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## RFID Goes Bananas

The first time I traveled to Bentonville, Ark., to visit Wal-Mart was in 2000, when the company's VP of fresh produce invited me to talk about whether RFID could solve one of his biggest problems. He explained that bananas are a popular item in any grocery store—nearly everybody buys them—and both the price and the ripeness must be just right. To ensure that no bunch is too green or too brown, bananas are packed so they

ripen in transit. If everything goes according to plan, they arrive at the store delicious and ready to buy. But this creates a logistics nightmare—timing is everything, and being too early is as bad as being too late. Besides, bananas don't know anything about traffic, and they don't sit in the back of the truck asking, "Are we there yet?"

When bananas arrive in bad condition, disaster strikes. The whole truckload has to be rejected, which means sending a full truck of fruit to someplace it can be disposed of safely, and leaving stores perilously close to running out of one of customers' favorite items.



The Wal-Mart VP wanted to know if there was a way to use RFID technology to help improve the meticulous choreography of the banana supply chain, as well as the supply chains of other produce. The answer was maybe—because banana ripening isn't just about timing. Other factors must be considered, the most important of which is a gas called ethylene. The bright yellow color of grocery store bananas is a result of artificial ripening by ethylene—naturally ripened bananas tend to be greener.

So, while RFID tags could help track, trace and time the bananas, they would be able to do a much better job if they were equipped with sensors that could detect the gases associated with ripening. RFID plus sensing looked like the perfect solution. The only trouble was, the sensors cost thousands of dollars. Or they used to.

In a great example of the ongoing innovation we are seeing in the RFID industry, Timothy Swager, a chemistry professor at the Massachusetts Institute of Technology, recently announced a 25-cent sensor—based on carbon nanotubes—that can detect ethylene and relay its data to the outside world via an RFID tag. The devices, which Swager has patented and hopes to commercialize, can be attached to produce crates and used to ensure that only perfectly ripe fruit arrives in stores, helping to eliminate the estimated 10 percent of waste caused by incorrectly ripened fruit every year.

This is not just a breakthrough in banana technology. Swager's nanotubes, which were funded by the U.S. Army via MIT's Institute for Soldier Nanotechnologies, mark the beginning of a trend that has been a long time coming: the fusion of RFID and sensors—an area that, it must be said, is ripe for innovation.

*Kevin Ashton was the cofounder and executive director of the Auto-ID Center.*



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