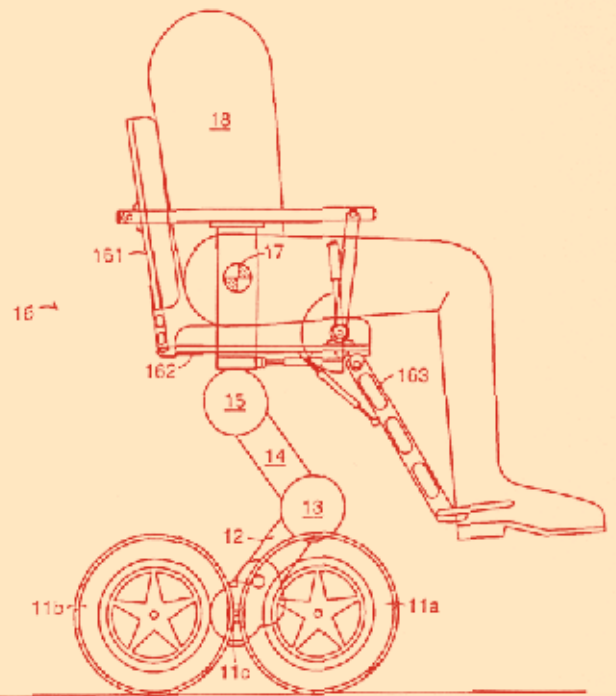


One of Dean Kamen's latest creations harnesses the power of the microprocessor and the gyroscope to solve some of the mobility problems of people who use wheelchairs. Equipped with high-speed microprocessors, a gyroscope, and two independent axles, his Independence 3000 Ibot Transporter, or simply Ibot, can roll up a curb, over sand, and even climb stairs.

Two events inspired Kamen's Ibot. First, he saw a young man struggling to get his wheelchair up a street curb. "It just seemed to me that the fundamental issue was the world has not been architected for people that are sitting down at 39 inches," he told MSNBC's John Hockenberry. The second event happened in his shower—when he stepped out of it one day, he slipped and had to grab a wall to regain his balance. He had already been thinking about how he might use the latest generation of Pentium microprocessors and he now realized he could use their computing power in combination with gyroscopes and small motors to recreate the body's power of balance.

The Ibot can do many things a wheelchair cannot. Its sturdy motor-driven wheels move independently and can raise themselves up to negotiate a curb or stairs. As in a modern all-wheel-drive car, the computer-monitored and -controlled drivetrain automatically adjusts itself to roll over sand, grass, and other irregular surfaces. The Ibot's gyroscopes provide it with a sense of balance; together with its Pentium chips and motors, it reacts to changes in position or weight to keep things stably rolling. Its sense of balance is so good that the Ibot can rear itself up on its back wheels, raising its user to standing height.

Rechargeable batteries keep the Ibot moving all day, and since mechanical or computer failure could be disastrous for its user, backup systems are built in. The Ibot is currently being built and tested by a subsidiary of Johnson & Johnson.



The Ibot, known to the patent office as a "transportation vehicle with stability enhancement."

One of Dean Kamen's most recent inventions is the Independence 3000 Ibot Transporter, or simply the Ibot. Using gyroscopes and microprocessors to help maintain its balance, the Ibot can negotiate stairs and curbs, as well as bring its user to a standing height.



With his earnings, Kamen outfitted the basement with electronics and equipment like lathes and milling machines. At WPI, he was a passionate student of physics but neglected his grades to pursue ideas that interested him. He eventually dropped out.

Inspiration for his next invention came from his brother, who was a medical student at Harvard concentrating on the care of newborns. “He’d come home from med school frustrated,” Kamen remembers. “He’d say, ‘They have these pumps that are made for adults but I can’t deliver microliters of stuff into these babies.’” Building a better pump didn’t sound too difficult, so the 20-year-old Kamen got to work. “The conceptual idea of the pump wasn’t very hard,” he remembers, “but making a device that is going to have lethal, toxic amounts of drug in it that has to work right all the time—that turned out to be more challenging than I thought.” A new kind of microchip that required very little power had recently come out and Kamen used it to put together a circuit that controlled a small pump connected to a syringe. The portable pump delivered precisely measured doses of drugs to a patient throughout the day.

A few months later, Kamen’s brother showed the pump to a doctor at Harvard, who was immediately excited by it. Between that doctor’s enthusiasm and a paper published in the *New England Journal of Medicine*, Kamen was soon flooded with orders. His second business was born, and he put his mother, his younger brother, and his brother’s friends to work in the basement workshop, assembling pumps as fast as they could.

Although he enjoyed the technical challenge of making the pump, initially Kamen didn’t realize how rewarding his invention could be. “It never occurred to me that people would say, ‘Without this my daughter wouldn’t be alive,’ or ‘My mother wouldn’t be home,’” he says. “It was *very* gratifying to make things that really helped people.” As more and more doctors began ordering his pump, the talkative and inquisitive Kamen built his knowledge of what devices the medical industry needed. “I’d deliver this equipment to different doctors,” he remembers, “and my questions to them were always the same: What do you do with this? What else can I do to it? What else do you need? They would always have some unsolved problem.”

The next problem that Kamen worked on was delivering insulin to diabetics. When diabetics inject themselves with insulin, their blood sugar can vary widely. Using the same principles as his first pump, Kamen built a portable, wearable de-

vice that delivered small, customized quantities of insulin, freeing diabetics from their injection regimen and smoothing out the peaks and valleys of their blood sugar level. The pump was released in 1978.

In 1979, Kamen moved his 20-person company to Manchester, New Hampshire, and three years later he sold it to a large medical equipment manufacturer for tens of millions of dollars. At age 31, Kamen was financially secure and free to do whatever he wanted. He founded another company, DEKA, and developed a new generation of insulin pumps, which are still considered the state of the art. He bought and renovated several nineteenth-century mill buildings on the Manchester riverfront to house the company. And he continued his hobby of collecting antique engines and machinery, some of which are displayed in his office.

Although the engines are often beautiful, his interest in antique technology is not merely aesthetic. For Kamen, there are lessons to be learned from the scientific and technical past. “I think most engineers are worried about how current they can stay,” he says. By contrast, one of Deka’s recent products, a kidney dialysis machine that can be used at home, works around physical laws discovered in the seventeenth and eighteenth centuries. (The machine also weighs in at just 22 pounds, one-seventh the bulk of previous dialysis equipment.)

Kamen’s current projects include the Ibot, an “advanced mobility system” that could replace the wheelchair. He is also looking at a long-ignored, early-nineteenth-century engine technology, the Stirling Engine, as a way to create small electrical generating systems. The engine, he says, “can be scaled to very small size, it can be used locally, and it doesn’t make pollution. Its flexibility in fuel is just awesome.” With the electric power industry freshly deregulated, he adds, the engine could “revolutionize the way people think about making and distributing electricity.”

In early 2001, news of another Kamen invention caused a sensation. After word of the mystery creation, known as “Ginger” or “IT,” was leaked to the press, feverish speculation about what “IT” might be ensued. Many people believe “Ginger” will be a personal scooter powered by hydrogen or a Stirling Engine, and Amazon.com founder Jeff Bezos was quoted as saying it would be “revolutionary.” IT, whatever it is, is expected to be unveiled in 2002.