Autonomous Underwater Vehicle for Homeland Defense

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LONG-TERM GOALS

This is an accompanying project to the Autonomous Ship Detection project (ONR# N00014-02-1-0267). The Autonomous Ship Detection statement of work was modified due to the events of September-11-2001. The U.S. Coast Guard requested and received from the Office of Naval Research the approval to change the focus to the use of Autonomous Underwater Vehicles (AUV) for Port Security operations. This decision was approved in mid March-2002 and work commenced in the beginning of April- 2002. The Coast Guard has specified the use of 12-3/4" diameter vehicles to support the Port security efforts. This size restriction was not a consideration in the original proposal, therefore, we will purchase an appropriate AUV based on the vehicle specifications as defined by the results of the Autonomous Ship Detection project.

OBJECTIVES

The primary objective is to purchase a 12-3/4" diameter AUV to support the Coast Guard's Port Security requirements for scanning a variety of underwater surfaces (ship hulls, docks & harbor bottoms). This will be addressed by identifying the AUV system requirements needed to support the sensor technologies and operational capabilities required for Homeland Defense applications and by developing the appropriate bid package.

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APPROACH

The Coast Guard has selected a laser based scanning instrument developed by the Center for Ocean Technology (COT) located at the University of South Florida (USF) (ONR#N00014-01-1-0279) as the primary sensor technology for initial integration and evaluation onboard a 12-3/4" AUV. This system, known as the Real-time Ocean Bottom Optical Topographer (ROBOT), uses a bistatic line imager to determine bottom or surface relief.

In order to develop and verify the operational requirements (specifications) for a 12-3/4" AUV platform, COT integrated the ROBOT into a 21" (53 cm) diameter AUV payload that mates with the underwater vehicle ROVEX that was developed by COT (ONR# N00014-02-1-0267). The autonomously guided underwater vehicle ROVEX was selected as the initial testing platform since the vehicle design supports a real time Ethernet and video connection that is extremely useful in developing subsea sensors. The use of this vehicle as an "AUV" test platform will terminate upon receipt of COT's commercially produced AUV scheduled for fall of 2003 as per this effort.

Figure 1. ROVEX with ROBOT payload
[The Laser imaging sensor ROBOT as an AUV payload connected to the autonomously guided underwater vehicle ROVEX. The white surface communications tow float is shown in the foreground.]

WORK COMPLETED

The results of the ROVEX-ROBOT operations from the ASDS project have allowed us to start developing our requirements for a 12-3/4" diameter AUV.

RESULTS

An initial bid specification has been created based upon the results collected to date as described in the ONR report for the ASDS (ONR# N00014-02-1-0267) project.

IMPACT/APPLICATIONS

The Coast Guard clearly needs a quick, efficient and cost affective method to scan underwater surfaces to look for potential sabotage as required to protect American seaports. The use of AUVs provides this by acting as a force multiplier (using several AUVs at once), provides a very stable sensor platform, easily supports a wide variety of sensors (Laser, Sonar, video, TNT, etc.) and minimizes or negates the risk to Coast Guard divers currently required for ship hull inspections.

TRANSITIONS

RELATED PROJECTS

This project is in support of the Advanced Underwater Port Security System (ONR# N00014-02-1-0859) in conjunction with the Autonomous Underwater Vehicle for Homeland Defense and Research Support (ONR# N00014-02-1-0825). All of these projects are a result of the modified Autonomous Ship Detection System (ONR# N00014-02-1-0267).