

Special Notice 12-SN-0020
Office of Naval Research
Special Program Announcement
“Sea-Based Automated Launch & Recovery System (SALRS) Sensor
Performance in Degraded Conditions”

1. INTRODUCTION:

This announcement describes a research project entitled “Sea-Based Automated Launch & Recovery System (SALRS) Sensor Performance in Degraded Conditions,” to be launched under the ONR BAA 13-001, Long Range Broad Agency Announcement for Navy and Marine Corps Science and Technology which can be found at <http://www.onr.navy.mil/Contracts-Grants/Funding-Opportunities/Broad-Agency-Announcements.aspx>. The posting of ONR BAA 13-001 to the respective website is expected no later than 30 September 2012. The research opportunity described in this announcement specifically falls under numbered paragraph 1 of the “Naval Air Warfare and Weapons (Code 35)” sub-section. The submission of proposals, their evaluation and the award of contracts will be carried out as described in that Broad Agency Announcement.

The purpose of this announcement is to focus attention of the scientific community on the area to be studied, and the planned timetable for the submission of white papers and proposals.

2. TOPIC DESCRIPTION: Sea-Based Automated Launch & Recovery System (SALRS) Sensor Performance in Degraded Conditions

a. Background:

The Navy and Marine Corps will increasingly need to operate highly capable unmanned air vehicles (UAVs) from ships at sea. Analysis indicates that fused multi-sensor systems are desirable to ensure highly reliable UAV operations under the most demanding at-sea conditions. Therefore, it is important to understand the capabilities and limitations of each sensor type, and how the inputs from two or more can be fused in a navigation process to provide sufficient accuracy, integrity, continuity, and availability across all anticipated conditions.

b. Objective:

The Office of Naval Research (ONR) is interested in research projects that characterize and model sensor performance in demanding naval environments. Performance data and sensor models are intended to be the foundation of a larger future effort to develop precision ship-relative navigation (PS-RN) capabilities to enable air vehicles to autonomously launch from and recover onto vessels at sea. This includes both fixed wing aircraft operating from aircraft carriers, and rotary wing aircraft operating from surface combatants (e.g. destroyers, frigates).

Sensors would be part of a PS-RN system with attributes as follows:

- Capable of providing final approach guidance for either (specify) fixed wing aircraft carrier (CVN) based aircraft out to 3 nmi, or rotary wing aircraft out to 1.5 nmi. CVN aircraft approach the ship from the stern; rotary wing aircraft can approach the ship from any direction.
- Sensor input accuracy (as input to the navigation system) at touchdown of 10 cm spherical error probability (SEP)
- Compliance with electromagnetic emissions control so that risk of ship detection is not increased during aircraft recovery operations.
- Fully operable with high degree of deck motion
- Fully operable with deck marking degradations experienced during the course of an extended deployment (snow, ice, spilled liquids, wear and tear)
- Fully operable in complete darkness (night, no moon, heavy overcast sky)
- Compatible with shipboard eye-safety requirements
- Fully capable, at reduced range, in heavy rain, snow, sleet, smoke, haze and fog.
- Not dependent on GPS
- High reliability
- Low impact to aircraft and ship in terms of size, weight, power and cost, even factoring in redundancy needed to meet reliability

Other attributes of interest include:

- Capable of detecting obstructions to safe landing (i.e. self-determination of landing safety)
- Using the PS-RN sensor(s) as a data link transmitter and/or receiver
- Potential for supporting other missions (e.g. surveillance)
- Potential for use in shore-based automated landings
- Potential for landing on unsurveyed ships with no special equipment

This effort is not for the purpose of sensor development, but to characterize and model state-of-the-art sensor performance in a very specific environment. Sensors of interest include:

- Electro-optic (visible wavelength)
- Infrared (short, medium, long wavelengths)
- Scanning LIDAR
- Flash LIDAR
- Very compact radar
- Laser/electro-optic guidance system (provided it can meet eye safety requirements)
- RF systems using time-difference-of-arrival, angle of arrival, differential Doppler or similar technique
- Other sensors

Sensors can be suitable for installation on either the aircraft or ship, and can be applicable to fixed wing application, rotary wing application, or both.

Technical objectives are:

1. Characterize candidate PS-RN sensor performance in demanding conditions representative of the Naval operating environment. Develop data that show how performance varies with the magnitude of the obscuring and deck motion condition, and with range from zero out to 1.5 nmi for helicopter systems and 3 nmi for fixed wing systems.
2. Test multiple candidate PS-RN sensors simultaneously and/or under identical conditions, so that their performance can be compared, and used for sensor fusion development.
3. Conduct and analyze tests of sensor signal propagation across a range of degraded conditions combined with high ship motion.
 - o Degraded conditions include fog, rain, snow, smoke, haze, varied lighting conditions, electromagnetic interference from other ship/aircraft systems, and jamming.
 - o Tests are desired in as high a fidelity environment as is possible within the time and budget constraints.
4. After determining baseline stand-alone sensor capability, investigate how cooperating concepts / devices can be used to enhance performance (e.g. paint patterns, retro-reflectors, fiducials, beacons, active transponders, etc.)
5. Based on test results and data analysis, develop physics based sensor models that capture the sensor's performance and operating characteristics across the range of degraded conditions and standoff distance and that can be used for:
 - o Simulations and development of multi-sensor fusion algorithms, and a multi-sensor PS-RN system to provide inputs to aircraft flight control system
 - o Determination of sensor contribution to system accuracy, integrity, and continuity
 - o Development of a plug-and-play sensor interface with a multi-sensor fusion system.

