Topic: N132-084

CFD Research Corporation

An Integrated Human Test Surrogate to Assess Injury Risk and Measure Non-Lethal Exposure

No current standard human surrogate exists that focuses on non-lethal weapon (NLW) exposures; however CFD Research Corporation's (CFDRC's) modular human surrogate will solve that problem. The modular human surrogate is capable of measuring a wide variety of stimuli produced by NLWs to gauge performance, safety, and risk of significant injury (RSI) of NLWs. This system's modular focus enables adaptability to current/future technologies with relatively small changes, low cost, and state-of-the-art sensors. The system has been prototyped and functionality verified for many NLW stimuli. CFDRC specializes in creating unique and valuable solutions to problems related to human body response and performance. Our goal is to transition this surrogate into government/prime contractors/developers of NLWs to become the testing standard used for demonstrating/evaluating human response and RSI due to NLWs.

Technology Category Alignment:

Biomedical Informatics / Health Information Systems & Technology
Protection, Sustainment, and Warfighter Performance
Sensors
Weapons Technologies
Modeling, Simulation & Test Infrastructure

Contact:
Keith Sedberry
Keith.Sedberry@cfdrc.com
(256) 726-4917
http://www.cfdrc.com
SYSCOM: MARCOR
Contract: M67854-15-C-6501
Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=M67854-15-C-6501

Department of the Navy SBIR/STTR Transition Program

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WHO

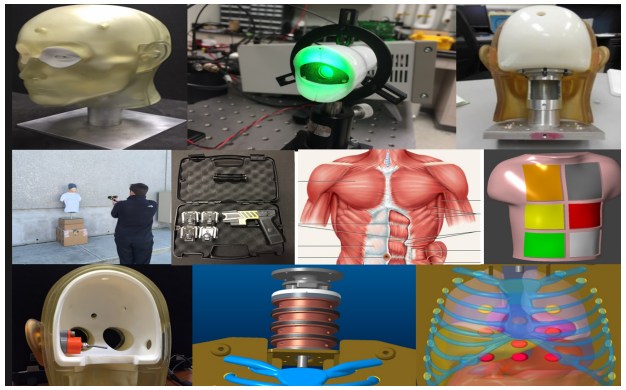
SYSCOM: MARCOR

Sponsoring Program: Joint Non-Lethal Weapons Program (JNLWP)

Transition Target: JNLWP; Testing organizations for combined NLW effects; and Programs of Record for current NLWs (i.e., M-84 Flash Bang Grenade and Human Electro-Muscular Incapacitation (HEMI) devices)

TPOC:
sbir.admin@usmc.mil

Other transition opportunities:



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Notes: No current standard human surrogate exists that focuses on non-lethal weapon (NLW) exposures. CFDRC's Modular Human Surrogate is designed in such a way that it can be tailored for any technology that employs blast, blunt impact, light (broadband/laser), electro-muscular, temperature, acoustic, and chemical aspects. Accompanying computational models for human engineering modeling and performance (HEMAP) and other analysis software can also provide added value.

WHAT

Operational Need and Improvement: No current standard human surrogate exists that focuses on gathering data to predict the risk of significant injury (RSI) to humans subjected to NLW exposures. The JNLWP and the DoD is in need of good human-like response data for computational model inputs to calculate accurate RSI. Currently, new technologies undergo long and rigorous evaluation processes and are not evaluated on human-like surrogates. A human surrogate fills a large technology gap in developing and testing NLWs, and can provide a standardized test platform to evaluate existing and emerging NLW technologies.

Specifications Required: JNLWP is requiring input data for sound pressure levels at the ear, the fluence and wavelength of light incident on the eye, pressure at as many points on the body as possible, chemical concentration at the face, temperature at various positions, kinetic energies at critical organ locations, and electromagnetic (EM) field intensity. All data is measured as a function of time. The accuracy of the data generated from the human surrogate test target will be validated against existing data collection systems.

Technology Developed: The surrogate has the ability to gauge NLW weapon performance and safety, and the modular sections are adaptable with a wide range of sensor suites based on the weapon of interest. The surrogate includes removable and replaceable state-of-the-art sensor suites in critical areas of interest for injury, and is based on accurate anatomical data to ensure the collected data matches closely to a human response. The surrogate also employs realistic skin and skull materials to provide appropriate responses.

Warfighter Value: CFDRC's Modular Human Surrogate enables the Navy, JNLWP, and the DoD to utilize one common testing standard for NLW exposure evaluation and data collection to more accurately calculate the RSIs of NLW technologies. The low cost, modular aspects of the surrogate provides reliable and reproducible data to transition laboratory NLW technologies to the field faster, saving overall program costs and time. CFDRC's Modular Human Surrogate is also easily adaptable to any testing need with minor re-work.

WHEN

Contract Number: M67854-15-C-6501 **Ending on:** December 8, 2016

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Tier 1 Sensors Head/Neck (Light, Sound, Pressure, Blunt, EM)	Low	Full Integration and Verification/Validation of Sensor Suites	Blast/Sound - 5, Light/Blunt - 4	1st QTR FY17
Tier 1 Sensors Torso (Blunt/EM)	Low	Fully Instrumented/Integrated Torso with Verification/Validation	5	1st QTR FY17
Tier 2 Sensors Head (Chemical, Temperature)	Low	Full Integration and Verification/Validation	5	1st QTR FY17
Initial Prototype Delivered to JNLWP	Med	Delivery of Prototype with Data Capture Set-up and Training on Use	5	1st QTR FY17

HOW

Projected Business Model: CFDRC intends on continued development/advancements of the human surrogate for the DoD, Prime contractors, and developers of NLWs. Each surrogate is currently projected to be a "made to order" product based on the exact needs of the customer. CFDRC is also looking to support DoD and other testing labs with personnel trained on the use of the human surrogates to assist with continued enhancements and testing.

Company Objectives: CFDRC is looking to establish contacts and working relationships with organizations and testing labs that evaluate and develop NLWs. Some of these organizations include the Navy Medical Research Unit (NAMRU), Naval Surface Warfare Center (NSWC) Dahlgren, Army Medical Research and Materiel Command (MRMC), Army's Armament Research, Development and Engineering Center (ARDEC) which is a major NLW R&D site, Air Force Research Lab (AFRL), Applied Research Lab at Pennsylvania State University, the Non-Lethal Technology Innovation Center (NTIC) at the University of New Hampshire, Institute for Defense Analyses (IDA/FFRDC), and Johns Hopkins University Applied Physics Lab. CFDRC is also looking to assist Prime contractors such as General Dynamics and L-3 Communications.

Potential Commercial Applications: CCFDRC's Modular Human Surrogate has potential commercial applications in many areas of the NLW community. The following organizations are involved in the development of NLWs (among others): Taser International (EM), Combined Tactical Systems Inc. (Flashbang), , Raytheon (ADS System for blunt impact), Mission Research Corporation, General Dynamics, and BAE Systems. There are also potential commercial applications in law enforcement training and NLW evaluations since law enforcement are large users of NLW weapons and technologies. This surrogate can also assist in safety testing for commercial products designed for a wide range of purposes.

Contact: Keith Sedberry, Senior Systems Engineer
Keith.Sedberry@cfdrc.com 256-726-4917