By DEBRA KAMIN

GROWING up in a small town in east Texas, the United States, Jason Ballard didn't imagine he would one day use robots to print houses.

He was busy chasing flying squirrels and swimming with alligators in the dense conifer woods behind Texas' pine curtain.

He felt called to God in those woods, which always smelled like Christmas. He thought he would be a preacher, and after high school, he entered the formal discernment process, a testing-of-the-waters of priesthood.

In addition to the heavens, he was drawn to big, romantic ideas about space above and the earth below. So he reached for both.

First, he earned a bachelor's degree in conservation biology, and fascinated with sustainable building, he took on an apprenticeship in carpentry (the biblical parallels were not lost on him). He also earned a master's degree in space resources to perhaps pursue becoming an astronaut.

But what Ballard carried with him from his childhood, between happy recollections of horseback rides and airborne rodents, was the memory of spending a Christmas in a Federal Emergency Management Agency trailer.

Hurricane Andrew, which killed 65 people, had forced his family to evacuate from Orange, Texas.

He would later evacuate from Katrina, Rita, Gustav and Ike, as well.

His mission, he decided, would be to stay exactly where he had started, in Texas, and develop housing. The homes would be sturdy, maybe even miraculous, and cheaper to construct yet better suited to withstand hurricanes and fires.

In 2017, Ballard co-founded Icon, a construction technology company that is focused on using 3D printers to help solve the housing crisis that has crushed the dream of homeownership for the majority of young Americans.

3D printing, which builds objects layer by additive layer from a digital file, could be a solution to the beleaguered housing market, where sky-high costs, rock-bottom inventory and a shortage of skilled workers have made prices crushing for the majority of Americans.

It's cheaper than traditional construction. It requires fewer workers to build a home, and significantly less time. And the handful of upstart companies that are using it to successfully build houses say their structures are better suited to withstand hurricanes and fires.

A sales grandmaster

In 2011, Ballard had a different idea to address the affordable housing crisis and climate change.

He created an eco-friendly home-improvement store in Austin called Treehouse.

Housed in a 25,000sq ft (2,323sq m) former Borders bookstore, it was something like a Home Depot but without any of the gas-powered lawn tools and packages wrapped in PVC film.

He had real success – opening two more stores in Texas filled with items like solar panels and non-toxic paint and pulling in angel investors to the tune of US$35mil (RM146mil).

But peddling cork flooring

Wolf Ranch, a collection of 100 3D-printed homes just outside of Austin in Georgetown, Texas. — Photos: JORDAN VONDERHAAR/The New York Times

'Can you 3D-print a house?'

How robotics and automation will help build more affordable and resilient homes in the US.

wasn't going to move the needle – the ministry of green housing wasn't reaching the masses.

A mutual friend who was working in 3D printing introduced him to Alex Le Roux, who had recently graduated from Baylor University.

"Jason is a sales grandmaster," said Le Roux, Icon's former chief technology officer who co-founded the company alongside Ballard and Evan Loomis.

They understood each other: Le Roux grew up in Houston, hunkering down with his family under Hurricane Rita, and then Ike, and then Harvey.

Climate change, they agreed, was shifting the equation on housing, and the need for a better solution was urgent. Le Roux had designed a 3D printer that used concrete to print large-scale projects but was getting pitches to print things like concrete planters and adorable knickknacks.

Ballard had a different vision: "Can you print a house?"

"He saw this as a technology that addressed a lot of the problems that he saw with housing," Le Roux said. "If you look at all the problems in the world, we don't need more precast piping. We need affordable housing."

The two men went to work, divvying up their duties. As Le Roux designed the company's first printer Vulcan I, Ballard sought out investors and locked down their first customers.

After a year of working nights

and weekends, Vulcan I was ready. It printed the first 3D-printed house in the US, a 350sq ft (33sq m) structure with curved walls and a sloped roof, printed over 48 hours with plenty of stops and starts to fix bugs in the printer.

The co-founders exhibited it at South by Southwest and secured US$9mil (RM38mil) in seed funding.

Houses built by Vulcans

Icon now has more than 200 houses built in five states and two countries, largely outpacing competitors that are building communities in California and creating printers and cement-like "ink" to sell to builders.

Wolf Ranch, with its 100 houses in Georgetown, Texas, a bedroom community 30 minutes outside of Austin, is Icon's flagship project. Breaking ground in 2022, the project is 98% sold and is currently the largest community of 3D-printed houses in the country.

Lennar, one of the country's largest homebuilders, collaborated with Icon for the development. Bjarke Ingels Group, the architectural firm, co-designed the community's eight housing models, which each has three or four bedrooms.

The houses are priced between US$325,000 (RM1.3mil) and US$560,000 (RM2.3mil), slightly below the median home price in Austin.

One of the luxury homes being printed in Wimberley, Texas.

A worker places rebar between concrete layers of a home printed by Icon in Wimberley.

Inside Icon's headquarters in Austin.