Fiscal Year:	FY 2024	**Task Last Updated:**	FY 12/14/2023
PI Name:	Pereira, Talmo Ph.D.		
Project Title:	Automated Deep Learning for Spaceflight Rodent Behavior Quantification and Health Phenotyping		
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) **BMed**:Risk of Adverse Cognitive or Behavioral Conditions and Psychiatric Disorders		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Zip Code:	92037-1002	**Congressional District:**	50
Comments:			
Project Type:		**Solicitation / Funding Source:**	03-OBPR-02
Start Date:	11/15/2023	**End Date:**	11/14/2024
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):	Saunders, Lauren Ph.D. (NASA Ames Research Center) Scott, Ryan M.A. (NASA Ames Research Center)		
Grant/Contract No.:	80NSSC24K0346		
Performance Goal No.:			
Performance Goal Text:			
	Spaceflight isolation and confinement increase the risk of behavioral health impairments and pose major hurdles for crewed deep space missions. To reduce these risks, further research is needed on the effects of spaceflight on psychiatric and behavioral health in order to develop systems for monitoring crew health and performance. This proposal aims to address this gap by applying artificial intelligence (AI)-based technology to enable automated behavioral quantification and health monitoring from spaceflight videos. Powered by state-of-the-art deep learning and computer vision technology, the proposed platform will leverage previous work on automated markerless motion capture (i.e., whole body movement tracking from video) and behavioral phenotyping (i.e., detection of behavior events such as walking or eating). This technology has been used for video-based behavioral analysis in insects, fish, plants, rodents, and humans, including for applications such as health monitoring in animal studies of cancer and neurodegeneration.		

Task Description:	The proposed work will demonstrate the feasibility of using this technology to automate spaceflight behavioral health monitoring by applying it to previously collected videos from the NASA Rodent Research-1 mission. These have been painstakingly manually annotated by human expert observers with frame-by-frame labels of behaviors (e.g., feeding, grooming) to enable quantitative analysis of rodent behavior during spaceflight. This laborious effort was necessary due to the challenging imaging conditions inherent in spaceflight videography – but which are overcome through the use of AI in the proposed work. By developing a platform capable of automating this process, we will establish the foundation for future systems that will be able to monitor behavioral health in research missions – automatically and in real-time, opening the door to interventional studies aimed at maintaining positive behavioral health conditions. Future work may adapt this technology for behavioral monitoring in humans to detect and mitigate the risks of crewed deep space missions.
Rationale for HRP Directed Research:	
Research Impact/Earth Benefits:	
Task Progress:	New Project for FY2024
Bibliography Type:	Description: (Last Updated:)