

# Engineers are designing systems for 24-hour operation

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sends their GPS location back to the rancher, then goes off to check the stock ponds. If needed, it can drop to within 2 meters to read a cow's eyeball temperature, an indicator of health.

John Church, a professor at Thompson Rivers University in British Columbia who advocates using drones for "precision ranching," gleefully suggested they could be deployed against Pacific Northwest ranchers' most fearsome foe: wolves.

"What if you put pepper spray on board?" Church said. "Send a drone out to the GPS and spray them all."

## Technology and the labor problem

Young Kim, CEO of Digital Harvest, said he was inspired a couple of years ago by the da Vinci surgical robotics system. A doctor sitting at a control panel across the room or even across an ocean can operate on a patient using technology that replicates a surgeon's hand movements to manipulate micro-instruments.

Kim, a former U.S. Air Force pilot with experience in drone technology, had been speaking earlier with one of Oregon's premier winemakers, Ken Wright, about the severe labor shortage facing vineyard owners and others in agriculture.

What if, Kim asked himself, you removed the requirement that the workers had to be physically present in the field? What if, like the surgeon, they could do the work remotely? Then there would be plenty of ag workers; they could be anywhere.

From that came the Remote Operated Vineyard Robot — ROVR — now in development. Wearing a virtual reality helmet and gloves, workers could manipulate tools mounted on a robotic vehicle that moves through the vineyard rows. They could prune, pick, lift wires that support vines and other tasks. The vehicle — a converted golf cart is serving as the test platform — could follow a navigation wire buried in the ground, so it wouldn't need a complicated guidance system.

"A dumb robot with a human operator equals a smart robot," Kim said during the Aug. 15-17 expo in Pendleton, Ore.

He envisions ag employees teleporting to work, harvesting grapes in the cool of night for delivery to the vineyard crush pad at 7 a.m. The job might be especially well-suited to people close to his heart: "wounded warriors," military personnel injured in action.

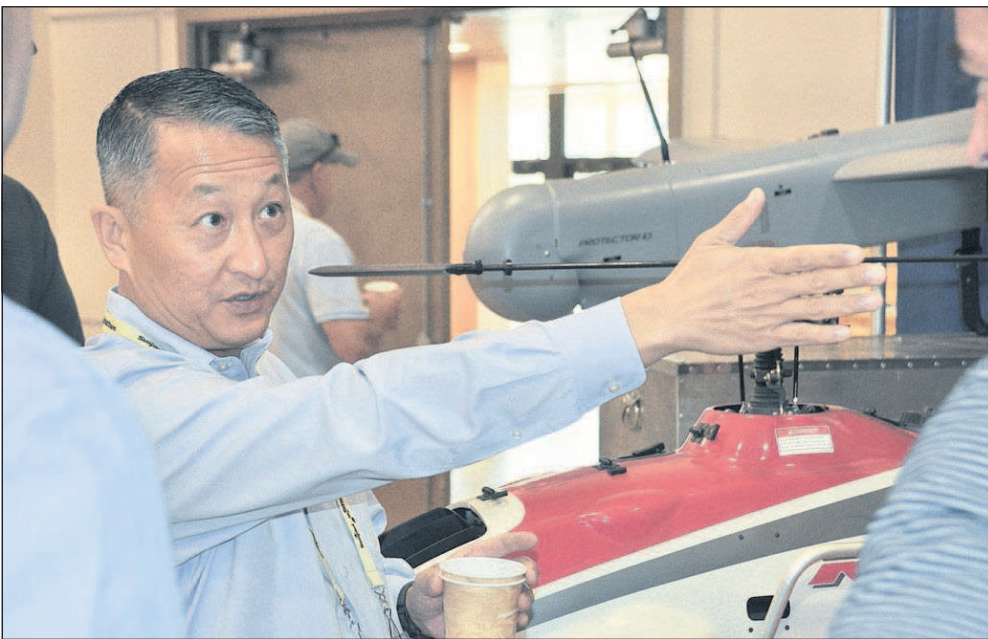
He hopes to have ROVR operational by 2019. His development partners range from Yamaha to staff at the Pendleton Airport's Unmanned Aerial Systems Range and students at Walla Walla Community College. Business Oregon, the state business agency, in August granted the project \$100,000 to help develop a prototype.

"This project proceeds at



Students Zack Thorn, left, and Dru Striefel are part of a Walla Walla Community College team that is testing the ROVR system. The college has an agricultural technology program.

