

# **Advanced Underwater Port Security Systems**

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## **LONG-TERM GOALS**

Due to the events of September-11-2001 the U.S. Coast Guard has requested and received from the Office of Naval Research the approval to change the focus of the original proposal from autonomous ship detection 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. Additionally, the Coast Guard has specified the use of 12-3/4" diameter vehicles to support the Port Security efforts. These changes will require considerable modification to the instrumentation payloads as well as vehicle capabilities in order to perform more complex surveys.

Our goal is to create an AUV that can scan underwater surfaces (ship hulls, docks, etc.) to detect anomalies, consistently and efficiently, so that large volumes of traffic can be routinely inspected for security risks. By clearing ships quickly and pinpointing the location of suspicious features in need of manual inspection, delays will be reduced while significantly increasing Port Security.

## **OBJECTIVES**

The current instruments will be repackaged or replaced in order to integrate them into the new, smaller vehicle and to enhance their capabilities. All imaging devices will be made capable of rotating 360° around the AUV longitudinal axis to be able to scan any desired. And a more robust navigation system will be implemented to support vehicle navigation as well as the image processing payloads. Clear and concise operational procedures will be developed for conducting ship hull, dock and harbor bottom scans using the AUV.

## **APPROACH**

## **WORK COMPLETED**

1. An acoustic modem has been ordered from WHOI and initial testing is scheduled for December in the Bahamas.
2. After consulting with both NUWC (Newport, RI) and Bluefin, the “Cornerstone” navigation system has been selected for use in this AUV. The main components are: Litton LN-250 INS/GPS, RDI 600 kHz DVL, Paroscientific Pressure/Depth Gauge, Draper Shadow Navigator Code, Dedicated Navigation Computer. The system accuracy is 0.1 % of distance traveled without DGPS aiding.

## **RESULTS**

### **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 will use the vehicles produced by the Autonomous Underwater Vehicle for Homeland Defense project (ONR# N00014-02-1-0719) and 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).