# Sebastian Thrun: What's Next for Silicon Valley?

*Our digital future isn't all Facebook and iPhone apps. Meet the engineer behind Google X.*

By ANDY KESSLER – June 15, 2012

Hewlett-Packard is laying off 27,000 people. Yahoo is treading water. Facebook IPO shares got flipped and then flopped. Has Silicon Valley reached the end of the line? Will everyone just develop me-too iPhone apps?

I knew just the guy to prove otherwise.

The entrance to his building is littered with the gaudy red, blue, yellow and green bicycles that Googlers tool around on. I'm at the secret headquarters of the not-so-secret Google X, where the way-out-there projects of the search giant turn into reality. The gregarious play master, Sebastian Thrun, leads us into a well-worn conference room. The chairs are a shade of green not found in nature and the disrupting clang and cheers from a rousing foosball game waft in through the door. Mr. Thrun, 45 and slight in stature, is sporting a gray T-shirt of a local start-up and speaks softly with German-English diction.

"I feel I jump from an ocean liner and then learn how to swim," he starts. Oh, this is going to be interesting.

Mr. Thrun earned a Ph.D. in computer science from the University of Bonn, "the 53rd of 53 German computer-science schools," he adds. His focus was on artificial intelligence, a field that failed in the 1980s with a rules-based approach—because humans could never come up with all the rules a machine needed—but then flourished in the mid-90s when machines had to learn the rules by themselves, by trial and error, almost like an infant.

Enlarge Image

Ken Fallin

Mr. Thrun left Germany in the mid-90s for Carnegie Mellon—looking "for the lack of authority, unlike Germany"—to build intelligent machines. His mentor at CMU, Tom Mitchell, told him, "Pick a problem that matters to society." So he helped create robots, including a "nursebot" to assist the elderly in nursing homes and robotic tour guides, where one named Minerva led thousands of visitors during a stint at the Smithsonian National Museum of Natural History. This required a cross-discipline education including nursing, psychology, material science and whatever else was required to help machines learn about the real world. These were hard projects, he says. "Just let go, trust your ability to learn, more [than] holding on to the things you've achieved—and that became the central theme in my life."

He eventually found his way to Stanford, leading the university team's entry in the 2005 Defense Advanced Research Projects Agency (Darpa) Grand Challenge to create an autonomous vehicle that could navigate 132 miles through a desert. He insisted on a blank slate, letting student imaginations run wild as opposed to proving that some professor's arcane research actually works. "It's sad that we never get trained to leave assumptions behind," he says. Stanford won by 11 minutes.

At the Darpa challenge he met Google founder Larry Page, who would attend the races hiding behind dark sunglasses and a hat. Mr. Page hired Mr. Thrun and his

team at first to work on StreetView for Google Maps. But his role soon evolved: "Larry frequently had me to dinner and every time, Larry would dream something up that was completely crazy. My gut reaction was that this makes no sense, it can't work, it's completely flawed. And I'd go home, do some calculations and a day or a week later I'd apologize and say: You were completely right."

One of these ideas was for a self-driving car, not through a desert, but on the streets of San Francisco and beyond. Crazy. But Mr. Thrun and 12 engineers created a car that could drive itself down twisty Lombard Street without a human driver. How did they do that? "We should question all the rules—we should break the rules," he says. "I like to put myself in the most uncomfortable position. There's so much baggage we take on. Why is that so? We should have the courage to put everything overboard."

But, I wondered out loud, why would Google do this? "I think Google's position was we have a responsibility to do something amazing for the world. Never once did we talk about how this would make money for Google."

I actually think the reason is as much for internal motivation. To show those biking Googlers that on the cheap—only 12 engineers, which I guess means spending under $50 million for the whole project, or more than 1,000 times less than the $80 billion Detroit bailout—you can change an entire industry.

