Department of the Navy SBIR/STTR Transition Program

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NAVSEA #17-532

Topic # N141-025

Submarine Imaging Real-time Enhancement (SIREN)

Charles River Analytics Inc.

WHO

SYSCOM: NAVSEA

Sponsoring Program: PEO IWS 5.0, Undersea Warfare Systems
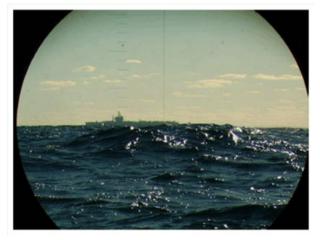
Transition Target: Periscope video system

TPOC:
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Other transition opportunities: Many other Navy platforms make use of EO/IR sensors for detection, classification, and tracking targets as well as for general search and surveillance functions, and could benefit from an automated video enhancement system. In the nongovernment commercial market, legacy security and surveillance systems could use the SIREN technology to immediately improve video quality without expensive hardware upgrades.

Notes: Since 1983, Charles River Analytics has applied computational intelligence technologies to develop mission-relevant tools and solutions to transform our customers' data into knowledge that drives accurate assessment and robust decision making.

www.public.navy.mil/subfor/underseawarfaremagazine/Issues/Archives/issue_38/images/photo_cont_5.gif

WHAT

Operational Need and Improvement: When a periscope video is being recorded it leaves camera interlacing artifacts and records smudges which occur on the periscope lens. Videos from legacy periscopes will have etched reticle lines which are recorded. The interlacing artifacts, smudges, and reticle lines complicate the video picture and reduce the performance of existing video processing capabilities. It requires manual labor to edit the video so that a true picture is available. Providing an innovative technique to improve video processing will reduce the costs of operator workload and increase the performance of sailors.

Specifications Required: The solution will include techniques that replace current labor intensive processes associated with manual removal of visual artifacts. It will address automatic contact detection, classification and tracking, and video stitching. The capability will also allow for scene motion correction through improving de-interlacing, reticule and smudge removal, and possibly Bayer color de-mosaicing, through the innovative integration of pre-processing steps.

Technology Developed: Submarine Imaging Real-time Enhancement (SIREN) system to detect and correct these artifacts in real time. In addition to a set of "gold standard" video enhancement algorithms and novel artifact removal techniques, SIREN features an image analysis module that detects which artifacts are present and automatically applies the correct enhancement algorithms.

Warfighter Value: Automated techniques to improve processing of video pictures during the pre-processing stage will improve the sailor's ability to effectively use periscope video by increasing the quality of the video image before it reaches the processing stage.

WHEN

Contract Number: N00024-16-C-4010   **Ending on:** October 28, 2017

Milestone	Risk Level	Measure of Success	Ending TRL	Date
prototype lab testing	Low	Demonstrate real-time pre-processing rate (≥ 30 frames per second (fps)) for high definition (HD) images (1080p)	6	October 2018

HOW

Projected Business Model: Charles River has over 30 years of steady growth providing innovative, cost-effective solutions through intelligent systems R&D. Over 100 Charles River projects have produced a wealth of advanced-technology prototype software that can facilitate the rapid integration of critical technology into operational systems. Charles River will (1) directly apply the developed system to specific programs within DoD and other Federal agencies; (2) license the technology to system integrators in imaging sensor industries; and (3) enhance the features of Charles River' commercial product line, VisionKit®

Company Objectives: The proposed technology will have an immediate application to submarine imaging systems by providing improved video quality from sensor masts. Also, many other Navy platforms make use of EO/IR sensors for detection, classification, and tracking targets as well as for general search and surveillance functions, and could benefit from an automated video enhancement system. In the nongovernment commercial market, legacy security and surveillance systems could use the SIREN technology to immediately improve video quality without expensive hardware upgrades. Charles River would like to discuss this technology with those interested in computer vision and video-pre-processing.

Potential Commercial Applications: Video algorithms would also have application in a variety of remote video capture situations including surveillance video and video capture from moving platforms in externally located cameras in support of industrial security, homeland defense, and other law enforcement settings. Any industry that incorporates video cameras in their security systems could benefit from the technologies developed under this topic.

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