The Mind Of an Inventor

He built his first computer as a child. In his 20s, he had moved on to supercomputers. Now Danny Hillis is thinking of bigger things.

BY STEVEN LEVY

Are inventors born, or are they made? Danny Hillis, who can't remember a time when he wasn't trying to make mind-blowing stuff, comes at the question, as usual, from an unexpected angle: potential inventors are un-made. "In some sense, every kid is inventive," he says. Without encouragement, a child's gleeful penchant for experimentation becomes endangered. "Kids invent things all the time until they get to school and adults tell them they shouldn't be wasting their time doing silly stuff," says Brain Ferren, Hillis's partner at Applied Minds, a company that invents amazing things for corporations like General Motors and institutions like the United States government.

Fortunately for Hillis, his approach to the world is as fresh and playful as it was in the fourth grade, when he decided to build a robot out of paint cans, motors and light bulbs. The only difference is that his inventions are now aimed at starting new businesses, sustaining our soldiers and finding effective chemotherapy drugs.
"When people talk about Danny," says his friend Nathan Myhrvold, former head of Microsoft’s research division, “they invariably wind up using the term “childlike wonder.” At 49, Hillis is clearly an adult: he’s a corporate executive and entrepreneur with a high government security clearance and a family of his own. But Hillis has never had to put out an APB for his inner child.

This becomes clear as soon as one crosses the threshold of Applied Minds, which sprawls over five flat buildings in an industrial area of Glendale, Calif. Behind an ordinary reception area, a door opens to a small room with only a red telephone booth that could have been a prop in an Austin Powers movie. Hillis picks up the handset. “The purple moon jumps over the purple sky,” he says, a twinkle in his eye acknowledging the corniness of the process. The wall behind him opens up to what geeks hope to see when they go to heaven: a vast room packed with brainiacs at work and exquisitely bizarre gizmos, ranging from a 13-foot skeleton of a robot dinosaur to a gleaming outback vehicle loaded with more communications gear than the trailers outside “Monday Night Football.” It’s a virtual museum of the future that rambles over several buildings.

At every turn, there’s something to make your mouth hang open. Here’s an array of data-display screens that looks like Han Solo’s cockpit. There’s a room populated with architectural mock-ups of “podules,” fully wired instant buildings designed for stealthy government agencies (that’s a picture of Donald Rumsfeld running a meeting in the full-scale version of the model sitting beneath it). Another area looks like Albert Einstein’s chop shop, stuffed with half-assembled Cadillac Escalade SUVs hooked up to exotic telemetry. Oops! Almost stepped on a six-foot-long robotic snake, slithering on the floor with scary fidelity to a pit viper.

Then you enter the darkened room with giant illuminated “touch tables.” The surface of each is a high-resolution computer display showing a satellite-camera view of the world. By putting your hands on the table and spreading them, you zoom into a region, a city, a neighborhood. You can also slide your hand over the table to expose the view as captured at an earlier time. (It’s possible to track, for instance, the progress of an Iranian nuclear facility, which now looks like a barren area but months ago was a giant hole being cleared for an underground complex.) At an adjacent device, called a “2-D Display,” you can display any point on Earth and get its topographical information. Want to see more? The surface of the table rises—rises!—to create mountains, streams and gullies. In a few seconds there’s a precise, model-train-tablelike model of the actual terrain.

The childlike wonder attributed to Hillis is contagious. His invention factory can make a corporate bigwig or a Pentagon official gurgle with excitement. “You walk in,” says one client who has visited Glendale, “and realize that there’s nothing not possible.”

The more complicated question is what makes a great inventor possible. Though Hillis may not be a household word, he’s definitely on the radar of those in the top ranks of science, government and business. He holds more than 70 patents, including a ground-
“brain” typically consisted of a single processor. Hillis imagined a supercomputer with thousands of processors all working together. Not only did this idea of “parallel processing” become his doctoral thesis but, while still a grad student, he started a company based on it, called (what else?) Thinking Machines. Funded in part by CBS magnate William Paley, Hillis’s firm succeeded in building ultrafast Connection Machines, the biggest with 65,536 processors—brooding black $10 million behemoths with rows of flashing red lights. But Thinking Machines, relying heavily on government purchases, failed as a business when the cold war ended.

