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- [ABC's new shows?](#)
- [Kids pick Will Smith](#)
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- [Master P's career moves](#)
- [Dudley Moore feud](#)
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- [Pick the Grammy winners](#)

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Author interview

Neil Gershenfeld



CAMBRIDGE -- Neil Gershenfeld's computer, apparently confusing him with an ordinary mortal user, has failed him at a critical moment.

"I have no idea what's going on with this..." he says, as he desperately points and clicks around his screen, trying to access a Web site central to his

presentation.

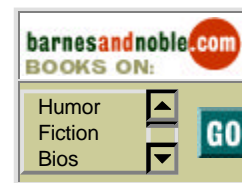
For anybody else, this would be business as usual: frustration, irritation, the urge to heave the wretched machine out the window. But Gershenfeld is no garden variety hacker. As co-director of the Things That Think consortium at MIT's famed Media Lab, he is both technically savvy and obsessed with ways to render the PC obsolete.

Perhaps the machine senses this, and is fighting back. Perhaps the servers are just down.

"I don't have a clue why this computer can't access the Net," he says, rushing out of his office to check the status of the university's system.

Moments later all is restored to health, and Gershenfeld happily clicks on a Web site showing his most treasured products — 2-year-old twins joyously interfacing with their Christmas present, a kiddie trampoline.

While there's an element of fatherly pride at work here, Gershenfeld is also using the bouncing babies to make a point about the problems with even the most sophisticated computers. "Until now," he says, "attempts to make smart machines have revolved around people sitting in front of a tube typing list programs that are supposed to be intelligent. But a typical computer doesn't have a fraction of my twins' life experience. It doesn't have a hope of being smart. But when you start to



connect rich sensory data to a computer, it lets computers behave much more sensibly."

"There's been a collective loss of common faith in the technocracy. Ordinary people *get* just how crazy it's become. So we're going backwards, looking at things like a Gutenberg Bible or a Stradivarius ... to understand why they work so well."



Getting computers to behave sensibly or, better yet, eliminating the computer and just creating smart things that connect the digital world to the physical has been Gershenfeld's passion since he first came to MIT. Now he's written a book, *When Things Start to Think*, about what the future might look like based on the products being developed at the lab.

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Imagine a newspaper that refreshes its information daily by means of electronic ink; imagine a tag that lets a map at Disneyland give you directions to the restrooms in your native language; imagine a computer that senses that you're stressed and delivers information at a speed that keeps up with your agitated soul.

All these things and many more are in the works at the lab, where the goal is to figure out what qualities were so satisfying about things like fountain pens and musical instruments and beautifully bound books, and to build them into the next generation of objects. It may sound retro, but Gershenfeld thinks it's the next wave.

"There's a sense in which our society is increasingly becoming anti-scientific and anti-technical," he says. "People seem to be starving for a way to talk about compelling science that matters for their lives in a way that is accessible."

As things get so complex, he says, "there's been a collective loss of common faith in the technocracy. Ordinary people *get* just how crazy it's become. So we're going backwards, looking at a Gutenberg Bible or a Stradivarius. In those things, what we like

is so intimately connected to the interface that you can't separate the interface from the hardware. And it's taxing all our resources to understand how it works and why it works so well."

To figure these things out, Gershenfeld has help from a renegade band of about 100 graduate and 200 undergraduate students who virtually live in the lab working on their toys. They've collectively figured out a way to spend most of their time noodling problems, rushing out to take necessary courses in physics and math and chemistry when they get stuck and decide they need to know more. Their efforts have already spawned such commercially successful products as Lego Mindstorms, one of the hits of the last Christmas season, and they're working with NEC on technology to build sensors that will adjust airbag deployment based on the size of the passenger. They're also involved with such quirky stuff as a shoe that will let you swap business card data with a colleague's shoe, and such urgent projects as a smart syringe that will help diabetics monitor their intake of insulin.

Gershenfeld, an intense, bearded 39-year-old, who downloads speech as if fired by a Pentium III processor, knows that the notion of things that think may seem a little weird now, but he's confident that this is the direction technology will be heading in the next five to ten years.

Take the idea of a computer that can sense how you feel. "Your affective state is whether you're happy or sad or tense or confused or bored," he says. "If I can't perceive that, I'm emotionally handicapped and can't function in society. Computers can't perceive affect. They're uniformly bland and cheerful, which is just as annoying in a machine as it is in a person. One of my colleagues is finding that if a computer has access to fine-grained biosensor data it can begin to perceive affect. If you're stressed, information delivered quickly makes you relax. If you're relaxed, information delivered quickly makes you stressed. So something as simple as the pace of information delivery needs to depend on your physiological state."

This is not a penetrating insight into cognition, he says; even your dog can sense your mood. But for a computer, it would be a breakthrough. "It's simply a recognition that we use all our senses to make sense of the world, and machines don't have access to that."

Gershenfeld says one of the reasons he wrote his book was to bring clarity to the discussion of what is technology and what is not. For example, he says, the fight between those who would embrace

electronic books and those who think they represent the end of the world as we know it, are missing the point: A book – from the latest Grisham thriller to a lavishly bound copy of the *Book of Kells* – is technology. "In its day, the book was the highest technology, and it beats the specs of most computers," he says.

"So people who say, 'I like books' and think they're making an anti-technology statement are just saying the old technology works better than the new technology and they don't want to switch until the new technology works better." Gershenfeld thinks that's a perfectly legitimate demand, and he aims to find ways of making things that are as user friendly as they are useful.

"When a thing works well — when the content and the interface are so well connected it ceases to be technology — it just works," he says. "Now we can really start to ask that new technology work as well as what it presumes to replace." - *By Linda Tischler*

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