

Topic: N121-041

## Holochip Corporation

### Variable Accommodation Head Mounted Display

Current flight simulator displays don't provide accurate depth cues at close proximity; Holochip solves this problem. For wide angle collimated displays and head-worn displays, correct accommodation and vergence cues are provided, eliminating the vergence-accommodation conflict and improving the user's spatial awareness at close to far range operations (less than 10 ft to over 60 ft). This system can be integrated into chin, cargo hatch and out-the-window visual systems for fixed, rotary wing and vertical/short takeoff and landing aircraft simulators and other virtual reality platforms. The system has been prototyped and is currently being installed in an operational environment where it will be evaluated by pilots. Holochip specializes in providing advanced technology solutions to problems of critical importance within the fields of simulation-and-training and image sensing. Our goal is to integrate and transition this technology into government and prime contractor systems for facilitating simulation, training and operational display technology that improves the warfighter's spatial awareness and effectiveness.

### Technology Category Alignment:

Biomedical Informatics / Health Information Systems & Technology

Personalized Assessment, Education, and Training

Protection, Sustainment, and Warfighter Performance

Modeling, Simulation & Test Infrastructure

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**SYSCOM:** NAVAIR

**Contract:** N68335-18-C-0056

**Room:** FST at WEST 2020

# Department of the Navy SBIR/STTR Transition Program

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NAVAIR

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## WHO

**SYSCOM:** NAVAIR

**Sponsoring Program:** Naval Aviation Training Systems Program Office (PMA 205)

**Transition Target:**

**TPOC:**  
(407)380-8031

**Other transition opportunities:** The primary application is in high fidelity helicopter simulators and Level D FAA simulators. Potential transition targets include the chin windows for the CH-47F TFPS and CH-53 trainer; additionally, chin, cargo hatch window and out the window (OTW) visual systems for fixed, rotary wing and vertical/short takeoff and landing (V/STOL) aircraft simulator platforms, and other simulation and virtual reality (VR) and augmented reality (AR) platforms.

**Notes:** Top: Holochip's Variable Collimation Display (VCD). Bottom: Holochip's Variable Accommodation Head Worn Display (VAHWD).



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## WHAT

**Operational Need and Improvement:** Rotary wing platforms require a complex set of flight regimes using low-altitude close-proximity visual cues while in hover, launch and recovery, search and rescue, cargo management, and search-and-rescue missions. Current aircraft simulator visual displays provide monoscopic visual cues using either real image or fixed collimated displays. Each technology has its own advantages and disadvantages. However, no optimal solution exists today for low altitude operations that provide binocular disparity, and correct vergence-and-accommodation at low altitudes.

**Specifications Required:** A display system that delivers all visual cues with a sufficiently large viewing angle that matches real-world depth perception while retaining general spatial orientation; low-altitude weather and night vision goggle (NVG) presentation, chin window and cargo hatch viewing of low-altitude, landing zones with changes in depth perception that are correct with dynamic changes in own-aircraft altitude and full correlation with the forward field-of-view imagery.

**Technology Developed:** Two Solutions: Head-Worn and Head-Up Displays enabled with natural accommodation depth cues.

1. Variable Collimation Display (VCD)

A wide-area collimated (WAC) display system with variable collimation provides accurate accommodation and vergence visual depth cues for image distances ranging from 3 to 60 m from pilot's eyes.

2. Variable Accommodation Head Worn Display (VAHWD).

A head-worn display (HWD) enabled with Holochip's focus-tunable lens stimulates natural focusing of the eye. The user experiences correct focus and vergence. Discomfort associated with Vergence-Accommodation Conflict is eliminated.

Applicable to VR/AR simulation and training environments

**Warfighter Value:** The VCD provides accurate accommodation cues based on the aircraft's distance to the ground. This innovative display technology improves visual cues provided to pilots and low-level (< 30 ft) operations, improving safety and training. The VCD may also contribute to enhancements on other display applications currently limited by a lack of accurate depth cues.

The VAHWD provides accurate accommodation-vergence depth cues needed for Navy training VR and AR applications in which vergence-accommodation conflicts remain a major problem.

## WHEN

**Contract Number:** N68335-18-C-0056 **Ending on:** December 22, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Variable Accommodation Head-Worn Display (VAHWD): Complete prototype; Demo in lab	Med	Simulation results achieve requirements	4	September 2019
VAHWD: Human factors studies	Med	Demonstration of visual cues	6	December 2019
Variable Collimation Display (VCD): Complete prototype; Demo in lab	Low	Demonstration of VCD technology at lab	6	September 2019
VCD: System integration; Evaluations with pilots	Med	Demonstration of VCD with an image generation (IG) or relevant computer graphics environment	7	December 2019

## HOW

**Projected Business Model:** Holochip is interested in partnering, joint venture or licensing agreements with Navy training system original equipment manufacturers (OEMs) and prime contractors. We seek opportunities to work with the developers of flight simulators to integrate and demonstrate our low-cost optical display technology into various training platforms.

**Company Objectives:** Holochip is a developer and supplier of Natural Depth Cue Displays for defense, industrial and consumer electronics. Our technologies enable next-generation flight training simulator displays with correct depth cues, enabling the natural focusing response of the user's eyes, for improved spatial awareness. The VCD and VAHMD are part of our suite of VR/AR, light field and WAC true focus display solutions for Navy and commercial customers.

**Potential Commercial Applications:** The initial commercial applications include chin window, cargo hatch, refueling and out-the-window (OTW) visual systems for fixed, rotary wing and vertical/short takeoff and landing (V/STOL) aircraft simulators and other simulation and virtual reality platforms.

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