DARPA Awards PARC Contract to Expand Ocean Knowledge

The different sensors for the Ocean of Things effort can provide data for a broad array of areas including ocean pollution, aquafarming and transportation routes. Business Wire

PALO ALTO, Calif. – PARC, a Xerox company, has been awarded a contract by the Defense Advanced Research Projects Agency (DARPA) for the next development phase in the Ocean of Things, a project to expand what scientists know about the seas, the company said in an Oct. 22 release.

Initially announced by DARPA in 2017, the Ocean of Things project is deploying small, low-cost drifters in the Southern California Bight and Gulf of Mexico to collect data on the environment and human impact. This includes sea surface temperature, sea state, surface activities, and even information on marine life moving through the area.

“Oceans cover more than 70 percent of the earth’s surface, but we know very little about them,” said Ersin Uzun, vice president and general manager of the Internet of Things team at Xerox. “The drifters gather data that we could never track before, enabling persistent maritime situational awareness.”

Each solar-powered drifter has approximately 20 onboard sensors, including a camera, GPS, microphone, hydrophone, and accelerometer. The different sensors can provide data for a broad array of areas including ocean pollution, aquafarming and transportation routes.

PARC leveraged its more than fifty years of experience developing industry-leading technologies to design a drifter that best fit the DARPA requirements for the program. Among

other things, the float needed to be made of environmentally safe materials, be able to survive in harsh maritime conditions for a year or more before safely sinking itself, and use advanced analytic techniques to process and share the data gathered.

PARC built 1,500 drifters for the first phase of the project and will deliver up to 10,000 that are more compact and cost-effective for the next phase. Data gained in this round will help further optimize the final design, at which point DARPA expects to deploy large volumes of these drifters to provide continuous information and a better understanding of oceans that is missing today.

Pratt & Whitney Awarded Contract for F135 Engine Modernization Study

An F135-PW-100 engine, which powers the F-35 Joint Strike Fighter, undergoes salt water corrosion testing in the Arnold Engineering Development Complex SL-3 facility at Arnold Air Force Base, Tennessee, in 2016. U.S. Air Force / Christopher D. Rogers

EAST HARTFORD, Conn. – Pratt & Whitney, a division of Raytheon Technologies Corp., has been awarded a $1.5M contract to conduct an F135 modernization study and operational assessment by the F-35 Joint Program Office to determine specific propulsion system growth requirements for Block 4.2 F-35 aircraft and beyond, the company said in an Oct. 20 release. The study is expected to conclude in March 2021.

“This award is a significant milestone for the program and the warfighter, as we look to ensure the F135 propulsion system continues to provide the foundation for all air vehicle capability requirements over the full lifecycle of the F-35,” said Matthew Bromberg, president, Pratt & Whitney Military Engines. “As we look to the future, growth in aircraft capability must be met with matched propulsion modernization. Fortunately, the F135 has ample design margin to support agile and affordable upgrades that will enable all F-35 operators to keep pace with evolving threat environments.”

Under this award, Pratt & Whitney will assess F135 engine enhancements required to support future F-35 weapon system capability requirements across all F-35 variants beginning with Block 4.2 aircraft. The scope of the assessment focuses on enhancements addressing improvements to up and away thrust, powered lift thrust, power and thermal management capacity, and fuel burn reduction.

Designed with the knowledge that operational environments will evolve and threats will advance, the F135 is postured to meet future F-35 capability requirements. Its modular design and advanced digital architecture allow for the agile development and spiral insertion of both hardware and software upgrades. As part of the study, Pratt & Whitney’s GATORWORKS organization will complete the conceptual design and analysis of multiple F135 Engine Enhancement Package (EEP) growth options with phased insertion plans.

Leveraging significant U.S. Government and Pratt & Whitney investment in next generation adaptive propulsion technologies, Pratt & Whitney’s EEP approach offers low risk, variant-common upgrade options for the F135 that provide increased performance aligned with the program’s continuous capability development and delivery strategy and serve as a critical enabler for future capability growth of the F-35 weapon system.

The combat-proven F135 is the most advanced operational fighter engine in the world, delivering 26% more thrust, 116% more powered lift, and more than a 300% increase in power and thermal management over 4th generation fighter engines – all with a demonstrated mission capability rate of greater than 94%.

“Built upon decades of combat propulsion experience, the F135 provides the warfighter with a critical technological advantage over adversaries at an unparalleled value to the taxpayer,” said Bromberg. “With more than 40,000 pounds of thrust, unmatched low-observable signature, world-class thermal management, and innovative engine control system, the F135 is a critical enabler of the F-35 weapons system and of operations conducted in advanced threat environments – a core element of the National Defense Strategy.”

