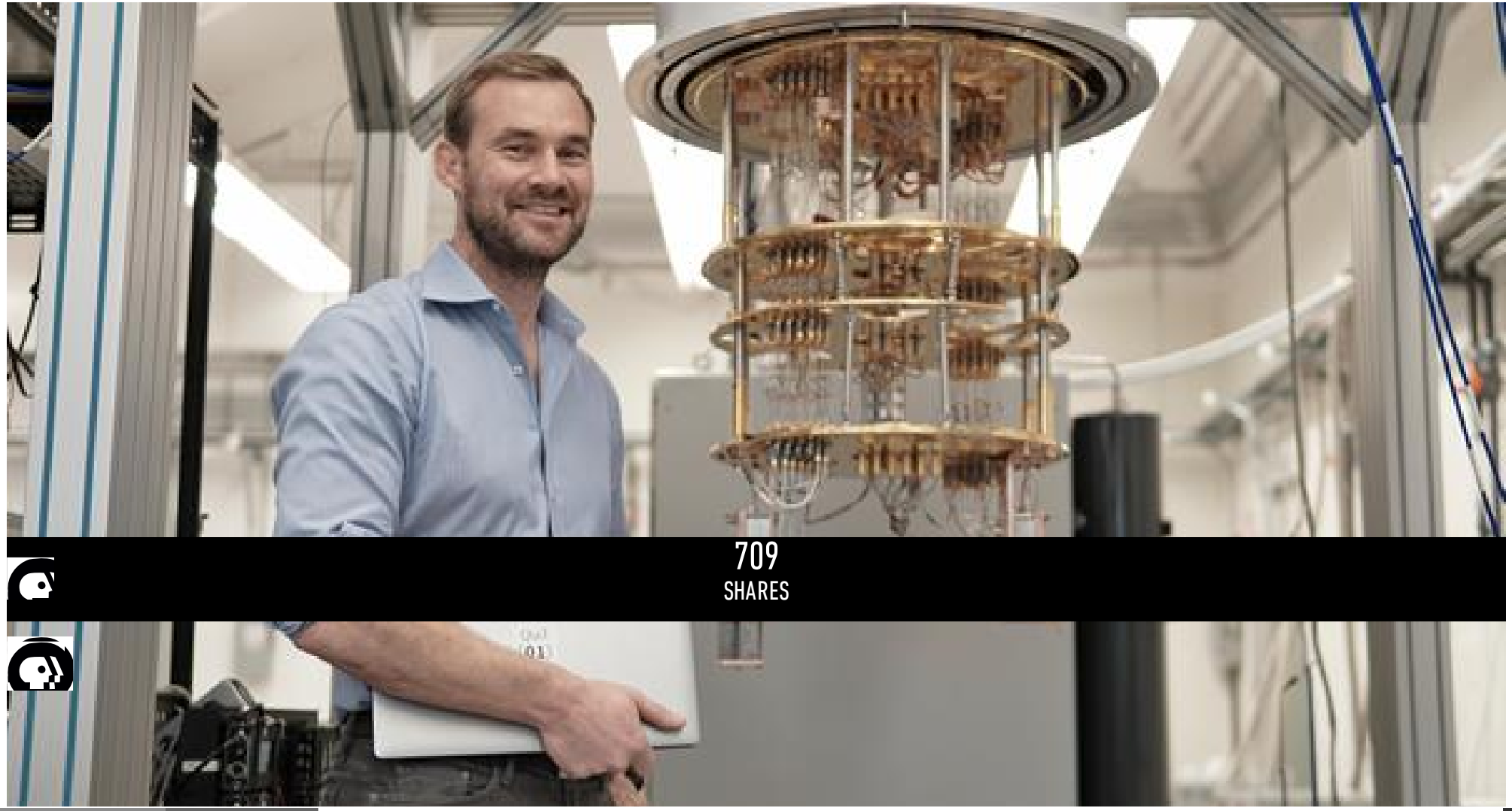
CAN THIS QUANTUM-COMPUTING GENIUS BEAT OUT IBM AND GOOGLE?



