NOV. 6, 2023

Best Inventions of 2023

TIME

THE 200 EXTRAORDINARY INNOVATIONS CHANGING OUR LIVES

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BEST INVENTIONS 2023

For our annual list of the year's most exciting innovations, TIME editors hunted through products and services to select 200 inventions that make the world better, smarter, or just more fun.

WITH REPORTING BY LESLIE DICKSTEIN, MATHIAS HAMMER, WILL HENSHALL, SIMMONE SHAH, AND JULIA ZORTHIAN

A YEAR IN SPACE

Space travel is increasingly routine: humanity made a record 178 successful takeoffs into orbit in 2022. More interest—and investment—led to a spate of scientific advancement this year.

That includes efforts to better understand space, like **NASA's OSIRIS-REx,** which gathered samples from an asteroid, and the **Japan Aerospace Exploration Agency's Lunar Excursion Vehicle 2,** built to explore the moon. Other innovations turned their gaze back on our planet, like **NASA's TEMPO,** which monitors air quality in the U.S.; **Nuview's LiDAR Satellite Constellation,** planned to map Earth in 3D; and Pixxel's work to detect environmental threats with its **Hyperspectral Imaging Satellites.**

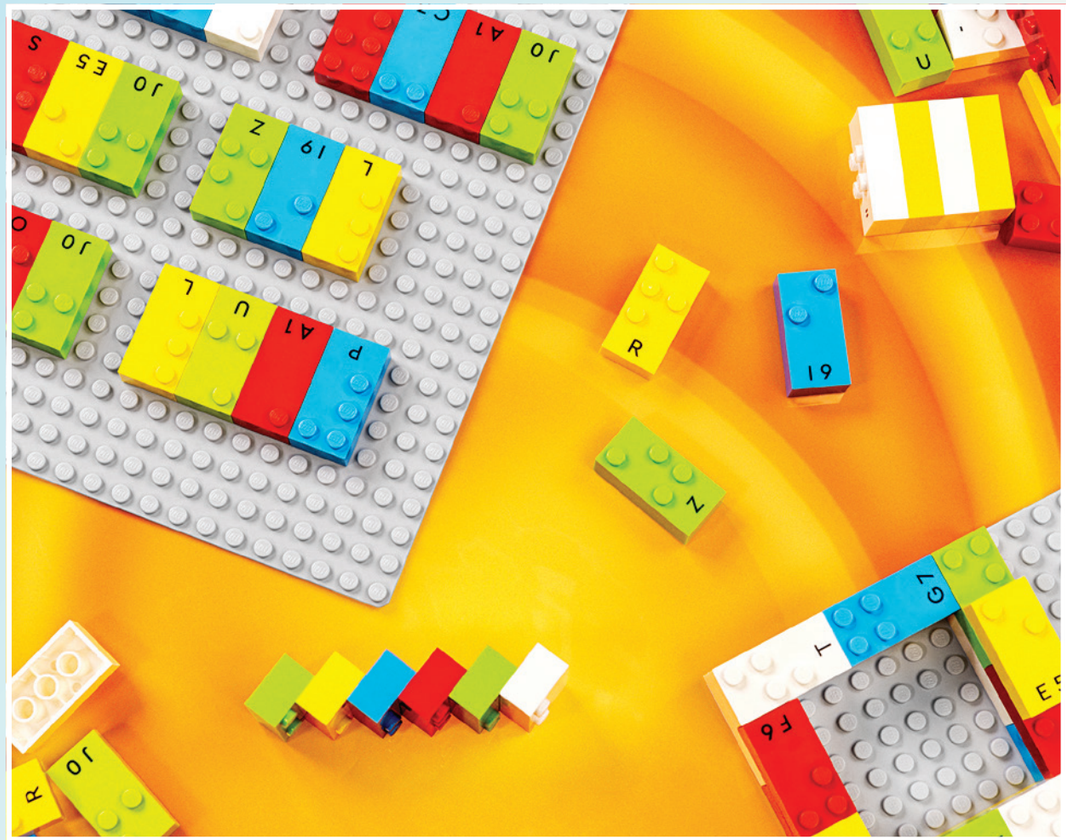
While scientists expanded the bounds of space exploration via **NASA's Moxie** experiment to separate oxygen from Mars' atmosphere, they also worked to reduce our impact and clean up space trash—which causes risky collisions—with the **ClearSpace-1** robotic arm. *—Tara Law*

OUTDOORS

Trunk show

ePlant TreeTag

After wildfires ripped through Maui in August, staff at ePlant set up 15 of their TreeTags on the Lahaina region's largest banyan tree, which had been damaged, to help arborists understand how to help it recover. The TreeTag sticks into the trunk, combining sensors and AI to measure growth, keep track of water and light inputs, monitor carbon capture, and store the data in the cloud. "Trees have their own unique way of communicating, and our sensors are like their translators," co-founder and CEO Graham Hine says. Anyone with trees in their yard will find the information helpful in keeping them healthy. *—Pranav Dixit*