State Dept. Approves Possible Sale of Defense Systems for Romania

A Naval Strike Missile is launched from the littoral combat ship USS Coronado (LCS 4) during missile testing operations off the coast of Southern California. U.S. Navy / Mass Communication Specialist 2nd Class Zachary D. Bell

WASHINGTON, D.C. – The State Department has made a determination approving a possible Foreign Military Sale to the Government of Romania of Naval Strike Missile (NSM) Coastal Defense Systems (CDS) and related equipment for an estimated cost of $300 million, the Defense Security Cooperation Agency (DSCA) said in an Oct. 19 release.

The Government of Romania has requested to buy two Coastal Defense Systems (CDS) consisting of: up to ten Link-16 Multifunctional Information Distribution System – Joint Tactical Radio Systems (MIDS-JTRS). Also included are two Coastal Defense System Fire Distribution Centers; four Mobile Launch Vehicles; Transport Loading Vehicles; Naval Strike Missiles; non-operational Inert Handling/Loading Missile to support missile handling and loading/unloading; training missile and equipment spares; associated containers; training and training equipment; publications and technical documentation; spares parts; loading and mobile maintenance support; U.S. Government and contractor engineering, technical, and logistics support services; and other related elements of logistical and program support. The estimated total cost is $300 million.

The proposed sale will improve Romania's capability to meet current and future threats by improving Romania's maritime defense capabilities in the Black Sea and increasing interoperability with the United States. Romania will use this long-range, precision strike weapon to enhance mission effectiveness, survivability, and NATO interoperability in current and future missions and operations. Romania will have no difficulty absorbing this equipment and support into its armed forces.

The principal U.S. contractor will be Raytheon Missile and Defense, Tucson, Arizona.

General Atomics Begins

SeaGuardian Validation Flights in Japan

The General Atomics Aeronautical Systems MQ-9B SeaGuardian remotely piloted aerial system. GA-ASI

HACHINOHE, AOMORI PREFECTURE, Japan – General Atomics Aeronautical Systems Inc. (GA-ASI) kicked off a series of validation flights on Oct. 15 for Japan Coast Guard (JCG) in Hachinohe, Aomori Prefecture, Japan. GA-ASI is working with Asia Air Survey (AAS) in Japan to conduct the flights.

"We appreciate Asia Air Survey's support in demonstrating how the MQ-9B SeaGuardian RPAS [remotely piloted aerial system] can provide affordable, long-endurance airborne surveillance of Japan's maritime domain," said Linden Blue, chief executive officer, GA-ASI. "The system's ability to correlate multiple sensor feeds and identify vessel anomalies provides effective, persistent maritime situational awareness."

The SeaGuardian flights will validate the wide-area maritime surveillance capabilities of RPAS for carrying out JCG's missions, from search and rescue to maritime law enforcement. These flights follow successful "legacy" MQ-9 maritime patrol demonstrations in the Korea Strait in 2018 and the Aegean Sea in 2019. The Hachinohe operation features the MQ-9B configuration, capable of all-weather operations in civil national and international airspace.

The SeaGuardian RPAS features a multi-mode maritime surface-search radar with Inverse Synthetic Aperture Radar (ISAR) imaging mode, an Automatic Identification System (AIS) receiver, a High-Definition – Full-Motion Video sensor equipped with optical and infrared cameras. This sensor suite, augmented by automatic track correlation and anomaly-detection algorithms, enables real-time detection and identification of

surface vessels over thousands of square nautical miles.

GA-ASI's MQ-9B is revolutionizing the long-endurance RPAS market by providing all-weather capability and compliance with STANAG-4671 (NATO airworthiness standard for UAVs). These features, along with an operationally proven collision-avoidance radar, enables flexible operations in civil airspace.

Textron Systems, Shield AI to Collaborate on Multi-Domain Autonomy

Textron Systems and Shield AI will collaborate to integrate artificial intelligence into military systems. Shield AI
HUNT VALLEY, Md., and SAN DIEGO, Calif. – Textron Systems Corp., a Textron Inc. company, and Shield AI, the artificial intelligence (AI) software company focused on operationalizing AI for maneuver by enabling systems to operate on the edge in denied environments, announced in an Oct. 13 their collaboration in support of advanced, multi-domain autonomy for a variety of military applications.

