

Greetings from

# FUTURE CAMP

According to Ray Kurzweil, the Singularity is a point at which **man will become one with machine and then live eternally**—which makes Singularity University, a nine-week academic retreat named for the concept, sound a little cultish. Our writer traveled west to investigate and found 40 stunningly sane brainiacs out to **change the world**

BY JOSH DEAN PHOTOGRAPHS BY DAVE LAURIDSEN

## “WHAT HAPPENED TO YOUR FINGER?”

Bruce Klein asked after noticing my bandaged digit. Cooking injury, I told him. “Maybe we can sprinkle some nanobots in there and fix it up,” Klein replied, and chuckled, though he was only sort of kidding.

Prior to hanging his hat here in the administration office of Singularity University (S.U.), Klein produced the film *Exploring Life Extension* and co-edited the book *Scientific Conquest of Death*, both of which are pretty self-explanatory. He is reed thin, thanks to strict adherence to a health regimen designed to prolong life (minimal calories, healthy foods, no booze, many supplements) and possibly because of the stress of helping to create and open this, America’s newest and most

peculiar institution of higher learning.

S.U., which opened last summer on the campus of NASA’s Ames Research Center in Mountain View, California, is the kind of place where you can tell your classmates that your goal is to one day upload your consciousness to a computer and they won’t look at you as if you’ve just announced plans to re-create your father using scraps of DNA salvaged from his corpse. Actually, you can say that too. The school’s chancellor, Raymond Kurzweil, has—and will say it again if you ask him.

Kurzweil is one of the most prolific inventors and radical thinkers of the past half-century. His creations include the flatbed scanner, optical character-recognition software, the first text-to-

voice reader, and an electronic keyboard that accurately mimics the sounds of a grand piano, which he built at the urging of Stevie Wonder.

For the past decade, however, the 61-year-old has become best known for synthesizing and espousing a set of controversial ideas that have made him an almost messianic figure to transhumanists, cyborg enthusiasts, nanotech evangelists and others on the fringes of the futurist circuit. As argued in his 2005 best seller *The Singularity Is Near: When Humans Transcend Biology*, Kurzweil believes that humanity has entered a period of exponential growth in technology that has us hurtling toward the next great evolutionary leap. By 2029, he projects, computers will achieve human intelligence, and by 2045 we should be able to upload our

**CLASS OF 2009** The students and faculty of the inaugural Singularity University summer graduate-studies program



consciousness into machines, providing eternal life. This is the Singularity. Along the way, we'll build some seriously smart robots, harness nanotechnology to end disease, custom-manufacture organs and limbs, and generally change the world with tools that we plodding proletarians can hardly imagine today.

So you can see why it's anything goes around the halls of S.U. And you can see why I arrived on campus for a short visit in July, during week four of the nine-week session, expecting to encounter a bunch of sci-fi nerds who couldn't wait to plug into the Matrix. Would lesson plans be Bluetoothed into skull implants? And come to think of it, wasn't the concept of humans gathering in a physical location a little olde-tymey? But I was surprised. The 40 men and women from 13 countries who paid \$25,000 each (or received one of about two dozen scholarships) to be part of S.U.'s inaugural Graduate Studies Program seemed almost pathologically

about how to solve problems and advance technology.

I spent my first afternoon on campus in Melanie Swan's "Futures Frameworks Simulation Workshop." Swan, a Silicon Valley hedge-fund manager, is one of the lesser-knowns among a faculty of heavyweights like Vint Cerf, the father of the Internet, and Will Wright, creator of *The Sims*. On this day, she was demonstrating how to best use prediction models to a group of 10 students, who had already spent the morning buzzing around the Bay Area in a zeppelin to observe cloud formations and witness firsthand the logistics of operating a small aerospace business. (Everything here is viewed through the prism of entrepreneurship.)

Swan clicked through PowerPoint slides of projections of the future as she sees it unfolding. "I predict that the future will merge traditional

since 1987, when Diamandis launched it along with his friends Bob Richards and Todd Hawley.

A few years back, Diamandis read *The Singularity Is Near* and was inspired to spread its message. He shared it with Richards, who was also fascinated. ("Peter changed his behavior and his diet and started taking the supplements. He drank the Kool-Aid," Richards says. "I drank the Kool-Aid, but I haven't had the discipline to execute yet.") The two began to discuss merging the ideas into ISU but then decided, says Richards, that "the canvas of Ray's ideas was large enough that this could be a university."

