

Special Notice 12-SN-0021
Special Program Announcement for the Office of Naval Research -
Navy Machinery Controls Automation

I. INTRODUCTION:

This announcement describes a research thrust, entitled “Navy Machinery Controls Automation” to be launched under the **ONR BAA 13-001**, Long Range Broad Agency Announcement (BAA) 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 research opportunity described in this announcement specifically falls under Section I, entitled “General Information”, sub-section 6, entitled “Research Opportunity Description”, the “Sea Warfare and Weapons Department (Code 33)” item, paragraph 1), subparagraph b, entitled “Survivability”. The submission of proposals, their evaluation and the placement of basic research grants will be carried out as described in that Broad Agency Announcement.

Proposals will be received under the new Long Range BAA numbered ONR BAA 13-001, which is expected to be released in late-September 2012 since the requested submission date for proposal is after the expiration of the current Long Range BAA numbered ONR BAA 12-001. This announcement is being initially released under the current Long Range BAA numbered ONR BAA 12-001 in order to allow sufficient time for all interested parties to submit full proposals. The requirements of proposal submission, evaluation and award of any resulting grants will ultimately be subject to ONR BAA 13-001. Potential Offerors may review the current Long Range BAA numbered ONR BAA 12-001 to get a general understanding of what the proposal requirements may be in the follow-on Long Range BAA numbered ONR BAA 13-001.

The purpose of this announcement is to focus attention of the scientific community on (1) the area to be studied, and (2) the planned timetable for the submission of proposals.

II. TOPIC DESCRIPTION: Navy Machinery Controls Automation.

The proposed topic will explore and exploit the science and technology that will enable autonomy for next generation naval ship machinery systems. The program will pursue the understanding, design, operation and affordability of increasingly complex, integrated, and interdependent systems which will constitute a leap ahead in capability for the “Navy After Next”.

Background:

Next Generation Naval Ship Machinery Systems:

- *Will have increased complexity in design and operation*
- *Will have increased complexity in interaction and interdependencies with other systems.*

- *The complexity of such systems is such that humans can no longer control them in a close to optimal nature.*
- *Demands for shipboard resources will exceed installed capacity, requiring complex optimization of allocation to shipboard loads.*
- *The performance of these complex systems will have a greater reliance on performance of their associated control systems*

Therefore:

- *These systems will neither be realized nor affordable within the current approach to Naval Machinery systems design and construction.*
- *These systems will require a new paradigm in systems design, taking a ‘system of systems’ approach to integration and control.*
- *These systems will provide a true leap-ahead capability that will emerge from their functionality as integrated into a shipboard platform as a whole.*
- *Predictive and adaptive capability enabled by modeling rolls up into a predictive and adaptive capability at higher levels.*
- *Control system design needs to be considered early in the design cycle and the trade space of control systems versus system architecture design needs to be considered.*

Objective:

The Office of Naval Research (ONR) is interested in receiving proposals for long-range Science and Technology (S&T) Projects which address basic and applied research related to the following topics:

- **Control / Coordinated Control of Large Scale Systems** – Methods of controlling large scale connected and unconnected systems; methods of performing coordinated control of connected or unconnected systems. Connected systems refer to systems where a control input in one system affects the state of another due to a physical linking of the system states.
- **Resilient Control** – Methods of maintaining operational normalcy and state awareness when systems are subject to major disturbances of a malicious or non-malicious nature, including cyber attack.
- **Market Based Control** – The use of market and economic theories and/or market abstractions for optimization and control.
- **Incorporation of Mission and Commander’s Intent into Control Commands** – Decomposition of mission objective and commander’s intent into actionable control decisions; incorporation of mission objectives into solutions of shipboard resource allocation problems; methods that account for human interaction with control systems.
- **Control System Design Methods** – Methods of exploring the design space for control systems early in the ship design cycle.

- Control System Design Space Exploration – Methods for exploring very large, multi-dimensional design spaces such as those found in the integration of large scale shipboard systems.
- Distributed Knowledge – Methods of utilizing local information to derive knowledge of system state, methods of encoding and transferring that knowledge in a distributed environment.
- Distributed Decision Making – Methods of utilizing local information to make control decisions.
- Distributed State Awareness – Methods that use local information to derive system of systems state.
- Distributed Sensor Networks – Technologies that enable smart sensing, distributed state awareness, and resilient sensor networks.
- Prognostics – Prediction of the remaining useful life of shipboard mechanical, electrical and electromechanical systems.
- Wireless Networks in Shipboard Environments – Modeling of the physics of propagation of wireless signals in shipboard spaces; methods of exploring the design space for the application of shipboard wireless communications in control systems.

III. FULL PROPOSAL SUBMISSION AND AWARD INFORMATION

Full proposals (including one technical volume and one cost volume) should be submitted under **ONR BAA 13-001** by **03 Oct 2012**. Full Proposals received after that date will be considered as time and availability of funding permit.

ONR anticipates only **grants** will be issued for this effort. All full proposals must be submitted through www.grants.gov. The following information must be completed as follows in the SF 424 to ensure that the application is directed to the correct individual for review: Block 4a, Federal Identifier: Enter N00014; Block 4b, Agency Routing Number, Enter the three (3) digit Program Office Code (331) and the Program Officer's name, last name first, in brackets (Seman, Anthony). All attachments to the application should also include this identifier to ensure the proposal and its attachments are received by the appropriate Program Office.

ONR plans to fund approximately 12 individual awards with a value of approximately \$200k per year, using Basic and Advanced Research funds. However, lower and higher cost proposals will be considered. The period of performance for projects may be from one to three years.

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

Funding decisions should be made by **1 Nov 2012**. Projects will have an estimated grant award date of **9 Jan 2013**.

IV. POINTS OF CONTACT

In addition to the points of contact listed in **ONR BAA 13-001**, the specific points of contact for this announcement are listed below:

Technical Points of Contact:

Anthony Seman, Program Officer, anthony.seman@navy.mil

Business Point of Contact:

Ryan Farrell, Contract Specialist, ryan.farrell@navy.mil

VIII. Submission of Questions

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

Questions regarding full proposals should be submitted no later than two weeks before the dates recommended for receipt full proposals. Questions after this date may not be answered.