

Oregon team develops engine to keep drones aloft longer

By Joseph Ditzler
The Bulletin

BEND (AP) — A team led by an engineering professor at Oregon State University-Cascades has developed a prototype hybrid engine for small, unmanned aerial vehicles, in what could be a significant development in drone technology.

Unmanned aerial vehicles, known as drones, and particularly small drones, are often limited by the amount of battery power. A hybrid engine, using a gasoline-powered engine to re-charge an onboard battery, allows the vehicle to stay aloft longer.

Chris Hagen, OSU-Cascades assistant professor of energy systems engineering, and his team managed to scale down the concept, opening the possibility of a viable hybrid engine for “smalls” — drones that weigh less than 55 pounds — said Mark Peters, research compliance

coordinator with OSU in Corvallis.

“Dr. Hagen brings a concept proven in hybrid vehicles and larger aircraft and miniaturizes it,” Peters said Wednesday. “It opens up the door to extending and enhancing the usability of small rotorcraft in research, search and rescue and all those different applications that are restrained by a battery pack.”

Previously, Hagen conceived of and developed at OSU a natural-gas-powered engine that also compresses natural gas, an advance that led to creation of a company, Onboard Dynamics, in Bend, to commercialize the project. Onboard Dynamics partnered with Southern California Gas Co. in January to demonstrate the engine as a more efficient means of refueling natural-gas-fueled school buses.

As for the hybrid engine for small drones, that work began two years ago, Hagen said. The technology existed

in its component parts; the challenge lay in bringing them together to work as a system, he said.

“The integration ended up being a lot more difficult than I expected,” Hagen said Aug. 17. “Although all the stuff exists, you have to basically tailor each one of these components so they consume the right amount (of energy) and they send off the right amount of energy.”

Hagen and his team, which included Sean Brown, formerly an OSU engineering graduate student and now an associate engineer at SpaceX, and Shyam Menon, formerly an OSU engineering professor who now teaches at Louisiana State University, pulled components off the shelf, starting with a Tarot-brand quadcopter. The team today includes a group of undergraduates at OSU-Cascades, Hagen said.

For power, Hagen’s team purchased a small, one-cylinder, two-stroke engine that produces 2.75 horsepower. The German-made engine, a 3W28i, is commonly used in radio-controlled aircraft, said Gerhard Stejskal, owner of Aircraft International LLC, the Florida-based importer that supplied the engine.

Hagen’s team used its

engine to power a generator that charges the batteries that run the electric motors attached to the drone propellers. Although simple in concept, attempts to bring it to reality proved elusive, Hagen said.

“We’ve flown for over an hour, and documented that — an hour and 3 minutes,” he said. “Other people have made these claims but we haven’t seen them do it.”

Actually flying the craft is a sometimes thing, he said. It typically “flies” while attached to a set of rails that allows it to rise and fall in a relatively safe environment. The otherwise modest-looking craft has more than \$230,000 invested in it, in terms of equipment, a NASA fellowship for Brown and the work of at least six other people, Hagen said. A qualified commercial pilot from Corvallis

sometimes crosses the mountains to fly the drone, he said.

“We’ve been at it a couple of years, and we flew five or six times longer than the best battery system,” Hagen said. “We did it just the other day.”

Peters said the hybrid system, on display at the Oregon UAS Summit and Expo in early August in Bend, attracted prospective users’ attention. He declined to identify the interested parties or what applications they had in mind. Other possible next steps include interesting the U.S. Defense Department, the National Science Foundation or other organizations in helping advance the technology, he said.

“Bend has a jewel in Dr. Hagen. He’s a researcher and an innovator that’s helped out a lot of Bend companies,” Peters said. “He’s a great guy to have around.”

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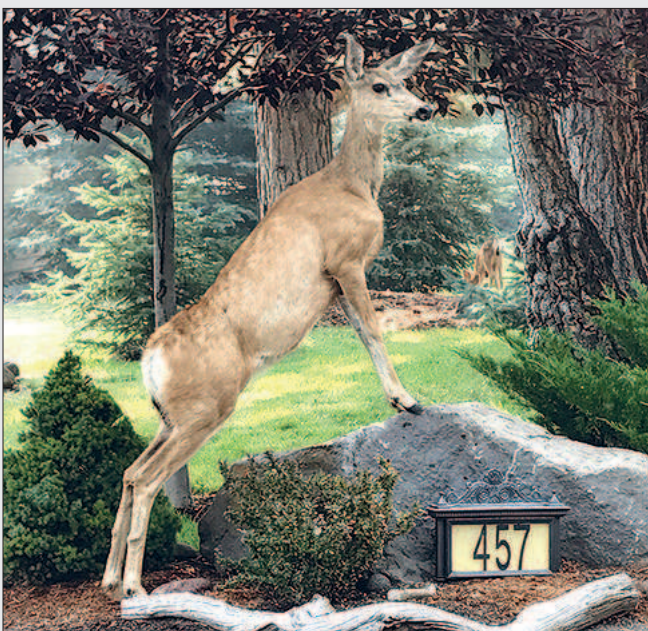


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