

# Embedded SYSTEMS

If someone would have told you as recently as three years ago that you would be using your smartphone as much as your laptop, you might have dismissed them. The same would be true of someone telling you that you would be using a 10-inch screen with no keyboard as your only home computer, but the world is changing fast and consumers are quickly taking up new tools and new ways to communicate.

Embedded systems are poised to make a drastic change in many of our lives. These systems are near-invisible software and hardware technologies that allow our clothing, appliances, phones, cars, and even “smart” homes to talk to us, our mobile devices, and sometimes one another. The presence of these systems is increasing as we purchase next-generation devices that work to be more efficient, easier to use, and integrate with our smartphones and laptops.

## Parenting in a Wired Home

As a new parent, keeping vigil over my son is a balancing act of quietly checking on him, judging the tone of a cry, and taking the occasional temperature. A new generation of garment will soon to be available that contains woven sensors that sense changes in temperature, humidity, and even subtle chemical shifts on the skin. Although a parent’s touch is still the most important thing to soothe a crying baby, some of the guesswork as to the reason for the tears will be taken away with a “smart” layette.

A crib capable of monitoring this special clothing would also be able to make accurate records about sleeping habits, fevers, hydration, and provide insights into when my son might be sick, cold, or simply need a diaper change. And this is just the beginning of what small sensors can do to change the way we live (and parent).

## Really Smart Cars

One of the most popular and visible types of embedded systems are those found in modern cars. Ford’s Sync and Toyota’s Entune are two examples. These technologies offer stand-alone

connectivity to the Internet and access to your online music data, contact lists, and even Facebook. These systems also interface with the driver’s mobile devices to allow for hands-free talk and other communications tools.

A system like the one found in Ford’s cars can begin to help people live safer and healthier lives. For people who are sick or live with a chronic condition, the mobility that a car offers is an important freedom. Having an embedded system within your car that can monitor your driving habits, breathing, and eye movement (as many cars today can), your car can begin to assess if you are in strong enough condition to drive, and contact medical support if the driver is having a problem.

Medical device maker Medtronic recently announced a project with Ford that allowed Sync to interface with diabetes patients using Medtronic’s glucose monitoring system and alert them if levels fall outside an appropriate range. For drivers with this chronic disease, there is an added level of safety in being aware of fluctuating glucose levels.

## A Connected World

Embedded solutions and technologies are all around us. From wired refrigerators that know when you’re out of milk and eggs to the networked television that will remind you to take your medication — and tell you what you need to take it with — at the next commercial break.

Many of the embedded systems included into today’s consumer goods are isolated and lack a standard to exchange information with one another. The popularity of smartphones and the relatively small number of popular operating systems has made them an excellent platform for interfacing with these embedded systems. The verticals of consumer electronics, personal technology, social networks, and personal information management are blurring. Connected systems are in a perfect place to take advantage and appear in almost all electronic devices.

Apple’s iOS and Google’s Android platforms allow otherwise despondent embedded systems to have a common vernacular and easy interface the average user is comfortable using. More than half of the mobile phones sold in the

Contributed by



**CHRIS CULLMANN** Vice President,  
Digital Strategy, Ogilvy CommonHealth  
Interactive Marketing, part of Ogilvy  
CommonHealth Worldwide.

United States are smartphones. It’s very easy to see a place for embedded systems to enter our lives and live as an app on our device.

Entertainment Weekly released its October 5th issue featuring a live Twitter feed directly in the print advertisement. The ad, featuring a pared down Android device, was receiving live Twitter updates via cellular connection. This kind of solution is now feasible and scalable. The same approach can be used on refrigerator magnets, on blister packs, and even at point-of-purchase spaces for OTC products.

Embedded technologies are on a path to join smartphones and tablets as a natural extension of the entertainment, personal information, and health management tech we use every day. As industry leaders, where do you see our products and treatments fitting into a new and completely networked world? **PV**

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