



PERSISTENCE

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LEASH



A GROUNDBREAKING PERSISTENT UAV SAVES WARFIGHTER LIVES
AND SHOWS ENORMOUS POTENTIAL IN THE MARKETPLACE

The police chief who handled the Columbine School shooting said that if he had been able to see what was happening inside the building, he would have sent officers in sooner. For an engineer at CyPhy Works, hearing that statement was a powerful “aha” moment. Would it be possible to create a small drone that could enter a structure and stay up for hours, even while providing secure communications?



Founded by Helen Greiner in 2008, CyPhy Works has become a leader in unmanned aerial vehicle (UAV) technology. This is the same Helen Greiner who co-founded iRobot, of Roomba vacuum fame. iRobot also developed the less well known PackBot, a military robot designed to carry out dangerous missions in high-threat scenarios. Since its creation, PackBot has saved the lives of countless warfighters. The new mission of CyPhy Works, located in Danvers, Massachusetts, was to target specific problems using robotic design.

A “persistent” drone, able to stay up for extended periods of time, might have helped at Columbine, and could be a life-saving tool for warfighters, too. In order to make the idea a reality, CyPhy Works turned to the Small Business Innovation Research (SBIR) program for development funding.

An initial SBIR Phase I award from the National Science Foundation in 2009 was later “adopted” as a Phase II by the Defense Advanced Research Projects Agency (DARPA) in 2010, leading to a Rapid Innovation Funding award (RIF) from the U.S. Air Force. The result? A prototype of a pocket-sized tethered drone. This concept demonstrator was powered through a microfilament tether that allowed operators to remain at a safe distance during dangerous entry operations.

CyPhy Works delivered a few of the miniature tethered drones to the Air Force for use in confined spaces such as buildings, caves, and tunnels. But somewhere along the way to deployment and commercialization, demand emerged for a larger persistent UAV that could provide surveillance, reconnaissance, and communications.

“We had customers tell us, ‘That tether thing is amazing. If we could just have [a larger UAV] that goes

up and stays there, that would be really useful for us,” Greiner said. “So we raised investment capital and built the PARC system, further evolving the tether and communications concepts developed under the initial SBIR.”

CyPhy’s Persistent Aerial Reconnaissance and Communications (PARC) system is a three-foot-wide flying hexacopter attached to a Kevlar-strengthened microfilament tether. The tether provides power as well as a closed communications link between copter and operator. PARC weighs 15 pounds, is able to carry its payload up to about 400 feet, and can stay aloft for more than 200 continuous hours of autonomous flight. A variety of payloads can be supported, including cameras, environmental sensors, and communica-

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tions equipment.

According to Greiner, researching and developing the tether system was key to making PARC work. Problems such as wind and spooling of the tether (about the weight of a cell phone charge cord) had to be addressed, and the electronics and tether technologies that provide power and communications needed to be developed. “The spooler is a whole new invention,” Greiner said.

CyPhy Works’ Data Platform provides secure connectivity through the cloud, and allows personnel in the field and elsewhere to see in real-time what PARC is seeing. The technology is also protected from jamming, spoofing, and interception. Industry has been quick to see the value of a rugged UAV that provides stable, secure, and extended autonomous flight. There has been an influx of venture capital from interested companies, including General Catalyst, Lux, Motorola, and UPS.

Currently, CyPhy is marketing the PARC system for



Helen Greiner, founder of CyPhy Works, has spearheaded any number of innovations within the robotics and aerial vehicle sectors, generating value within the marketplace as well as saving the lives of American warfighters.


use in public safety venues and for monitoring operations in mining, construction, and the energy-industry. Two PARC systems were used for surveillance during the Boston Marathon, providing real-time video to the Massachusetts Emergency Management Agency’s (MEMA) operation centers, which gave the system high marks.

Greiner cited SBIR funding as being vital to the development of the engineering concepts underlying both the pocket-sized drone as well as PARC. She explained that, as a small company, CyPhy Works had to choose one of the two projects to prioritize. The demand for PARC made it the obvious choice for commercialization. But that didn’t preclude eventually commercializing the miniature drone or making it available for military uses.

“The Pocket Flyer has a lot of great

military applications—tunnels, culverts, buildings,” Greiner said. “The [military] could really use the Pocket Flyer so they don’t have to put a guy into the building first. You could fly a robot in.”

In the meantime, PARC is providing a persistent presence as an “eye in the sky” for American troops, companies, and citizens. The U.S. Army and Marine Corps have deployed PARC systems through both Special Operations and the U.S. Army’s Rapid Equipping Force. The technology is in high demand.

According to Greiner, a representative from Special Forces told her that PARCs were saving lives. “That’s a great feeling,” Greiner said. “What’s better than having your equipment come from the SBIR program and be out there at the tip of the spear helping with current operations and keeping our guys safe?” 



CyPhy Works, Inc.

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