Based on years of mutual experience in the field, Textron Systems and Shield AI are cooperating on proof-of-concept work to integrate Shield AI technology into Textron Systems' proven air, land and sea unmanned systems. As a world-class designer and integrator of systems spanning more than one million operational hours, Textron Systems works with the best and brightest in the business, including Shield AI, to deliver superior capability for evolving customer missions.

“Working with U.S. Department of Defense customers since the 1980s to provide reliable, highly capable unmanned systems, we understand how these technologies extend the capabilities of our warfighters, while keeping them at a safe standoff distance,” notes Senior Vice President Wayne Prender of Textron Systems. “We are continuously enhancing our autonomous platforms to meet stated and anticipated future requirements for our customers. We look forward to collaborating with Shield AI on this shared priority.”

“Shield AI is delighted to announce this collaboration with Textron Systems, a leading defense technology company known for its advanced unmanned systems and hardware,” says Ryan Tseng, Shield AI cofounder and CEO. “We are excited to innovate together and believe this marks a significant moment on our path to achieving our mission and delivering AI for Maneuver at scale.”

General Atomics, Boeing Partner on High-Energy Laser Weapon System

An artist’s conception of the High Energy Laser weapon system. General Atomics Electromagnetic Systems

SAN DIEGO — General Atomics Electromagnetic Systems (GA-EMS) and Boeing are partnering to jointly pursue opportunities for a 100 kW-class scalable to 250 kW-class High Energy Laser (HEL) weapon system to support a variety of air and missile defense applications, the companies announced in an Oct. 13 release. The partnership combines both companies’ expertise in

directed energy to build a best-in-class HEL solution capable of delivering superior, combat-ready protection for the warfighter on an accelerated timeline.

The HEL weapon system will combine GA-EMS' scalable distributed gain laser technology, HELLi-ion battery systems and integrated thermal management with Boeing's beam director and precision acquisition, tracking and pointing (ATP) software. In addition to meeting the high-output power, range, adaptability and precision ATP requirements necessary to defeat an increasing array of emerging threats, the HEL weapon system's compact footprint will offer a reduced logistics footprint and greater configurability for both stand-alone use and integration with a variety of mobile ground, sea and air-based platforms.

"GA-EMS has made significant advancements in developing and demonstrating highly scalable laser technologies to facilitate high output power in smaller, lighter weight packages," said Scott Forney, president of GA-EMS. "We look forward to working with Boeing to deliver a laser weapon system with capabilities designed to meet current operational requirements, while providing the flexibility and adaptability to suit emerging platform requirements supporting missions across a multi-domain battlespace."

"Our partnership with General Atomics will deliver an innovative HEL force protection capability to the warfighter that is capable of supporting future needs and modernization objectives," said Norm Tew, Boeing Missile and Weapon Systems vice president and general manager, and Huntsville site senior executive. "Together, we're leveraging six decades of directed energy experience and proven, deployed technologies to rapidly field a next-generation solution with unmatched precision, performance, safety and affordability."

SAIC Wins $49.5M U.S. Navy Contract for Saudi C4ISR Upgrades, Refurbishment

U.S. Marines with 2nd Battalion, 7th Marines assigned to the Special Purpose Marine Air-Ground Task Force-Crisis Response-Central Command (SPMAGTF-CR-CC) 19.2, conduct raid rehearsals with the Royal Saudi Naval Forces (RSNF) during Nautical Defender (ND) 20. SAIC will continue to provide C4ISR support services to the RSNF under a new task order. U.S. Marine Corps / Lance Cpl. Sahara Luna

MCLEAN, Va. – The U.S. Navy awarded Science Applications International Corp. a $49.5 million single-award task order to continue to provide the Royal Saudi Naval Forces support services for command, control, communications, computers, and intelligence, surveillance and reconnaissance (C4ISR) upgrade and refurbishment, the company said in an Oct. 12 release. The work will take place in the Kingdom of Saudi Arabia.

Under the cost-plus fixed-fee task order, awarded as part of the SeaPort-NxG contract, SAIC will leverage repeatable solutions such as engineering, design and integration, integrated product support and sustainment capabilities on critical networks. These networks fulfill the Naval Information Warfare Systems Command's requirement for Program Executive Office C4I International Integration Program Office (PMW 740) Royal Saudi Naval Forces (RSNF) In-Kingdom of Saudi Arabia (KSA) Support Services.

"For more than 40 years, SAIC has supported the Navy's mission to help maintain the Royal Saudi Naval Forces' C4ISR capability modernization, engineering and logistics," said Jim

Scanlon, SAIC executive vice president and general manager of the Defense Systems Group. “As a leader in technology integration, SAIC is excited to continue its assistance to the Navy as it continues to build this strategic partnership with the Kingdom of Saudi Arabia.”

