

# Wearable electronics move on from iPhone, to iWatch and beyond

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You can wear your heart on your sleeve. Why not your electronics? In a burgeoning trend that has captivated Silicon Valley, a mind-boggling array of "wearable electronics" has begun to arrive, not just at a website or clothing outlet near you, but on an arm, a face, a wrist and even a pinkie finger.

"Everyone's recognizing that tech's next great, innovating chapter is more practical and intimate use of [computing power](#) in our everyday lives," said Scot Herbst with San Jose, Calif.-based design firm Herbst Produkt. "And that means not having to reach into your pocket, grab your phone and put in a password. It's all about making computers more organic in their interaction with you."

Hold on to your hats, which also happen to be undergoing digital makeovers of their own with things like snowboard helmets decked out with a pair of \$599 Oakley Airwave goggles with GPS and streaming audio. From Apple's rumored iWatch to [Google's](#) in-the-works eyeglass-like "Glass" (\$1,500 for an early pilot version) to tech-embedded clothing from Uniqlo that uses the body's evaporating moisture to heat knee-high socks that cost about \$13 a pair, the wearable [digital revolution](#) is upon us.

"The trend is gaining momentum because the cost of chips, along with sensors like [gyroscopes](#) and heat- and light-[sensing devices](#), has dropped dramatically," said analyst Avi Greengart, research director for consumer devices at Current Analysis.

He knows firsthand the wonderful allure of this wearable technology. Greengart uses it himself.

"Unlike a lot of bleeding-edge tech, these things work," he said. "I have a Fitbit, which is a little clip you put on your belt, and it's a glorified [pedometer](#). But it does much more, and it makes it easy for me to see how much physical activity I've had during the day, for example, and that motivates me to exercise even more."

An army of engineers, fashion designers, futurists and gadget geeks is hard at work, trying to extend the reach of computing power along those precious few inches from pocket and purse to forearms and ears.

At Intel Labs, user-experience researcher Cory Booth said his team is looking even beyond that, "past the near-term fascination with specific locations on the body, like the wrist, to a more long-term view. We see an entire new ecosystem of devices that will multiply over time and interact with one another."

Many of these gadgets will simply piggyback on the muscular computing prowess available in the cloud, said Mike Roberts, an engineer with PARC, a Xerox-founded research-and-development center in Palo Alto, Calif.

Computers take the mountain of input from your device, crunch it, and immediately suggest ways for you to, say, improve your athletic performance.

Roberts talked about one very human application of wearable technology, a beta version of a head-mounted computer that PARC worked on with Motorola Solutions. It connects a user in the field - say, a sailor trying to fix a broken generator on a naval ship - with an expert thousands of miles away.

"This remote collaboration enables the expert to help someone in the field solve a complicated problem in real time," Roberts said. "The helmet's video camera captures the generator, then the expert takes stills from the video and annotates them to show the guy which bolts to remove to fix the generator. This gives you expert advice anywhere in the world, and it's all hands-free."

Over time, experts say, consumers will be dazzled by an assortment of electronic gear woven into their clothing, strapped to their limbs, wrapped as thin membranes over their fingers, or hung from their belts. Challenges with wearable tech abound, from harnessing enough computing power onto ultrathin devices like pieces of tape to persuading average consumers to wear silly-looking glasses and bulky watches without "nerding them out" too much. As futurist Paul Saffo puts it, "I'm convinced the Segway failed because no matter who drove it, they looked like a dork."

Cool tech toys are one thing, but merging them with fashion raises all sorts of issues for designers. Said Saffo, "Wearable technology is absolutely the way we're heading, but the secret is how designers work out the details. The genius of Apple is that it's a fashion company that also does tech. Look at the iPhone - it's a beautiful polished talisman, even when it's just sitting there."

John Edson, president of San Francisco-based design firm Lunar, said that with the proliferation of these devices, "my smartphone becomes just the collector of all the data coming from the sensors I've got on me. Like the swipe and pinch features on the iPad, we're just starting to scratch the surface of things we can do with gestures."

Edson said test audiences seem to love wearing the devices his firm has worked on with BodyMedia. "Some of these tools help users achieve weight loss through a wearable sensor," he said. "They have really

proven algorithms that can clearly and accurately tell you about your calorie burn, just by wearing a device that tracks a few different body metrics."

The road ahead will undoubtedly be littered with the detritus of [wearable electronics](#) that consumers will refuse to wear. But engineers and designers will keep throwing ideas against the wall until something sticks.

"You got the iPhone," said PARC's Mike Kuniavsky, "then you got the apps, and now the apps are jumping off the screen and becoming devices you can wear."

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