



Kyler Laird has set up 4 robotic “tractobots” that drive themselves, including this Deere 6330 that’s used to plant corn.



Laird also modified a Deere 420 garden tractor, an old Massey Ferguson to plant soybeans, and a Challenger for vertical tillage and pulling a grain cart.

By Jim Ruen, Contributing Editor

He Built His Own Robotic “Tractobots”

Kyler Laird watched his Deere tractor and planter put in 500 acres of corn while he sat in a nearby pickup truck working on other farm business. He has also drilled soybeans and done vertical tillage, all while sitting in his truck. Last fall he signaled the tractor on his grain cart to bring it to the combine when he needs to dump. Laird calls the tractors he uses “tractobots”.

“I have set up 4 tractobots,” says Laird. “My first was a Deere 420 garden tractor. Then I modified an old Massey Ferguson to plant soybeans and a Challenger for vertical tillage and pulling a grain cart. Tractobot 03 is a 6330 Deere for corn planting.”

Laird has a bachelor’s degree in computer science and a master’s degree in agricultural systems management, but is self-taught on robotics. He actually started out working with a remote control wheelchair, using a motor controller and computer to control it. The Deere 420 was his first real step in autonomous tractors.

“I bought the 420 at an auction, ripped out the hydraulics and redid it, learning how to make hard hydraulic lines and designing the electronic system using off-the-shelf components,” says Laird.

He set it up so a computer could control the ignition, hydrostatic transmission and clutch. He had to figure out how to electronically control the hydraulic steering and control the rockshaft to lift and lower implements. He installed GPS for positioning.

“I wrote the software and tried it,” recalls Laird. “I configured it to drive from one point to another and avoid obstacles. It worked fairly well. I kept refining it.”

His next step was a 2745 Massey Ferguson using the same style computer interface and programming. He used electric actuators to control the steering and to push the clutch in and an electric solenoid valve for the implements. He tested it out on a disk and then drilled soybeans with it.

Laird traded a Deere for an MT765 Challenger, in large part because of dealer support. While it was difficult getting information from Deere, the AGCO dealer was helpful.

“They brought out 2 huge binders filled with schematics before I even bought it,” says Laird. “It was super easy to interface with.”

In some ways, setting it up for autonomous use was easier than either previous tractor. The hardware already operated electronically,

and it had a guidance system already installed.

“I used the same program code on the Challenger, and it went through the field on a straight line at 19 miles per hour,” says Laird. “The vertical tillage was wonderful. It ran at up to 7 miles per hour. It was more fun sitting in the truck and watching it than it was running it manually.”

Laird is still working on the transmission control. He uses a remote to throttle up and down. “It’s fun watching it at the row ends, slipping around,” he says. “It does the flip to return a whole lot better than I could.”

This past summer he took first place honors for best autonomous planting technology at the AgBOT Challenge, held annually at Gerrish Farms, Rockville, Ind. He entered the 6330 and 8-row MaxEmerge planter he planted his corn with this past spring.

To automate the older Deere, he added an autosteer valve and a steering angle sensor modified from an auto part. He also used linear actuators for the lever on the transmission and for the reverser.

Initially he used a Verizon smartphone for in-field location. When it encountered a dead spot in a field caused by a nearby billboard,

Laird stopped the tractor short of driving through the billboard.

“I installed a larger antenna to eliminate dead spots,” says Laird.

Laird continues to refine his tractobots. He has replaced the smartphone on the 6330 with GNASS GPS receivers. All 3 full-size tractors can be driven manually as well as autonomously. He drives them to the field and then turns them loose after setting the electronic boundaries. Each generation gets better, with the goal of eliminating the need for a tractor cab.

“Tractors with guidance systems pretty much do it all now with auto steer,” says Laird. “I have a Deere 280R with all the technology, leather seats, heat and radio. It’s all a waste of money. I’m looking for tractors 2 generations back that I can modify to do what I want.”

