Draper Draws on Navigation, Autonomy Expertise for Navy's USV Programs

Medium Displacement Unmanned Surface Vehicle (MDUSV) prototype Sea Hunter pulls into Joint Base Pearl Harbor-Hickam, Hawaii on Oct. 31, 2018. U.S. NAVY

ARLINGTON, Va. — Draper is leveraging its work on the U.S. Navy's unmanned underwater vehicles toward building systems for the service's future family of unmanned surface vehicles (USVs), a company official said. The company's experience in navigation, autonomy, sensors and control systems will enable it to provide a strong proposal for some systems for the USVs.

Draper is one of 40 companies the Navy chose to develop technology for the various systems in six functional areas for the Navy's USVs under a five-year, $982 million, indefinite-delivery/indefinite-quantity, multi-award contract. Each company has chosen to develop certain systems within the program. Draper is working on development of payloads, non-payload sensors, and autonomy and vehicle control systems.

Draper will provide capabilities for Navy platforms that include the existing Sea Hunter USV, the medium and large USVs, and the mine countermeasures USV, Draper said in a release. "The company will deliver sensor and actuator technologies, computing technologies, design methods and tools and modeling and simulation technologies, among others."

Bill Borgia, director of mission systems for Draper — formally known as the Charles Stark Draper Laboratory Inc. in Cambridge, Massachusetts — told *Seapower* that his company has been supporting the Navy for more than 60 years in guidance and control systems, most notably those in the service's

submarine-launched ballistic-missile systems since the days of the Polaris program.

Borgia said that Draper is an independent, not-for-profit, developer of technology that focuses on developing “first-of-their-kind systems and putting them in the field, ready for production.”

He said Draper developed the guidance system for the Apollo spacecraft, the first fly-by-wire aircraft, the first swim-by-wire submarine – the Navy’s Seawolf-class attack submarine. His division focuses on precision navigation and timing systems and guidance, navigation and control systems.

Borgia said that Draper has deployed on vehicles of various sizes the Maritime Open Architecture Autonomy (MOAA), a “Navy standard autonomy package that can be applied to unmanned systems – surface or subsurface.”

Under the new contract, Draper will deliver the hardware and software for the autonomy controller for inclusion on USVs.

Draper has been delivering alternatives to GPS navigation over many years such as celestial, vision-aided, magnetic and other navigation techniques to provide assured navigation to the Navy. Draper is under a separate contract to provide ship-board celestial navigation systems to the Navy.

Borgia said the “holy grail” of autonomy is to be able to “task an unmanned system to similarly to how you would task a Sailor, a human subordinate,” with sensors and actuators.

“What is more challenging is, tell me exactly what those sensors are seeing,” he said. “Instead of seeing a radar blip, tell me what that radar blip is. As you go to higher and higher levels of control, you’re trying to understand the world more like a human would understand it.”