1: Deputrment of Psychiatry PI Address 2: 149 13th Street, Suite 2651 PI Web Page: City: City: Chadesown City: City: Chadesown City: Cit	<b>Human Research Program Elements:</b>	(1) <b>HFBP</b> :Human Factors & Behavio	oral Performance (IRP Rev H)	
Space Biology Cross-Element   Disciplines   None   Space Biology Special Category:   None   Space Biology Special Category:   None   Space Biology Special Category:   None   Strang@mmr.mgh.harvard.edu   Fax:   FY	Human Research Program Risks:	(1) BMed:Risk of Adverse Cognitive or Behavioral Conditions and Psychiatric Disorders		
Discipline:   None   Space Biology Special Category:   None	Space Biology Element:	None		
Pl Email:   Strang-Zimmr.msh harvard.edu   Fax: FY		None		
Pl Organization Type:   NON-PROFIT   Phone: 617-724-0662     Organization Name:   Massachusetts General Hospital     Pl Address 1:   Department of Psychiatry     Pl Address 2:   149 13th Street, Suite 2651     Pl Web Page:	Space Biology Special Category:	None		
Organization Name:         Massachusetts General Hospital           PI Address 1:         Department of Psychiatry           PI Address 2:         149 13th Street, Suite 2651           PI Web Page:         City:         Charlestown         State:         MA           Zip Code:         02129-2020         Congressional District:         7           Comments:         Froject Type:         GROUND         Solicitation / Funding Source:         2014-15 HERO NN114ZSA001N-Crew Health (FLAGSHIP & NSBR)           Start Date:         08/01/2015         End Date:         05/31/2017           No. of PhD Candidates:         No. of Master' Degrees:         No. of Master' Degrees:           No. of Master's Candidates:         No. of Bachelor's Degrees:         No. of Bachelor's Degrees:           No. of Bachelor's Candidates:         Monitoring Center:         NSBRI           Contact Monitor:         Contact Phone:         Contact Phone:           Contact Email:         Flight Program:           Flight Program:         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., 8/30/16) NOTE: End date changed to 12/31/2016 per NSBRI (Ed., 9/16/15)           Flight Assignment:         NOTE: End date change to 5/31/2017 per NSBRI (Ed., 9/16/15)           Key Personnel Changes/Previous PI:	PI Email:	strang@nmr.mgh.harvard.edu	Fax:	FY
Pl Address 1:   Department of Psychiatry   149 13th Street, Suite 2651   149 13th Street, Suit	PI Organization Type:	NON-PROFIT	Phone:	617-724-0662
PI Address 2:	Organization Name:	Massachusetts General Hospital		
PI Web Page:   City:   Charlestown   State: MA	PI Address 1:	Department of Psychiatry		
City:         Charlestown         State:         MA           Zip Code:         02129-2020         Congressional District:         7           Comments:         Project Type:         GROUND         Solicitation / Funding Source: Health (FLAGSHIP & NSBRI)           Start Date:         08/01/2015         End Date: 05/31/2017         05/31/2017           No. of PbD Condidates:         No. of PhD Degrees:         No. of PhD Degrees:           No. of Master's Candidates:         No. of Master' Degrees:         No. of Bachelor's Degrees:           No. of Bachelor's Candidates:         No. of Master's Candidates:         No. of Bachelor's Degrees:           No. of Bachelor's Candidates:         No. of Bachelor's Degrees:      <	PI Address 2:	149 13th Street, Suite 2651		
Zip Code:	PI Web Page:			
Comments:  Project Type: GROUND Solicitation / Funding Source: Health (FLAGSHIP & NSBRI)  Start Date: 08/01/2015 End Date: 05/31/2017  No. of Post Does: 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: No. of Bachelor's NSBRI  Contact Monitor: Contact Phone:  Contact Email:  Flight Program:  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., 8/30/16) 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.:	City:	Charlestown	State:	MA
Project Type: GROUND Solicitation / Funding Source: 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 Master' Degrees: No. of Bachelor's Degrees: No. of Master's Candidates: No. of Master's Candidates: No. of Bachelor's Contact Monitoric Center: NSBRI  Contact Monitor: Contact Phone:  Contact Email: Flight Program:  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., 8/30/16) 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.:	Zip Code:	02129-2020	Congressional District:	7
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	Grant/Contract No.:	NCC 9-58-NBPF04202		
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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.

**Task Description:** 

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: 03/25/2024)