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Startups Aim to Get a Piece of the Driverless Car

Low-cost tech and free software let even the smallest players create autonomous vehicles

By Mike Ramsey
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Autonomous vehicles from Cybernet Systems do complex jobs, such as moving shipping containers. Photo: Cybernet Systems

You don't have to be a tech giant to teach a vehicle to drive itself.
Big names like Tesla and Google grab all the attention when it comes to developing autonomous vehicles. But, very quietly, startups have also been getting into the field. These small companies are taking advantage of easily accessible software and plummeting equipment prices to carve out a niche in this emerging industry—retrofitting existing vehicles that do specialized jobs.

Thilo Koslowski, a senior automotive analyst with Gartner Inc., says there are dozens of startups adding autonomous functions to military and farm equipment. A smaller number of them, meanwhile, are tackling the biggest challenge of all, automating passenger cars.

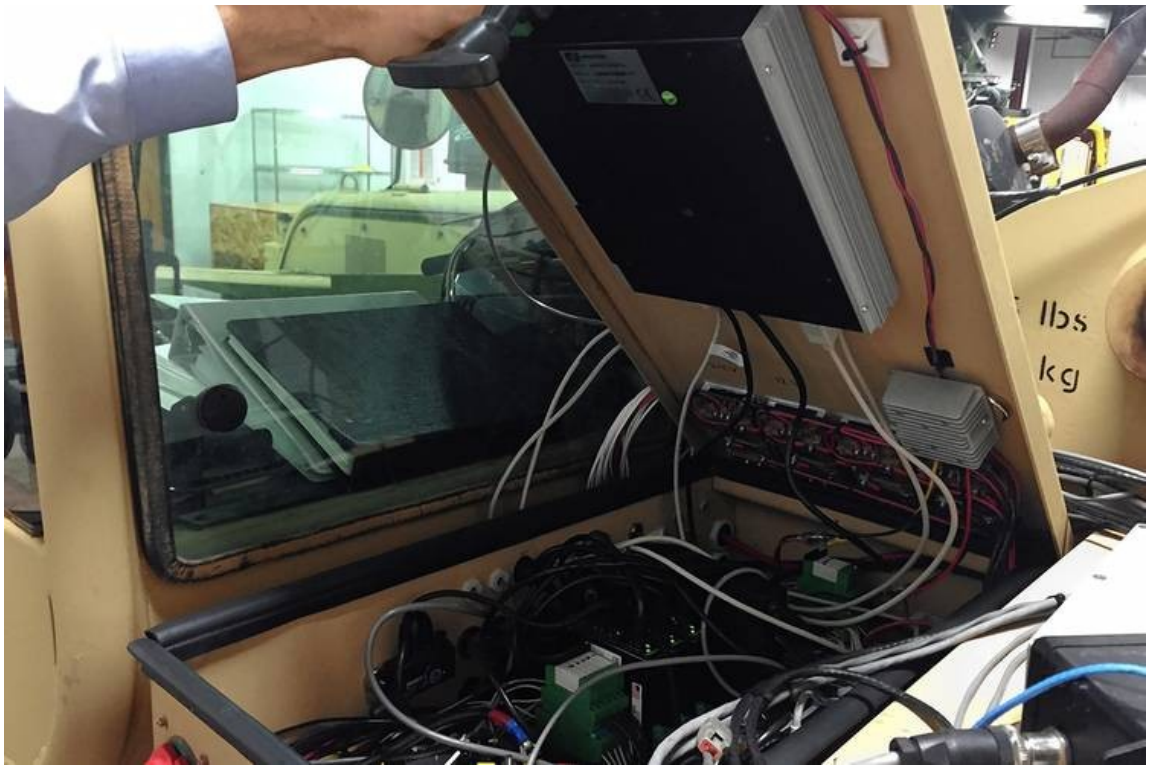
"It shows the innovation in this field isn't limited to big R&D budgets," Mr. Koslowski says.

Easy entry

One of the big advances driving the startup boom is open-source software. For the most part, the programs necessary to run autonomous vehicles have already been developed by universities, which are giving them away free, says John Leonard, a Massachusetts Institute of Technology robotics researcher and one of the leading minds in the autonomy field. “That gives you the ability to rapidly get up to the state of the art. It’s not like an IBM controls that,” Mr. Leonard says.