Hillis embarked on other projects like using evolution to write computer programs and—in a project that he still passionately pursues—building “The Clock of the Long Now,” designed to keep time for 10,000 years and, in the process, make observers think more about the future.

In 1996, Hillis joined Imagineering, the research division of Disney, working on a number of projects, including a giant robot dinosaur that could safely mingle with tourists at the Magic Kingdom. (The six-ton creature shifts weight so artfully that if its foot encounters an eggshell, it will back off before the egg cracks.)

Hillis clicked with the head of Imagineering, Ferren, a well-known wizard in combining technology and design skills with a flair for showmanship. In 2000, the duo began Applied Minds. Backed by venture-capital firms Kleiner Perkins (Amazon, Google) Millennium Ventures and private funders, Applied Minds rents its resident brains to key clients. In addition to collecting a retainer, Applied Minds gets to patent its inventions. Managing partner Rob Turfe says that the private company is profitable on the fees alone and will be more so when licensing revenue from patents kicks in.

To get a good idea of how Applied Minds works—as well as to understand Hillis’s own creative process—consider the first product created by the company to actually hit the marketplace. It rose out of a three-year collaboration between Applied Minds and the Herman Miller office-furniture company, which was looking to expand into technology. One problem it sought to address was the

The MaxiMog
A rugged expedition vehicle loaded with high-tech equipment to perform research in remote areas. Powered by a Corvette engine.

Branpower: The Mog’s one of the projects “owned” by Applied Minds cofounder Bran Ferren.

Photograph by Ian White for Newsweek
INVENTOR LOGBOOK

Owner of more than 70 patents, Applied Minds cofounder Danny Hills has been creating cool stuff for decades, including one item he hopes will last for millennia.

X MAN: Hillis with MIT friends

TINKERTOY COMPUTER

While a sophomore at MIT, Hillis and a friend used 10,000 wooden pieces of the classic toy to make a computer that plays tic-tac-toe. It's still undefeated.

CORPORATE COMPUTER

Hillis broke ground with a supercomputer with more than 65,000 processors running at the same time. It was a big hit among spy agencies and data miners, but his company, Thinking Machines, crashed.

ROBOT DINOSAUR

Working as a Disney fellow, Hillis helped create Lucky, a giant autonomous beast now stalking Hong Kong Disneyland. It walks so carefully that if it steps on an egg, it'll back off before breaking the shell.

CLOCK OF THE LONG NOW

Built to tick once a year and to chime every century, the full-scale version of this clock is designed to run until the year 12000. Set the alarm.

FEELING LUCKY: Dino in China

lack of privacy among cubicle dwellers. Most people would attack the problem by trying to figure out how to muffle the sound. But Hillis zoomed to a starting point he often adopts when trying to come up with something new: identifying the paradox in the problem. In this case, he thought of restaurants. People like them to be noisy, and he figured this was because we like hearing human voices in the background, and because the din creates a degree of privacy for your own conversation.

Here was the paradox: sometimes the clatter of voices is soothing or energizing but other times it's grating. The difference, Hillis concluded, was when you could figure out what's being said. "It's the meaning that's distracting and obnoxious," he says. "Not the sound. The melody of the voice is actually pleasant." This epiphany—along with his knowledge of cryptography and signal processing—led to his invention: a box that blocks out a cube-dweller's conversation by simultaneously playing a soundtrack of scrambled, meaningless vocal snippets. (Hillis also had the benefit of work done by Herman Miller's R&D division.) Just playing anyone's voice wouldn't bring privacy, because a focused eavesdropper could pick out the user's conversation. But if the soundtrack consisted of a scrambled recorded version of the speaker's voice, an actual conversation by that person would be impossible to understand, even by someone sitting just outside the cubicle. "Your own sounds are the right thing to mask the meaning of your voice," Hillis says. "If you were trying to hide yourself in the woods, the right camouflage would be to tear off the leaves around you and glue them to you."

The result of this is Babble, a shiny black box the size of a paperback that plugs into the phone and has two speakers you put on top of the cubicle. As promised, when the speakers play a scrambled version of your voice, your real conversation can't be understood by someone standing even four feet away. (In tests by NEWSWEEK, no one wanted to stand four feet away, because the chatter from those boxes was anything but soothing.)

Ambient noise problem or not, the Herman Miller company is thrilled. It has start-
To come up with something new, Hillis often looks for the paradox in the problem.