Diamandis approached Kurzweil in late 2007. "He got it right away," Diamandis says. By mid-2008, they had hired two S.U. "architects" who, working with Diamandis, organized a founding conference, held that

## WHEN I ARRIVED ON CAMPUS, I EXPECTED TO ENCOUNTER A BUNCH OF SCI-FI NERDS WHO COULDN'T WAIT TO PLUG INTO THE MATRIX.

grounded—pragmatic people more interested in starting businesses than speculating on the nature of computing in 2045. They were overachievers of the highest order, Type A polymaths with such biographies as: "Luke Hutchison was born in Auckland, New Zealand, and grew up tinkering with computers and building gadgets. He is a Ph.D. candidate in computer science and computational biology at MIT. Luke has spent the last two years studying intensive Chinese as a hobby while completing his Ph.D. He is very interested in North Korean human rights as well as skydiving and global off-the-tourist-track travel. Luke is an avid Android hacker and all-around tech geek."

Certainly, Kurzweil's specter haunts the halls, but the real idea behind the program is practical and clever: to put together brilliant people who wouldn't typically interact and get them thinking

electronics and molecular electronics, integrating organic and non-organic materials," Swan said, following one of Kurzweil's favorite formulations. "By 2018, we should have the ability to do a full human-brain neural simulation. I think it's possible we'll be able to do a backup of our mind file before that." Around the room, students nodded matter-of-factly and tapped along on their laptops, unfazed by the notion.

**IN TRUTH**, S.U. isn't all about Ray Kurzweil. It wasn't even his idea. That credit goes to Peter Diamandis, founder of the X Prize Foundation and the annual summer graduate program that S.U. is modeled after, the International Space University. ISU is an interdisciplinary crash course in all things space-related that has been attracting the future stars of aerospace

September at Ames. There they recruited sponsors (including Google) and set a general framework. Students would stay on the Ames campus and attend classes just like at college, and the summer session would be split into thirds. The first section would be 10 hours of daily lectures providing an overview of so-called exponential technologies like artificial intelligence and nanotechnology, taught by some of the foremost experts in those fields. In the second section, students would follow specific "tracks," such as Futures Studies and Forecasting (which is what was going on when I sat in on Swan's class), and then split into four groups in preparation for the last segment. During the final stretch, each group was to come up with a project that could affect the lives of a billion people within 10 years and that could be implemented almost immediately.



THE GURU Ray Kurzweil's ideas about exponentially accelerating technologies, particularly artificial intelligence and life extension, have made him an intellectual hero to certain tech-minded communities.

The project was dubbed “Ten to the Ninth Power”—scientific notation for the number one billion. S.U. would have no tests or papers. It was to be more intellectual retreat than actual school.

Kurzweil announced the launch of S.U. at the 2009 TED conference, an annual gathering of tech, entertainment and design luminaries. Diamandis hired Salim Ismail, the former chief of Yahoo’s in-house incubator (known as Brickhouse), as executive director. Some 1,200 applications for the program poured in.

Ismail was hardly a Kurzweil disciple. “I knew just a little bit about his work,” he said while throwing a Frisbee outside the red-roofed hacienda-style building that houses S.U., late on my first afternoon there. “I hadn’t read any of his books.”

Bob Richards says S.U.’s founders were well aware of the “pros and cons of branding with Singularity”—for instance, of “the potential to be branded as the Church of Ray,” which would basically stuff ammo into the musket barrel of any cynic who felt like taking aim. “[S.U. is] not a religion,” he says. “It’s an academic institution,” though not one intended to rival MIT or Caltech, and not one in the traditional graduate-school mode, where a student focuses on an extremely specialized topic for years and emerges an expert. (“People are studying an ion channel on one particular neuron,” Diamandis told me, rolling his eyes.) “The idea,” Richards says, is to “bring in virtuosos and make them generalists.” And beyond that, the idea is to get these virtuosos to focus on turning brainstorm into businesses.

As early as the fourth week, Ismail said, interesting things were afoot. He recalled one session in which students and faculty were discussing ways to geoengineer climate change. Scientists have proposed spritzing seawater into the air to deflect sunlight. The problem is that it’s an expensive proposition and would happen in international waters, and who would fund or manage that? A student who once headed up e-business for the consulting firm Accenture raised his hand when the idea came up in class. “Form the clouds in the shape of a Nike logo or a BMW car,” he said. “Or sell advertising on the clouds so



that commercial airlines can see.”

Ismail estimated that at least four companies had been born in the first month, and more were likely to follow. One, in fact, was being sussed out under some trees not far from where we stood. “Yonatan is an adviser to Shimon Peres, the president of Israel,” Ismail said, pointing to a young man standing at a dry-erase board set on an easel. The guy to his left was an A.I. entrepreneur from Canada, he continued, and the young woman in red was an adviser to the prime minister of Canada.