Visit Laird’s Facebook page to follow his progression with the tractobots. Look for videos of his work at FARMSHOW.com.

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Amazing Ram Up To 2.687 Million Miles

“I’ve got plenty of time to visit about my 17-year-old Ram truck because I’m on the road with it right now,” Howard Clayton told us when we called in late September, 2017 to ask if he was still driving his high-mileage rig. “The speedometer is rolling over on 2,687,028 miles and we’re pulling an RV trailer to Texas to help someone buried by floodwaters.” FARM SHOW has written about Clayton and his iconic Ram in 2011 (Vol. 35, No. 2) and in 2015 (Vol. 39, No. 5) and it was great to hear that his rock-solid Ram is still going strong.

Over the past two years Clayton has logged only 200,000 miles with his truck because he says “at age 76 a guy just has to take a little time off”. He and his wife, who sometimes rides along as he delivers RV’s, now spend 2 to 3 months each winter in the South. In his spare time there, he loves to “drive around”, which is what you’d expect from someone who’s delivered RV’s to every state in the lower 48 and every Canadian province.

“It’s the best job anyone could have because I’m my own boss, I see every part of this great continent and my truck never lets me down,” Clayton says. Since we last visited in 2015, his go-to maintenance guy Forest Cunningham in Hallsville, Mo. has changed oil, filters, coolant, tires and put in a new transmission. “The body, frame and interior are still original, and the only modification I’ve made is replacing the



This September Howard Clayton reached 2,687,028 miles on his 17-year-old Dodge Ram.

passenger seat with a bed so I can sleep in here at rest stops,” says Clayton. “I’m still getting 20 miles per gallon empty and 12 to 13 loaded, which hasn’t varied a bit in 17 years.”

Clayton is an owner-operator so he sets his own schedule and works when he wants to. Normally he drives 600 to 700 miles a day, leaving at sunrise and parking in late afternoon so he can have a good meal and plenty of rest for the next day. With the 2017 storms in Florida and Texas, he expects most of his trips will deliver RV’s to those areas. “People down there are just crushed with damage,” says Clayton, who arrived in Houston just two weeks after the storm.

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Stone Furnace Holds Lots Of Heat

Doug Violette’s outside stone furnace has the thermal mass needed to keep producing heat all night long. A small barrel stove serves as the furnace firebox. Insulated air ducts pull warm air out and bring cool air back.

“A single load of wood has been known to heat our 16 by 34-ft. off-grid cabin for up to 16 hrs.,” says Violette.

The 4 by 5-ft. furnace has 8-in. thick, mortared stone walls set on a concrete slab. The furnace is capped by a 4-in. concrete slab roof. Added mass comes from loose stones piled around the firebox, which is fastened to the bottom slab.

“I gathered stones for about 4 years before building the furnace,” says Violette. “We built a fiberglass insulated door and door frame out of sheet metal and 2 by 4’s and mounted it before building the walls. We used old 2-in. lumber to build slip frames for the walls.”

The entire build took about 24 hrs. over a 2-day stretch, recalls Violette. “The stones had been stored on pallets, and the rain had cleaned them. One person mixed mortar while the other lugged stones into place.”

Before installing the firebox, he shortened the 55-gal. barrel stove by about a third. He cut it off below the lower ring and attached it to the floor slab. A small squirrel cage fan operates off a standard line voltage thermostat powered by a small solar panel. “If the temperature inside the furnace is less than 110 degrees, a snap switch keeps



Outside stone furnace uses a small barrel stove as the firebox. Insulated air ducts pull warm air out and bring cool air back.

the fan from running,” explains Violette. “There is no benefit in moving air below that temperature.”

The air ducts are 6-in. galvanized stovepipe surrounded by about an inch of fiberglass insulation, all inside an 8-in. galvanized stovepipe. The cold air pipe runs at near ground level from the cabin back to the furnace. The hot air duct travels at an upward angle out of the furnace.

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