

Topic: N132-133

## Systems Technology, Inc.

### Advanced Helo Display for Zero-Zero Shipboard Landings

There is a critical need to improve Navy rotorcraft shipboard recoveries in degraded visual environments and high sea state conditions. Systems Technology, Inc. (STI) is developing the Adaptive Shipboard Guidance and Recovery Display (ASGaRD) that supports single pilot shipboard recoveries under zero-zero conditions with a set of intuitively integrated guidance and spatial cues that are optimized to enhance pilot-vehicle system performance and safety. With a 60 year history, STI is an industry leader in the design, analysis, and evaluation of manual and automatic flight control systems and related technologies. Building on this expertise, the effectiveness of ASGaRD has been demonstrated via piloted simulation. Team partner, Lockheed Martin Rotary and Mission Systems, is the prime contractor for the MH-60R and is providing support and guidance towards fleet integration.

### Technology Category Alignment:

EO/IR Components for sensing, transmission and communication

Rotary Wing Vehicles

Protection, Sustainment, and Warfighter Performance

System Interfaces & Cognitive Processes

### Contact:

David Klyde

[dklyde@systemstech.com](mailto:dklyde@systemstech.com)

(310) 679-2281127

<http://www.systemstech.com>

**SYSCOM:** ONR

**Contract:** N00014-15-C-0117

 Corporate Brochure: [https://navystp.com/vtm/open\\_file?type=brochure&id=N00014-15-C-0117](https://navystp.com/vtm/open_file?type=brochure&id=N00014-15-C-0117)

# Department of the Navy SBIR/STTR Transition Program

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ONR Approval # 43-2203-16

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Advanced Helo Display for Zero-Zero Shipboard Landings  
Systems Technology, Inc.

## WHO

**SYSCOM:** ONR

**Sponsoring Program:** PMA-299

**Transition Target:** MH-60R

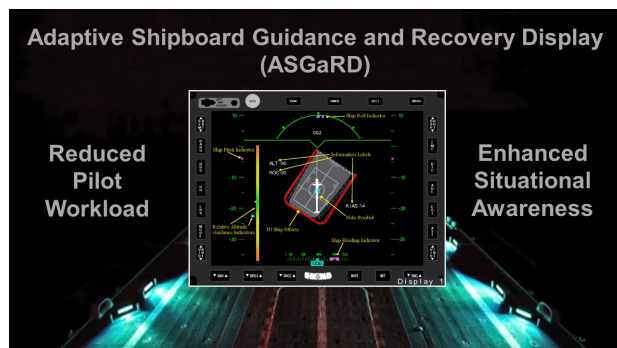
**TPOC:**

Dr. Kenneth Iwanski

[kenneth.iwanski@navy.mil](mailto:kenneth.iwanski@navy.mil)

**Other transition opportunities:**

Within the Navy other transition opportunities include PMA-261 and the emerging CH-53K King Stallion platform as well as the legacy CH-53E Super Stallion and the MH-53E Sea Dragon. Phase II team member Lockheed Martin Rotary and Mission Systems is the prime contractor for these platforms. PMA-275 provides another transition opportunity via the MV-22 and CV-22 Osprey. While modifications to ASGaRD will be required, transition opportunities are also possible with Army and Air Force land-based helicopters, wherein the enhanced guidance features can aid degraded visual conditions due to weather conditions or brown out.



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## WHAT

**Operational Need and Improvement:** There is a critical need to improve Navy rotorcraft shipboard recoveries in degraded visual environments and high sea state conditions. There is therefore a need for head-down display symbology that, as stated in the SBIR Topic objective, will enable a helicopter pilot to safely, efficiently and easily land on a moving ship deck without outside visual cues. This SBIR topic is sponsored under the ONR Sea-based Automated Launch and Recovery System (SALRS) program. More significantly, this program will directly support the needs of PMA 299, which provides world-wide support for the Navy's H-60 helicopters (i.e., MH-60S and MH-60R).