Photos by Eric Mortenson/Capital Press



Young Kim, CEO of Digital Harvest, makes a point during the Future Farm Expo. Kim's company and partnering firms are developing a vineyard pruning and harvest robot that can be remotely manipulated by an operator.



Jake Joraanstad, CEO and co-founder of Myriad Mobile Systems in North Dakota, said advances in robotics and artificial intelligence provide a "clear path to completely automated farming."

the speed of cash," Kim said.

## Develop, demonstrate — and then deploy

The proving ground is Echo West Estate Vineyard, west of Pendleton. Across the way, a remotely piloted Yamaha RMAX helicopter lifts off, finds its bearings and drops down to spray a vineyard. It covers the length of

a row, then flies in reverse to spray the next one over.

It's a miniature bird, 2.75 meters from nose to tail — a little more than 9 feet — and can carry 16 kilograms, 35 pounds, of spray. It's been used for 25 years in Japan, where it's primarily used to spray rice fields. Yamaha has more than 2,500 RMAX operating in Japan and perhaps a dozen in the U.S., and three of them are at Pendleton's UAS

Range. California vineyards are beginning to use the helicopters to replace workers with backpack tanks, and Oregon's may follow suit.

The vineyard is owned by Lloyd and Lois Piercy, who also operate a winery tasting room in the small town of Echo. They've opened their vineyard to testing the ROVR, as well.

Lloyd Piercy, 66, a former World Cup ski racer who turned to farming in 1974, sees the technology as an extension of the evolution that replaced mules with tractors and eventually added GPS guidance and auto-steer. The technology is a leap in food safety and farmworker safety, he said. With an unmanned sprayer, for instance, "Nobody is sitting in that cloud of spray."

Piercy said the technology is "an absolute sea change" for agriculture.

"Here it is," he said, "here it is."

Jeff Lorton, who produced the Future Farm Expo and is something of an evangelist for ag technology, believes the same. He moved his advertising agency from Yamhill County, where he'd done

economic development consulting, when Pendleton was chosen one of only six UAS ranges in the country in 2014.

The Columbia Basin, including Southern British Columbia and Alberta in Canada and the Pacific Northwest states, is "one of the most productive agricultural zones on the planet," Lorton said. Producers in Oregon, Washington and Idaho grow wheat, potatoes, apples, wine grapes, berries, livestock and much more, producing an annual harvest worth \$20 billion before processing, he said.

"When I say \$20 billion in farmgate sales, that gets people's attention," Lorton said. "It's the perfect place for an ag tech accelerator to exist."

George Kellerman, chief operating office of Yamaha Motor Ventures and Laboratory in California's Silicon Valley, was keynote speaker on the first day of the expo. The company works with Young Kim on ROVR and has its RMAX helicopters at the UAS range.

"You are at the leading edge," he told expo attendees. "This is the future of farming."

"In the future, all farm equipment and vehicles will be connected to the internet," Kellerman said. "They will have a sense of their environment and some form of artificial intelligence. (Farm equipment) will look at the environment and act on its own."

Not all of the technology will be devoted to agricultural production. Country Financial, the Midwest crop insurance and financial services company, recently announced it expanded its "crop claims" drone fleet from four to 12.

In a news release, a company loss control executive said, "A crop claims adjuster using a drone can scout three times as many acres as an adjuster on foot. This innovative technology will provide our customers extra peace of mind knowing all their crop damage is accounted for."

## The Hand on the plow

The engineers and entrepreneurs involved in agricultural technology acknowledge they are designing systems for 24-hour operation.

Young Kim, of Digital Harvest, said night will become the default time for spraying. Less wind at night means less spray drift, he said during a panel discussion. Drones fly better at night, too, he said. Another panelist said lasers work better at night as well.

"Fortunately, robots don't get tired," said Stewart Moorehead, a field robotics manager for John Deere who also was part of the panel.

"This march from automation to autonomy is going to change how farming is done," he said.

But what happens to the farmer? What is his or her role? Is the farmer relegated to machine tender? Data analyst? Marketer? Or is the farmer simply a landholder, and the farm's machines become the farmer?

Several Future Farm panelists noted the world population is projected to reach 8.6 billion by 2030, a billion more than now. By 2050, the earth may have nearly 10 billion people to feed.

The venerable family farm may not be up to the task. It's more than an American concern; the Future Farm Expo was attended by scientists, researchers and innovators from Chile, Peru, Uruguay, Nicaragua, Paraguay, Canada, Japan and Germany.

