Transition Wide-Angle Goggles with Integrated Illuminated Display (TWIGIID)

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SYSCOM: Office of Naval Research (ONR), Naval Sea Systems Command (NAVSEA), Naval Surface Warfare Center – Panama City Division

Program Sponsor: Office of Naval Research (ONR) Dr. Reginald Beach

Other Potential Programs: All DoD programs will benefit from TWIGIID system, including operations and programs relating to wreckage salvaging, ship husbandry, underwater maintenance (i.e., underwater dam inspections, hydrographic survey) and construction, security, search and rescue, and public safety diving.

Current TRL: 5
Projected TRL: 7 / Q4 2023

Keywords: heads-up display, augmented reality, scuba diving, underwater, wearable, situational awareness

THE CHALLENGE

The U.S. Navy is seeking a submergible Heads-Up Display (HUD) system that enables divers to see through low-visibility environments. Underwater operations are complex and a major obstacle to overcome. Divers lack detailed schematics, drawings, and plans during underwater operation and are limited in surface communications. Coupled with the inability to clearly see the immediate operational environment, an underwater HUD will significantly enhance manned diving operations and situational awareness.

THE INNOVATION

To satisfy the Navy need, Intellisense is developing a Transitional Wide-angle Integrated Illuminated Display (TWIGIID) system that innovatively integrates a Commercial off-the-shelf dive mask, compact near-eye display, and display driving electronics. Specifically, the TWIGIID system combines real world imagery with digital overlays to provide enhanced situational awareness cues to the diver. By coupling a waveguide into Navy-certified dive masks, TWIGIID leverages technically proven commercial systems, thus mitigating associated development costs, risks, and future obsolescence.

THE NAVY BENEFIT

U.S. Navy diving is an integral part of U.S. defense strategy. To ensure technical superiority across the entirety of diving operations, new state-of-the-art diving equipment must be developed. The TWIGIID system not only uniquely provides critical information and sensor data, including sonar images; ship husbandry and underwater construction schematics; enhanced navigation displays; augmented reality; and text messages, but also goes beyond just the diver. TWIGIID bridges the communication gap between the diver and his/her team by enabling Command and Control-aided augmented visualizations and sharing dive imagery. Thereby, TWIGIID improves diver vision and situational awareness in challenging environments.

THE FUTURE

Intellisense plans to continue development of the TWIGIID system to ensure safe operation in underwater depths of up to 100 ft. Plans are to continue leveraging its collaboration with the Navy, commercial dive mask manufacturers, and sonar systems to optimize the system based on customer needs. Intellisense has reached out to public safety divers who have expressed huge interest in the system. Intellisense plans to pursue them and the Navy to perform end-user testing as potential prime customers.

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