SwRI shifts big rig into automatic for trucking without truckers (video)

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The next generation of commercial trucking won't require truckers.

At least that's the goal behind technology developed by engineers at Southwest Research Institute in San Antonio.

But taking the truck driver out of the cab requires precision, efficiency and low maintenance for the commercial sector, which can be a big leap for technology initially built for the federal government.

CARLOS JAVIER SANCHEZ | SABJ

Stephan Lemmer is a research engineer in the applied sensing and intelligent systems division at Southwest Research Institute in San Antonio.

“The military can be a lot more devoted to maintenance. They can have specialists there that know how to operate [and repair] things. Part of what makes the commercial space so hard to work in is that everything has to be cheap and unbreakable,” said Stephan Lemmer, research engineer in SwRI's applied sensing and intelligent systems division.

Lemmer sat inside a SwRI tractor trailer, nicknamed Big Red, which is a class 8 truck with a gross vehicle weight rating of 33,000 pounds. It is equipped with a camera sensor system attached to the bottom of the truck that's integrated with software that controls the truck's basic functions and follows the engineer's instructions.

"The system looks at the ground and doesn't have any occlusal problems with trees, urban canyons or tunnels that GPS has. The only downside is that you have to create a map," Lemmer said.

But after the truck is taught how to drive, it can follow that route over and over. And it can head in reverse without a driver. That is required to hold a commercial license on private property.

“Backing up [a tractor trailer] ... is quite important for trucking and freight companies. ... It’s quite easy

to drive a truck forward. Driving it backwards is much more difficult," he said.

The sensor system made of cameras is an alternative to GPS and has accuracy down to 2 centimeters. The cameras that focus on the ground can be an alternative to LIDAR technology. LIDAR is a light detection and ranging system that uses light stemming from a top-mounted pulsing laser to measure distances to earth. But LIDAR has a noticeable shortfall when road conditions have low visibility, such as during heavy snowfall. The vehicle can get lost without visual markers.

In 2006, SwRI took $5 million of its own funds and began the internal research and development program to work on autonomous vehicles. It now has 20 self-driving vehicles in its fleet, and SwRI holds several patents related to autonomous vehicle technology.

Widespread commercial use of autonomous trucks on public roads isn't exactly around the corner, but self-driving trucks on private property is possible now.

"If you have a very controlled and predictable route with clear weather, known road, fairly light predictable traffic, you can have it out tomorrow," Lemmer said about the potential application in the private sector. "If you have fair weather, decent traffic for an unmaintained vehicle, I would say that's going to be a couple of years because you have to figure out the diagnostics. If you say full driver replacement, I would say 15 years."

Potential cost savings for the trucking industry include reduced labor expenses and even greater fuel efficiency. For example, trucks that drive in close quarters can take advantage of aerodynamics and reduce fuel consumption up to 10 percent, according to the organization's research. Autonomous long-haul trucking may be a few years away, though, due to gaps in regulation.

Kristen Mosbrucker
Reporter
San Antonio Business Journal