

Virginia Beach NICE JEWISH GIRLS GONE BAD

These women have been on Comedy Central and HBO, deconstructing years of tradition in vaudeville-style comedy. 8 tonight at The Jewish Mother, 3108 Pacific Ave. (757) 422-5430.

Suffolk "THE NUTCRACKER"

This timeless holiday classic is being performed by Ballet Virginia at the Suffolk Center for Cultural Arts, 110 W. Finney Ave. 3 p.m. today and Sunday. (757) 923-2900.

Chesapeake CHRISTMAS IN THE COUNTRY

The Triple-R Ranch is offering music, horse-drawn hayrides, a skate park, children's crafts, a live Nativity scene and more from 5:30 to 9 p.m. today. 3533 Bunch Walnuts Road. (757) 423-4177.



SATURDAY

The Virginian-Pilot

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STEPHEN M. KATZ | THE VIRGINIAN-PILOT

See the boat in action at PilotOnline.com.

BOAT WITH SENSE CAN STEER ITSELF

Navy warfare center tests a craft with a brain of its own

By Matthew Jones
The Virginian-Pilot

FORT MONROE

Subject: Look Mom, no hands.
Full name: Autonomous Maritime Navigation Unmanned Surface Vehicle. AMN USV for short.

English translation: a boat that drives itself.

In development for most of the past decade, an experimental craft is now plying local waters as its developers fine-tune its thinking.

"We're not giving the boat a script - we're giving it a goal," said Eric Hansen of the Combatant Craft Department at the Naval Surface Warfare Center.

Hansen has been pursuing the concept for several years. The boat is a collaboration between the warfare center and

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inside

INAUGURATION HOPEFULS

A Norfolk class writes to a Virginia businessman for a trip to see Barack Obama sworn in.

The Daily Break



sunny, cold

High, mid-40s.
Low, near 30.
Details on the
back page of
Business

coming tomorrow

A Coast Guard retiree in trouble at home tries to start over as a military contractor in Iraq.

There Is Still Room at The Top

Condominium Homes

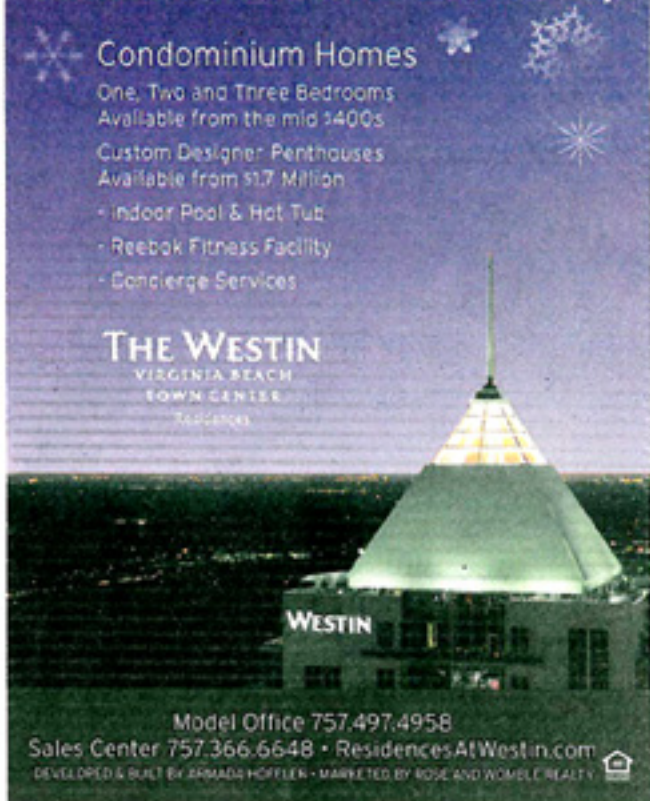
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BOAT | *Unmanned Surface Vehicle being tested in Bay; next up is James River*

Continued from Page 1

Spatial Integrated Systems, a Virginia Beach engineering design and development company.

The boat is not driven by remote control; there is no one with a joystick back at home plate. The vessel has its own eyes, to perceive what's around it, and its own brain, to react to that information.

Its task, for now, is to patrol off the beach at Fort Monroe in a rectangular test range that measures 0.8 by 0.45 nautical miles.

On Friday morning, Sam Calabrese eased the USV out of the fort's docks and into the Chesapeake Bay. His job is to take the vessel to and from the test range and to take over if anything goes wrong. Three onboard technicians monitor the boat's systems. Eventually, none of them will ride along.

Calabrese cranked the 40-foot craft up to a brisk 35 knots, skipping over choppy 2-foot waves in the bracing December breeze. The target, a 30-foot harbor security boat, followed along.

Once at the range, Calabrese made radio contact with the target and the base, then hit a button and relinquished control.

"Drew! Yours!" he yelled back to Drew Sellers, a technician with Spatial Integrated Systems.

The engine kicked in on its own and the boat began its patrol route, scanning the area with a combination of X-Band radar, stereo cameras, a global positioning system, an inertial measurement unit, a second camera array, and a marine VHF-based automatic identification system.

The data from these sensors were fed into software

The goal is to perfect how the vessel "sees" and identifies objects, and then how it relates them to one another, just as the human brain does constantly.

and through algorithms similar to those used on Mars by NASA rovers, which also have to operate autonomously.

Suddenly, the USV made a sharp left turn and picked up speed. It had found something. Up ahead, the target boat motored by. But as the USV closed in, it veered off to the left. Turns out it hadn't picked up on the boat this time but rather a passing wave or something else.

The USV disengaged and resumed randomly patrolling the search box. At one point it was heading straight for one of the Bay's range lights, which stood on a platform above the waves. But the boat's obstacle avoidance software kicked in and the craft maneuvered smoothly to the side.

Meanwhile, the trawler began another pass through the box. The USV locked onto it again.

"Intercept," Calabrese called, keeping score, as the USV hit 12 knots and circled around behind the trawler like a sheepdog. "Engage."

The USV matched the trawler's course and 8-knot speed, staying back but maintaining a presence, all the while sending photos back to the command center on shore.

After several more passes and engagements, Calabrese assumed control and both ves-

sels headed back to the pier.

Hansen said the system is currently like the cartoon character Mr. Magoo, who was intelligent but half-blind. So the next big investment will be to increase its perception.

That will mean an upgrade to K-Band radar, which provides a smaller range but higher resolution. The team also hopes to incorporate laser-based lidar, which in testing has spotted a 6-inch object at 120 meters, as well as a 360-degree camera and a grayscale optical correlator for real-time target recognition.

The goal is to perfect how the vessel "sees" and identifies objects, and then how it relates them to one another, just as the human brain does constantly.

"In the end," Hansen said, "the goal is to create a virtual world in near real time."

The system is scalable to vessels of any size, making its applications numerous, said Rick Simon, program manager for Spatial Integrated Systems.

Future missions could include guarding oil platforms, minesweeping, mapping sea lanes and patrolling ahead of battle groups.

The plan is to send the boat up the James River to Richmond by the end of this month, armed only with observers, maps and a destination. Later trips are planned to Washington and to Navy strike group exercises.

As the program moves from the research and development phase, Simon said the hope is to land it on an admiral's wish list.

Until then, the testing and tweaking will continue.

Matthew Jones, (757) 446-2949, matthew.jones@pilotonline.com