Fiscal Year:	FY 2015	**Task Last Updated:**	FY 07/17/2014
PI Name:	Somers, Jeffrey M.S.		
Project Title:	ATD (Anthropomorphic Test Dummy) Injury Metric Development		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:	HUMAN RESEARCH--Space Human Factors Engineering		
Joint Agency Name:		**TechPort:**	Yes
Human Research Program Elements:	(1) **HFBP**:Human Factors & Behavioral Performance (IRP Rev H)		
Human Research Program Risks:	(1) **Dynamic Loads**:Risk of Injury from Dynamic Loads		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
PI Email:	jeff.somers@nasa.gov	**Fax:**	FY
PI Organization Type:	NASA CENTER	**Phone:**	281-483-6010
Organization Name:	KBR/NASA Johnson Space Center		
PI Address 1:	2400 NASA Parklway		
PI Address 2:	MAILCODE: WYLE/HAC/37C		
PI Web Page:			
City:	Houston	**State:**	TX
Zip Code:	77058	**Congressional District:**	36
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	Directed Research
Start Date:	07/01/2015	**End Date:**	09/30/2017
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:**	NASA JSC
Contact Monitor:	Whitmore, Mihriban	**Contact Phone:**	281-244-1004
Contact Email:	mihriban.whitmore-1@nasa.gov		
Flight Program:			
Flight Assignment:	NOTE: Change to start date per E. Connell/SHFH/HRP (Ed., 2/3/16) NOTE: Added "Development" to title, per E. Connell/SHFH/HRP (Ed., 10/7/15) NOTE: Change in title to "ATD Injury Metric" from "THOR Injury Metric Development" per E. Connell/SHFH HRP (Ed., 8/19/15) NOTE: Period of performance changed to 5/1/2015-9/30/2017 (previously 7/3/2014-10/31/2016) due to delayted start, per E. Connell/JSC SHFH element (Ed., 4/15/2015)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Gernhardt, Michael Ph.D. (NASA Johnson Space Center)		
Grant/Contract No.:	Directed Research		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	Currently, the Test Device for Human Occupant Restraint (THOR) is the most biofidelic Anthropomorphic Test Device (ATD or crash test dummy) available. This ATD is the best solution for future occupant protection standards and requirements; however, the THOR responses are not well correlated to low injury risk. Since automotive research is directed at preventing severe injuries in very low probability events, and because NASA vehicles will land every time, a lower risk of injury is needed. Because NASA requires this lower level of injury risk, new injury risk functions for the THOR are needed. Specific aims are as follows: 1. Identify appropriate datasets for THOR comparison 2. Test THOR in same conditions as historical testing 3. Use historical human data to establish tolerance and injury risk focusing on lateral responses and sex differences 4. Use Bayesian analysis combined with survival analysis along with human tolerance to estimate injury risk. Use results of prior data mining and existing literature as prior distribution 5. Develop new Injury Assessment Reference Values (IARVs) based on the new statistical analysis Historical human data will be selected from the Wright-Patterson Collaborative Biodynamics Network (CBDN) and National Highway Traffic Safety Administration (NHTSA) databases. The data will be selected based on loading dynamics and subject demographics. Once these data are selected, the THOR Anthropomorphic Test Device (ATD) will be tested in identical conditions. A Bayesian analysis along with survival analysis will be used to relate the resulting THOR responses to improve injury risk predictions. The results of the Occupant Protection (OP) Data Mining and Modeling Task will be used as prior distributions.
Rationale for HRP Directed Research:	This task meets the criteria for a Directed Task due to schedule constraints and the requirement of using the same test facilities used in the original human testing. Based on the approved Path to Risk Reduction, this task is required to be completed by the end of FY17 in order to meet the Orion schedule for EM-2. Because of this accelerated schedule, there is insufficient time to solicit this work. In addition, the testing in this task must be conducted to best replicate the original human test conditions. Because of this, testing will need to be conducted at the original test facility, excluding the ability to solicit the work.
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2015. (Ed. Note 4/15/2015: change in period of performance per SHFH element)
Bibliography Type:	Description: (Last Updated: 12/29/2020)