It is important that the government obtain data rights that would allow it to share the models developed by this project with companies interested in developing a navigation fusion capability for the Navy. While the source code associated with the model may be proprietary, it is the government's intent that the model executable will be made available along with interface and model design information to allow integration with other models and simulations.

3. Proposer Workshop

ONR will hold a web-based workshop **on Thursday, 4 October, 2012, 1300 – 1500 EDT** for those interested in proposing projects under this Special Notice. This will be a web-based workshop. Registration is required. **Register at <https://secure.onr.navy.mil/events/regdetail.asp?cid=897>.** **Registered participants will be provided with connection instructions a few days before the workshop.** Participation in the Proposer Workshop is not mandatory for either White Paper or Proposal submission.

4. WHITE PAPER SUBMISSION

White papers are desired and strongly encouraged for all offerors seeking funding. Each white paper will be evaluated by the Government to determine whether the technology advancement proposed appears to be of particular value to the Department of the Navy. Initial Government evaluations and feedback will be issued via e-mail notification from the Technical Point of Contact. Only authors of white papers that appear to be of particular value to the Department of the Navy will be invited to submit full proposals.

Detailed Full Proposal will be subsequently encouraged from those Offerors whose proposed technologies have been identified through the above referenced e-mail as being of “particular value” to the Government. However, any such encouragement does not assure a subsequent award. Full Proposals not invited based on review of a white paper are strongly discouraged and will be considered only as time and availability of funding permit.

For white papers that propose efforts that are considered of particular value to the Navy but either exceed available budgets or contain certain tasks or applications that are not desired by the Navy, ONR may suggest a full proposal with reduced effort to fit within expected available budgets or an effort that refocuses the tasks or application of the technology to maximize the benefit to the Navy.

The requirements for white paper format outlined in ONR BAA 13-001 apply. White papers should not exceed 5 single-sided pages, exclusive of cover page and resume of principal investigator.

The cover page should be labeled “2012 Sea-Based Automated Launch & Recovery System (SALRS) Sensor Performance in Degraded Conditions” and include the following information: title of the proposed effort, technical point of contact, telephone number, fax numbers, and e-mail address.

The 5-page body of the white paper should include the following information:

- (1) Technical approach that will be pursued to meet the technical objectives
- (2) Listing of specific sensors to be tested and rationale for why they are expected to be candidates for this application.
- (3) Test Plan and Schedule
- (4) Brief description of ongoing or prior programs that will be leveraged
- (5) A funding plan showing requested funding per fiscal year

A resume of the principal investigator, not to exceed 1 page, should also be included after the 5-page body of the white paper.

White papers should be submitted electronically to the program technical point of contact. Files exceeding 10MB in size should not be emailed, but instead transmitted via a file transfer service, for example AMRDEC Safesite, <https://safe.amrdec.army.mil>, or mailed on CDROM or DVD.

White papers shall be in Adobe PDF format (preferred) or in a Microsoft Word format compatible with MS Office 2007.

To ensure full, timely consideration for funding, white papers should be submitted **no later than 05 NOV 2012**. White papers received after that date will be considered only as time and availability of funding permit.

The planned date for completing the review of white papers is shown in section 6.

4. FULL PROPOSAL SUBMISSION AND AWARD INFORMATION

In accordance with ONR BAA 13-001, Section III entitled, "Eligibility Information" research in this area is limited to "U.S. persons" as defined in the International Traffic in Arms Regulations (ITAR) -22 CFR § 120.1 et seq.

Full proposals (including one technical volume and one cost volume) invited based on white paper review should be submitted under BAA 13-001 no later than **19 DEC 2012**. Full Proposals received after that date will be considered only as time and availability of funding permit.

ONR anticipates that a contract, cooperative agreement, or other transaction agreement will be issued for this effort. Full proposals should be submitted in accordance with the instructions at Section IV of BAA 13-001, Application and Submission Information, item 2.b.i, entitled "INSTRUCTIONS FOR CONTRACTS, COOPERATIVE AGREEMENTS AND OTHER TRANSACTION AGREEMENTS (Does not include Grants)."

ONR plans to fund a single award with a value of approximately \$2M. However, lower and higher cost proposals will be considered.

The period of performance for projects is estimated to be 18 months. However, shorter or longer periods of performance will be considered.

Although ONR expects the above described program plan to be executed, ONR reserves the right to make changes.

Funding decisions should be made by the date shown in section 6.

5. POINTS OF CONTACT

The Technical Point of Contact for the project is John Kinzer, Program Officer, john.kinzer@navy.mil

Business Point of Contact: Joe Cloft, Sr. Contracting Officer, joseph.cloft@navy.mil

6. SIGNIFICANT DATES and TIMES

<u>Event</u>	<u>Date</u>
Recommended White Paper Submission Date	05 NOV 2012
Notification of White Paper Evaluation*	19 NOV 2012
Recommended Full Proposal Submission Date	19 DEC 2012
Notification of Selection: Full Proposals*	18 JAN 2013
Awards*	14 NOV 2013

Note: *These are approximate dates.

7. Submission of Questions

Any questions regarding this announcement must be provided to the Technical Points of Contact and/or Business Point of Contact listed above. All questions shall be submitted in writing by electronic mail.

Answers to questions submitted in response to this Special Notice will be addressed in the form of an Amendment and will be posted to the following web pages:

- Federal Business Opportunities (FEDBIZOPPS): <https://www.fbo.gov/>
- ONR Special Notice Webpage - <http://www.onr.navy.mil/Contracts-Grants/Funding-Opportunities/Special-Notices.aspx>

Questions regarding White Papers and Full Proposals should be submitted no later than two weeks before the recommended date for receipt of White Papers or Full Proposals. Questions after this date may not be answered.