



NASA SBIR 2016 Phase I Solicitation

H12.02 Passive Vital Sign Monitoring

Lead Center: ARC

Participating Center(s): JSC

Human exploration missions beyond low earth orbit (LEO) require physiologic monitoring of the crew. These highly mass, volume, and power constrained missions require significant leveraging of resources by all vehicle subsystems. To date, research and development resources involving physiologic monitoring have been allocated to crew worn devices to measure these physiologic parameters. NASA recognizes that there are numerous worn devices that provide monitoring, but all of these devices still require mass, volume, power, and crew time to operate. The exploration vehicle, however, will already provide a variety of technologies that could potentially be used to extrapolate human physiologic data in a more passive and continuous manner that does not require additional mass, volume, power, and crew time to operate. Examples of technology embedded within the vehicle include, but are not limited to, high quality video and audio, wireless networks, radio frequency identification, and other electromagnetic (EM) sources/detectors.

NASA requires new technologies that will exploit vehicle infrastructure to passively and continuously monitor the crew's physiologic parameters. NASA is amenable to improving existing vehicle technologies to extract crew data, but also for incorporating novel and innovative technologies that could be added to the vehicle or the crew. Examples of technology developments can include, but are not limited to, heart and respiration rate detection via HD video, temperature detection via infrared camera, or circadian rhythm phase detection via automated urine analysis. Some of the parameters that would be desirable for monitoring include:

- Heart Rate.
- Oxygen Saturation Level.
- Respiration Rate.
- Blood Pressure (diastolic/systolic).
- Core and/or Skin Temperature.
- Urinary 6-sulfatoxymelatonin.

A list of anticipated medical conditions that would require monitoring can be found on the Exploration Medical Condition list (EMCL), which may be found on NASA's Human Research Wiki:

<https://humanresearchwiki.jsc.nasa.gov/index.php?title=ExMC>.

Phase I Deliverables - Conceptual prototype of a monitoring device/algorithm and final report detailing the conceptual prototype and hardware/software development plans.

Phase II Deliverables - Completed monitoring device/algorithm, and final report on the development, testing, and validation of the tool.

