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**Steve Mann,
cyborg**

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Meet Steve Mann, director of the EyeTap Personal Imaging Lab (ePI Lab) and a professor at the University of Toronto. He's also a living, breathing cyborg—defined by the Oxford Canadian Dictionary as "a person whose physical abilities are extended by machine technology."

Mann says he has always been interested in expanding the mind and body using technology. Indeed, he is the author (with Hal Niedzviecki) of *Cyborg: Digital Destiny and Human Possibility in the Age of the Wearable Computer*. Mann completed his Ph.D at the Massachusetts Institute of Technology (MIT), where he founded the wearable computing group as a part of the MIT Media Lab. At MIT, Mann deepened his knowledge of personal imaging by working with photography pioneer Dr. Harold Edgerton, who invented the electronic flash and stroboscope.

Mann is rarely seen without his Eye-Tap computerized eyeglasses, which he invented. "In effect, they cause the eye to function as both a camera-type imaging system as well as a display-type system," Mann explains. "They correct for things like visual memory deficiencies. For example, if you have trouble associating visual information such as names and faces, the eyeglasses can print out the name of somebody in fairly large letters the next time you meet them. Or, if you get easily lost, it can help in terms of way-finding."

Mann looks right at home among the gadgets and grad students at the ePI Lab. Founded by Mann in 1998, it was formerly known as the Humanistic Intelligence Laboratory (HI Lab) at the University of Toronto. Its mandate is to research wearable computing and cybernetic concepts and turn them into practical, market-driven products and processes. Mann's team hopes to develop a new generation of personal imaging solutions and mediated reality interfaces, and also to overcome the challenges of living in an information-saturated world.

"Eyeglass-based computing is one form of body-worn computing," says Mann. "In the 1980s, I also invented smart fabrics – cloth that's computational. There are electric circuits embedded in fabrics that provide assistive technology and other forms of way-finding."

For example, Mann adds, fabrics can "tell" a person with a vision disability when he or she is approaching an object. "Some of the fabrics included conductive materials that send out electric fields that
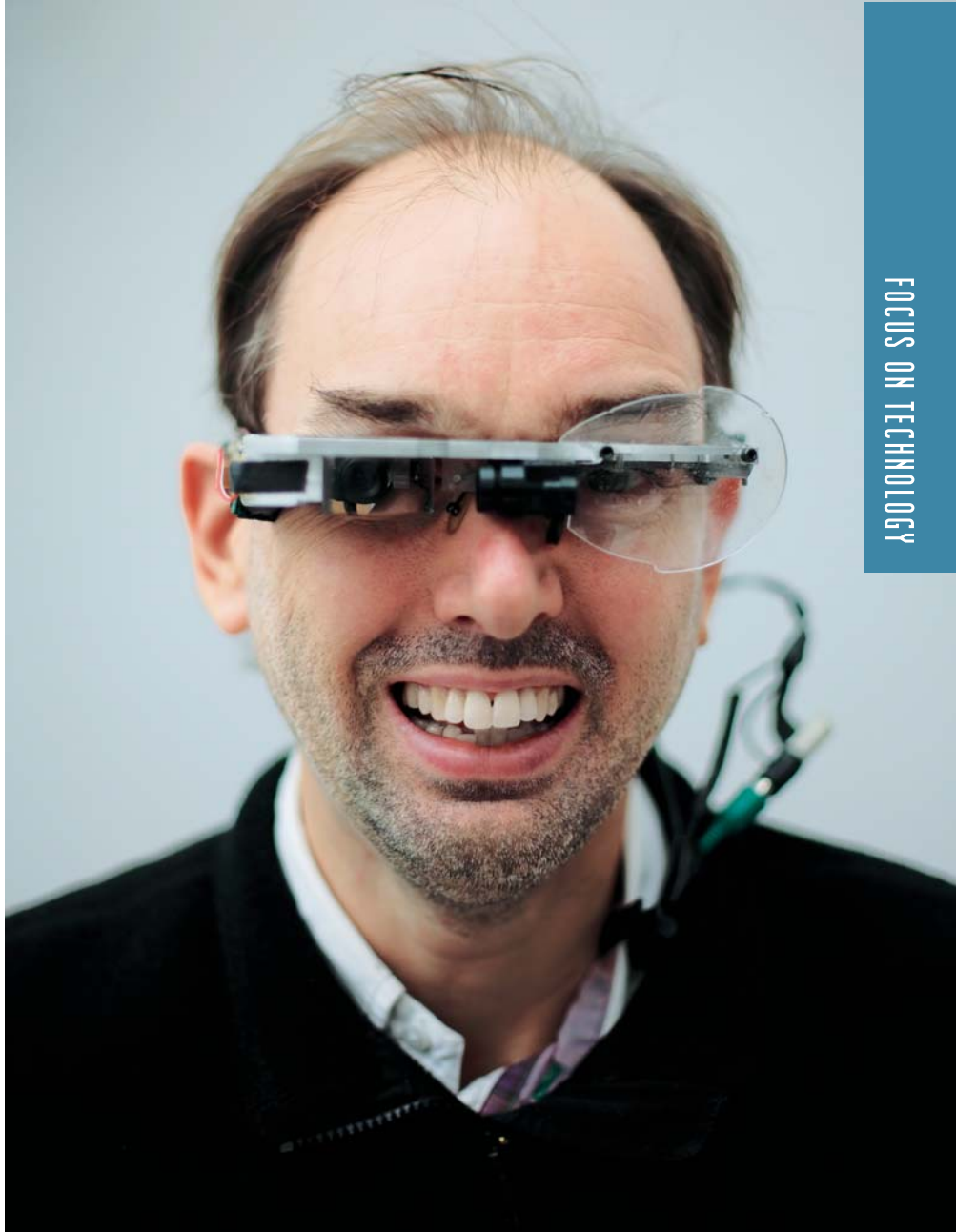
The **Wired Wizard**

