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NAVY SBIR TRANSITION PROGRAM

SPOTLIGHT

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Stottler Henke advances autonomous VTOL landing technology through Navy experimentation

Stottler Henke Associates, Inc., a California-based small business specializing in artificial intelligence, is developing an innovative Navy SBIR-funded technology to help uncrewed aviation systems (UAS) with vertical takeoff and landing (VTOL) capabilities analyze potential landing sites. The technology enhances the Navy's ability to conduct stealthy autonomous takeoff and landing operations in noncooperative naval environments.

In 2025, Stottler Henke brought its Autonomous VTOL software for Intelligent and Adaptive Noncooperative landing (AVIAN) system to two large-scale Navy experimentation exercises, gaining valuable data and insight into the system's performance in real-world operational conditions.

Stottler Henke participated in Silent Swarm 25, hosted by Naval Surface Warfare Center Crane Division, which focused on experimentation with technologies employed on small multi-domain unmanned systems. The company also participated in Coastal Trident, conducted by Naval Surface Warfare Center Hueneme Division in Southern California as part of the Navy's Advanced Naval Technical Exercise (ANTX) program. Both events are designed to help participating companies and the Naval Research & Development Establishment (ND&RE) assess technology performance and inform future science and technology investments.

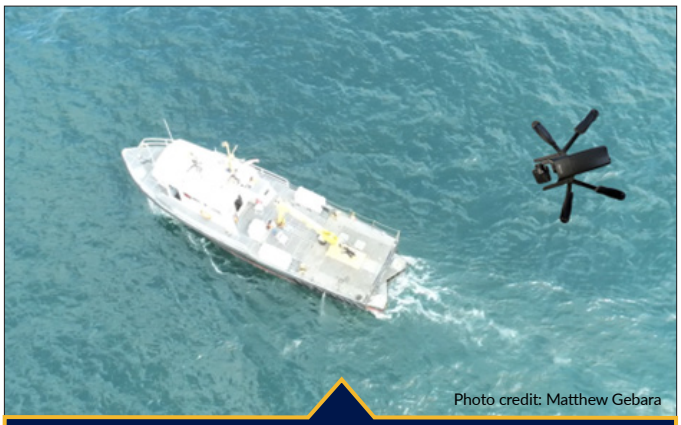

Photo credit: Matthew Gebara

Field experimentation enabled Stottler Henke to test and deploy its Autonomous VTOL software for the Intelligent and Adaptive Noncooperative Landing (AVIAN) system in real-world conditions.

According to AI software developer Matthew Gebara, who executed for Stottler Henke at Silent Swarm, field experimentation allowed the company to validate system performance by flying a drone in a wide range of conditions, including varying sea states, different video conditions, and operations aboard vessels the company would not otherwise have access to.

"Stottler Henke had the opportunity to fly on board different NOAA vessels. At one point, our team landed on an unmanned surface vessel and gathered a vast array of practical, real-world at-sea data," Gebara said. "There are things you can simulate, but once you are out in the real world you find interesting new use cases and new approaches that you would not discover in a

simulated environment."

Gebara also emphasized the collaborative value of the events. "Our team had some great interactions with stakeholders and other groups. We had the opportunity to interact with different companies and help them explore how other technologies can fare when there's an autonomous system flying. Overall, it was a valuable experience. Stottler Henke is on track to be part of Silent Swarm again in 2026, which will allow us to fly more, collect even more data, and make sure the technology is ready to transition into real world use."

AVIAN integrates data from multiple sensors, including an onboard camera and inertial measurement unit (IMU), to model the environment and intelligently analyze potential landing sites. After selecting a site, AVIAN continues monitoring the environment during approach. Upon reaching a landing site and ensuring it is suitable, AVIAN uses IMU and camera data to safely land. AVIAN then uses stored landing data along with new sensor information to depart the site while remaining covert.