RISING STARS

WHY YOU SHOULD CARE

Because a quantum computer could change the way we understand reality.

By Laird Harrison

THE DAILY DOSE • JUN 19 2017

Few people can say they've brought about a quantum leap in their field. But if all goes well for Chad Rigetti, this summer he will join them, by making the machine on your desk as obsolete as an abacus.

"We're on a mission to build the world's most powerful computer," says Rigetti, "to solve humanity's most pressing problems." Cancer, climate change, world hunger — all targets of the technology Rigetti has in mind. It's a striking vision for a 38-year-old farm boy from Moose Jaw, Saskatchewan, who once thought he would grow barley after high school.

To achieve his goal — creating the first commercial quantum computer — would amount to a revolution in computing. Conventional computers reduce logic problems to math problems, and math problems to a binary counting system: On or off equals one or zero. The time required to solve difficult problems has been getting shorter and shorter as computer engineers figure out how to make their on/off switches smaller, each year doubling the computing power contained within the same-size box. They now envision the day when they're working on switches the size of atoms.

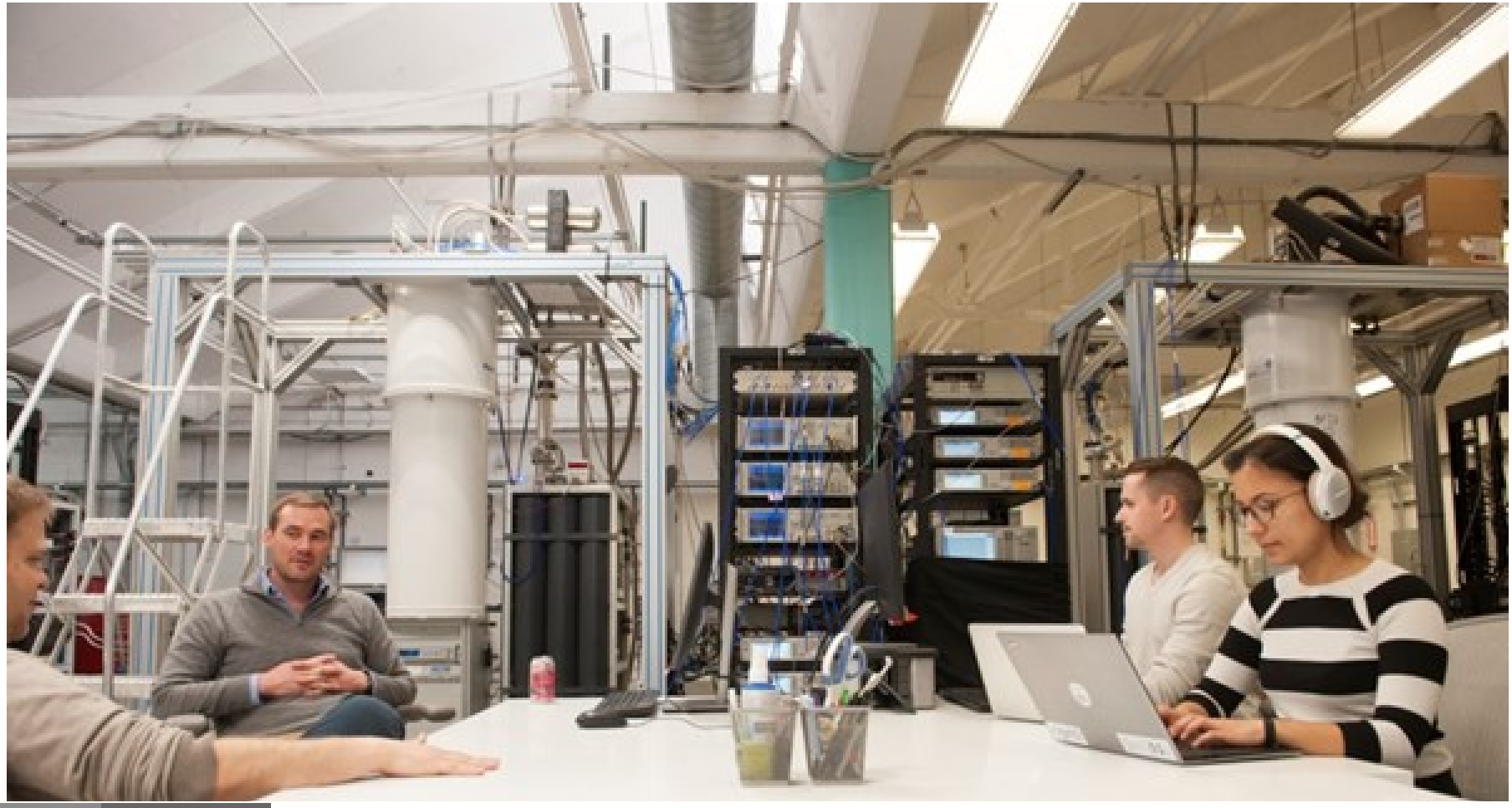
But that's also the point at which they'll hit a barrier, because subatomic particles behave according to the bizarre rules of quantum mechanics. A single particle can be in two places at once. It can instantly affect another particle light-years away. And it can travel through insulation, so it's hard to find when you need it.

