Differences

Autonomous vehicles aren’t exactly new; automakers have been working on the technology, particularly in the transportation industry, where Volvo has been developing an autonomous and electric carrier capable of moving heavy loads. Instead of a driver in a cab, the HX2 uses digital logistics-driven control technology to detect people and other obstacles.

But in contrast with autonomous vehicles on public roads, construction projects occur in relatively constrained environments with controlled variables, Ahmed said. Most job sites have few people, and those who are on site are trained professionals, allowing the robots to work in a more predictable setting than the challenging environments faced by self-driving cars.

Many construction sites use drones with sensors such as lidar with GPS. Controlled remotely by mobile devices, they can capture important information from aerial views, which is then used for building information modeling on a project. But Built Robotics is the first to use AI guidance systems on dirt-moving equipment.

Firsts

Built’s technology turns standard construction equipment — including excavators, dozers and skid steers — into fully autonomous robots. The AI Guidance Systems can be installed on almost any kind of heavy equipment from any manufacturer, while still maintaining full manual operation capabilities.

“Built’s AI Guidance Systems can be installed on almost any modern piece of heavy equipment,” Ahmed said. “We assemble the hardware used in our AI Guidance System, but do not directly manufacture components. Our team helps install the AI Guidance System on a partner’s machinery.”

The first prototype was installed on a Bobcat T650. Today, it’s fitted on lots of construction equipment; popular machines include excavators, skid steers/CTLs and dozers.

The first customers to use the autonomous robots from Built Robotics were excavation contractors in the California Bay Area in early 2018.

Progress

Since then, Built Robotics has deployed autonomous heavy equipment to numerous construction projects, including critical infrastructure projects in the renewable energy, oil and gas pipeline industry and water distribution, across the United States and in Australia.

“The robots have excavated foundations for wind turbines across the Great Plains, handled demolition operations for parts of the I-5 highway system in California, graded pads for large-scale residential developments and dug trenches for energy projects,” Ahmed said.

The upgraded equipment is able to perform jobsite activities completely autonomously, Ahmed said, such as digging trenches, excavating foundations and grading building pads. “It cannot do everything a skilled operator can do,” he admitted, but it can focus on “automatic, discreet, specific tasks.”

The equipment excels in greenfield excavation: areas without underground infrastructure and those that consist of “fresh” dirt.

“Right now, those are the best areas for our robots to operate in,” Ahmed said. “The robots are best used for excavation tasks: trenching, excavating, backfilling, grading, compaction, demolition, clearing and foundation digging.”

How It Works

An autonomous fleet can be managed via a Web-based platform, allowing equipment operators on site to supervise and control the robots. After an operator specifies the GPS coordinates of an area to be dug, an excavator will drive itself to the starting point and proceed to complete the job, digging up to thousands of feet of material a day. One person should stay on site, though, in case a problem arises, Ahmed advised.

When the robots operate out in the field, they send feedback data to software located within an onboard computer. The data includes information about the terrain conditions, obstacles, GPS, safety geofence and topography. If the information differs from the site plans, the robot will make adjustments or pause working. However, if conditions are dramatically different or are unknown, the robot will stop to allow a person (in this case, a remote operator) to make manual