"We can't afford to have people die of starvation," said Jake Joraanstad, CEO of Myriad Mobile Solutions, based in Fargo, N.D. His company sells an application that lets grain elevators communicate directly with farmers, storing and sharing data.

"There's a clear path toward completely automated farming," Joraanstad said. "To solve the hunger problem, we have to be going there, that has to be the future."

"Ideally, with artificial intelligence, it should be better at farming than we are."

## 'We were just asking for a fair shake'

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"We don't twist arms," Stuhlmiller said. "The fact is they granted us an audience and heard our concerns. We walked away without any assurances. There was no doubt in my mind they could still ban" chlorpyrifos.

The meeting came one month before a court-ordered deadline for a decision on whether to ban chlorpyrifos. The 9th U.S. Circuit Court of Appeals, tired of delays, had originally ordered the EPA to act by the end of 2016, but the Obama administration, which had proposed a ban, won a three-month extension that pushed the final decision onto the Trump administration.

White House adviser Don Benton, a former Washington state senator, hosted the meeting with Stuhlmiller and the rest of the delegation. According to the EPA's notes, Benton said the new administration wanted to be transparent, inclusive and "help farmers comply with the law in a way that makes sense."

EPA Administrator Scott Pruitt joined the meeting briefly, telling the delegation that it was "a new day, a new future, for a common sense approach to environmental protection."

The Times drew on the remark for its headline: "EPA Promised a 'New Day' for the Agriculture Industry, Documents Reveal."

Stuhlmiller agreed with The Times that the EPA has promised a "new day" in its relationship with agriculture. The meeting with EPA officials at the agency's headquarters was unprecedented, he said.

"We were just asking for a fair shake in the policy process, which hadn't happened, particularly in the past eight years," Stuhlmiller said.

According to EPA notes, the Washington delegation's concerns included complicated regulations, the availability of pesticides and EPA support for What's Upstream, a lobbying campaign to mandate 100-foot buffers between farms and waterways in the state.

On chlorpyrifos, the delegation asked for "a reasonable approach to regulating this pesticide and would

like the farming community to be more involved in the process."

Stuhlmiller said the notes accurately reflected the meeting, which he said lasted about 30 minutes.

Four weeks later, the EPA said the science was unresolved on whether the pesticide poses a risk to fetuses and infants at even low levels. The agency said it will continue with a congressionally ordered review of the pesticide due in 2022.

The EPA issued a statement Monday criticizing The Times for not reporting that the USDA and the National Association of State Departments of Agriculture opposed banning chlorpyrifos. Those positions, including the USDA's, were taken during the Obama administration.

The EPA also chastised the newspaper for not reporting that the circuit court declined in July a motion by the Natural Resources Defense Council and Pesticide Action Network to overrule the EPA.

The circuit court said it only ordered EPA to make a decision, not arrive at a particular outcome.

## ODFW investigations confirm two wolf attacks on calves on private land

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issues and "asked all the right questions."

Rosa also sent Minor a letter, suggesting he ask the governor to end the "needless suffering and killing of our cattle in Eastern Oregon."

"OCA strongly recommends lethal removal of the ENTIRE pack to prevent continued needless suffering, injury and death to our defenseless cattle," Rosa wrote. He said killing four wolves, the action ODFW settled on, will not be an effective deterrent.

"Our biggest concern is that progress can get slowed down," Rosa said in an interview. "We hope (Brown) will reach out to ODFW to speed up the process."

A coalition of 18 conservation groups, including Oregon Wild, took the opposite view. They asked the governor to intervene, saying ODFW's recent action "clearly demonstrates the need for stronger requirements for transparency and public accountability."

The groups said they are willing to work with ODFW to adopt a wolf management plan that achieves those goals. The state's plan is up for review and possible revision this year by the ODFW Commission, a citizen panel.

ODFW spokeswoman Michelle Dennehey said the department has kept the Governor's Office informed about the Harl Butte pack and ODFW's lethal control decisions.

"The governor has not asked us to change any decision," Dennehey said in an email.

Meanwhile, ODFW investigations confirmed two wolf attacks on calves on private land in Umatilla County. The Meacham Pack was blamed for injuring a 550 pound calf found Aug. 15 and a 450 pound calf found Aug. 17, both in the Sheep Creek area. In addition, the ODFW also confirmed the Walla Walla Pack killed a calf found partially consumed Aug. 13 on private land in the Government Mountain area.