

Tucson tech: UA 'lander' could 1 day test waters



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In the next decade, a little pontoon boat developed at the University of Arizona could be whizzing around a lake on one of Saturn's moons.

In the meantime, there's still a lot of surface water on Earth to be explored.

Wolfgang Fink, a UA associate professor of electrical and computer engineering, recently

presented his concept for a "lake lander" named Tucson Explorer II, or TEX II. Fink is proposing the autonomous exploration vehicle to explore the lakes of liquid hydrocarbon known to exist on Saturn's largest moon, Titan.

The work is a continuation of NASA research Fink had been involved with before coming to the UA from the California Institute of Technology in 2009, focusing on the concept of a network of vehicles able to explore the atmospheres and surfaces of planetary bodies.

TEX II is the second vehicle designed by Fink as part of his NASA exploration concept, which was featured in Science magazine in 2010.

The lake lander prototype isn't much to look at - and that's by design.

"It's generic. That's part of the principle of it," said Fink, noting that its modular design makes it a fine test bed for sensor technologies.

Measuring about 6 feet by 5 feet with twin Styrofoam hulls, the roughly 100-pound TEX II prototype is propelled by two electric fans.

The elevated, twin-propulsion system allows the ultra-stable catamaran to literally turn on a dime, Fink noted.

"It has a very fine maneuverability aspect, which in our opinion you can't get with a single-engine craft," he said.

The central, raised platform can hold up to a 150-pound payload of computers, batteries and sensors, and the prototype is fitted with two forward cameras and a 100-meter sonar sensor.

In its current configuration, TEX II can be controlled from anywhere in the world via an Internet connection, and it will soon be fully autonomous - meaning it will be able to evaluate data and decide to act on its own under a broad directive.

"We're working on a truly autonomous boat," Fink said.

Potential commercial applications include harbor surveillance and cleanup operations, search and rescue, and environmental research, Fink said.

For example, the craft could be valuable for tracking ocean pollution - including floating islands of garbage - and for monitoring radiation levels around nuclear plants such as Japan's heavily damaged Fukushima Daiichi nuclear plant.

"We have some folks who are interested, but it's too early to talk about," Fink said.

His lake lander could tap into a growing market.

The global market for so-called unmanned marine vehicles - including surface and underwater craft - is expected to enjoy double-digit growth in the next few years, reaching a projected \$676 million by 2017, according to Global Industry Analysts Inc., a San Jose, Calif., research firm.

TEX II isn't the only robotic vessel developed in Tucson.

Hydronalix Inc., based in Sahuarita, has developed a kind of robotic, self-righting buoy for surf monitoring and rescue. A few years ago, the company had been working with another UA scientist to develop a more sophisticated sea-skimming craft, which has yet to reach market.

Globally, big players including iRobot - maker of the Roomba robotic vacuum cleaner - market underwater data probes, while another company, Liquid Robotics, has developed a sea-skimming unmanned marine vehicle that harnesses the power of waves for nearly indefinite operation.

But while such systems can cost upwards of \$200,000 per copy, the modular, simple design of Fink's lake lander could be produced economically.

"When things are simpler to make, then you can make them in bulk for a relatively low cost," Fink said.

Meanwhile, Fink said he is also plans to discuss his lake-lander concept with scientists working on the Titan Mare Explorer (TiME) project, which is evaluating a lander mission that would launch in 2016 and arrive on Titan in 2023.

While the UA is supporting his current research, Fink says he's hoping to finance future work with a combination of grants and possibly investor money.

The technology also could lead to a startup company or be licensed to an existing company, he added.

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