Department of the Navy SBIR/STTR Transition Program

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Topic # N241-D02
Secure UWB Communications for Aircrew Physiological Monitoring
Dirac Solutions Inc.

WHO

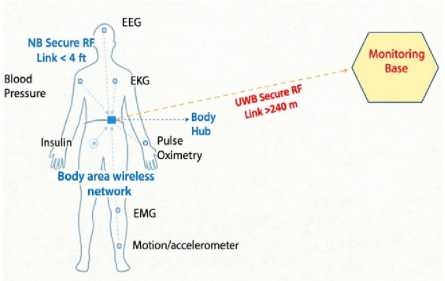
SYSCOM: NAVAIR

Sponsoring Program: NAVAIR

Transition Target: PMA 202

TPOC: (443) 414-4513

Other Transition Opportunities: Army PEO Warrior, Airforce



DSI's Secure UWB Communications for Aircrew Physiological Monitoring

Notes: Dirac Solutions, Inc. (DSI) has developed a secure, pulse-based wearable physiological monitoring system that integrates commercially available non-intrusive sensors with Ultra-Wideband (UWB) and Narrowband wireless communications. It transmits vital signals—including ECG, SpO?, blood pressure, heart rate, and EEG—over extended ranges, maintaining performance in RF-challenging environments such as aircraft cabins.

WHAT

Operational Need and Improvement: ffective warfighter physiological monitoring demands a wearable system capable of continuous, real-time tracking of vital signs (e.g., ECG, heart rate, SpO?, blood pressure) to rapidly detect life?threatening physiological episodes in confined, high-risk environments like aircraft. It must achieve secure, high?integrity data transmission over distances up to 240 m in RF?challenged settings, far exceeding standard Bluetooth range and security. High SWaP (size, weight, and power) efficiency, robust battery life, and compatibility with consumer-grade non-intrusive sensors are also vital to ensure the system remains comfortable under military gear and mission constraints.

Specifications Required: The system must provide continuous monitoring of vital signs—including heart rate, ECG, EEG, blood pressure, and SpO?—for real-time detection of physiological episodes in warfighters. It shall operate effectively in confined, high-noise environments such as aircraft, support secure, encrypted wireless transmission over at least 240 m despite RF interference, and integrate with commercially available, non-intrusive physiological wearable sensors within a military-grade, software-defined wireless platform.

Technology Developed: Dirac Solutions, Inc. (DSI) has developed a cutting-edge wearable physiological monitoring system built on a secure, pulse-based wireless architecture. The core technology combines commercially available non-intrusive physiological sensors, Ultra-wideband (UWB) and Narrowband wireless communications technologies.
The system securely transmits vital physiological signals—such as ECG, SpO?, blood pressure, heart rate, and EEG—over extended range, even through RF-challenging environments like aircraft cabins.

Warfighter Value: DSI's wearable physiological monitoring system delivers essential value to warfighters by enabling continuous real-time tracking of vital signs—such as heart rate, ECG, SpO?, blood pressure, and core temperature—to identify fatigue, heat strain, and emerging health risks before they escalate. This capability supports leadership decisions by providing digestible readiness indicators (e.g., "green/amber/red" status), helping prevent musculoskeletal injuries and improve recovery management. Built for resilience in RF-challenged environments, the system securely transmits data over extended distances, even within aircraft or submarines. Integrated into emerging DoD initiatives—like JPEO-CBRND's LifeLens and the Army's Optimizing the Human Weapon System—this technology enhances mission safety, operational readiness, and force survivability through proactive health monitoring and predictive insights.

WHEN

Contract Number: N68335-25-C-0114 **Ending on:** Sep 15, 2027

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Body Area Network (BAN) Design and Implmentation	Low	Test and evaluations	6	1st QTR FY26
Sensor-BAN interface	Low	Test and evaluation	6	3rd QTR FY26
UWB-BAN Interface	Low	Test and evaluation	6	4th QTR FY26
Sensor-BAN-UWB Interface	Low	Test and evaluation	6	3rd QTR FY27
System refinement and Testing	Low	Test with an aircraft	6	4th QTR FY27

HOW

Projected Business Model: DSI's business model is to transition innovative research to high TRL through SBIR phase I, II, and III projects and target various applications based on the similar technologies. DSI's current strategy includes working with prime defense contractors for mainframe integration and welcomes the opportunity to test and sell directly to other government agencies if there are sufficient interests.

Company Objectives: DSI aims to design next-gen wireless systems that prioritize reliability, security, low cost, and low power. Its initial focus is on DoD applications, including aircraft, submarine, tunnel, and skyscraper communications, supporting voice, sensor data, and image/video. DSI also targets DOE and nuclear environments, deploying wireless sensor and video systems capable of penetrating thick concrete walls—such as those in nuclear reactors and submarines. Additionally, the technology supports first responder networks in harsh conditions, including firefighters operating in nuclear emergency scenarios.

Potential Commercial Applications: Integrating wearable physiological sensors with reliable and secure wireless transmission—has strong commercial potential across healthcare, industrial safety, public safety, consumer audio, and autonomous systems. In healthcare, it supports continuous remote monitoring, enabling early detection of critical events like arrhythmias and neurological stress. In industrial and construction environments, it enhances worker safety by delivering clear communications and health insights in high-noise settings. Public safety teams (e.g., firefighters, EMTs) benefit similarly during emergencies.

Contact: Faranak Nekoogar, CTO
Faranak@DiracSolutions.com (408) 421-7537