ON THE CUTTING EDGE OF THE CUTTING EDGE

At IBM, EECS alumnus Dario Gil directs a global research team with an ambitious science agenda.

By Stephanie Schorow | Connector Contributor

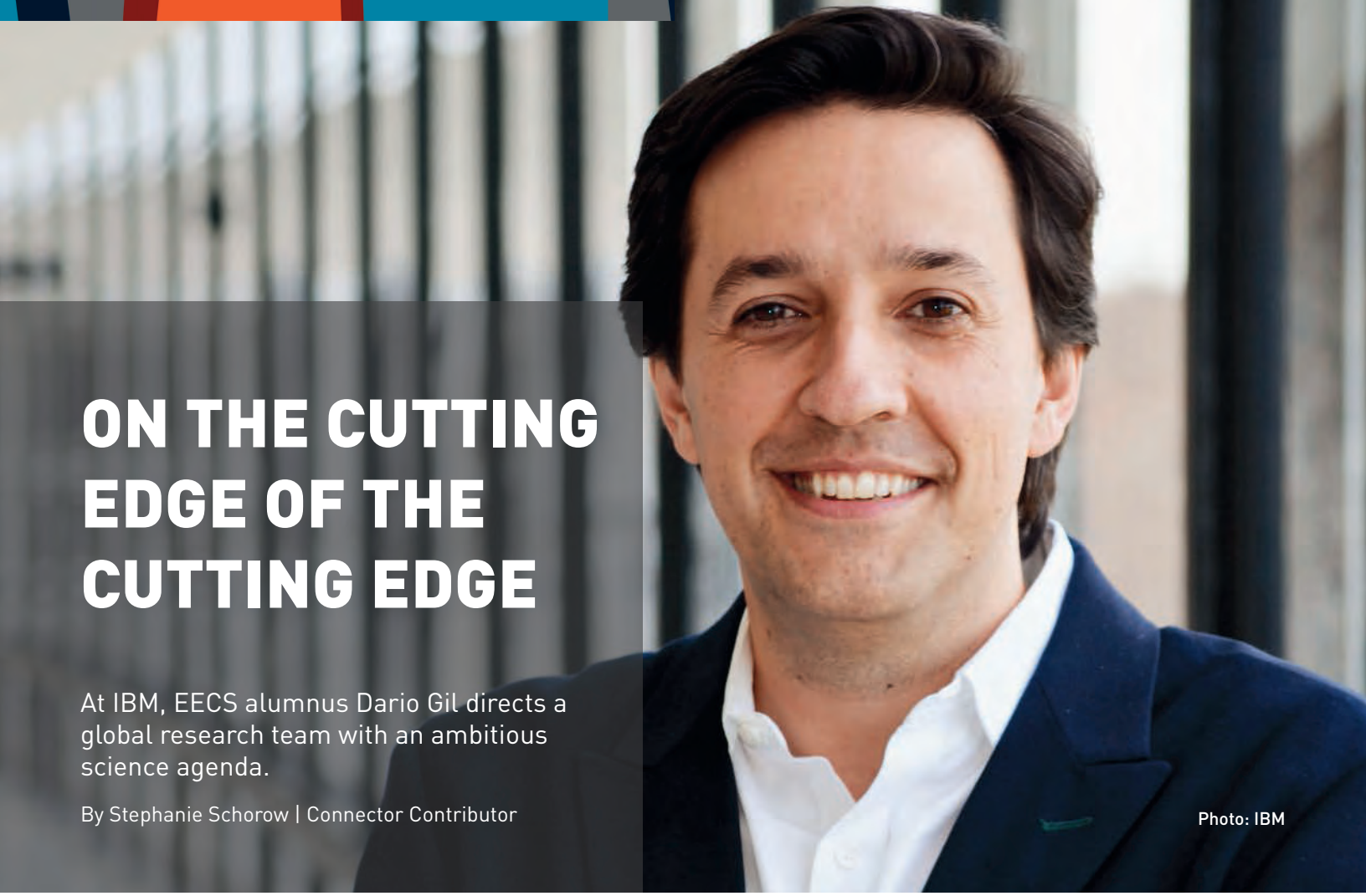

Photo: IBM

Here's a thought experiment inspired by an interview with Dario Gil, SM '00, PhD '03, the vice president for science and solutions of IBM Research:

Two researchers are spiritedly discussing a computing problem when one of them opens his laptop computer to check a formula — and the conversation grinds to a halt. The researcher now has access to information, but the engagement has been disrupted.

But what if the laptop simply joins the conversation? What if it verbally explains the information? Or outlines an analysis? Or even begins to debate the two researchers about the solution?

While most of us now think primarily of computers as processors of information, Gil sees them as potential collaborators.

"Imagine a future in which we are talking to each other and the computer system is also collaborating with us," he says. "To me, it has always been very interesting to see the asymmetry of how much we expect of computing when we're alone and how little we expect of it when we are together."

