Alberta Farmer Express

Robo-tractors invented by farmers are already here

Software-savvy producers aren't waiting for equipment makers — they're writing code and automating their machines

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by Jennifer Blair

Indiana farmer Kyler Laird posted this video in November after making a new remote control for his automated combine because he wanted something more user friendly than his laptop. In the video, he uses the joystick on the game controller to back the combine out of the shed, bring it alongside a grain cart, and then transfer grain to the cart. To find this and other videos by Laird, go to YouTube.com and search for 'Kyler Laird.' PHOTOS: From 'portable joystick system' on youtube.com Photo: From 'Portable Joystick System' on YouTube

Kyler Laird did it the John Deere way when he returned to the family farm in Indiana after his father's death in 2010.

But after five years of sitting in a tractor, planting crooked rows of corn, he decided to do it his way instead.

Kyler Larid photo: Jennifer Blair

"Even when I was a kid out discing or out drilling, I thought, 'There's got to be a better way,'" Laird told FarmTech attendees last month.

"I spent all this money on RTK (real-time kinematic) guidance, but I thought I could do better."

So he did. In 2015, Laird — who worked as a computer programmer before coming back to the farm — automated his grandfather's Massey tractor using less than $1,000 in parts and some basic computer programming.

That's when things got really interesting.

He sent the tractor out to plant 50 acres of corn in the field across from his house using the simplest algorithms he could come up with. And it worked.

His first 'tractobot' was up and running.

“Automated tractors do not have to be expensive or complex,” said Laird.

Brian Tischler photo: Jennifer Blair

You just need the know-how — and the freedom — to build one. That’s where open-source software and hardware come in, said Mannville-area farmer Brian Tischler, who also spoke at FarmTech.

Think of it a little like a cookie, he said. If you want a cookie, you need the recipe, and if you want a better cookie, you need to change the recipe.

With open-source software and hardware, anyone can tweak the recipe however they want. Closed source, on the other hand, is like buying a box of cookies — you can eat them, but you can’t make them yourself, and you can’t change them to suit your tastes.

Agriculture is mostly closed source.

“Open source is the absolute unicorn of agriculture,” said Tischler. “It basically does not exist. But it’s starting to.”

Open-source future

For most farmers, that’s fine — they don’t want to rig up an autonomous tractor on their own anyway. Moreover, in some cases, tinkering with your tractor to automate it could void your warranty.

But for others, open-source technologies will usher in the high-tech future of the agriculture industry.

“It will change agriculture,” said Tischler.

He started exploring open-source options when he hit a wall with ISOBUS, a system that helps ensure precision tools (such as displays) are compatible with different types of machinery. All he wanted to do was track where he had last seeded into the heavy residue on his field.

“It was the most frustrating experience of my life,” he said. “You can’t get the codes; it’s so locked down. To begin to play, you need at least $100,000 to start.”

So he decided to make his own app. The first thing he did was grab some open-source computer code. Well, almost. A quick Google search into open-source precision-seeding code turned up nothing.

“There was nothing out there. In terms of open source in agriculture, it didn’t exist.”

Tischler looked instead to the marine sector, which uses GPS in a lot of its systems. After scouring YouTube and online forums, he finally found the answers he was looking for.

AgOpenGPS was born.

“It’s literally a game. Instead of you running a game controller, the tractor is the controller.”

Using a visual display on a smart device or computer, the GPS system maps what has been seeded (in green) and what has not (in black).

“I turn the section on when it’s black and turn the section off when it’s green. It’s so simple.”

And the possibilities are pretty much endless — marking rocks in the field using Google Earth; tracking weed resistance in the field; controlling the sprayer or seeder; even automating the tractor itself.

“All of these things are doable with open source,” said Tischler. “You can build whatever you want.”

‘It should be simple’

And that’s what has farmers excited about this type of do-it-yourself technology.

Ken Coles photo: Supplied

"The more traditional approach is to wait for the big companies to come up with it," said Ken Coles, general manager of Farming Smarter. "These guys don't want to wait. They realize what's possible."

In a lot of ways, agriculture technology is behind the times, and farmers are starting to get frustrated by the snail's pace of true innovation in the industry, said Coles, who also farms near Coaldale.

"I look at smartphones and what they can do, and then when I go into a tractor monitor and try to do the same thing, it's like going back in time to the Apollo space mission," he said.

"All these technical barriers are there. It's ridiculous. It should be simple."

This growing trend toward DIY equipment automation is one of the ways farmers are pushing back against this perceived lack of progress.

"These guys are going outside the box and bending some rules to do what they want to do," said Coles, adding that the legality of reprogramming your equipment is still up in the air.

"It highlights the limitations that are placed upon us by big corporations."

Right now, the people who are doing these on-farm automations tend to be "really techy," but there are already some examples out there of what's possible — and how easy it could be.

"Right now, the technical guys are doing it, but if enough people start doing it, there will be more easy solutions out there," said Coles. "I think it will get to the point where it's not that hard to do."

Eventually, companies will start offering more automated solutions for farmers (the industry is already seeing some of that now), but the inevitable march toward automation will be taken in baby steps, said Coles.

"I feel pretty strongly that this path toward automation is the single biggest opportunity that's going to shape agriculture over the next 20 years.

That makes some producers a little nervous, he added.

"I think some of them are terrified by this," said Coles. "They're wondering, 'Well, what am I going to do now?' There's a fear of being replaced."

Still lots to do

But the family farmer won't become obsolete any time soon, Laird said.

"A lot of people think, 'Great, I can go on vacation and check in from the beach,'" he said.

"I think of it as I can do all the things that it takes a human to do instead of trying to be a robot and stay on the line."

Instead of relaxing on the couch while his tractor does the work, Laird is out in the field to check that seed is being properly placed or running to get fertilizer — things he can't do from the cab of a tractor.

"I've been in the cab, and I planted very poorly," said Laird. "If you want to know if you're planting well, you need to get on the ground."

For Laird, who has also done some automation on his grain cart and his combine, autonomous equipment eliminates the tedious parts of farming.

"I could only spend a few hours in a tractor before getting pretty fatigued," he said. "With this auto steer, I could go all day and all night. What a huge difference."

By supervising the operation from his truck or from the field itself, Laird is able to go about the business of farming.

"I'm in the truck answering calls or emails, and I look up and it's done another 10 acres. The ability for me to concentrate on other things is a whole lot different."

So far, the results speak for themselves.

“This year, I planted all of my corn — 535 acres — without being on the tractor while it was planting.”

And yes, the rows were perfect.