

Department of the Navy SBIR/STTR Transition Program

DISTRIBUTION STATEMENT A. Approved for public release. Distribution is unlimited.
 NAVAIR NAVAIR Public Release 2023-828. Distribution Statement A – “Approved for public release; distribution is unlimited.”

Topic # N201-009
 Software Framework for Integrated Human Modeling
 BioMojo LLC

WHO

SYSCOM: NAVAIR

Sponsoring Program: PMA276

Transition Target: H-1 USMC Light-Attack Helicopters

TPOC: (301) 342-9261

Other Transition Opportunities: Naval Research Laboratory (NRL), Air Force Research Laboratory (AFRL), Army Research Laboratory (ARL), Army Medical Research Acquisition Activity (USAMRAA), Army Aeromedical Research Laboratory (USAARL), Army Natick Soldier Systems Center (NSSC), Defense Threat Reduction Agency (DTRA), Occupational Safety and Health Administration (OSHA), National Aeronautics and Space Administration (NASA), military manned aircraft and crew-served weapon systems and equipment, U.S. industries (commercial aerospace manned systems, automotive, heavy equipment, medical product development, consumer product development)

Notes: Software Framework for Integrated Human Modeling is produced as the BioMojo Digital Representation Of People (DROP) whole-body, multi-parameterized approach to human modeling and design by integrating best-in-class open source and proprietary tools. DROP provides an open application programming interface (API) and data fusion framework for integrating current and future commercial off-the-shelf (COTS) human and medical modeling tools. BioMojo creates cutting-edge, integrated software and hardware solutions to improve operator decision-making, knowledge management, resilience, teamwork, and mission-critical task execution. This is achieved via extended reality (XR) software and systems development, spatial computing, computational biology, wearable sensors, data analytics, digital therapeutics, Natural Language Processing (NLP), and Artificial Intelligence (A.I.).

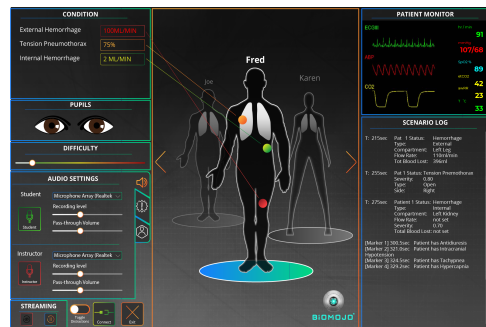


Image courtesy of BioMojo, LLC 2022.

WHAT

Operational Need and Improvement: Digital human modeling (DHM) efforts in the DoD have primarily been used to assess ergonomic and human factors situations. The current commercial software on the market is highly specialized toward providing human analysis for narrow tasks and situations. It does not, contrary to the name, typically model the whole human system. The result of this software specialization is a plethora of part-task analysis software that operates mostly independently. Each software by itself is unable to inform the larger picture and holistically model the human system.

Specifications Required: DROP shall enhance the ability of existing and future software packages to leverage data developed from each other by providing an architectural framework that can incorporate the output of COTS digital human and medical modeling software to build a detailed digital representation of a multi-parametrized human. As a more developed and accurate digital representation of a physical human begins to develop, this software can provide input for these existing software packages to provide more accurate task analysis results.

Technology Developed: DROP is an extensible and scalable framework for current and future modeling software. BioMojo is developing an API for ingesting and exporting data from the human system model, incorporating the output of COTS digital human modeling and medical modeling software packages to create whole-body simulations of a diverse array of human body types and physiologies, enabling users to assess ergonomic and human factors design more accurately. The DROP prototype provides a graphical user interface (GUI), leverages an open-source physiology engine, and utilizes markerless motion capture data.

Warfighter Value: This effort will result in a framework enabling cross-collaboration between COTS software. This framework will enhance the value of existing software packages, promote the development of new features, and enable interoperability between software packages. For example, existing ergonomic software incorporates anthropometric survey data to accurately model humans with diverse sizes and shapes. However, the software does not incorporate a variety of other factors that can affect the interpretation of an ergonomic analysis. Combining anthropometric data with musculoskeletal and injury modeling data would enable the generation of a highly accurate human reach envelope for both normal and abnormal human avatars. Likewise, dehydration data, hypoxia data, and other stressor data can be combined to provide a more accurate cognitive task analysis for humans operating under abnormal conditions and in stressed environments.

WHEN

Contract Number: N68335-23-C-0180

Ending on: Jan 06, 2025

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Phase I Model	N/A	Proof-of-concept delivered; two sources of data ingested, modeled, exported to COTS data file.	3	4th QTR FY20
Develop API for Ingesting and Exporting Data	Low	Demonstrate functional API and multiple data sources	4	4th QTR FY23
Incorporate physiology engine into the framework	Low	Physiological data ingested based on physiology engine output for at least 2 scenarios	4	1st QTR FY24
Develop GUI for examination and manipulation of data in the human model	Low	Operational GUI; Prototype UI/UX demonstrated	5	1st QTR FY24
Integrate major modeling packages and task analysis software into the framework	Medium	Demonstrate functionality with at least two external software packages	6	3rd QTR FY24
If Option exercised, extension of	Medium	Demonstrate functionality with	7	1st QTR

HOW

Projected Business Model: BioMojo will sell the commercial software that is developed post-Phase II using a business model analogous to DDS (Data Distribution Service (DDS) / RTI Connex, which is a commercial software built on the open-source DDS standard. We will work with our channel partners to bring the software to market, and we will also offer the completed DROP system (including any proprietary plugins) on the GSA schedule. We will also make our service division available to organizations who wish to develop their own software using the DROP framework.

Company Objectives: BioMojo has a well-established business development team of highly skilled experts who will ensure a competitive edge in transitioning technologies to Phase III and beyond.

Potential Commercial Applications: We believe the customers for this software include planners and experts in human performance, weapon systems, and military equipment. A potential primary candidate for the DROP system is the synthetic training environment (STE). Our go-to-market assessment has also revealed that there is an opportunity to insert DROP into the interactive entertainment industry as a mechanism to create more realistic characters.

Contact: Jerry Heneghan, CDO
jerry@biomojo.com (919) 345-0155