Someday, however, users will compute together "not as a network in front of our computers over the Internet — we know how to do that already — but when we are physically engaged with each other, without screens in front of us."

If there is a cutting edge to the cutting edge, Gil walks it at IBM Research, where he oversees an expansive science agenda that includes the physical sciences, the mathematical sciences, and health care and the life sciences. He speaks with energy and passion about advances in ambient, ubiquitous computing as well as in artificial intelligence and cognitive systems.

While he directs a global organization of some 1,500 researchers across 11 laboratories, Gil also spends a few hours a day working with his quantum computing team. "It's healthy for leaders to continue to be deeply involved in some particular area that you manage because it anchors you and feeds you with energy," he says.

This love of hands-on research can be directly linked to Gil's MIT days, when he worked in the nanotechnology laboratory of EECS Professor Emeritus Henry "Hank" Smith. There, Gil had his first lab experience: creating knowledge, rather than just learning it. "That was intoxicating," he recalls. "My imagination was captured by the nano world — the world we could not see."

Indeed, Smith remembers Gil as an "energetic, friendly graduate student" who was "noticeably helpful to others and unusually creative in the way he approached problems in the lab."

In the lab, Gil and other graduate students developed and demonstrated a new system for doing nanolithography, Smith says. That new system employs an array of 1,000 diffractive-opitical microlenses and writes patterns much faster and with greater precision than other forms of nanolithography. "We patented various elements of the technology and spun off a small company, LumArray, Inc.," Smith says. That company is still operating in Somerville, Mass., providing special lithography services.

The work is an example of how Gil, as Smith puts it, "takes in a comprehensive view of the role of technology in the larger world and how technology can both create problems and solve them."

Among the key factors in the development of Gil's perspective was his international experience as a youth. Born in Spain as the youngest of four brothers, Gil grew up spending his summers learning languages in Ireland, France and Italy. He spent his senior year of high school at Los Altos High School in California, which he considers a pivotal aspect of his life. After graduating as the valedictorian of Stevens Institute of Technology in Hoboken, N.J., he came to MIT in 1998 to study for a master's degree and PhD.

"The part that I have always admired about MIT is its can-do culture and the quality with which it integrates theory and practice," Gil says. Most telling to him is the ability of MIT to produce so many alumni that years and decades later continue to work in engineering and science, their passion undimmed.

In 2003, he graduated from MIT, joined IBM, and had his first child. His advice: "Try not to combine all that within a year." He now has two girls.

Unlike many of his fellow alumni, Gil has worked for just one company since graduating. When he joined IBM, he continued working in nanofabrication. He led the team that built the world's first microprocessor with immersion lithography in 2004. He later moved into industry solutions, exploring smart grids and energy and then into artificial intelligence and cognitive solutions. As director of Symbiotic Cognitive Systems, he was responsible for the design and creation of three pioneering laboratories and experiential centers: the Cognitive Environments Laboratory, the IBM Research THINKLab, and the IBM Watson Experience Center.

"Over the last 14 years, I have had a chance at multiple careers," he says. "Sometimes you do that with different companies. I get to do them inside IBM."

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Currently, he describes himself as "very, very excited right now about quantum computing." Last year, IBM Research installed a 5-qubit quantum computer in the cloud. "Now we have 45,000 users from 140 countries who are learning about quantum computing," he says. "I'm really passionate about our technical and science community around the world engaging with this topic."

Gil's vision for computing, in fact, seems boundless: Can we build machines that are persuasive? That can convince us? That we can debate with? And that can help solve the world's problems?

Smith answers the last question this way: "I have met with Dario on a number of occasions for the sole purpose of exchanging ideas on the great problems facing the world and what role a company like IBM can play in helping to solve them: global warming, failed states, and the refugee problem, food supply, the role of the Internet in providing education to the Third World and in combating misinformation and radicalism, and the role of social media for good and otherwise."

Gil and his team are also involved with the intersection between genomic diagnosis and advances in artificial intelligence that could drive a new level of personalized medical treatment. IBM recently announced a partnership with Illumina and Quest Diagnostics in which DNA sequencing can be imputed directly into Watson Genomics to create specific recommendations, such as a tailored treatment for a specific tumor. Or a person's DNA would be sequenced to try to match it to a clinic trial to improve outcomes.

As someone at the forefront of artificial intelligence, Gil remains bemused by the tendency to frame debates about new technology as a clash between two extremes: robots take over the world on one hand and computers create utopia on the other where we can all lie on the beach all day.

"I understand why people like to frame it that way," he says. "It's catchy, right? It provokes a reaction. But I don't think either frame is most illustrative of the path that lies ahead." He advocates a nuanced perspective that technology will progress not because of the fancy new gadget we might build, but "the choices we make as a society."