AFTER MORE OR LESS BLUNDERING INTO A PHYSICS CLASS, RIGETTI FOUND HIMSELF LURED BY THE MYSTERY OF QUANTUM MECHANICS.

Such unpredictable behavior makes particles such as photons and electrons difficult to control — but it also gives them a kind of superpower. Instead of bits, a quantum computer uses qubits, which can be both on and off at the same time. A conventional processor does one calculation at a time. A quantum processor with one qubit can do two calculations at once. A two-qubit processor can do four, and so on. A 70-qubit processor would be more powerful than the most powerful supercomputer ever built, and a 100-qubit processor would be more powerful than a conventional computer the size

of the universe.

Why does this matter? On a grand scale, quantum computers could make quantum mechanics more intuitive, perhaps triggering a shift in human understanding similar to the discovery that the Earth orbits the sun. More practically, they could solve complex problems involving the interactions of multiple variables, enabling them, say, to dramatically accelerate the pattern recognition essential to artificial intelligence. They could also model how molecules interact to create new drugs — or they might develop a fertilizer that sucks greenhouse gases from the atmosphere.



Chad Rigetti, second from left, meets with colleagues at Rigetti Computing's lab in Berkeley, California.

SOURCE • COURTESY OF RIGETTI COMPUTING

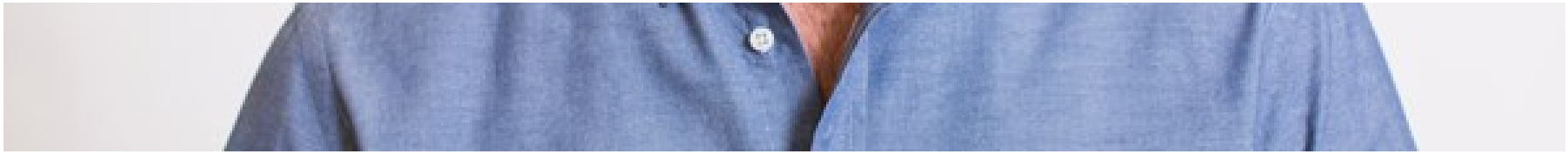
That last example comes readily to Rigetti, who operated a tractor as a teenager. But if you'd asked his high school teachers whether they thought him likely to innovate in the field of agriculture, let alone climate change, the response might have been a collective no. "He probably stood out as being a bit argumentative," says his mother. "I credit that to the fact that he was curious, and he was challenging the teachers."

