



All-electric autonomous Erion tractor comes with 9 electric motors with gearboxes. Each wheel has a drive motor as well as a motor for steering. The ninth motor raises and lowers undercarriage tools, such as a cultivator.

## Autonomous Tractor Adapts Fast

An all-electric, autonomous Erion tractor that was designed and built in Quebec is slated for on-farm testing this summer.

"We've been working on the Erion for 2 years," says Marc-Antoine Legault, Innovation Vehicle Institute. "We hope to have 10 units in farm fields by 2121."

The 2 1/2-ton, 30-hp. tractor features 9 electric motors with gearboxes. Each wheel has a drive motor as well as a motor for steering. The ninth motor raises and lowers

the undercarriage tool. Electric actuators control row width, moving the side rails of the tractor frame apart or closer together, changing wheel spacings from 54 in. to 78 in. in seconds.

"The steering motors can work in tandem or independently for any type of steering desired," says Legault. "The tractor can turn on a dime, crab steer or shift to one side or the other."

A 350-volt battery on the trailer that

delivers the tractor to the field can recharge on-board batteries, lengthening the workday without having to go back to the shop.

The design of the tractor was the result of interviews with farmers from different sized operations. "Weeding vegetable crops kept coming up so we focused on that," says Legault. "It is labor intensive, and farmers have turned to ever-larger tractors to speed up the work. The resulting soil compaction is reducing yields. Autonomous tractors can deploy smaller equipment."

He explains that the combination of mobility with undercarriage mounting of tools, such as cultivators, will allow more precise and close-to-the-row fieldwork. The prototype has been fitted with a 6-ft. wide cultivator, but is capable of carrying a 12-ft. wide attachment.

"Our first application is weeding with the cultivator," says Legault. "Other types of fieldwork are just a matter of adapting attachments to the frame."

The undercarriage tools require a strong framework. The heavy-duty joints are specifically designed to handle the forces produced by attachments.

The tractor can be controlled remotely as it leaves a trailer to enter a field. Once in the field, the autonomous mode relies on the on-board computer and sensors. Cameras and AI algorithms will detect plants and manage where the cultivation tools go within the row.

The system is designed to communicate with a control communicator at a base station with human intervention only as needed.

"RTK GPS is our navigation base," says Legault. "We are also using Lidar to detect obstacles and 3D lasers, looking for the best configuration of both systems as we experiment in the field."

A bird's-eye camera has also been added to transmit activity real time to the base. This will allow the technician in charge to understand what is going on around the tractor, explains Legault.

"As we gain experience and confidence, we will better understand any safety concerns," he says. "We will start with something simple like cultivating and data gathering and then follow that with real-life experience."

IVI is working with Elmec, a Quebec company, on the project. Funding has also come from the provincial and federal governments. Elmec's concept is to provide field services such as cultivation to farmers for a fee, rather than producing and selling the final autonomous product.

Other projects of IVI include an all-electric school bus, an urban transit bus, and an electric delivery vehicle.

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## Bucket-Mounted Lift Straps Easy To Install

Harley Willett came up with an easy way to lift and move heavy objects with his 40 hp. loader tractor. He replaced the hydraulic cylinder attach pins on the bucket with 7 12-in. long, 1-in. dia. drawbar hitch pins, with the pin handle facing outside. About 3 in. of the handle is exposed, where he attaches nylon lift straps.

He recently sent FARM SHOW photos of a 6-ft. long, 2-in. wide sewn loop end strap that he uses to lift his riding mower for service work. The strap is rated at 6,400 lbs. and has a loop at each end. He looped the strap through itself, then hooked it onto the mower's push bar.

"I bought the hitch pins and strap at Harbor Freight and use them with my New Holland DC 48 loader tractor equipped with a 6-ft. bucket. I keep finding new uses for them all the time," says Willett. "For example, lifting and moving 55-gal. barrels, and loading stuff into my pickup.

"In my opinion, straps are a lot safer to use than chains because the web material absorb shocks. I use only one-piece, heavy duty straps rated for the purpose. When I'm done using the straps I roll them up and store them under the tractor seat."

Willett says the straps can hang straight down from the pins, or be rigged across left to



Bucket-mounted, sewn loop end strap shown above hooks onto the push bar on Willett's riding mower, lifting it for service work.

right underneath the bucket. "The straps also can be thrown over the top of bucket, and that way the rollback cylinder allows more precise control of the lifting process," says Willett. "Using straps this way works great with big 25-in. log tongs, because I can retrieve logs without having to get off the tractor."

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"I keep finding new uses for my bucket-mounted lift straps all the time," says Willett.

## "Head Fan" Designed By Farrier For Farriers

Anyone who shoes horses - or works in any kind of smoky area - will be interested in this new 12-volt "hot fit" fan invented by Reuben Miller, Leesburg, Ind. With a design like a headlamp, its purpose is to blow smoke away from your face as you work.

The 3-in. dia., sealed bearing fan is attached to an elastic head band mounted on a plastic frame, and enclosed in a hinged plastic box that has an on-off switch and can be tilted up or down. There's a rechargeable lithium ion battery pack on back of the band.

Miller is a self-employed Amish farrier who uses a horseshoeing technique called "hot fitting" in which the horse shoe is heated red hot. Then the farrier uses hot tongs to pick up the shoe and presses it onto the hoof, just long enough to melt the hoof horn to match the foot surface of the horseshoe. The process produces a lot of smoke.

"I came up with the idea because I didn't want to breathe in smoke all the time, and because I wanted a clearer view of the hoof and shoe," says Miller. "Normally I hold the hoof between my legs while bending over, and as I work smoke rolls up my chest and into my face. The hinged plastic box provides the fan with a wide range of movement, and can even be tilted down far enough to blow on your face. The entire unit is well balanced and won't slide down over your eyes."

According to Miller, the fan also can come in handy for other jobs. "For example, if you're dehorning cattle with an electric iron you can use the fan to blow away smoke that



Designed like a headlamp, 12-volt "hot fit" fan blows smoke away from your face as you work.

rolls up off the horn stubs," he says. "It also works great when brushing down a horse that is shedding loose hair and covered in dried mud. Instead of having to step back every few minutes to get away from the dust cloud and grab a breath of fresh air, just use the fan to blow the dust away."

The fan with headband and battery retail for \$130 plus S&H.

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## Easy Way To Send Your Ideas

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