Fiscal Year:	FY 2022	Task Last Updated:	FY 12/07/2022
PI Name:	Wood, Scott J. Ph.D.		
Project Title:	Manual Crew Override of Vehicle Landings Following G-Transitions		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline Element/Subdiscipline:			
Joint Agency Name:	TechPor	t:	No
Human Research Program Elements:	(1) <b>HHC</b> :Human Health Countermeasures		
Human Research Program Risks:	None		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Zip Code:	77058	Congressional District:	36
Comments:	NOTE: PI returned to NASA JSC in January 2017. PI was at Azusa Pacific University from August 2013 – January 2017; prior to August 2013, PI was at NASA JSC.		
Project Type:	Flight Solici	tation / Funding Source:	Directed Research
Start Date:	04/04/2022	End Date:	09/30/2032
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		NASA JSC
Contact Monitor:	Brocato, Becky Contact Phone:		
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Flight Program:	ISS		
Flight Assignment:			
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Barratt, Michael M.D. (NASA Johnson Space Center ) Duda, Kevin Ph.D. (Draper Laboratory ) Heineman, Raymond M.S. (NASA Johnson Space Center ) Moore, Steven Ph.D. (Central Queensland University, Rockhampton, Australia ) Reschke, Millard Ph.D. (NASA Johnson Space Center ) Wheelock, Douglas M.S. (NASA Johnson Space Center ) Young, Millennia Ph.D. (NASA Johnson Space Center ) Bishop, Michael M.S. (NASA Johnson Space Center )		
Grant/Contract No.:	Directed Research		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	Namua control onling exploration spaceting robusts of our planned autonnated spervisory control and unplanned crew override. This crew override capability is critical to enable overall mission success during landing contingencies. However, the introduction of manual override capabilities must be implemented to enable crews to mitigate risks introduced by human error. Adaptive changes in the sensorimotor system can manifest during G-transitions as spatial disorientation. While training and landing aids enable successful landing through disorientation, these adaptive changes may increase cognitive demand that need to be accounted for in the manual control strategy. It is important to characterize these effects as soon as possible following the G-transition. Therefore, during this study, we will examine two types of piloting tasks following International Space Station (ISS) missions: an actual T-38 flight performed at the rally airport and a simulated lunar landing using a six degree-of-freedom (6DOF) motion-base. The motion base simulation will be implemented both in the laboratory at the NASA Johnson Space Center (JSC) and at the NASA Kennedy Space Center (KSC) and will be available within hours following return from commercial crew landings. The primary goals of this study are (1) to understand the impact of spaceflight on crew ability to perform manual crew override proficiency, and (3) compare performance during late in-flight "just-in-time" training with early post-flight crew performance. The impact of spaceflight on piloting capability will be assessed from pre- versus post-flight changes in rewmembers assigned to either short duration (< 30 day) or long duration (-6-month) missions to the ISS. Individual differences in post-flight vestibular and cognitive changes include motion sickness reports, measures of tilt motion perception accuracy and precision, and dual task tracking. During the T-38 flights, pilots will be tasked to take over controls and set up the final approach for landing t
Rationale for HRP Directed Research:	This research is directed because it contains highly constrained research. This flight study addresses the sensorimotor research emphasis stated in the Human Research Program (HRP) Integrated Research Plan titled "Risk of Altered Sensorimotor/Vestibular Function Impacting Critical Mission Tasks". One gap associated with this risk (SM-102) is to "characterize the effects of short and long-duration weightlessness on manual control after G-transitions." This research gap led to the solicitation of a manual control study conducted before and after long duration flights on the ISS to map changes in sensorimotor function to manual control decrements. Unfortunately, these results (Moore et al., 2019) were limited due to testing delays related to time required for direct returns from Kazakhstan, with the initial measurements conducted more than 20 hr following landing. The approach of this investigation is to leverage the commercial crew landings in the US to obtain measurements as early as possible. While the Moore study used a T-38 X-plane simulation, we will obtain measures during actual T-38 flights. We will also add a lunar landing simulation based on the current concept of operations for the HLS. Further refinements are also proposed in the sensorimotor and cognitive test battery based on the previous study.
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2022.
Bibliography Type:	Description: (Last Updated: 06/03/2025)