Fiscal Year:	FY 2014	**Task Last Updated:**	FY 07/31/2015
PI Name:	Thompson, William M.S.		
Project Title:	Flexible Ultrasound System		
Division Name:	Human Research		
Program/Discipline:			
Program/Discipline--Element/Subdiscipline:			
Joint Agency Name:		**TechPort:**	Yes
Human Research Program Elements:	(1) **ExMC**:Exploration Medical Capabilities		
Human Research Program Risks:	(1) **Medical Conditions**:Risk of Adverse Health Outcomes and Decrements in Performance Due to Medical Conditions that occur in Mission, as well as Long Term Health Outcomes Due to Mission Exposures		
Space Biology Element:	None		
Space Biology Cross-Element Discipline:	None		
Space Biology Special Category:	None		
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Zip Code:	44135	**Congressional District:**	16
Comments:			
Project Type:	GROUND	**Solicitation / Funding Source:**	Directed Research
Start Date:	06/17/2014	**End Date:**	06/30/2017
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:	Antonsen, Erik	**Contact Phone:**	281.483.4961
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Flight Program:			
Flight Assignment:	NOTE: Changed end date to 6/30/2017 (originally 8/31/2016) per discussion with PI in Jan 2017 (Ed., 3/20/17)		
Key Personnel Changes/Previous PI:			
COI Name (Institution):	Zoldak, John (Zin Technologies, Inc.)		
Grant/Contract No.:	Directed Research		
Performance Goal No.:			
Performance Goal Text:			

Task Description:	The Flexible Ultrasound System (FUS) is a technology development project that addresses NASA's gap in non-invasive diagnostic capability for imaging of internal body parts on future Exploration missions. Ultrasound will be the "workhorse" internal imaging modality on such missions due to its portability, low power consumption, and avoidance of the use of ionizing radiation. State of the art clinical ultrasound units offer excellent and ever-expanding diagnostic capabilities, but they are difficult to adapt toward accommodating novel custom scans and therapeutic algorithms developed by NASA and its research partners. The FUS-GDU (ground demonstration unit) is an effort to address this gap by introducing advanced research level system access into a clinical diagnostic scanner, while simultaneously expanding the system's functionality with additional hardware capabilities. Aims: 1. To develop an open architecture ultrasound device that would provide ultrasound imaging and therapies simultaneously with a single integrated system. 2. To provide a higher degree of control over the scanning parameters and greater access to the raw ultrasound data, thereby facilitating advanced algorithm development. 3. To identify a path to qualifying medical ultrasound systems for deep space exploration missions by functioning more readily with radiation-tolerant processes. Methods: The FUS is based on a clinical scanner, the GE Vivid-e95 with modifications to allow researchers to develop advanced algorithms. There are two separately partitioned hard drives and interfaces with which an FUS user can perform ultrasound scans. The clinical user can scan with the FUS in the same manner as a regular Vivid-e95 machine, with all of its FDA (Food & Drug Administration) clearances intact. Research users must boot the machine into a special research mode with a dongle to invoke the applications programming interface (API) for communicating between investigator-developed software and the lower level hardware. Software development kits (SDK) provide both Matlab and C++ programming capability for investigators using FUS. Specially developed external hardware for the FUS permits the accommodation of novel ultrasound probes, higher power output level than traditional clinical scanning, and the use of a dual probe transmit/receive configuration. Future directions: The FUS ground demonstration units will be delivered to NASA in the Spring of 2016. National Space Biomedical Research Institute (NSBRI)-funded ultrasound researchers will then begin integrating their novel ultrasound modalities onto the FUS per the FUS Usage Plan (GRC-FUS-PLN-003). Additional developers for the FUS are being sought, per the FUS Advocacy Plan (FUS-PLN-004), through potential research announcements, SBIR (Small Business Innovation Research) funding or Space Act Agreements.
Rationale for HRP Directed Research:	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
Research Impact/Earth Benefits:	
Task Progress:	New project for FY2014. [NOTE: added to Task Book when received information in July 2015]
Bibliography Type:	Description: (Last Updated:)