**Specifications Required:** Requirements as stated in the SBIR Topic are to: (1) provide display symbology that is easily interpretable for rapid and low workload pilot response, and that is unambiguous and confidence inspiring; (2) take into account the maneuverability of a helicopter representative of the MH-60R/S, and the response time of a pilot; (3) provide guidance to a pilot to bring the helicopter onto the flight deck so that the helicopter and ship motions at touchdown are synchronized; (4) provide continuous and appropriate indication of limits and safety margins; and (5) utilize a display representative of those in existing MH-60R/S helicopters.

**Technology Developed:** Systems Technology, Inc. (STI) has developed the Adaptive Shipboard Guidance and Recovery Display (ASGaRD) that supports single pilot shipboard recoveries under zero-zero conditions with a set of intuitively integrated guidance and spatial cues that are optimized to enhance pilot-vehicle system performance and safety. With outside visuals not available, ASGaRD includes animation of a moving ship deck that provides pilots with enhanced situational awareness. Guidance symbology leads the pilot to the desired shipboard approach and recovery.

**Warfighter Value:** For Navy helicopter pilots, ASGaRD will allow single pilot helicopter deck recovery via a set of intuitively integrated guidance and spatial cues under zero-zero visibility conditions. ASGaRD's advanced guidance and symbology will reduce pilot workload and enhance safety when outside visual cues are not available under these challenging conditions.

## WHEN

**Contract Number:** N00014-15-C-0117 **Ending on:** December 31, 2016

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Phase II Base Program Piloted Simulation Evaluations	High	Quantitative and qualitative pilot evaluations.	4	November 2016
Phase II Base Program Prototype	Med	Phase II Team and Stake Holder Assessments	4	December 2016
Phase II Option I Evaluations at NAVAIR Manned Flight Simulator	Med	Quantitative and qualitative pilot evaluations.	5	December 2017
Phase II Option II MH-60R Integration & Simulation Evaluations	High	Quantitative and qualitative pilot evaluations.	6	March 2019

## HOW

**Projected Business Model:** (ASGaRD) will meet Navy objectives via a software solution that is compatible with the existing multi-function cockpit displays of the MH-60R thereby allowing for rapid fleet integration. STI plans to transition this technology through the Prime based on the needs and requirements established by PMA-299. The prime for the MH-60R is Lockheed Martin Rotary and Mission Systems. Sikorsky Aircraft, now part of Lockheed Martin, provides the H-60 airframes that are assembled into a MH-60R at the Owego facility. Lockheed Martin Mission Systems and Training are subcontractors to Systems Technology, Inc. on this Phase II SBIR, so the Prime is well-engaged in the development of ASGaRD and provides a distinct competitive advantage.

**Company Objectives:** With a nearly 60 year history, STI is an industry leader in the design, analysis, and piloted evaluation of manual and automatic flight control systems and related technologies. The company objectives for the Forum for SBIR Transition event are to enhance visibility for the emerging ASGaRD technology beyond ONR and NAVAIR to the fleet, in general, and the helicopter PMA's, in particular, such that a Phase III commercialization pathway can be identified and pursued. To demonstrate the capabilities of ASGaRD, a real-time demonstration will be available to Forum attendees.

**Potential Commercial Applications:** Potential non-DoD and commercial applications for ASGaRD include US Coast Guard helicopter shipboard operations and commercial helicopter offshore oil rig operations. Phase II team member Lockheed Martin Rotary and Mission Systems provides access to advanced platforms (e.g., S-92) that are designed for these missions. Fly-by-wire platforms such as the S-92 will achieve enhanced performance in degraded environmental conditions with the incorporation of ASGaRD in the cockpit MFD's.

**Contact:** David Klyde, Vice President & Technical Director, Engineering Services  
[dklyde@systemstech.com](mailto:dklyde@systemstech.com) 310/679-2281 x127