

Smart farming recoups IoT investment

In the United States, California avocado farmer Kurt Bantle experimented with Internet of Things (IoT) connected technology to see if costly water consumption could be reduced in growing his 900 avocado trees. He spent US\$8,200 for LoRa stations with soil moisture sensors, valve controllers, LoRa gateway and cellular backhaul. Cellular backhaul refers to a gateway that connects the farm to the cell network and then eventually to the Internet.

The results proved to be staggering. The annual cost of watering his 900 avocado trees was originally \$47,336, but by connecting his trees with IoT technology, his annual water bill dropped 75 percent to \$11,834. The hardware investment was recovered within six months.

These results pave the way for millions of small, medium, and large-sized farms around the world to emulate his experiment and slash millions of dollars off the cost of growing fruit and vegetables. The only downside for the farmer in harnessing the power of IoT to reduce water consumption and cut costs was that he was placed under state surveillance for meter tampering. Millions of others may face the same fate.

The story

It takes 280 liters of water to produce one pound of avocados, and drought-stricken California produces 95 percent of avocados grown in the US. Nearly all are grown in Southern California, in a five-county region that straddles

the coast from San Luis Obispo to San Diego.

Like the rest of the state, the southern coastal region is locked in a drought and largely cut off from the flow of surface water from the state's big irrigation projects. Avocado groves have been hit badly with sky-high water costs and reliance on water pumped from underground aquifers.

Water consumption is regulated in California, with the state entering its fourth year of drought resulting in water regulators imposing sweeping restrictions on the use of water. The State Water Resources Control Board has even urged Californians to let their lawns die.

Bantle divided his farm into 22 irrigation blocks and inserted two soil moisture measurement units into each block. The units contain a LoRa unit for narrow band data communication to a LoRa gateway, which has broadband cellular uplink connectivity functionality.

The gateway also contains a Spirent-partner Oasis re-programmable SIM, which becomes the enabler in remote water provisioning. All soil moisture data is collected from the avocado trees into a cloud and visualized by a

presentation layer. The UK company Spirent Communications plc provides verification, assessment, analytics, and device intelligence solutions.

When a tree needs to be watered, the solution turns the sprinklers on automatically to get the correct level of soil moisture for each tree. It then turns them off when the correct moisture levels are reached. The connected trees are monitored constantly day and night.

"Avocado trees typically take 4 acre feet of water per acre per year. This is not only to supply the needed water but also to leach the salts, which build up in the soil," Bantle says.

"The soil moisture sensors let me drastically reduce water usage by telling me when to water and how deep to water to push the salts past the bulk of the rooting zone. The majority of the roots are in the top 20 centimeters (cm) of soil, so there is a sensor there and one at 61 cm so I can see when I've watered deep enough to get the salts out of the rooting zone. By keeping the salts in check along with keeping nutrients supplied, stress on the trees is reduced and they are able to have better crop production," he adds.



Avocado farmer Kurt Bantle explains the use of IoT connected technology at an IoT World event.

App developed to forecast floods

A preliminary version of WetIn App, a flood forecasting app, developed for the Niger and Benue Rivers, was launched at the headquarters of the Federal Ministry of Agriculture and Rural Development, in Abuja, Nigeria, on August 9, 2016.

Severe flooding on the Niger and Benue Rivers in 2012 led to a partnership between the Government of Nigeria, represented by the Federal Ministry of Agriculture and Rural Development (FMARD), and International Water Management Institute (IWMI) to develop an app to provide information to better manage future inundations, among other developments.

Project leader Giriraj Amarnath developed the app, using satellite altimetry data from NASA and French and Indian satellite missions. Presently, the app provides information on the historical flooding pattern along the two rivers. The goal is to provide a flood forecast warning with a 4- to 5-day lead-time, which will involve using data on river levels at five upstream virtual stations to provide support to agricultural and disaster management agencies to help the people at risk downstream.

FMARD Director of Agribusiness, Processing and Marketing, Azeem Olumuyiwa, notes that the app will "help to assist the Ministry and other agencies in Nigeria to plan for flood risk management and better utilization of flood water for flood recession and dry season agriculture."

THE APP WAS DEVELOPED USING SATELLITE ALTIMETRY DATA FROM NASA AND FRENCH AND INDIAN SATELLITE MISSIONS.

Director General Moses Beckley of the Nigerian Hydrological Services Agency (NIHSA) says "the development of the app is a step in the right direction" and pledges to support IWMI in its further development by providing hydrological data from its stations along the two rivers. The NIHSA has been a key collaborator in developing the app.

The app can be downloaded from the IWMI website www.iwmi.cgiar.org/resources/apps/.

Odor control solution reduces H₂S emission 95 percent

OMI Industries introduced Ecosorb® 5000S, a new water-based solution that fights municipal and wastewater treatment odors while also reducing hydrogen sulfide emissions by over 95 percent.

OMI claims the biodegradable solution also reduces emissions from mercaptans, amines, and thioethers while offering strong odor control across a broad spectrum of odorous compounds including acids and bases.

"Unlike any other offering in the marketplace, Ecosorb 5000S is a

game-changing solution that is transforming how municipal and wastewater treatment plants fight both odor and emissions," says Brian McLaughlin, director of industrial sales and marketing, OMI Industries.

According to the Occupational Safety & Health Administration (OSHA), hydrogen sulfide (H₂S) emissions can be toxic at even the lowest levels, with concentrations of 100 ppm or greater being "immediately dangerous to life and health." Ecosorb 5000S meets

all OSHA standards for safe odor mitigation and hydrogen sulfide emission reduction.

Much like other solutions in the OMI Ecosorb® family, Ecosorb 5000S is safe to spray or air atomize in the open air around employees. Comprised of a blend of plant oils, food grade surfactants, and purified water, Ecosorb 5000S can be diluted with water or used as-is, depending on application and delivery equipment to remove odorous compounds including acids and bases.