Telling Google engineers that their Google projects destroy cable TV or book publishing by making them obsolete should be much easier, certainly easier than building a driverless car. But, Mr. Thrun insists, "it is a great challenge that benefits society"—because it could save thousands of lives that careless or imperfect human drivers take on the road every year. So "how could we not do it?" His auto autos have since logged hundreds of thousands of miles without human hands on any steering wheels.

At Google X, Mr. Thrun brought in University of Washington Prof. Babak Parviz to create a set of eyeglasses that are capable of displaying Web and Google search results. Not easy—yet another cross-discipline challenge to make the device ultra lightweight and natural to use. It was announced recently as Google Glass. It works like bifocals in that you look up to see the display so your normal vision below is never blocked. "We discovered this is not some crazy moon shot, this is real. It turned out we were closer to something interesting than all of us thought." Every geek is itching for a pair.

I tried to get the scoop on other Google X projects, but without much luck. Mr. Thrun did say that "they have to be a science challenge. The preconditions are they have to have massive influence on people, they have to have a path to become real, and we have to have massive challenges." Smartphone apps are too easy. "Larry Page always encouraged me to aim high."

If you can't tell already, Mr. Thrun is a restless sort. "I take all day to climb mountains and then spend about 10 minutes at the top admiring the view."

Yet there is one project he's happy to talk about. Frustrated that his (and fellow Googler Peter Norvig's) Stanford artificial intelligence class only reached 200 students, they put up a website offering an online version. They got few takers. Then he mentioned the online course at a conference with 80 attendees and 80 people signed up. On a Friday, he sent an offer to the mailing list of a top AI association. On Saturday morning he had 3,000 sign-ups—by Monday morning, 14,000.

In the midst of this, there was a slight hitch, Mr. Thrun says. "I had forgotten to tell Stanford about it. There was my authority problem. Stanford said 'If you give the same exams and the same certificate of completion [as Stanford does], then you are really messing with what certificates really are. People are going to go out with the certificates and ask for admission [at the university] and how do we even know who they really are?' And I said: I. Don't. Care."

In the end, there were 160,000 people signed up, from every country in the world, he says, except North Korea. Rather than tape boring lectures, the professors asked students to solve problems and then the next course video would discuss solutions. Mr. Thrun broke the rules again. Twenty-three thousand people finished the course. Of his 200 Stanford students, 30 attended lectures and the other 170 took it online. The top 410 performers on exams were online students. The first Stanford student was No. 411.

Mr. Thrun's cost was basically $1 per student per class. That's on the order of 1,000 times less per pupil than for a K-12 or a college education—way more than the rule of thumb in Silicon Valley that you need a 10 times cost advantage to drive change.

So Mr. Thrun set up a company, Udacity, that joins many other companies attacking the problem of how to deliver the optimal online education. "What I see is democratizing education will change everything," he says. "I have an unbelievable

passion about this. We will reach students that have never been reached. I can give my love of learning to other people. I've stumbled into the most amazing Wonderland. I've taken the red pill and seen how deep Wonderland is."

"But Wonderland is also crazy!" I interrupt.

"So?"

Ah, another Thrun project that can radically disrupt the old way of doing things. "But isn't that exactly what we should be doing? I'm going part-time at Google to pursue this. I really care. Isn't this the American history? Can't you pinpoint almost everything that happened back to some technological breakthrough?" Indeed, this is going to disrupt public schools and teachers unions and universities and tenured professors and so on, Mr. Thrun effectively interjects: "The dialogue always focuses on what's going to happen to the institutions. I'm totally siding with the students."

I ask why he always takes on these quantum changes instead of trying something incremental. "That's what Google taught me. Aim higher. Udacity is my playground—to radically experiment and find out. I've seen the light."

Now Mr. Thrun is talking like a true Silicon Valley entrepreneur. "The AI class was the first light. Online education will way exceed the best education today. And cheaper. If this works, we can rapidly accelerate the progress of society and the world. If you think Facebook is neat, wait five to 10 years. So many open problems will be solved."

I've met a few others like Sebastian Thrun. When you ask them why they took on a huge challenge, they ask: Why not?

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