SAIC will deliver solutions and services to include program management, systems engineering and integration, maintenance engineering, and integrated logistics for the modernization and refurbishment of RSNF systems. These services are enabled by SAIC’s legacy of support to RSNF, and SAIC’s investments in digital engineering and end-to-end logistics and supply chain solutions.

The prime contract has a five-year base period of performance.

Tanker loading crude damaged by floating mine in Yemen

Explosive Ordnance Disposal Technicians Attach demolition materials to a simulated floating mine in order to dispose of the mine in this 2019 photo taken during exercises in the Arabian Gulf. A similar floating mine is thought to have damaged the Maltese-flagged tanker MV Syra. U.S. Army / Staff Sgt. Sidney Weston

A Maltese-flagged tanker has reportedly been damaged by a mine while taking on crude on October 3 outside the Yemeni port of Bir Ali. MV Syra reportedly suffered significant damage, resulting in a oil spill.

The Iranian Press News Agency (IP) reported on Oct. 6 that “An

oil tanker of the United Arab Emirates was exploded and sunk in Yemen's Al-Nashimah oil port. The Emirati oil tanker Syra carrying 500,000 barrels of oil was exploded and sunk in Al-Nashimah oil port, due to a collision with marine mines."

Other sources report that Syra was damaged, but not sunk. In fact, as of 8:30 a.m. EDT, the vessel was underway on its own power and preparing to arrive at the Port of Khor Fakkan in the UAE.

According to maritime website *Splash*, "A number of suspicious floating objects were reported to have drifted towards the tanker as it was loading its cargo. One or two of these objects – assessed as likely to have been floating IEDs or sea mines – later exploded in proximity to the tanker."

Splash reported that significant pollution has been spotted in satellite images in the wake of the Syra. "Splash understands the tanker suffered damage to its forward ballast tanks, but has been able to move on its own power and is due to arrive in Fujairah in the United Arab Emirates later today where its cargo will be transferred and then the ship will head for repairs.

A listing of maritime casualties on *vesseltracer.com* stated that "Syra was targeted by a marine mine which caused an explosion at the Rudhum/Al-Nashimah terminal, Yemen, on Oct 3, 2020, at 8 p.m. The mine was planted by the Southern Transitional Council militias, while the tanker was in the process of loading oil at the terminal. The Syra immediately halted the pumping process after the explosion, which caused minor damage. She departed the terminal on Oct. 4 at 7 a.m. headed to Khor Fakkan, United Arab Emirates, where further damage evaluation was to take place after the arrival on Oct 9. One ballast tank was reportedly damaged."

Yemen has been devasted since 2014 by a civil war between the Saudi-backed government forces and Iranian-supported Houthi

rebels.

Mines, both on land and at sea, have been employed by the Houthis. Three Egyptian fishermen were killed in International waters by sea mines near Yemen in February of this year. A Saudi Press Agency (SPA) report said that Houthis indiscriminately planted 137 mines in the south of the Red Sea and Bab-el-Mandeb strait, which were located and destroyed.

“Houthi militia’s continued planting and deploying naval mines is a serious threat to maritime navigation and international trade in the south of the Red Sea and Bab-el-Mandeb strait,” an SPA spokesman said.

HawkEye 360 Satellite System Tracked Chinese Activity near Galapagos

A schematic from Hawkeye 360 showing how the system works.

ARLINGTON, Va. – The recent concentration of Chinese fishing vessels in the vicinity of the Galapagos Islands in the Eastern Pacific Ocean, accused of fishing inside the Ecuadorean Economic Exclusion (EEZ) around the islands, was tracked by a commercial satellite system that intercepts RF signals and can detect when a vessel turns off its AIS (Automatic Identification System).

HawkEye 360, a commercial satellite company which specializes in RF geo-analytics, collected RF data from the Chinese fishing fleet near Galapagos and published the data, which the company said “reveals the Chinese vessels deactivated their

Automatic Identification System (AIS) tracking system hundreds of times to ‘go dark.’ “

The discovery of the Chinese fishing fleet near Galapagos raised protests from Ecuador and other nations, despite the denial on Aug. 24 by Chinese Ambassador Chen Guoyou that the fishing fleet did not penetrate the EEZ. The Ecuadorean navy sent vessels to investigate the fleet, later joined by a U.S. Coast Guard cutter.

