**WHAT**

**Operational Need and Improvement:** There is an urgent need to improve shipboard recoveries in degraded visibility conditions with high sea state conditions wherein these Navy aircraft are often required to operate. The Systems Technology, Inc. team is working directly with ONR, NAVAIR including the Manned Flight Simulator facility, and NAWCTSD to develop a pathway to increased TRL that will ultimately lead to fleet integration. The current Phase II Base program will conclude with piloted simulation evaluations of JASMINE at the Manned Flight Simulator facility at Patuxent River NAS using an F/A-18 representative cockpit environment. If successful, pathways to flight test Integration and assessment will be pursued next.

**Specifications Required:** As stated in N161-056, the objective of this topic is to “develop and demonstrate Head-Up Display symbology for pilots to perform tactical jet landings on an aircraft carrier in highly degraded visibility and deck motion conditions, using advanced flight control augmentation and precision ship-relative navigation.” The display must be easily interpretable, matching display dynamics with aircraft dynamics and flight control, and provide high confidence situation awareness, including ship deck motion and landing area dimensions. The display must be compatible with existing HUD displays that are used throughout the flight envelope, to avoid any disorienting or difficult to learn transformations when transitioning from mission operations to landing approach. Finally, the aircraft should fly a standard Case III (straight-in) approach to landing.

**Technology Developed:** The Jet Aircraft Shipboard landing Man-machine Interface for Naval Environments (JASMINE) meets Navy requirements via a software solution that is compatible with the existing cockpit head-up display technology of the F/A-18E/F, thereby allowing for rapid fleet integration.

**Warfighter Value:** The combination of the MAGIC CARPET flight control modes with JASMINE’s advanced symbology and guidance algorithms will direct pilots to safe shipboard recoveries regardless of visibility conditions or sea state. JASMINE will provide the Naval Aviator with advanced visual cues that enhance situational awareness of aircraft and ship relative position thereby reducing pilot workload when outside visual references are not available. Ultimately, JASMINE will enhance safety under the most challenging environmental conditions.

**Projected Business Model:** JASMINE will meet Navy objectives via a software solution that is compatible with the existing cockpit head-up displays of the F/A-18E/F/G thereby allowing for rapid fleet integration. STI plans to transition this technology through a military HUD provider based on the needs and requirements established by PMA-265. Rockwell Collins, a military supplier of HUDs and the F-35 HMD, will be participating in the Phase II Option of this program. This provides STI with a pathway to fleet integration through an industry leader in military cockpit avionics and displays thereby providing a distinct competitive advantage.

**Company Objectives:** With 60+ year history, STI is an industry leader in the design, analysis, and pilot testing/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 JASMINE technology beyond ONR and NAVAIR to the fleet, in general, and the strike fighter PMA’s, in particular, such that a Phase III commercialization pathway can be identified and pursued. To demonstrate the capabilities of JASMINE, a real-time simulation will be available to Forum attendees that will allow forum attendee “pilots” to safely land a Super Hornet on an aircraft carrier under severely degraded visual conditions.

**Potential Commercial Applications:** As all travelers understand, weather continues to be a factor in air travel delays and cancellations. To address these issues, the JASMINE technology can be re-hosted for airport-based operations. Here, the opportunities will benefit the commercial, business, and general aviation markets by providing a means to perform and/or improve approach and landing performance with enhanced safety when operating in Category III instrument meteorological conditions. In these applications, the JASMINE carrier reference symbology will be replaced by an airport specific runway reference.

**Contact:** David Klyde, Vice President & technical Director, Engineering Services
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**WHEN**

**Contract Number:** N00014-18-C-1009  **Ending on:** November 22, 2019

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Risk Level</th>
<th>Measure of Success</th>
<th>Ending TRL</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prototype Display Symbolology Development</td>
<td>Med</td>
<td>Symbology and underlying guidance algorithms operate as intended and validated via analysis.</td>
<td>3</td>
<td>1st QTR FY19</td>
</tr>
<tr>
<td>Engineering Simulator Evaluations</td>
<td>Med</td>
<td>Down select to best performing symbology options and guidance algorithm parameters.</td>
<td>4</td>
<td>2nd QTR FY19</td>
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<tr>
<td>Display Integration/Checkout at NAVAIR/MFS</td>
<td>High</td>
<td>Display fully integrated in real-time environment with all features functional.</td>
<td>5</td>
<td>4th QTR FY19</td>
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<tr>
<td>Test Pilot Evaluations</td>
<td>High</td>
<td>Quantitative task performance and qualitative pilot opinion metrics.</td>
<td>6</td>
<td>1st QTR FY20</td>
</tr>
</tbody>
</table>

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**HOW**

**Projected Business Model:** JASMINE will meet Navy objectives via a software solution that is compatible with the existing cockpit head-up displays of the F/A-18E/F/G thereby allowing for rapid fleet integration. STI plans to transition this technology through a military HUD provider based on the needs and requirements established by PMA-265. Rockwell Collins, a military supplier of HUDs and the F-35 HMD, will be participating in the Phase II Option of this program. This provides STI with a pathway to fleet integration through an industry leader in military cockpit avionics and displays thereby providing a distinct competitive advantage.

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