

<b>Fiscal Year:</b>	FY 2015	<b>Task Last Updated:</b>	FY 08/19/2015
<b>PI Name:</b>	Norcross, Jason M.S.		
<b>Project Title:</b>	Metabolic Assessment of Suited Mobility using Functional Tasks		
<b>Division Name:</b>	Human Research		
<b>Program/Discipline:</b>			
<b>Program/Discipline--Element/Subdiscipline:</b>	HUMAN RESEARCH--Biomedical countermeasures		
<b>Joint Agency Name:</b>	<b>TechPort:</b>	No	
<b>Human Research Program Elements:</b>	(1) <b>HHC</b> :Human Health Countermeasures		
<b>Human Research Program Risks:</b>	(1) <b>EVA</b> :Risk of Injury and Compromised Performance due to EVA Operations (IRP Rev F)		
<b>Space Biology Element:</b>	None		
<b>Space Biology Cross-Element Discipline:</b>	None		
<b>Space Biology Special Category:</b>	None		
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<b>Zip Code:</b>	77058-3711	<b>Congressional District:</b>	36
<b>Comments:</b>			
<b>Project Type:</b>	GROUND	<b>Solicitation / Funding Source:</b>	2013 HERO NNJ13ZSA002N-Crew Health OMNIBUS
<b>Start Date:</b>	09/30/2014	<b>End Date:</b>	09/30/2015
<b>No. of Post Docs:</b>		<b>No. of PhD Degrees:</b>	
<b>No. of PhD Candidates:</b>		<b>No. of Master' Degrees:</b>	
<b>No. of Master's Candidates:</b>		<b>No. of Bachelor's Degrees:</b>	
<b>No. of Bachelor's Candidates:</b>	1	<b>Monitoring Center:</b>	NASA JSC
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<b>Flight Program:</b>			
<b>Flight Assignment:</b>			
<b>Key Personnel Changes/Previous PI:</b>			
<b>COI Name (Institution):</b>	McFarland, Shane M.S. ( NASA Johnson Space Center )		
<b>Grant/Contract No.:</b>	Internal Project		
<b>Performance Goal No.:</b>			
<b>Performance Goal Text:</b>			
<b>Task Description:</b>	<p>Existing methods for evaluating extravehicular activity (EVA) suit mobility and verifying requirements have typically relied on measurement techniques such as motion capture and joint torque measurements looking at several isolated joint range of motions. These methods are straightforward and can be clearly defined, but they have little to do with how well a crewmember can actually perform in an EVA suit. EVA tasks often rely on the movement of several joints concurrently to complete the task. This proposal seeks to evaluate alternate methods of evaluating suited mobility through measurement of metabolic rate and time to completion of functional tasks.</p> <p>The product of this research will be inputs to suit mobility requirements, possibly new suit requirements based on metabolic assessment of functional task, and risk characterization inputs for the Integrated Research Plan (IRP) gap EVA 7.</p>		

Traditional joint torque and isolated joint range of motion measurements may be quantifiable and measurable, but they do not provide information that describes how the EVA suit as a whole allows the crewmember to function. We propose that by focusing on crewmember physiological performance of functional tasks, we can define metrics that verify that a suit is meeting suit mobility requirements.

**Rationale for HRP Directed Research:**

**Research Impact/Earth Benefits:**

An end result of this research may be a functional requirement and verification process for spacesuit mobility enabling more effective exploration extravehicular activities (EVAs).

**Task Progress:**

Data collection on this research task was completed in June 2015. For the first time, we now have repeated measures of metabolic cost on six subjects performing functional tasks in 3 different prototype spacesuits. This data will be used to compare performance across spacesuits, task, and subjects. The first cut at data analysis is underway with continuing versions after various internal stakeholder reviews. The plan for results is to present at the 2016 Human Research Program along with another national conferences and to prepare and submit a journal manuscript as well.

**Bibliography Type:**

Description: (Last Updated: 01/06/2022)

**Abstracts for Journals and Proceedings**

Norcross JR, McFarland SM. "Moving Towards Metabolic Assessment of Suited Mobility Using Functional Tasks." Presented at the 2015 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 13-15, 2015. 2015 NASA Human Research Program Investigators' Workshop, Galveston, TX, January 13-15, 2015. , Jan-2015