That team was at work on a community-car-sharing idea known as Gettaround. Think of it as Zipcar using private cars: Individuals join the pool and then rent their cars for the periods in which the cars are sitting idle, which for most cars is as much as 90 percent of their life span. In one weekend, the group built an iPhone application that showed where and when cars were available and could remotely unlock and start those cars.

be summoned—stick with me—by whatever the future version of an iPhone app is. Probably something embedded into our skull and activated by blinking. Correction: by thinking.

**ONE WOULD EXPECT** a guy with messianic status to be dynamic and charismatic. One would guess that a man who takes some 150 supplements a day in an effort to extend his life would have great hair and a healthy glow. In reality, Ray Kurzweil is smallish, quiet and not exactly frumpy, but certainly not slick and commanding. He rarely changes expression. He is friendly but not overly so.

It was the final week of the S.U. session, and Kurzweil and I were both back on campus for “graduation.” Chatting with him in a conference room at S.U. HQ, it occurred to me that he doesn’t attempt to carry the air of a messiah. He does, however, very much want to get the point across that

I was a student. It’s a billion times greater in computation per dollar, and that’s going to happen again.”

Kurzweil can be a little pie-in-the-sky. He seems to think we can Singularity our way out of anything using a few exponential growth curves. Should his supplements not succeed in keeping him around long enough to have his consciousness uploaded to a machine, he has arranged to have himself frozen until the technology arrives.

A publicist nudged us to say that it was time for Kurzweil, who was already triple-booked, to move on. Kurzweil bristled slightly at a question that may have been obvious—“How is the Singularity idea important today, as in right now in this world we inhabit?”—and asked if I’d read his books. I said I had read *The Singularity Is Near*, which was half true (I quit midway through its 672 pages). He stood and walked to a shelf containing rows of his books.

“*The Singularity Is Near* isn’t just talking about 2045,” he said. “We’re

## KURZWEIL SEEMS TO THINK WE CAN SINGULARIZE OUR WAY OUT OF ANYTHING.



**ON CAMPUS** Counterclockwise from top: Peter Diamandis, who came up with the idea for Singularity University after reading Kurzweil’s work; the students and faculty behind Gettaround, a car-sharing project similar to Zipcar but using private vehicles; Charles Du, an S.U. staffer who post-session went on to work toward commercializing Gettaround.



A cool car-sharing company might not seem to be the kind of grand project you’d expect from something as loftily named as Ten to the Ninth Power, but Team Gettaround is quick with a counterargument. Sarah Scarsic, a University of Michigan medical student who was working on the project, said they settled on transportation because it’s an issue that can be addressed with technology that already exists. “It’s not cancer or HIV or poverty; it’s not this amorphous problem that we don’t really know how to solve.” The way Gettaround will save humanity—if you follow the loose logic trail into the dark and scary woods—is that it makes people rethink their car. It’s no longer a possession but rather a mode of transportation that belongs to the collective. In the future, we will rely on autonomous cars plying robotic roadways that can

things are changing, fast, and that the vast majority of us have no clue what that means. In Kurzweil’s view, most of us are bumbling along in a straight line while the various technologies that enable us are on a rocket ship pointed straight at the clouds. (He likes to illustrate this using exponential graphs; they riddle his book.)

S.U., for Kurzweil, is a way to hammer these points home to influential people in key industries. “The Singularity is an outcome of the exponential growth of information technology,” he said. “That growth is happening. We’re on a fairly steep ramp of that. The telephone took 50 years to be adopted by one fourth of the population. Things are happening faster and faster. The cellphone you have is 100 times more powerful than the computers we shared at MIT when

already at a point when future time is influential in affecting us.” What he means is that the future is careening at us like an out-of-control robot car and that we need to start using the tools it’s handing us to their full potential before it mows us down. He grabbed a copy of his latest book, *Transcend: Nine Steps to Living Well Forever*, and signed it. “To Josh,” he wrote. “Keep on Transcending.”

**ON THE MORNING** of the final presentations, a student was playing cello in the lobby of the main building as people scurried to and fro with laptops and note cards. A member of the Xidar team, which was working on disaster response using smartphones, approached the school’s publicist to ask if she could get a press release “out on the wire,” which seemed a quaint concept for this crowd. [CONTINUED ON PAGE 78]

[CONTINUED FROM PAGE 59]

# FUTURE CAMP

Over in Peter Diamandis Hall, a one-story building renamed for the ISU and S.U. terms that houses the cafeteria and a large ballroom, the jangly chords of Ziggy Marley's song "Future Man, Future

Lady" played. Diamandis stood in front of two screens and a giant globe onto which the school logo had been projected and introduced the team-project concept. "Ten to the Ninth Power," he said,

facing a crowd of Valley luminaries. "Affect a billion people positively over the next decade. Without further ado, I pass it off to our first team to show you what they'd do." "Look around you," said Margo Liptsin, a member of the team known as Acasa and a Ph.D. candidate at Harvard University in the history of science. "Most everything was made using an automated process, with one exception. This building. Construction is still done the slow, labor-intensive way." Acasa's plan, she said, was to address the problem of substandard housing around the world. Even the crudest prefab houses are hand-built, relatively expensive and time-consuming. "What if there were another way to build a house? What if we told you we could build a home using 70 percent less energy with virtually no waste? How?" She paused for emphasis. "The house would be printed."

