

<b>Fiscal Year:</b>	FY 2010	<b>Task Last Updated:</b>	FY 03/15/2011
<b>PI Name:</b>	Sandor, Aniko Ph.D.		
<b>Project Title:</b>	Displays and Controls Interfaces		
<b>Division Name:</b>	Human Research		
<b>Program/Discipline:</b>	HUMAN RESEARCH		
<b>Program/Discipline--Element/Subdiscipline:</b>	HUMAN RESEARCH--Space Human Factors Engineering		
<b>Joint Agency Name:</b>	<b>TechPort:</b>	No	
<b>Human Research Program Elements:</b>	(1) <b>SHFH</b> :Space Human Factors & Habitability (archival in 2017)		
<b>Human Research Program Risks:</b>	(1) <b>HSIA</b> :Risk of Adverse Outcomes Due to Inadequate Human Systems Integration Architecture		
<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	<b>Congressional District:</b>	22
<b>Comments:</b>			
<b>Project Type:</b>	Ground	<b>Solicitation / Funding Source:</b>	Directed Research
<b>Start Date:</b>	08/30/2010	<b>End Date:</b>	09/30/2012
<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>	<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>	Archer, Ronald ( Lockheed-Martin/ NASA Johnson Space Center )		
<b>Grant/Contract No.:</b>	Directed Research		
<b>Performance Goal No.:</b>			
<b>Performance Goal Text:</b>	<p>Future exploration missions will require much greater crew autonomy, particularly for suited operations. Crews will be extremely dependent on the information available within the spacesuit for monitoring their health and suit resources, and for performing tasks. Suit data such as battery power, oxygen remaining, crew biomedical data, procedure and task information, and navigational data are all needed by EVA crewmembers to successfully complete their mission. If informational displays are poorly designed, or not easily accessible, crews will not have access to critical data, putting their mission and personal safety at risk. Suits pose special challenges in terms of information display and interaction, given limited display real estate, and gloves and helmets compromise vision, hearing, and touch. The methods by which information is delivered need to support, not hinder, task completion. Current EVA crewmembers depend heavily on communication with the ground for completion of their tasks. Future missions to more distant destinations will require a much different approach to ensure crew independence.</p>		

<b>Task Description:</b>	<p>This line of research will focus on: 1) special techniques for formatting data delivered in a spacesuit, and 2) mechanisms for delivering and interacting with that data, given suit constraints. Researchers will first identify the different classes of information needed by the suited crewmember, then determine the modality and format of the data required for each class, and finally investigate the best technology solution to provide the data. Researchers will work with EVA Physiology, Systems and Performance (EPSP) researchers and developers using the metabolic data display issue as a case study. Various information designs and technology solutions will be empirically compared and requirements developed.</p> <p>Methods to be used consist of the following: Task analysis, to identify and understand the suited tasks to be performed, including interviews with EVA astronauts to understand suited information needs and issues from the astronauts perspective; literature reviews on different information display techniques for different classes of data (e.g., procedures, alarms, metabolic data) and available technologies (e.g., Head Mounted Displays (HMDs), cuff checklists, voice); and usability testing and experimental studies to assess human performance with the proposed designs using metrics such as error rates, task completion times, verbal protocol comments, and questionnaire responses, ratings, and rankings. Standard parametric and non-parametric statistical methods will be used for data analysis. Multiple methods, metrics, and information developed as part of the Information Presentation (2008-2010) DRP will be leveraged in this project, including information on labels, alarms, cursor control devices, HMDs, and health and status displays. Products developed as part of the Usability (2008-2009 )Directed Research Project will be validated as part of this new DRP, including methods and metrics for error rates, legibility, and consistency.</p>
<b>Rationale for HRP Directed Research:</b>	This research is directed because it contains highly constrained research, which requires focused and constrained data gathering and analysis that is more appropriately obtained through a non-competitive proposal.
<b>Research Impact/Earth Benefits:</b>	
<b>Task Progress:</b>	New project for FY2010.
<b>Bibliography Type:</b>	Description: (Last Updated: 03/03/2016)