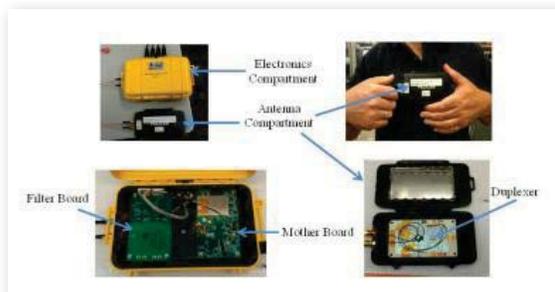


Biomedical Monitoring By A Novel Noncontact Radio Frequency Technology Project

Center Innovation Fund: KSC CIF Program
Space Technology Mission Directorate (STMD)

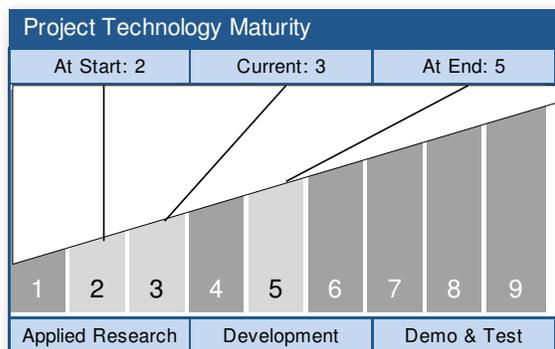
National Aeronautics and
Space Administration



ABSTRACT

Design, develop and advance technology for a near-instantaneous, non-invasive radio frequency-based method for measuring heart and lung function without invasive probes, cuffs, electrodes and without patient contact.

The Prototype Radiofrequency Unit Hardware



Technology Area: Human Health & Performance TA06.3 (Primary)
Human Health, Life Support & Habitation Systems
TA06 (Secondary)

ANTICIPATED BENEFITS

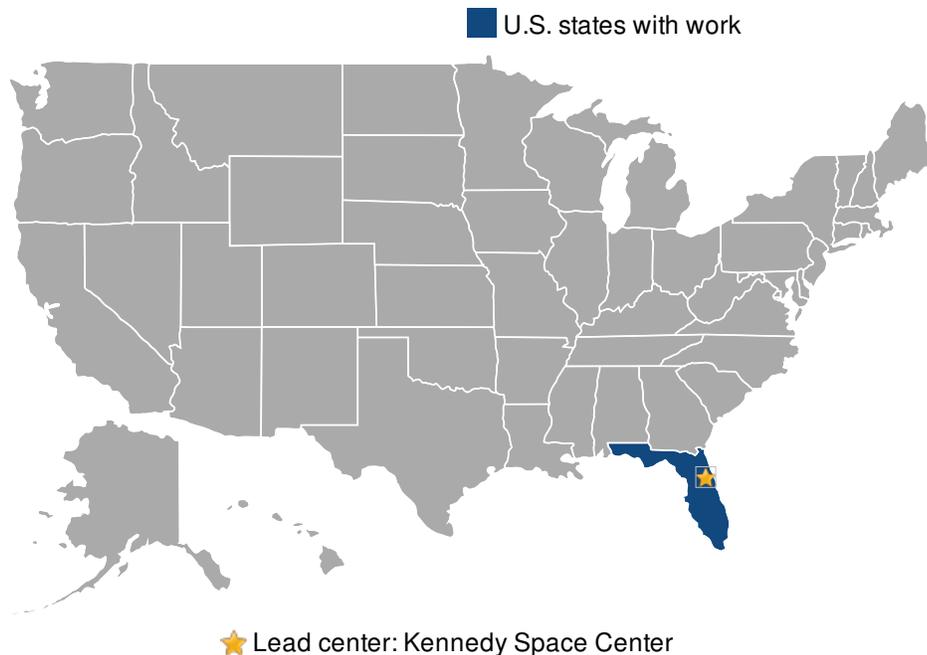
To NASA funded missions:

NASA: Aboard the ISS, noncontact monitoring of heart rate, cardiac output and respiration is needed in both exercise and EVA. At KSC, monitoring is needed in stressful tasks, i.e. firefighting and SCAPE Department of Defense: Health monitoring of troops in combat
Clinical Emergency Medicine: Immediate assessment of shock NASA, DoD, NIH, many health care industry applications.

To other government agencies:

This technology will be applicable in numerous situations such as for immediate...

Read more on the last page.



