

Tapping the Internet-of-Things for Smarter Farming

By Tim Kalinowski

When farmers a century ago looked out on the first diesel-driven tractors working the field, they must have known they were witnessing a seismic change in farming. There are times even today when you see a new innovation or technology brought to market, you get that thrilling pulse down your spine. You just know you have seen the future, and that future is now.

Adam Stanford, a research technician at Farming Smarter in Lethbridge, gets that feeling every time he thinks about the exciting possibilities of the Internet-of-things, otherwise known as Smart Farming.

“I think it has huge potential to completely change the way we farm,” he told Ag-Matters at the recent Lethbridge Plot Hop. “The Internet-of-things, or Smart Farming, is about getting devices which are sensors and thinks like actuators to better utilize Internet-enabled devices that allow you to do your job more easily and efficiently using technology.”

Stanford gives the example of auto-steer on farm vehicles, which are GPS and wireless enabled, as one technology of this type which farmers have embraced. However, total adoption of Smart Farming technology hovers at about the one per cent mark in other areas of agriculture, says Stanford. This low adoption rate may be partly attributable to the costs involved in the changeover, but, he adds, a changeover is surely coming sooner rather than later.

“There are people driving past their field every day going to check and see what their crop is doing,” he explains. “If you can have that data and not have to actually go out to the field, it is going to save you tons and tons of time and money. I really think this kind of smart technology is going to gain wider adoption every year, and I don’t see the trend stopping anytime soon.”

Farming Smarter is aiding with that transition process as best it can, says Stanford, by engaging in field level research on low cost sensor systems. In fact, he modelled just such a low cost system at the Plot Hop for those in attendance.

Using a simple tripod stand, a home-made weather vein, and a collection of low cost technologies he ordered from the Internet, Stanford was able to create an accurate soil moisture and soil temperature wireless measuring device for about \$26. Current commercial retailers on the market sell such arrays for about \$1,700.

To save cost, the prototype uses a reprogrammed chirp sensor, (Yes, one of those little sensors that chirp when your houseplants need water), a low cost soil temperature probe he got for about \$1.50 on Alibaba, and other open source chips and software to make a working array which can transmit its data wirelessly.

There is more testing and refining to be done on the home-made array, but farmers at the Plot Hop were certainly enthusiastic about the price tag.

However, it is not just about the cost of the array, says Stanford, it is also about connectivity. The Internet-of-things may be wonderful, but it does need the Internet part to make most Smart Farming technologies go. Stanford acknowledges that is a bit more of a problem for many producers.

“The connectivity issue is the big one,” he admits. “Cost isn’t necessarily the issue, especially for big operations. But in terms of connectivity, many farmers have these commercial systems where they have to spend \$500 or \$700 per year just to get connectivity. There is no way essentially to do it as this point without having a subscription to somebody’s service. And then you don’t know who has access to your data— so I think that is a big part of why the adoption hasn’t necessarily taken hold yet.”

Stanford says new transmitter systems coming into the marketplace may make that cost-connectivity equation more balanced.

“Now there is LoRaWAN,” explains Stanford, “and I think as soon as the proof of concept gets shown it will start to get adopted. There is a way to build one for \$15, and that is a pretty new development in this.”

LoRaWAN is a media access control protocol designed to allow low-powered devices to communicate with Internet-connected applications over long range wireless connections. This low frequency alternative to current wireless services has a lot going for it as far as agriculture is concerned, says Stanford.

“The interesting thing about LoRaWAN I read the other day is the world record was set for connectivity distance on the system. Somebody attached it to a weather balloon and sent it up. I believe the distance a sensor packet (of data) was able to be sent was right at about 800 km.”

While LoRaWAN trials being conducted around the world are promising for distance and cost, says Stanford, there are also a few drawbacks to consider.

“The big thing about LoRaWAN is it has pretty low signal rates,” he admits. “So if you have LoRaWAN, you are not going to be able to stream video. But you will have the ability to send text readings from sensors and things like that.”

For Farming Smarter it is all about serving the needs of farmers by testing interesting questions those farmers have no time to test themselves, says Stanford. He is excited to continue to look into ways to bring the Internet-of-things to day-to-day farm operations.

“All this (Smart Farming) stuff is finally starting to come together,” he says. “And now that we have these new lower energy protocols where you can go potentially hundreds of kilometres with your signal— and it’s not too expensive, and you own your own data, and it’s secure— I think that going to be sufficiently interesting for farmers some are going to want to adopt it a bit more.”