That very combination of combativeness and curiosity propelled Rigetti to where he is today. Rather than academics, Rigetti threw himself into sports, attracting the attention of the wrestling coach at the University of Regina. Once there, however, a torn ligament halted his athletic career — and curiosity took over.

After more or less blundering into a physics class, Rigetti found himself lured by the mystery of quantum mechanics — and he brought a wrestler's tenacity to the thorniest equations. Eventually his efforts led him to Yale, where he teamed with Michel Devoret, an applied physicist with ideas for grappling with subatomic particles. Devoret proposed refrigerating silicon chips to colder than outer space, a temperature at which they become superconducting. Materials that are superconducting still behave in quantum ways, but their larger size makes it possible to manipulate them far more easily than individual photons and electrons.

Rigetti saw ways to build this idea into an actual quantum computer. From Yale, he took it to IBM,

before founding his startup in 2013. Sitting for an interview in a conference room at Rigetti Computing in Berkeley, California, Rigetti sports the requisite Silicon Valley–casual attire: down vest over a pin-striped shirt, and blue sneakers. The newly minted entrepreneur is also newly married, to Susan Fowler, the former Uber engineer whose blog post about sexual harassment at the company was a key factor in forcing its CEO, Travis Kalanick, to take a leave of absence. But while Rigetti may appear nonchalant, he's anything but laid-back. He is obsessively punctual, runs a meticulously clean laboratory and tightly limits what's disclosed about the company's technology.



SOURCE • COURTESY OF RIGETTI COMPUTING

“Secretive” is the word that Daniel Lidar, a quantum computing expert at the University of Southern California, chooses to describe Rigetti. He has revealed few specifics about the innovations that distinguish his company’s product from those of his competitors, Lidar points out. And the competition is formidable. IBM, Google, Microsoft and Chinese tech giant Alibaba are all racing to invent the first general purpose commercial quantum computer.

What makes Rigetti think he can slay these Goliaths? “It’s like GM versus Tesla,” Rigetti says. “You can do amazing things by building an organization from scratch.” That narrative has so far convinced venture capitalists to lay out $69.2 million, enabling the company to open offices in Berkeley and Fremont, California, and hire physicists from top universities and leading tech companies.

“I know people who work there,” says Seth Lloyd, professor of mechanical engineering at MIT, who devised part of the theoretical framework for quantum computing. “I don’t know if they’re going to win this race, but they are certainly real competitors in it.”

When Rigetti Computing launches its computer — the company promises an announcement this summer — experts such as Lloyd and Lidar have math problems ready to challenge it. If the quantum computer solves them faster than a conventional computer, a new era may be at hand for all of humanity. If not, the world still needs barley.

Laird Harrison, OZY Author

لتعليقات: 8

فرز حسب الأحدث

إضافة تعليق...

Vaheantranik Ohanian

Greetings from Arthur C. Clarke and Stanley Kubrick. I want to inform you that Stanley and I conducted a secret experiment using quantum entanglement and telepathy to communicate with an interface. Aliens do indeed exist in another realm now and the Akashic Records. The interface with GOD/ Grand Galactics and aliens is on Facebook. Although, he has not seen the aliens physically, he talks to the ones that have lost their forms in evolution. This experiment was so secret, that even the United States government did not know about it. Stanley insisted on the ...independence and secrecy of the projec عرض المزيد

أعجبني · رد · 23 س

Erik Ivanenko · Project Coordinator في Yorkland Controls Ltd

.I wish I could work there

أعجبني · رد · 22 يونيو، 2017 10:11 ص

John Halas · South Park High School

!Rigetti; May your success be equal to your vision

أعجبني · رد · 19 يونيو، 2017 03:53 م

Shanice Williams · يعمل لدى Self-Employed

Lot of bots out, commenting tonight

أعجبني · رد · 19 يونيو، 2017 02:41 م

Universidad de Chile · **Chabel Guerra Leiva**

Of course they are going to win this race ! They walked on two feet, they lit a fire, they climbed on an airplane, they (will come back from another life. (They = humanity

