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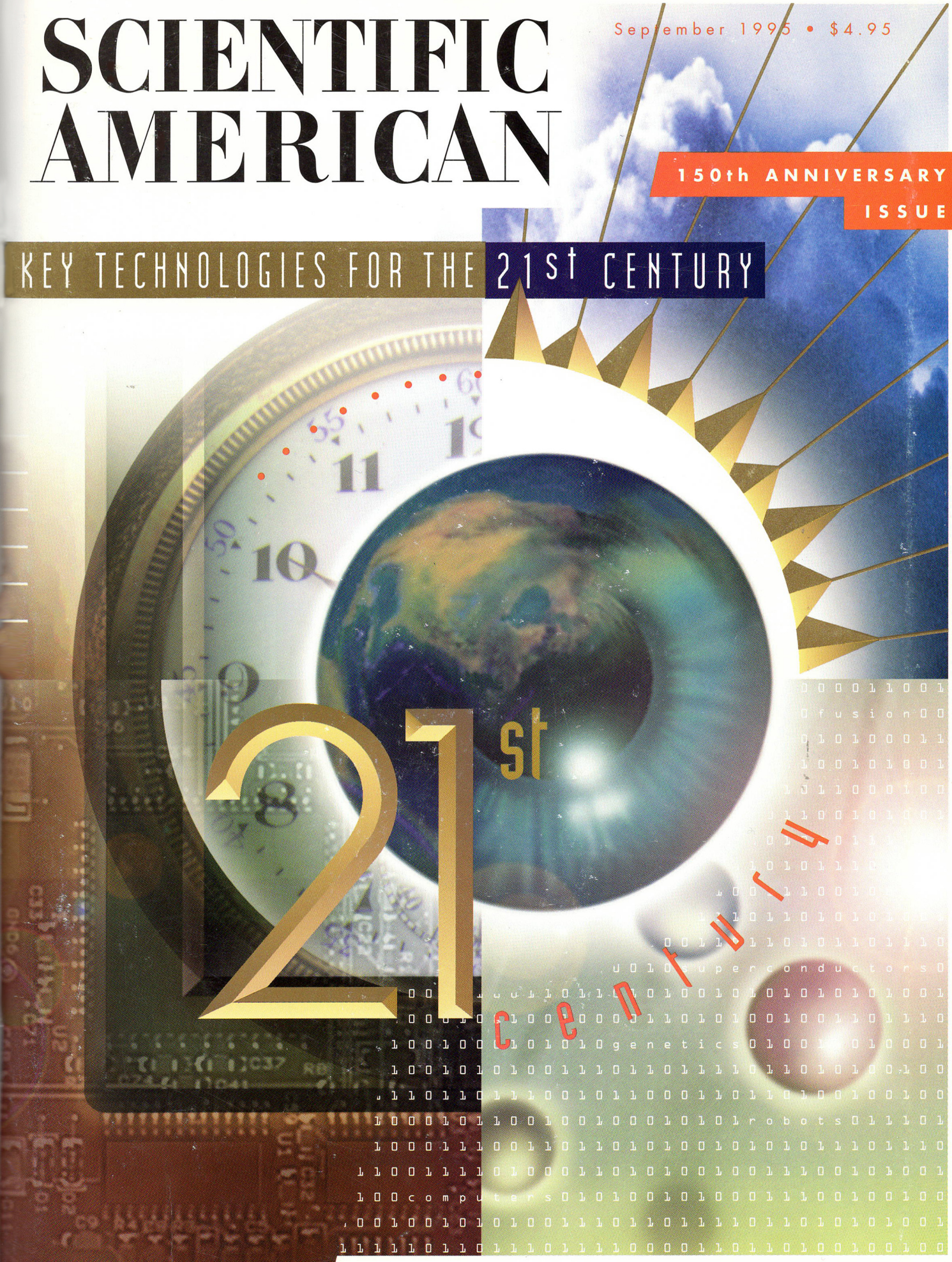
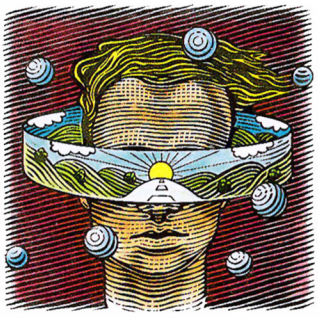


Commentary

Virtual Reality

VR will transform computers into extensions of our whole bodies

by Brenda Laurel



Since the hype began in the mid-1980s, virtual reality (VR) has captivated public interest with pictures of people wearing enormous goggles and sensor-laden gloves. The technologies used to immerse people in a computer-generated world will, however, change radically during the coming decade, making the begoggled cybernaut as quaint an image as the undersea explorer in a heavy metal diving helmet.

