NASA SBIR 2019 Phase I Solicitation

H12.06 Continuous Crew Health Monitoring

Lead Center: JSC

Participating Center(s): GRC

Technology Area: TA6 Human Health, Life Support and Habitation Systems

Human exploration missions beyond low earth orbit (LEO) require physiologic monitoring of the crew. Currently, NASA employs a wide variety of commercial off the shelf (COTS) crew-worn biosensors and devices that provide minutes to hours of high quality physiologic information. All these devices require mass, volume, power, and crew time to operate, each of which will be in short supply during missions beyond LEO. Additionally, existing technologies typically do not provide continuous physiologic monitoring and instead require either electrode replacement, battery replacement or some other constraint that limits the operation of the technology. The exploration vehicle, however, will already provide a variety of technologies that could potentially be used to extrapolate human physiologic data in a continuous manner that does not require additional mass, volume, power, and/or 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 continuously monitor the crew's physiologic parameters without crew intervention. Ideally, these solutions should not require additional mass, volume, power, and/or crew time and should leverage an existing capability already being provided by the vehicle. However, NASA is amenable to 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 stress detection via voice analysis.

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

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

The expected TRL for this project is 2 to 4.

This technology would reduce the mass/volume/power required to execute physiological monitoring and supports NASA's Human Research Program Exploration Medical Capabilities, the ISS Health Maintenance System, and the Commercial Crew Program.

References:

- https://www.nasa.gov/hrp/elements/exmc

- https://ntrl.ntis.gov/NTRL/dashboard/searchResults/titleDetail/N20110022379.xhtml
- https://www.nasa.gov/exploration/commercial/crew/index.html
- https://www.nasa.gov/directorates/heo/index.html