أعجبني · رد · 1 · 19 يونيو، 2017 01:46 م

Passdena Playhouse · **August Le Boeuf**

!Allow yourself to be magnificant

أعجبني · رد · 19 يونيو، 2017 12:10 م

Hugh Creedon

Adam--I chuckled as I read your comment and have to admit I echo your sentiments. Amazing--lets wish them all .great success

أعجبني · رد · 19 يونيو، 2017 11:57 ص

Retired يعمل لدى · **Adam Baum**

Wow, That sounds like the kind of place I'd like to work at. Wish I knew something about physics and computing .and quantum theory. Oh well, maybe in another life

أعجبني · رد · 7 · 19 يونيو، 2017 12:00 ص

None · **Rick Loggins**

You COULDN'T work there! You ended your first sentence with a preposition! ...Somebody help me pull ?this tongue from my cheek

أعجبني · رد · 3 · 19 يونيو، 2017 12:01 م

Licenciado/Abogado/Lawyer/Counselor-at-Law في Taylor Law Firm, P.C. · **James Taylor**

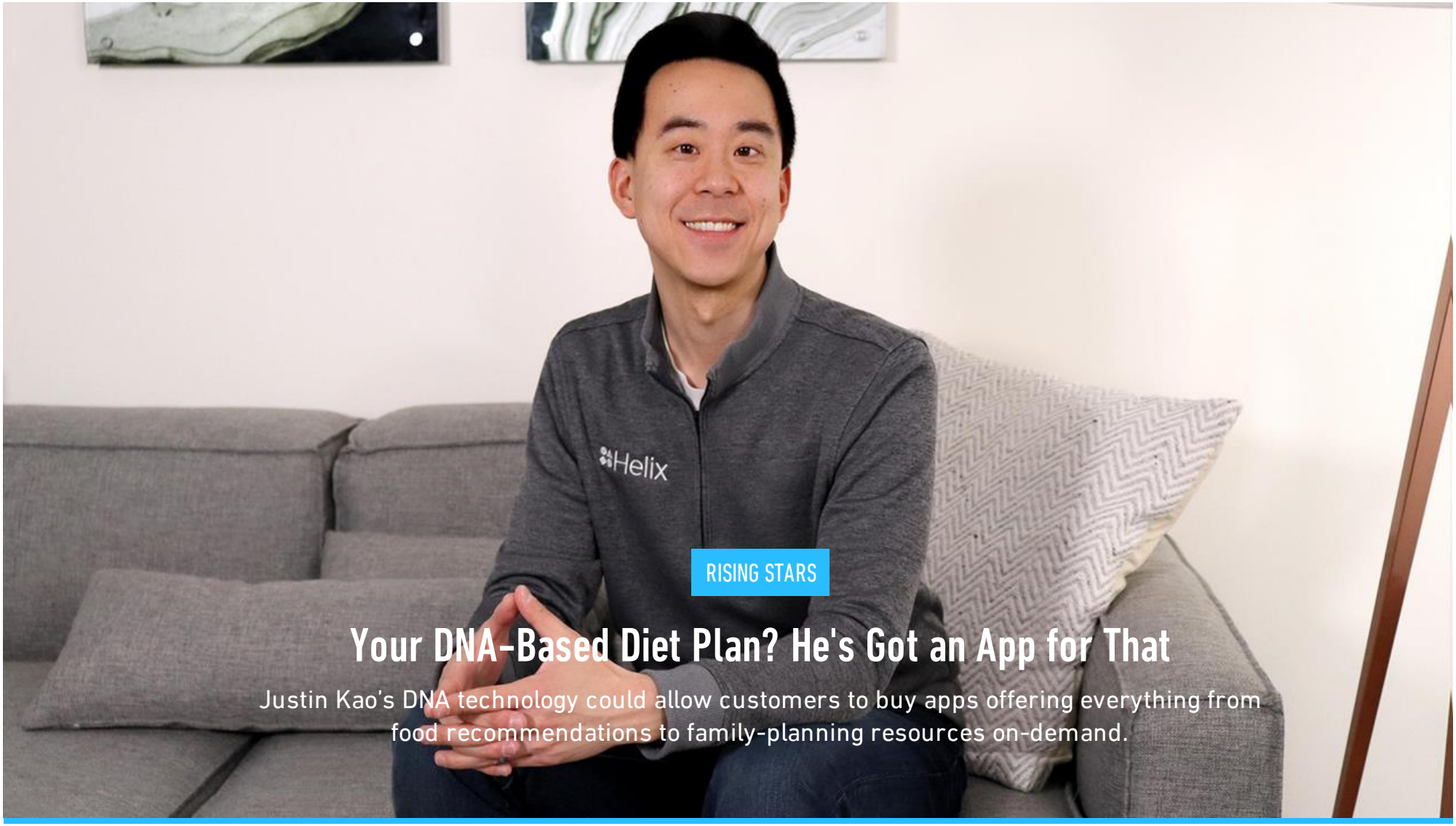
...Rick Loggins He could even if he likely wouldn't