Acasa's plan was large-scale commercialization of a fringe technology that had been around for a while—using three-dimensional printing to, literally, print houses. A portable unit that is easily constructed on-site extrudes concrete from a nozzle; a one-story house could be completed in two days. "This is not just theoretical," Liptsin said. "Today we are building walls this way." This was a crucial point. While the S.U. students had spent plenty of time in the previous weeks pondering downloadable consciousness and other far-out concepts, a successful Ten to the Ninth Power project had to start with an existing technology to have any chance of fulfilling the whole point of the enterprise—affecting the lives of a billion people in a decade. "Neil will tell you how we realize this mission."

Neil was Neil Thompson, a tall Canadian with curly blonde hair who is currently getting a doctorate in business at the University of California at Berkeley but who considers himself "cross-disciplinary," with a particular interest in brain-machine interfaces.

He began by discussing the challenges. For now, the technology won't work with foundations or roofs, for instance. But the inventor of this large-scale printer, University of Southern California professor Behrokh Khoshnevis, had joined the Acasa group and was committed to improving on the idea.

In the near future, Thompson said, they hoped to be able to print features of the home's interior, as well as roofs and foundations. It could be adapted to local materials (adobe, say), and by "leveraging exponential advances"—here he clicked to a graph showing the

exponential curve, which appeared in every presentation, the Nike swoosh of the Kurzweil philosophy—it's not outlandish to apply the technique to space, by melting moon rock and saving future spacemen the burden of lugging sacks of concrete with their luggage.

Back here on Earth, Acasa didn't need much to start moving. With \$10 million and 16 months, Thompson said, they could do proof-of-concept, have a prototype home built, and obtain regulatory approval. He cued up Acasa's video. Essentially a commercial with an original score set to inspiring images,

it had been put together in two days by team members and was every bit as inspiring as the ads for which big companies pay millions.

It was obvious that this was as much a pitch slam to the assembled venture capitalists as it was an end-of-term presentation. A number of people stood up and asked incisive questions about potential weaknesses. For instance, do shantytowns have the sewer and water infrastructure to accommodate a sudden burst of permanent housing? One man sitting several rows ahead of me said he was

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# FUTURE CAMP

“awed” by the idea but pointed to the \$10-million and 16-month figures. “Both of them struck me as, um, optimistic.”

**IN THE END**, S.U.’s association with Kurzweil seemed to be primarily a marketing tool to attract attention and top faculty. It also ensured that anyone who came to S.U. would be open-minded and curious, and motivated to take fringe technologies and move them into the mainstream. The students, at least, were pleased with the result. Almost to a person, the denizens of S.U.’s inaugural class reported that the program “exceeded expectations,” as if they were filling in a circle on a Scantron survey.

Of course, it’s yet to be seen whether the schemes that emerge from S.U. will thrive. Gettaround raised \$250,000

in angel funding and hopes to soon begin testing its car-sharing concept on college campuses in the Bay Area. Acasa has a business plan, the inventor of the technology on board, and team members in place but was still chasing VC money as of last fall. Members of the other two teams—Xidar, a disaster-response system based on PDAs, and One Global Voice, which aims to build a platform for application-building on the 2G wireless network (which is far more common in the developing world than faster 3G networks)—would continue to pursue capital and partnerships.

Singularity University’s most lasting influence may turn out to be the alumni network it spawns. Next year, the program will grow as large as 120 students, and shorter programs for business executives began last fall.

Yonatan Adiri, the adviser to Shimon Peres, is charged with overseeing the alumni network. He had never read Kurzweil’s book either until Peres gave it to him. What he took away, he told me in the moments before graduation, was the message that every part of our world is changing, rapidly, and that those who thrive are the people most able to grasp the technologies handed to us.

“I do believe that each and every one of us [S.U. grads] within the next three to five years will have a powerful Singularity moment, meaning a moment in which he or she can impact a large number of people,” he said. “Someone said—and I think it’s a very appropriate way of framing this thing—it’s been more about the science than the fiction.”

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*Josh Dean, a regular contributor to POPULAR SCIENCE, wrote about free Internet-based college last September.*