

Topic: N131-012

## TRITON SYSTEMS, INC.

Universal In-Ear Warfighter Monitoring System (1002-062)

The wireless sensing system developed allows for sensing in and around the body (e.g. hypoxia monitoring, physiological status monitoring, acoustic dosage, hearing protection validation). Triton Systems is a technology incubator with a long track-record of developing innovative solutions and successfully transitioning many of them to commercial products. The initial application is wireless in-ear pressure monitoring for pilots and is also being expanded for physiological status monitoring and acoustic dosage monitoring. The microsystem developed is the only in-ear sensing system platform successfully developed for extended use and continuous transmission of data. The first complete sensing systems have been developed. Triton also develops nonlinear hearing protection. Triton is seeking additional Defense customers in need of tiny sensing solutions such as hypoxia monitoring, and hearing protection validation.

### Technology Category Alignment:

None

None

None

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**SYSCOM:** NAVAIR

**Contract:** N68335-15-C-0035

 Corporate Brochure: [https://navystp.com/vtm/open\\_file?type=brochure&id=N68335-15-C-0035](https://navystp.com/vtm/open_file?type=brochure&id=N68335-15-C-0035)

# Department of the Navy SBIR/STTR Transition Program

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Universal In-Ear Warfighter Monitoring System (1002-062)

TRITON SYSTEMS, INC.

## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** PEO Joint Strike Fighter

**Transition Target:** Aircraft Systems Program Office (PMA 202)

**TPOC:**  
(301)342-9213

**Other transition opportunities:** National Institute for Occupational Safety and Health (NIOSH) and Occupational Safety and Health Administration (OSHA) for hearing protection evaluations for earplugs and earmuffs, and real-time noise dose monitoring.



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## WHAT

**Operational Need and Improvement:** There is a need to objectively measure commercial-off-the-shelf (COTS) earplug performance and safety, but it is currently difficult to obtain these measurements because no sensors exist to measure within the ear canal without compromising earplug performance. Miniature wireless sensors integrated into COTS earplugs would assist in more accurate evaluations of earplug performance for pilots and aircrew personnel and for continuous monitoring of warfighter physiological status during military operations.

**Specifications Required:** Accuracy:  $\pm 0.5\%$   
Pressure range: 0-15 psi  
Duration: 4 hours  
Size: Capable of fitting in ear canal  
Sample Rate: 25 samples/sec

**Technology Developed:** Triton Systems has developed a modular, in-ear canal wireless sensing microsystem to evaluate the true risk associated with using sealed earplugs. The extremely small size of the sensing system allows it to easily fit inside the ear canal. Sensing arrays can be placed inside the ear canal, on the pinna, or on the head in close proximity to the ear (e.g. temple, postauricular region, or even occipital region). The system permits the pressure in the ear canal to be monitored in real-time without impacting the performance of the earplug.

**Warfighter Value:** Earplug-integrated wireless miniature sensors for personnel monitoring would benefit warfighters by increasing mission effectiveness and safety by providing objective measurements to evaluate the performance and safety of COTS earplugs for pilot use and to ensure a warfighter does not exceed their daily noise exposure limit.

## WHEN

**Contract Number:** N68335-15-C-0035 **Ending on:** May 15, 2016

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Create a low-power, small in-ear sensor.	N/A	Demonstrate pressure readings on a system capable of fitting in the ear canal	5	July 2015
Create the behind-the-ear unit.	Med	Demonstration of behind-the-ear unit interacting with the in-ear unit	6	October 2015
Create the user interface.	Med	Demonstrate data logging and user interface to adjust data collection	6	January 2016
Deliver the full system.	Med	Deliver a full system for measuring the in-ear pressure	6	February 2016

## HOW

**Projected Business Model:** The commercialization strategy for the in-ear canal wireless pressure sensing technology is to retain the design, assembly, and packaging portions of the product manufacture internal to Triton. The electronic board manufacture will be outsourced to U.S. vendors (e.g. Advanced Circuits) who specialize in electronics manufacturing. The product will be a Triton-branded item with marketing and sales provided by Triton and audiology product distributors.

**Company Objectives:** Triton Systems is a small business located in Chelmsford, MA that employs 50+ science and engineering staff with expertise of photonics, biotech, electronics, advanced materials and engineered systems. The commercialization model includes Federal funding combined with private equity and strategic partners from industry and academia. Products created are licensed into existing distribution and supply chains, sold from Triton to Federal customers or result in spin-outs. Triton intends to use this extensive product development experience to develop noise dose monitoring and hearing protection evaluation sensors for military, industry, and commercial markets.

**Potential Commercial Applications:** The base technology developed for this device has a commercial application as a noise dosimeter for field microphone in real ear (F-MIRE) measurements of actual noise exposure, and hearing protection evaluation and monitoring to determine the actual hearing protection provided by hearing protection equipment as worn by the user and/or to ensure the user is wearing their hearing protection properly. This technology can also be used for physiological status monitoring system.

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