In a metal shed at Fairview Beach Marina, Payne Kilbourn and Lee Hasell work on a sail for a boat they are building. But this is no ordinary sail, and in the annals of sailing, no ordinary boat. Military and Coast Guard applications might include reconnaissance, mine detection and port security.

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The sail more resembles a vertical airplane wing, fitted with solar panels. And the boat - with the help of computers and satellite navigation - will steer itself, with no humans aboard.

Welcome to a technology-enabled brave new world in which unmanned ships will do oceanographic research, monitor oil platforms and undersea cables, patrol harbors and conduct military missions.

The sleepy King George community on the Potomac River isn't exactly a research and development hub, though boats of all types abound. What the location provides is a wide expanse of river for testing - one element that attracted the Dahlgren Navy lab a few miles downriver.

Their company, Unmanned Ocean Vehicles, recently received a $70,000 grant from the Office of Naval Research to produce a small-scale prototype.

UOV is a division of Solar Sailor Holdings Ltd., in Sidney, Australia. Kilbourn is president; Hasell, chief engineer and boatwright; and Gary W. Van Tassel, chief designer. All are experienced sailors.

"You could use this for anything you'd use a manned ship for, only it would be much, much cheaper," says Kilbourn, 51, a Naval Academy graduate who retired as a Navy captain in 2003.

He envisions sending UOVs to remote ocean reaches for climate and fisheries research, tsunami monitoring, gathering oceanographic data and the like.

Military and Coast Guard applications might include reconnaissance, mine detection and port security. UOVs could be launched from land, or transported and released at sea.

The obvious advantage: No crew to feed or put in harm's way, smaller, cheaper vessels and vast amounts of fuel saved.

The company is converting a 20-foot Fiberglas boat with 7-foot beam that will be fitted with computers and navigation software. Those will enable the craft to steer itself by satellite coordinates, right itself in storms, "see" by video link, sense and avoid obstacles, and even shed ocean debris.

Recently Kilbourn and Hasell were working on the 17-foot-high sail, which will give the boat a top speed of about 5 knots. Solar panels on the deck, combined with an electric generator attached to a propeller on the stern, will provide about 500 watts of power more than enough to run electronic systems and sensors.

The prototype should be ready by late fall. The goal, Kilbourn said, is to produce a full-scale, 30-foot model "that you could launch at City Dock and tell it to go to the Azores," an island chain in the mid-Atlantic Ocean used as a pit stop for airlines and ships.

Kilbourn is not sure yet how much that production model would cost.

Unmanned vehicles are not new. Some gas and diesel-powered boats have been developed, and small, pilotless aircraft have been used in Afghanistan and Iraq.

Daryl Davidson, executive director of the Association for Unmanned Vehicle Systems International in Arlington, says unmanned vehicles are getting a lot of attention, especially from the military.

"Generally speaking there's been a huge push over the last 10 years in all types of unmanned systems," he said yesterday. "If you went back and tracked it, research and development and procurement has been on the heels of military conflicts" such as the last two Gulf wars.

"The technology is starting to mature and unmanned systems are no longer taboo."

And that's significant, he says. "Once it's put in use and begins to take off, you start finding people in civil and commercial sectors leveraging the technology. It's no different from the space program," which led to products for the civilian sector. Kilbourn concedes that some in the tradition-bound maritime industry are skeptical of unmanned vessels.

"They're a conservative bunch. The moment you talk about unmanned, they say, 'How do you keep it from running into other people and follow the rules of the road?' My response is, 'Twenty-five years ago there was the same talk about unmanned aerial vehicles.' What's new about UOV's design is nautical freedom. Because it has an unlimited power supply and no crew, it could be on its own for months indefinitely except for periodic maintenance and repairs.

Rigid wing sails have been around for years and aren't practical for light winds, but are practically indestructible compared to traditional sails.

Hasell got blueprints for the design from Van Tassel; parts were produced by a German company. He pieced together the Fiberglas, wood and plastic components and glued them. "I'll take the better part of a week to finish the sail," Hasell said, shirtless and sweating despite the shade under the shed. "This is a most critical thing. You wouldn't want to fly an aircraft with a bent wing. It has to be perfectly square." The sail sits on a post, allowing it to turn with the wind.

Steering it will be another task: "The concept is a computer on the boat, and to link up commercial 18-piloting 3/8 systems, manipulate computer algorithms and teach the thing to sail," Kilbourn said.

He moved to King George in 2002, the year before his retirement from the Navy. Looking for something interesting to do, he started a small consulting firm. Through that, he met Robert Dane, chief executive officer of Solar Sailor, which was looking to expand its business. The company specializes in combining "hybrid" solar and conventional means to power vessels, saving fuel and helping the environment.

With Solar Sailor's expertise and government contacts and Kilbourn's background in naval architecture and submarines, they co-authored a patent for a fully stand-alone, unmanned craft. Kilbourn trademarked the term "unmanned ocean vehicle."

He lined up investors and a solar-panel manufacturer, and teamed up with Virginia Tech to submit an application for the Navy grant.

Hasell, 53, has a background in shipbuilding. "I'm on the Web. Payne found me. We talked and decided that we could make it work."
The project began in June when the pair gutted a 1970s sailboat to create their own design. It could have been done solely by computer, but Kilbourn and Hasell wanted a more hands-on approach to actually build the prototype.

As Kilbourn put it, "to get our butts in it and see how it sails."

Hasell, an Australian who lives in Alexandria and commutes to Fairview Beach, is excited by the challenge.

"I've been building 40- to 90-meter ships. This is totally different. It's more fiddly. It's the most interesting thing I've done. This is like, yeah!"


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