Contributing Partners

DoD, Department of NAVY

DETAILED DESCRIPTION

This technology will be a quantum advance in cardiac monitoring and will be applicable in numerous situations such as for immediate assessment and monitoring of patients in life-threatening emergencies, during environmental stressors, and in performance of hazardous occupational tasks. For NASA these benefits will apply to both flight and ground personnel. For the military this device can be used during actual combat to alert medical personnel when a service member is wounded and to monitor his/her condition even before help is provided thus lowering medical evaluation times. This can also be used to aid medical personnel allowing them to prioritize triage and evacuation in multiple casualty contingencies.

MANAGEMENT

Program Executive:
John Falker

Program Manager:
Nancy Zeitlin

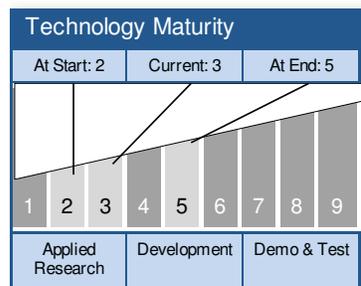
Project Managers:
David Bush David Tipton

Principal Investigator:
David Tipton

Co-Investigators:
Kenneth Cohen Robert Friedman

TECHNOLOGY DETAILS

Radiofrequency Impedance Interrogation (RFII)



TECHNOLOGY DESCRIPTION

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- This technology is categorized as a hardware system for other applications
- Technology Area
 - TA06.3 Human Health & Performance (Primary)
 - TA06 Human Health, Life Support & Habitation Systems (Secondary)
 - TA07 Human Exploration Destination Systems (Additional)

For NASA these benefits will apply to both flight and ground personnel. For the military this device can be used during actual combat to alert medical personnel when a service member is wounded and to monitor his/her condition even before help is provided thus lowering medical evaluation times. This can also be used to aid medical personnel allowing them to prioritize triage and evacuation in multiple casualty contingencies. See published AmericaSpace article, "NASA Chief Technologist Visits NASA's Space Life Sciences Lab" August 2, 2012 (<http://www.americaspace.com/?p=23488>) and KSC Spaceport News article, "New diagnostic tools may benefit patients in space." Vol. 53, No. 6, page 11, Mar 22, 2013...

TECHNOLOGY DETAILS

CAPABILITIES PROVIDED (CONT'D)

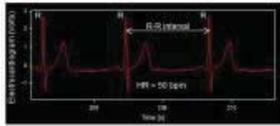
(http://www.nasa.gov/centers/kennedy/pdf/736478main_mar22-2013.pdf).

POTENTIAL APPLICATIONS

This technology will be applicable in numerous situations such as for immediate assessment and monitoring of patients in life-threatening emergencies, during environmental stressors, and in performance of hazardous occupational tasks. For NASA these benefits will apply to both flight and ground personnel. For the military this device can be used during actual combat to alert medical personnel when a service member is wounded and to monitor his/her condition even before help is provided thus lowering medical evaluation times. This can also be used to aid medical personnel allowing them to prioritize triage and evacuation in multiple casualty contingencies.



IMAGE GALLERY

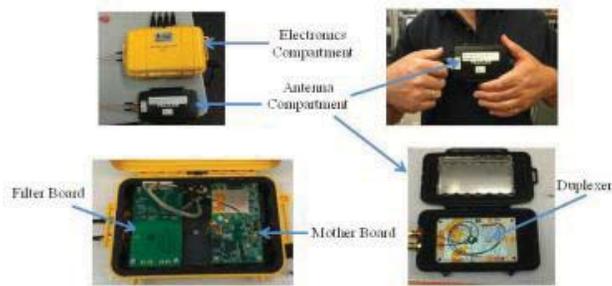


Electrocardiogram of heart function obtained with glue applied skin electrodes. Heart rate was calculated from the R-R intervals.



Non-contact cardiac waveform obtained by placing the RF unit over clothing. Heart rate was calculated from the Peak-Peak intervals.

Biomedical Monitoring by a Novel Noncontact Radio Frequency Technology



RFII Hardware

ANTICIPATED BENEFITS

To other government agencies: (CONT'D)

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To the nation:

In clinical medicine, this device will save precious seconds in even simple assessment of pulse, while real-time measurement of cardiac stroke volume will allow critical assessment of life-threatening shock and allow medical personnel to provide optimal resuscitation in the field or in the hospital emergency department.