"This technology consists of a couple of components," said Bridge Eimon, Stottler Henke's principal investigator for the project. "The first and most apparent is autonomous drone control: the ability to control a drone from a hover point where it's surveying the scene all the way to the landing site. That includes deciding the best route, the optimal time to land, and how to avoid lines of sight and areas of high traffic or visibility. We've also started to work on making the system platform agnostic, with interfaces to different drone control systems.

"The other component, how we select landing sites, is the 'special sauce' of the project," he explained. "Our team uses computer vision algorithms, structure from motion algorithms, SLAM algorithms, and heuristics to choose large open areas on a ship that appear relatively flat and aren't changing very much and then track that space over time."

The landing site selection process occurs in two phases. "The first is what we call 'coarse site selection,' which processes the entire ship very quickly to narrow it down to candidate points. We then perform 'fine site selection,' which looks at those candidates in more detail. The algorithm also takes into account the proximity of other high-quality landing sites. If the drone reaches its selected landing site and a person is standing there, it's better if alternative sites are close by so the system can change course with minimal replanning."

According to Eimon, the 2025 experimentation events aligned perfectly with AVIAN's developmental timeline. "In Phase I, we tested our algorithms and architectures in simulation. We had confidence in how things would work but you never truly know until you test in the real world. Silent Swarm gave us an excellent opportunity to take the algorithms we developed in simulation, apply them in real world conditions, and collect data and metrics as we crossed the SIM-to-real boundary."

Stottler Henke's technical point of contact for the Navy SBIR project, Anthony Brescia, is a proponent of using experimentation events to reduce transition risk, Eimon said. Before the company was even awarded its Phase II contract, Brescia connected Stottler Henke with the

Department of the Navy SBIR Experimentation Cell (DoN-SEC), which helped identify Silent Swarm and Coastal Trident as the best fit for the technology and supported the team during execution at the events.

"Getting the technology in front of potential clients and transition partners early is huge because it builds buy in, generates early feedback, and helps us develop an optimal solution for end users. It's not possible without that iterative feedback. We can demonstrate the technology, see what worked and what didn't, and understand what features the users and clients want," Eimon added.

"This is a major strength of the SBIR program as well. It brings small companies into this innovation pipeline where we can iterate and develop faster than a traditional prime contractor. We can turn things around quickly, working in six-month-to-two-year phases, and create something that ultimately provides significant value to the government."

While Stottler Henke is currently focused on transitioning AVIAN to the Navy, the technology has potential commercial applications as well. As businesses explore future drone delivery service, AVIAN's ability to identify landing sites that avoid heavily trafficked areas could be used to help deter package theft. Its ability to adapt mid-flight to changing conditions, rerouting to a secondary landing site when necessary, could also enhance intelligent scheduling software, such as Stottler Henke's Aurora scheduling solution, originally developed for NASA. "That capability is very applicable to the commercial sector, for scheduling manufacturing, classes, appointments—any heavily resource-constrained environment," said Eimon.

Stottler Henke has specialized in developing AI solutions for defense, federal agency, and commercial customers since 1988, using techniques that include case-based reasoning, reinforcement learning, machine learning, and large language models.

"We specialize in automating human thought processes," Eimon emphasized. "Anything a human operator does, we try to assist with artificial intelligence, in the broadest sense. These days artificial intelligence is often equated with large language models and machine learning, but those aren't the right tools for every problem. If you just have a hammer in your toolbox, everything starts looking like a nail. We use the full toolkit, and we don't try to take the human out of the decision process but rather present a more curated set of data to the human decision maker to reduce cognitive burden."

Headquartered in San Mateo, California, Stottler Henke develops intelligent software solutions for planning and scheduling, autonomy, knowledge management and discovery, education and training, and machine learning and data analytics. The company has received numerous awards for its work, including the Small Business Association's Tibbetts Award, which recognizes exceptional success developing cutting-edge technologies through the SBIR/STTR programs. For more information visit www.stottlerhenke.com.

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