The important thing about VR is what it does rather than how its effects are achieved: it permits people to behave as if they were somewhere they are not. That place may be a computational fiction or a re-created environment from another place or time. VR transports perceptions by appealing to several senses at once—sight, hearing and touch—and by presenting images that respond immediately to one's movements. The techniques for creating this illusion differ depending on the kind of place being visited and what a user wants to do while there. A pilot in a flight simulator, for example, might need hydraulic actuators to simulate banks and turns, whereas a molecular biologist exploring the bonds between molecules might need particularly fine position sensors and mechanisms to simulate the "feel" of interatomic forces.

Certainly the coming decades will bring dramatic improvements in existing applications through faster, "smarter" computing and improved interface technology. Bulky, head-mounted stereoscopic displays will be replaced by lightweight "glasses" that can superimpose synthesized images on the real world. The encrustations of tracking and sensing devices cybernauts now wear will be integrated into clothing or replaced by video cameras and other sensors that monitor movements and gestures from a distance. Similarly, technologies that simulate the sensations of force, resistance, texture and smell will become available.

Initially, such new equipment will make existing applications work faster and more comfortably. Already people are performing complex, delicate tasks in hazardous environments, such as space or the inside of nuclear reactors. Pilots and astronauts train in VR cockpits that merge three-dimensional graphics with the view out the window and that contain sound systems offering cues about their surroundings. Architects and planners walk through the environments they design to see how it might feel to live and work inside them. (For a speculative foretaste of the wider possibilities, one can go to arcades and amusement parks where people fly combat missions, fight dinosaurs or travel through the human body.)

As software evolves, as computing power increases, VR will be used to present models of all kinds of complex dynamic systems, from personal investments to global economics and from microorganisms to galaxies. During the past decade, the success of scientific visualization has shown how to harness people's ability to see patterns in properly presented data; soon it will be possible to bring multiple senses to bear simultaneously, engendering a response from the mind and the body that will be more than the sum of its parts.

The social uses of VR will also be an important force in its evolution. Even in the simple text-based on-line environments known as MUDs (Multi-User Dimensions), researchers have shown that a sense of place is crucial to communication and community. In the real world, people devote a great deal of energy to creating particular places as a context for social interaction—consider display windows, architecture and interior design. VR will make it possible to carry many of those skills over to cyberspace. As virtual spaces begin taking on a richer, more complex texture, VR will be the foundation of a major transformation in the ethos of computing. People have until now thought of computers as the last stop on the road of mind-body dualism: as close to disembodied thought as the material world permits. Computers generally have no sense organs, nor do they address human senses particularly well. They have evolved as a race of severed heads, doomed by the arcana of their communications mechanisms to make extremely small talk with people who are almost as strange as they are.

VR, in contrast, makes little or no distinction between body and mind. Instead it employs in a new context the bodily senses that evolution has so magnificently prepared. VR is concerned with the nature of the body—how our senses work, how we move around, how we get the feeling of being somewhere and how the sense of presence affects us. It is also concerned with representing the nature of things, both virtual and actual, in ways that reveal their structure, dynamics and potential uses.

Artists, who have always had to think about the interplay between intellectual and physical responses to their work, may play a more pivotal role in the development of VR than technologists, who may be content with the computers as a medium that exclusively addresses the disembodied human intellect. As artists explore the expressive potential of VR, they will grow more adept at representing the subtleties and complexities of experience—from "synthesthesia" to emotional associations—and VR tools and technology will evolve accordingly.

As a result, virtual reality may function as a link from the technological manifestations of humanity back to the world that technology has ostensibly supplanted. VR may transform our understanding of computers from severed heads to extensions of our whole selves. And in doing so, it may even offer a way to imagine ourselves, technology and all, as part of the natural world.

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