Steve Mann Makes Technology Personal

BY RAYMOND COHEN AND JACLYN LAW

bounce off objects, return and create a kind of standing wave, something you can feel pressing against your body before you actually touch something."

Mann's inventions are adopted by the public in varying degrees. "The EyeTap seems to be something people can immediately relate to and use," says Mann. He says that there is a growing awareness of accessibility, and also a growing awareness of the need for autonomy. "Accessibility is not just making it possible for somebody to access something – it's also about making it easy for people to access it themselves without having to rely on others," says Mann. "A really important element of accessibility is self-sufficiency. Mere signage is not necessarily way-finding. Technologies that are just in the environment to help are not necessarily enough. We also need to think about technologies that people have their own control over, so that there's a sense of self-esteem that comes to the special needs technologies."

Special needs, in Mann's estimation, are those needs that, when met, allow a person to become an equal citizen and "fully able." Mann also thinks that technologies that bridge the gap between peo-ple with disabilities and the wider population are important, both for commercial viability and to bridge social gaps.

One of his most popular inventions is the hydraulophone, shown on this issue's cover. It is an organ made from water pipes. (See a video of it in action at http://wearcam.org/hydraulophone/.) It works like a wind instrument (you cover the holes to direct the water and change the sounds), and it's used for water and music therapy. "It's a fun technology for people with special needs, but also fun for everybody, and therefore it allows the special needs populations to experience this benefit without the possible stigmatization of isolating themselves from the rest of society. It even has immediate appeal to everybody as a form of sculpture."

Beneath Mann's cyborg gear lurks the soul of an artist, and it's obvious when he describes the benefits of the hydraulophone. A key part of the instrument's appeal is that it enables people to create and explore. "A lot of people identify with the ability to really, really express yourself through subtle changes in the sounds," says Mann. "The other nice thing is that you can see those changes, because it uses water. It's like a penny-whistle, where you can half-cover up the hole to change the pitch a little bit and bend it down and make it sound really sad, like the call of a loon in the wilderness."

People's skills improve quickly, Mann adds, because they watch other people playing, see the way the water is squirting out and mimic those movements. "The water…allows you to feel the resistance and do finger exercises to increase agility, and at the same time, it gives you some intricacy and lets you play music. There's a feeling of accomplishing a skill, which is kind of nice."

Mann sees the potential of technology to improve the human experience. "There's all these cyborg-type technologies out there now, but at the same time, I find the water instrument is something very primal, very soothing, very back to basics," says Mann. "Maybe we've seen all the cyborg stuff already, and we as a society are looking for a unifying thing that brings us all together as human beings."

For more information about Steve Mann and the EyeTap Personal Imaging Lab, visit www.eyetap.org.