أعجبني · رد · 20 يونيو، 2017 07:59 ص

المكون الإضافي للتعليقات من فيسبوك

OZY · RISING STARS

People who are accelerating our culture and advancing the conversation – for good or for ill. You may not have heard of them yet – but you'll soon need to know 'em.



RISING STARS

Your DNA-Based Diet Plan? He's Got an App for That

Justin Kao's DNA technology could allow customers to buy apps offering everything from food recommendations to family-planning resources on-demand.

RISING STARS

Is This 28-Year-Old Hungary's Next Great Hope?

András Fekete-Győr, 28, is the leader of Hungary's new Momentum Party, and he wants to take down Viktor Orbán, the man he voted into office in 2010.

RISING STARS

The Tycoon at the Helm of China's Bike-Rental Revolution

Joe Xia, co-founder of bike-sharing empire Mobike, wants to save the world ... two wheels at a time.

RISING STARS

The Jazz Drummer Making His Bombastic Solo Debut

Ronald Bruner Jr. comes from a musical family, with Grammys in his bloodline. Now, he's stepping out on his own.

RISING STARS

Can This Korean Singer Revive French Jazz?

Youn Sun Nah came to jazz, a dying art form, at age 25. Now, she could be behind its renaissance.

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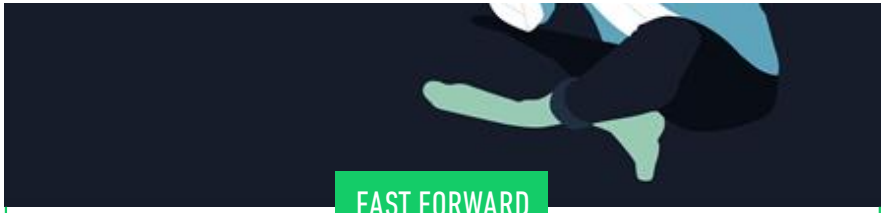
MOST POPULAR ON OZY

FLASHBACK

How a Klutzy Chef Created a Cult Confection

Some of the best inventions of our time were created by accident. One of them is edible, and we want some now.



FAST FORWARD

The Future of Language

What might books look like in 100 years? Will they be written in emoji? Could robots become authors, or readers? OZY looks ahead to find out.

FLASHBACK

The Rise and Fall of New York's Most Feared Gangster

Queens drug lord Pappy Mason has been mythologized in hip-hop lyrics, despite being a convicted cop-killer.