The cost of much of the equipment needed for autonomy has also fallen dramatically, such as for LIDAR. These laser-based systems, which act like ultradetailed radar for autonomous vehicles, originally cost more than $80,000 each when they were introduced in 2006. Now the manufacturer, Velodyne Acoustics, is offering a version that costs less than $8,000.

In many cases, small companies can even buy a kit that bundles together most of the software and hardware they need, and then customize it to the specific vehicle and job involved. AutonomouStuff LLC, Morton, Ill., sells kits starting as low as $2,000 per vehicle for vehicles with simple functions, ranging up to around $150,000 per vehicle for ones that can do things like plan routes and interact with pedestrians and other vehicles.



Cybernet Systems uses automation kits that allow vehicles to drive themselves. Photo: Cybernet Systems

“What’s happening right now in the automotive industry is a complete transformation of mobility,” says Bobby Hambrick, chief executive of AutonomouStuff, which he says has more than 1,000 customers. “For the first time in history for the automotive industry, five guys in a garage can make a huge impact on the industry.”

Many of the projects that startups are tackling are relatively simple, involving vehicles that operate largely in isolation. Jaybridge Robotics, a Cambridge, Mass., company of 20 people, launched in 2008 and has carved out a specialty in automating large industrial vehicles.

A common assignment: automating a tractor and grain cart to run alongside a combine that is harvesting wheat and collect its grain. The job involves a central computer and sensors placed in strategic spots around the automated vehicle.

“We are primarily a software company, and there is a relatively low bar to making a kit that can make a vehicle autonomy ready,” says co-founder Jeremy Brown, who, like his partner Josh Pieper, used to design autonomous systems for underwater vehicles.

Systems from Cybernet Systems Corp. represent the next step up in autonomous-vehicle complexity. The company, which is based in Ann Arbor, Mich., frequently works with the Department of Defense to turn military vehicles into semiautonomous or autonomous machines that must work around people and other vehicles. One such vehicle sits inside the company’s work bays: a giant, green forklift used to move shipping containers.

The machines can autonomously pick up shipping containers and then move them around. Inside a factory, the specially fitted forklifts can roam around without following a buried metal strip or requiring other sign posts to navigate about, avoiding people and other machines as they go about their work.

Chief Executive Charles Jacobus and his wife, Heidi, who is the chairman, were part of a Defense Advanced Research Projects Agency challenge in 2007 to design cars that were able to drive themselves around a citylike course. The vehicle they designed became the basis of the company’s autonomy kit, which includes a central processing unit, a global positioning system and forward, side and rear sensors.

APT, a startup based in Boston, also aims to tackle complicated autonomy tasks. Launched by the developer of one of the original self-guided transportation shuttles at airports, William Alden, APT is trying to develop a prototype of an autonomous low-speed vehicle that would take a person from a parked car all the way to the airport terminal or even the gate. “The autonomous technology is out there,” says Mr. Alden, who is working with MIT and the Olin College of Engineering, as well as several other engineers. “We are not trying to develop the technology from scratch.”

APT—Airport Personal Transport—launched a Kickstarter campaign earlier this year to raise money to build the prototype. The campaign didn’t reach its goal, but the company continues to operate and seek funds.

Among the most ambitious startup projects is one from Cruise Automation Inc. The San Francisco-based company sells a “pod” that can be installed on the roof of certain Audi models to create an autopilot system—allowing drivers to take their hands off the wheel and their feet off the pedals while on the highway. Cruise Automation said it would ship 50 of these $10,000 systems in 2015, which for now are being deployed only in California.

“Lower hardware costs have tipped the scales so that formerly infeasible business models are now very attractive,” says Cruise Automaton CEO Kyle Vogt. “In those situations, it’s often startups that win.”

Moving ahead

Many researchers in the field are watching the company with great interest, in part because of Mr. Vogt’s pedigree: He was the founder of Twitch.tv, a popular website where viewers can watch other people play videogames, that was ultimately sold to Amazon.com Inc.

Ryan Eustice, a University of Michigan autonomy researcher, has seen firsthand how fast the technology has evolved. But he is skeptical about the safety of a system that is an "appendage" to an existing vehicle. "I don't know how safe it is. It has to go in and work with systems that weren't designed with these functions in mind," he says.

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