The EEZ around Galapagos is larger than Spain and Portugal combined, and therefore “using traditional coast guard and airplane observation is near impossible making it easy for fishing vessels to ‘go dark’ and cross into the EEZ,” HawkEye360 said in a release.

According to Reuters, Ecuador’s government said that 149 of some 325 vessels still fishing near the ecologically sensitive islands had turned off tracking systems to prevent monitoring of their activities.”

HawkEye 360 “discovered multiple instances of dark vessels within the EEZ boundary that didn’t correlate with AIS records – raising suspicion of illegal fishing without notice,” the company said. “HawkEye 360 also conducted a joint RF and SAR [synthetic aperture radar] collection with partner Airbus Defence and Space Intelligence. By fusing multiple forms of intelligence, they found many dark vessels and a better understanding of fleet activity.”

“During a six-week period from mid-July to the end of August, HawkEye 360 compared its geolocations against AIS data to filter out vessels that were routinely reporting their locations,” the release said. “The remaining hundreds of geolocations indicated previously unknown vessel positions. Of greatest concern, HawkEye 360 discovered multiple instances of RF activity within the EEZ immediately adjacent to the heart of the Chinese fishing fleet. None of these locations

correlated with AIS records for the entire day when they were detected. Although it could be other types of vessels engaged in legitimate activity, these signals may be evidence of dark Chinese vessels crossing into the EEZ to conduct illegal fishing.

“Airbus’s automatic vessel detection extracted 58 vessels locations from the SAR image and provided estimated size and heading for each vessel,” the release said. “Comparing these locations against +/- 60 minutes of AIS data matched only 16 vessels to AIS tracking, again reinforcing the many gaps in the AIS record.”

The HawkEye360 satellite system also has been used to track Chinese forces along the Indian border and “dark” Iranian vessels at sea,” said John Serafini, chief executive officer of HawkEye360, in an Oct. 8 interview with Seapower.

Hawk360 has one satellite system currently in orbit. The system includes three satellites that fly in a cluster and triangulate RF emissions of 1 watt and greater, including S-band and X-band radars, Serafini said.

The company plans to launch a second system in December and will launch another five systems – roughly one per quarter – in 2021 and 2022. The first system was carried aloft by a Space-X rocket and has been in orbit for 20 months.

The data – all unclassified – from the satellites is sold to governments and private companies and organizations. Serafini was not at liberty to discuss specific customers, but said that they included U.S. defense, intelligence and civilian organizations, international defense and intelligence organizations, and commercial entities.

Serafini, a former U.S. Army officer, said that HawkEye360 raised $130 million in private financing to launch and operate the company.

GE to Provide LM2500 Gas Turbines to Power Pakistan Navy's MILGEM Corvettes

Derlim Cotte (center) and Cheri Undheim from Florida State College at Jacksonville's Vision Education & Rehabilitation Center look at the inside of a LM2500 Gas Turbine Motor. U.S. Navy / Scott Curtis

EVENDALE, Ohio – GE Marine has signed a contract with STM (Savunma Teknolojileri Mühendislik Ve Ticaret A.Ş.), Ankara, Turkey, to provide LM2500 marine gas turbines to power the Pakistan Navy's new MILGEM multipurpose corvettes, GE announced in an Oct. 6 release. STM is the main propulsion system integrator for the MILGEM newbuilds.

In July 2018, the Pakistan Navy contracted for four MILGEM corvettes with ASFAT (Askeri Fabrika ve Tersane İşletme A.Ş.), two of them to be built in Turkey and the other two in Pakistan. Recent milestones for the Pakistan Navy's MILGEM program include the keel laying of the first ship in Istanbul, Turkey, and the steel cutting ceremony for the second corvette in Karachi, Pakistan.

"We are delighted to provide the Pakistan Navy with our proven LM2500 gas turbine to power these new MILGEM corvettes," said Kris Shepherd, vice president, Marine Operations, GE Marine, Evendale, Ohio. "Our LM2500 gas turbines are reliably logging operating hours onboard the Turkish Navy's four MILGEM corvettes, the first of which was commissioned in 2011," he added.

The propulsion system for all the MILGEM ships consist of one

LM2500 gas turbine in a combined diesel and gas turbine configuration with two diesel engines; total propulsion power is 31,600 kilowatts. Additionally, 24 LM2500s operate aboard the Turkish Navy's *Barbaros* and *Gabya* class frigates. Worldwide, there are over 1,200 marine LM2500 gas turbines providing reliable power for 39 international navies and in countless industrial applications.

The LM2500 gas turbines for the Pakistan Navy's MILGEM program will be manufactured at GE's facility in Evendale, Ohio.