BusinessWeek

Talk to Me, Fridge

A world in which humans communicate with household objects—partly to better the environment—is closer than you think

by Drew Lanza

Imagine a world where our things could talk back, where exchanges such as the following are the norm.

Sprinkler: Hey, horticultural genius! Did you realize you're using 20% more water in your garden than last year? It's costing you an extra $50 per month! And by the way, it's raining and the Internet says you should expect 4 in. tomorrow. So why am I still on?

Me: O.K., bring up the map of the garden with the current watering schedule and we'll change it.

Before long, you won't have to imagine it. Interactions like this one represent—if you'll pardon the expression—the Internet's next big flowering. We'll soon witness the emergence of what's come to be known as the Internet of Things, a confluence of technologies and tools that gives us the ability to interact virtually with most of the objects in our lives.

This new ability represents the logical next step for computation in its evolution from centralized and expensive to distributed and cheap. Today we can use information gleaned from a Google (GOOG) search on the Internet to reprogram our stuff—from Sony (SNE) TVs, to Whirlpool (WHR) washing machines, to Boeing (BA) jet engines. Tomorrow, those things will be able to collect that digital data themselves and then act upon it by grabbing our attention. In some cases the things will be able to respond to the new information independently.

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We will see early, tangible signs of this new Internet of Things in the coming year or so, through such novelty products as stuffed Golden Bears that, on request, offer up the latest University of California at Berkeley sports updates. In a few more years we'll have little orbs on our washing machines glowing yellow when Pacific Gas & Electric warns of a brownout, letting us reschedule our laundry to 3 a.m. We'll get reports on how our electricity usage stacks up against that of comparable homes. Or if our dog breaks loose, we'll locate Fido through the chip in his ear, and then talk soothingly to him via the Web while the kids head out to bring him home.

This isn't just another forecast of the Electronic Home of the Future. As a trained feedback engineer, I am skeptical of some of the elaborate visions put forth by futurists. We're all still waiting for those foolproof automatic trackers of pill usage by our aging mothers or automatic lighting and heating systems that auto-adjust as you walk through your home.

The problem with many of these pie-in-the-sky visions is that they require computers to do everything, from beginning to end. They bring to mind failed Mars probes. What they lack is active human control. It's not an accident that in the *Star Trek* of the 23rd Century, the Enterprise still has a pilot.

The concept of human-to-object connectivity is as old as the Internet. Aficionados will remember the "Prancing

Pony," a vending machine connected to the Internet of 40 years ago that allowed someone at a keyboard to order a Coke and walk down the hall to find it already poured.

SEMICONDUCTOR SMARTS

But it hasn't been until now that such interaction is economically feasible. That's thanks in part to the proliferation of Wi-Fi, technology that lets us connect to the wireless Internet at high speeds—not only from our homes and coffee shops but also from cars, airplanes, and even parks. To that we can now add a new generation of task-specific semiconductors so inexpensive that they can be deployed in the billions to various sensors and objects and then connected to the Internet via the same wireless technology.

In the coming years, designers will deliver these semiconductors for a buck or two and get them to run off a single AAA battery for years. The connectivity provided by these new chips, when combined with the kind of 50¢ micro-controllers you find on automatic sprinkler systems, will lead to a near-miraculous transformation.

Connected to Wi-Fi, my "dumb" sprinkler system will suddenly become "smart"—not in the sense of crunching a lot more numbers or making a lot more decisions. Instead, objects will be smart in the sense that, by connecting to the Internet, they actually know something about the world around them. It's one thing to go online and determine it's raining, calculate the price of water, and even ascertain typical water usage in your neighborhood. It's another thing entirely to bring those observations together in a way I can view and respond to.

WISING UP

What are the implications as this vision of dumb-things-getting-smarter becomes reality?

First, we become more efficient. Instantaneous feedback on resource usage, for example, will cause most people to change their consumption habits dramatically. I drive differently now that my dashboard is continually communicating my miles per gallon. That same enhanced power of observation, spread across the broader population, could have a dramatic effect on our consumption of resources. (Many environmentalists believe that more appropriate watering techniques could reduce overall water consumption by 30% or more).

Second, we can stay in control. I'm the boss, not my sprinkler. I don't want—and I don't think most people want—some Big Brother of a utility automatically curtailing my resource usage at whim.

Third, we will be able to control our stuff from anywhere on the planet. On vacation in Beijing I'll see an e-mail from my sprinkler system that tells me it's raining cats and dogs in the Bay Area, which prompts me to turn the water off.

Fourth and perhaps most important, it will allow us to better utilize the continually expanding body of the world's collective knowledge. Think how, in the past 30 years, many objects that were once easy to operate (analog clocks, dial-up phones, sprinkler systems adjusted with wooden pegs, etc.) have evolved into complicated systems, with 100-page manuals. By offering up the Web browser as the single interface for everything, the Internet of Things will resolve the great untackled issue of our time—the easy reincorporation of mundane objects into our everyday lives.

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