In Oakland, hackers race DIY autonomous cars—and it may revolutionize your ride

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They aren't much to look at with their bare plywood or plastic frames, exposed wires and electronic innards on display.

But don't be fooled by these vehicles' rough exteriors. With cameras that let them see and sophisticated software telling them where to go, these mini self-driving cars could help democratize the burgeoning autonomous car industry - and may just revolutionize it in the process.

Each month, anywhere from a few dozen to 100 people gather at a vacant Oakland warehouse. There's no electricity and no flush toilets, just a handful of folding tables and a race course hastily etched in white and yellow paint on the concrete floor, where teams of hackers go head-to-head in a battle to see whose car is fastest, or at least, which one can complete the course.

The informal event is spearheaded by Chris Anderson, a former editor-in-chief of Wired magazine. Ten years ago, he created the website DIYdrones.com to help people build their own drones at a time when the airborne gadgets were mostly used by the military and in the aerospace industry but were out of reach to everyday consumers. The hobbyist site grew into a massive community for open-source robotics development, and later, into 3-D Robotics, a drone company Anderson founded with a business partner he met through the site.

"Ten years later, there was just this sense that we could do it again in cars," Anderson said.

On a recent Saturday, dozens of people lined up against the racetrack to watch the mini cars - about one-16th to one-10th the size of a full-sized vehicle - attempt to complete the course. Some were defeated early by a sloping curve, with the car shooting off in the wrong direction and crashing. Others plodded along diligently, completing the lap, albeit a bit more slowly. And still a few others seemed to accomplish both tasks - speed and accuracy - to the delight of the cheering crowd.

These pint-sized vehicles aren't as sophisticated as the self-driving cars engineered by Tesla or Google but, at under $300 to make and often assembled on site, they're ideal for testing the technology because they're cheap, don't require human safety drivers and can crash without anybody getting hurt or killed, Anderson said.

And that ability to crash and learn from mistakes has already produced major gains, said William Roscoe, a programmer and early participant in the monthly meetup. It took three months before one car could complete the track, he said, but since then, they've watched as the race times have dropped by a factor of three. In just a few more months, Roscoe's teammate, Adam Conway, thinks the cars could approach the speed of a vehicle with a human driver behind the wheel, and one day, even surpass them.

As one of the early participants in the monthly meetup, Roscoe was one of several people who wrote software to control the cars, which has been since uploaded onto the web for anyone to download and use. He's an advocate for one version of autonomous vehicle technology called neural networks, or "deep learning," which essentially teaches the car the course and how to complete it. The other is computer vision, a technique that uses a camera to, in this case, follow the lines on the track.

It's a similar battle to the one being waged in the autonomous vehicle industry today, Anderson said. And while it might be a stretch to think a

bunch of hobbyists could influence an established and well-funded industry, the software doesn't care about the size of the car, he said.

"If you take exactly that same software and exactly the same hardware, it will be an autonomous car," he said, before cautioning, "I wouldn't do that, though, because I can't guarantee it would be safe. But, the idea is that this is on a continuum."

In fact, there's a long history of the racing industry spurring changes in cars and motorcycles. The first automotive races of the late 1870s used vehicles built in tinkerers' garages, said David Vodden, the president and CEO of Thunderhill Raceway, a racetrack in Glenn County, Calif., which last year hosted the first full-sized autonomous vehicle track day.

He credits the insatiable desire to win as the driving force behind the introduction of rear-view mirrors, air-filled tires and seat belts, which are now all industry standards.

"(The track) becomes a laboratory," he said. "One of these Oakland people will find a solution that is not on the big boys' table, and that is how the history of the automobile industry has always been."

Anderson agrees.

"We're not smarter, we're not better funded, and we're not more experienced," he said. "What we do have is the technique of wheel-to-wheel combat."

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