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SEPTEMBER 2005 • governmentvideo.com



Industry News

UAV provides NOAA with airborne eye

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In a project that offers possibilities for long-range video surveillance for scientific and law enforcement applications, the National Oceanic and Atmospheric Administration has teamed with NASA to mount a high-resolution video camera on an unmanned aerial vehicle, with its pictures being transmitted to the UAV's ground-based operators at Gray Butte, CA. NOAA funded the project, its first-ever use of UAVs for an earth sciences application, to determine whether UAVs can provide a safe, accurate, and cost effective method for patrolling vast marine areas, such as the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve.

"The reserve is approximately 100 miles wide and 1,200 miles long, and encompasses entire length of the Northwest Hawaiian Islands chain, from Nihoa Island to Kure Atoll," said Todd Jacobs, West Coast regional coordinator for NOAA's National Marine Sanctuary Program. "Trying to patrol this area to catch illegal fishing and other prohibited activities is extremely difficult, particularly because the area is so remote. The work is long and often quite tedious. Being able to monitor this area remotely using real-time video from UAVs would improve our surveillance and enforcement, and be more cost effective than using manned aircraft."

NOAA started working with NASA on the project last year, according to Jacobs. The first test flights were conducted last spring, and additional flights were scheduled for last summer.

With a range of more than 2,500 miles, a wing design that allows flights as high as 52,000 feet, and the ability to carry enough fuel for up to 32 hours of uninterrupted flying time, the rear prop-driven Altair UAV from General Atomics is an ideal platform for long range video surveillance. Better yet, because its pilot is safely on ground, the UAV doesn't need a cockpit, oxygen, or an on-board washroom. When one pilot gets tired, they can be relieved without bringing the Altair back to base — the remote control of the flight via satellite is simply handed off to a fresh operator.

Of course, UAVs are equipped with real-time video capture, otherwise their pilots couldn't see where they were flying. However, to get the quality of video required for effective surveillance, NOAA and NASA mounted a Wescam electro optical/infrared imaging system (nicknamed the "Skyball") on the underside of the Altair's forward fuselage.



NOAA and NASA will continue to evaluate the potential of UAVs for patrolling marine areas.

"The Skyball can be used to locate and identify a vessel within a restricted zone, and to determine what activities the vessel is engaged in," explained Jacobs. "We can also accurately determine the vessel's precise location in real time using the Altair's onboard GPS locator and the Skyball camera's crosshairs."

For NOAA and NASA, surveillance video with PTZ capability wasn't enough: They wanted to be able to downlink and then distribute the video across NOAA's intranet in real time. Specifically, NOAA wanted to know whether such video could be shared among various far-flung agencies, and see if the UAV platform was flexible enough to allow the participants to actively direct its surveillance as they met in cyber-

space. This way, different enforcement agencies could work together to handle actual intrusions, coordinating their responses together as the situation unfolds.

To make this happen, the NOAA/NASA team downloaded real-time video from the Altair UAV via a Ku band satellite link to the GA-ASI ground station in Gray Butte, where it was encoded using a Streambox SBT3-5000. It was then sent over the Internet to a NOAA IT facility in Boulder, CO, where a StreamboxTV Server decoded the video and managed the distribution across NOAA's WAN. At more than 30 receiving sites, StreamboxTV decoders unbundled the video for immediate desktop viewing by PC and Mac users.

"The Streambox solution used was similar to the one CNN employs for its broadband satphone video reports," explained Bob Hildeman, president and CEO of Streambox. "In CNN's case, the compression is even more aggressive, because their reporters have to send out their reports over a 128 Kbps Inmarsat channel."

Despite the distance traveled by the UAV's signals — including the 45,000 mile hop to and from space — the NOAA signals reached their destinations with little delay. "We had law enforcement participants who were able to see what they wanted to see in real time by directing the UAV's Skyball operator to pan, tilt, and zoom as they wished via the Streambox solution and a conference call," added Jacobs.

The NOAA/NASA trials showed that UAVs can be used quite successfully not just for high-resolution video surveillance, but also as a real-time eye for law enforcement and security agencies during times of crisis. Plus, streaming technology adds the potential of interagency coordination for a variety of situations.

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