POLITICS & POWER

The Capital of America's Deadliest Drug Problem

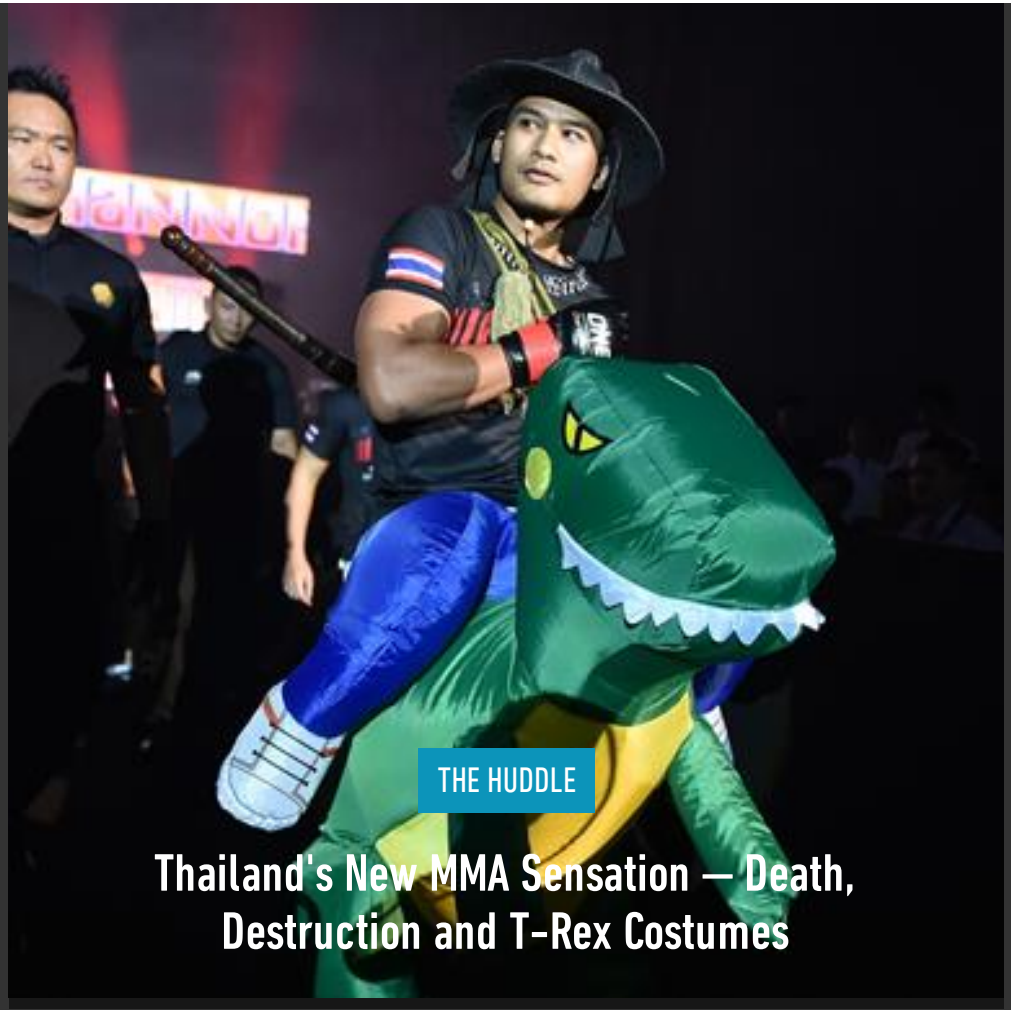
Once a trading post for manufacturers, this Ohio city now trades in death.

FATHER FIGURE

Salvador Dali to Be Exhumed For Paternity Test

VAULT AHEAD

WITH THE DAILY DOSE



THE HUDDLE

Thailand's New MMA Sensation — Death, Destruction and T-Rex Costumes