

## Implants turn humans into cyborgs

Radio frequency identification chips replace house keys

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Cyborgs have stepped out of science fiction and into real life with a small but growing group of tech aficionados who are getting tiny computer chips implanted into their bodies to do everything from opening doors to unlocking computer programs.

Amal Graafstra and his girlfriend Jennifer Tomblin never have to worry about forgetting the keys to her Vancouver home or locking themselves out of Graafstra's Volkswagen GT.

They can simply walk up to the door and, with a wave of a hand, the lock will open. Ditto for the computer. No more struggling to remember complicated passwords and no more lost keys.

As Graafstra puts it, he could be buck naked and still be carrying the virtual keys to unlock his home.

"I did it for the very real function of replacing keys. It saves me having to walk around with a huge chain of keys in my pocket," said Graafstra, 29, who spends a lot of time in Vancouver, although he calls Bellingham, Wash. -- where he operates several businesses -- home.

It's all thanks to tiny radio frequency identification (RFID) chips -- costing about \$2 each -- that are already in fairly common use for applications from livestock identification to merchandise tracking.

Think of the tiny ampoule that your vet implants under the skin of your dog or cat for identification if the animal is lost. All it takes is a special reader flashed over the skin and Fido can be on his way home.

Graafstra did much the same, only the three-by-13 millimetre chip was put under the skin of his left hand by a surgeon. A second one, measuring two-by-12 millimetres, is in his right hand.

Using his computer skills, Graafstra was able to modify the locks on his car and his house so they would be activated by a built-in reader.

Graafstra, whose book *RFID Toys* is already listed on Amazon.com and due out in February, said he got the idea from pets' tags.

"I'm a project, gadget-builder kind of guy and I saw cats and dogs getting these



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Amal Graafstra shows where a chip was implanted into his hand (above) that allows him to log into his computer without a password.

tags and I spent a few years thinking about the different ways they could be used," he said.

It was only when he came upon non-proprietary parts that he could hack up to use in his own applications that Graafstra asked a surgeon he knew to implant the tiny tag in his left hand. It was a five-minute operation with a scalpel and the tag sits under the skin in the webbing between his thumb and index finger. That was last March, but most recently Graafstra had the second chip implanted, this time with an injector needle by a family doctor.

"It wasn't a big deal," he said. "I can't even feel it unless I push on it with my finger."

The RFID reader for Graafstra's chip is made by a University of Calgary spin-off, Phidgets Inc., which sells the reader for \$65 Cdn. Graafstra found it through the company's U.S. reseller Phidgets USA, which sells readers and tags.

The company's technology is used in similar personalized identification applications, such as a U.S. university that issues tags to students that they slip in front of a reader to find information in their schedules. However, the students and most people who rely on the technology carry it around in cards in their wallets, not in their bodies.

"I saw the tiny ampoule tags and fell in love because they are so tiny and look so futuristic, but I never had an idea people would put them in their bodies," said Phidgets USA CEO Matt Trossen. "When we found out about it we immediately had to put up a disclaimer, because these things are just kept in a drawer -- they're not sanitized. We're a hobby company not a medical supplier."

Graafstra's experiments piqued the interest of geeks around the world and he estimates there are perhaps more than 20 people who have implanted the RFID tags. There's even an online group, the "Tagged" RFID implant forum, where members share their implant stories and photos and vigorously debate the merits and risks of putting computer chips under their skin.

While the ogre of Big Brother, (or George Bush as some forum participants fret) looms large in the debates, the RFID experts say users have little to worry about, since the technology transmits no more than a few inches. And Graafstra said his implant has encryption so even if someone were two inches away with a reader, they would learn little.

"There aren't a lot of people doing implants, because there aren't a lot of doctors willing to do the implants," said Dan Henne, vice-president of Calgary's Phidgets Inc. "And there is always the unfounded fear that somehow government is going to use this to track people.

"But the technology has its limitations. If you had an entire research group you might be able to read a person's tag a couple of metres away. It takes an awful lot of science to do that.

"I'm sure the CIA would love it but it won't work."

Aside from the Big Brother and privacy concerns, Dr. Morris VanAndel, registrar of the British Columbia College of Physicians and Surgeons said there are no ethical considerations that would prevent a doctor from implanting the chips.

So if your boss tells your doctor to implant your company pass card info into your arm, the answer would be no. But if you're tired of being locked out of the house, or your gym club is threatening to bar you if you forget your pass one more time, an implant could be the answer.

"People get breast implants," said VanAndel. "A foreign body in somebody's body is nothing new.

"It's a personal consideration and I can't imagine it having much of an ethical consideration."

VanAndel said the ethics would depend on the purpose of the implant.

"If the purpose was to monitor your blood glucose if you were a diabetic, I could see nothing wrong with that. But if this is Big Brother wanting to keep track of us as we go about our business -- the futuristic scenario -- that would have privacy concerns and ethical considerations."

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