Topic: N162-094

Charles River Analytics Inc.

Ecological Advanced Support Interface Toolkit for Heads Up Attention to Improve Warfighter Knowledge (EASI-HAWK)
Ecological Advanced Support Interface Toolkit for Heads-Up Attention to Improve Warfighter Knowledge (EASI-HAWK) enables better spatial orientation through natural visual and auditory cues that extend beyond the foveal visual system; seamlessly transitioning pilots from aided to unaided vision. EASI-HAWK, an auxiliary toolkit, supports head-up displays (HUDs) and head-mounted displays (HMDs) under development for the F/A-18 and F-35 variants, enhancing pilot effectiveness. Charles River Analytics, a leading provider of innovative R&D solutions for increasingly complex and important human-systems challenges seeks integration with HUDs and HMDs and EASI-HAWK's visualization display components with a number of military aircraft and land vehicles. The underlying display design principles provide benefits for guiding effective display criteria to support remotely piloted and pilot-optional aircraft, as well as augmented display devices for private and commercial pilots.

Technology Category Alignment:

Protection, Sustainment, and Warfighter Performance
System Interfaces & Cognitive Processes

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SYSCOM: NAVAIR
Contract: N68335-18-C-0113
Corporate Brochure: https://navystp.com/vtm/open_file?type=brochure&id=N68335-18-C-0113

Department of the Navy SBIR/STTR Transition Program

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NAVAIR JSF19-910

Topic # N162-094

Ecological Advanced Support Interface Toolkit for Heads Up Attention to Improve Warfighter Knowledge (EASI-HAWK)

Charles River Analytics Inc.

WHO

SYSCOM: NAVAIR

Sponsoring Program: JSF, Joint Strike Fighter

Transition Target: Displays and controls under development for F-35 Lightning II variants

TPOC:
(301)342-6638

Other transition opportunities: In addition to the F-35, any other aircraft platforms. The underlying display design principles are applicable for display concepts for use in supervising remotely-piloted and unmanned wingman teaming and augmented systems for private and commercial pilots.

https://media.defense.gov/2013/Apr/08/2000060591/-1/-1/0/130404-F-KX404-037.JPG

Notes: As an example of an alternate SBIR transition path successfully pursued on another program, Charles River developed a tool to guide the warfighter through a formalized approach to assessing, analyzing, and forecasting human behavior (Contract Number FA8650-04-C-6403). The tool eventually underwent a successful Military Utility Assessment in 2008 and an Extended User Assessment with a Joint agency; it is now in use by DoD warfighters worldwide.

WHAT

Operational Need and Improvement: When pilots transition from aided to unaided vision during flight, the number of visual cues that can be used as reference for aircraft attitude is greatly reduced. If this occurs during night operations with very low ambient light, spatial discordance can occur. Rapid transition from aided to unaided vision reduces the number of peripheral visual cues from many to few, which can lead to spatial disorientation and unsafe flight. Dark adaptation, or the ability to perceive low-level light, can take as long as half an hour to achieve. In addition, key mission events, such as aerial refueling increase the challenges of spatial disorientation. Technology with the ability to provide a pilot support during these events to support spatial orientation and safe flight is needed.

Specifications Required: No additional weight should be added to the helmet; some possible solutions may involve adding devices to the helmet, which is not permitted. If power is required, it must be limited to the accessory power generated by the aircraft.

Technology Developed: Improved displays are required to support accurate perception of ownship orientation and movement during precision maneuvers. To address these challenges, we will design, demonstrate, and evaluate an Ecological Advanced Support Interface Toolkit for Heads Up Attention to Improve Warfighter Knowledge (EASI-HAWK).

Warfighter Value: EASI-HAWK will enable efficient transition between aided and unaided vision through natural visual and auditory cues that extend beyond the foveal visual system. These cues enable robust, direct perception and disambiguation of orientation and motion cues critical to maintaining aircraft awareness and effective control responses.

WHEN

Contract Number: N68335-18-C-0113 **Ending on:** July 27, 2020

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Analyze Requirements	Low	Completion and SME review	TRL1	January 2018
Design Ecological Multimodal Display Design	Low	Completion and SME review	TRL2	December 2018
Prototype and Demonstrate EASI-HAWK Displays	Low	Software and hardware functionality demonstrated including verification and validation testing	TRL3	October 2019
Evaluate EASI-HAWK Displays	Low	Completion of experimental evaluation and statistical analysis of the data	TRL5	December 2019
Extend and Refine Display Concepts	Low	Meets ecological interface design (EID) principles; completion	TRL6	December 2020
Identify and Pursue Commercialization and Transition Pathway	Low	Completion and SME review of scenarios	TRL 7	December 2023

HOW

Projected Business Model: We see two approaches to commercializing the technologies developed under EASI-HAWK. First, they can be licensed to commercial entities that will use them directly or incorporate them as added functionality to their other commercial products. In particular, we will look at companies developing software for F-35 and F-18 cockpits as well as the HUD and HMD markets as potential technology licensees. Second, we will incorporate these technologies into our own DRIVE visualization toolkit, providing a fully integrated cockpit editing solution as part of STARFIRE, which will both increase its commercial product appeal and enable us to use the tool to provide consulting services based on DRIVE to DoD customers, other Government agencies, and commercial markets.

Company Objectives: We would like to engage with companies developing software for F-35 and F-18 cockpits, such as Rockwell Collins as well as the HUD and HMD markets, including VSI, Rockwell Collins, Occulus, and Valve, as potential technology licensees.

Potential Commercial Applications: Given the rapid emergence of commodity augmented reality and immersive reality systems, we plan to transition enhancements into our DRIVE visualization toolkit to for HUD and cockpit display prototyping in commercial aviation, as spatial discordance has been found to be a large contributor to civilian mishaps as well as transitioning the technology into the entertainment industry.

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