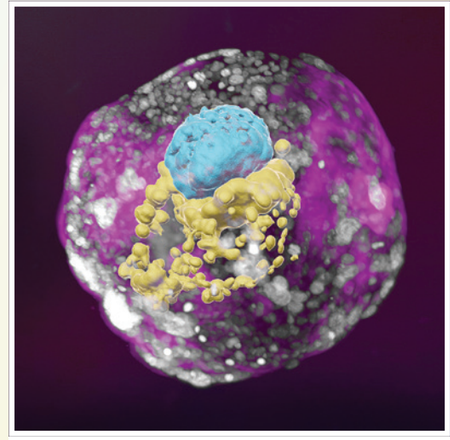


ACCESSIBILITY

Playing with braille

Lego Braille Bricks

Once available only through schools and other educational institutions, Lego Braille Bricks—which teach visually impaired children necessary tactile skills—are finally coming to consumers' homes. The set (currently available in English and French, with more languages on the way) takes the classic 2x4 building brick and modifies its knobs to correspond with the braille alphabet, numbers, and symbols. The pieces are compatible with all Lego products. "We developed these for everyone, so even sighted children and family members can show their interest in learning braille," says Rasmus Logstrup Jensen, Lego's creative lead on partnerships and innovation. *—John Mihaly*



EXPERIMENTAL

Studying life

Human Embryo Model

Because of medical and ethical challenges, there's much we don't know about the first few weeks of human embryo development, says biologist Jacob Hanna of Israel's Weizmann Institute of Science. Hanna's team used naive stem cells treated with chemicals to nudge them into becoming four types of cells found in early embryos. One percent of the treated stem cells spontaneously formed a structure similar to a human fetus, which researchers allowed to grow for 14 days. While distinctly not human, the model is close enough to give researchers potential insights into fertility, miscarriage, and more, for the first time. *—Katie MacBride*

COOK SMARTER

Home chefs have long innovated their own efficiency hacks, but now companies are catching up. New inventions speed up cooking, like **Breville's Joule Turbo Sous Vide,** which cuts sous-vide time in half. Or they streamline tasks: the **Nama J2 Cold Press Juicer** reduces prep work, and the **Dreamfarm Fluicer** is a hand press that gets more juice out of your fruit. The **Spinn Pro** converts whole coffee beans directly into drinks.

Other devices improve upon existing appliances. The **Invisacook** induction stovetop doubles as a countertop and eliminates gas-stove toxins, while the **GE Profile Smart Mixer** adds a built-in scale and timed mixing. **Mill**'s sleek composter can help you clean up more sustainably.

On the road, **EcoFlow's Glacier** cooler can both chill food and make its own ice, eliminating a trip to the store. And **Sweetgreen's Infinite Kitchen** locations robotically assemble your salad faster and more accurately, serving as a model for other chain restaurants. *—T.L.*

DESIGN

Boundary-pushing instrument

Roland 50th Anniversary Concept Piano

Old meets new with Roland's 50th Anniversary Concept Piano. The Japanese Nara oak wood, preinstalled sounds from vintage Roland pianos, and the acoustic performance of a classic grand are all nods to the brand's history. Flying drone speakers float above the piano providing 360-degree sound, and a touchscreen panel supports videoconferencing and piano lessons. Only four have been made. "This is our vision for the home grand of the future," says Roland CEO Gordon Raison. *—Jeff Wilser*

DESIGN

Browsing, simplified

The Browser Co. Arc

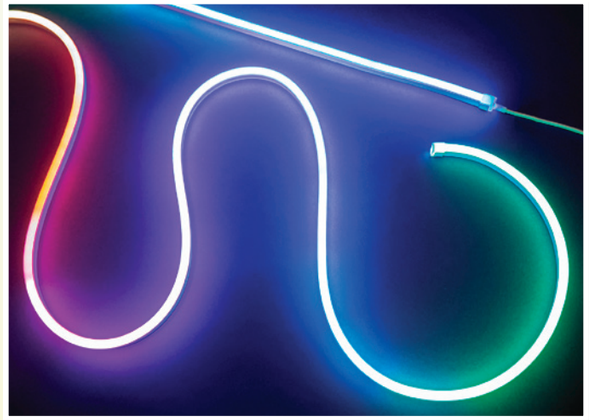
The internet has changed a lot since the '90s. The browser hasn't. The Browser Co.'s free internet interface, Arc, is a modern take that caters to multitaskers with more viewing options. "Instead of one endless row of tabs you can barely read, let alone organize, Arc includes a vertical sidebar with room for everything," says CEO and co-founder Josh Miller. Users can easily save screenshots and share digital whiteboards. Every 12 hours, Arc closes and archives any unpinned tabs to reduce clutter; it's cleaned up over 100 million open tabs to date. *—Jared Lindzon*

TRANSPORTATION

More than a fast car

Czinger 21C

To make the wasplike 21C—one of the fastest street-legal, mass-produced cars ever—Czinger used the all-in-one Divergent Adaptive Production System (DAPS). In tandem with human input, generative AI engineered the car and 3D-printed and assembled the components, including the first fully printed suspension. It starts at $2 million, but co-founder Lukas Czinger says it's not just a luxury: "Yes, it's hugely expensive. But it's doing something quite revolutionary." DAPS minimizes the amount of structural material by 15% to 40% and makes lighter, more efficient vehicles—reducing waste and streamlining the supply chain. *—Alison Van Houten*



HOUSEHOLD

Light it up

GE Cync Dynamic Effects Neon-Shape Smart Lights

LED strip lights are increasingly popular in home-entertainment setups. But GE's Cync Dynamic Effects Neon-Shape Smart Lights are a little different from the kind most of us are familiar with. The neon rope lights include embedded microphones, which allow them to dynamically respond to the beat of the music or sounds from the TV. The product is a dream for anyone looking to create their own light shows or make their living-room viewing experience feel immersive. *—Chris Stokel-Walker*

DESIGN

Redesigning the Big Apple

Group Project New York City Better Bin

New York City's trash bins have a new look. The iconic cans that have been largely unchanged since the 1930s—simple, green wire-mesh baskets—will be replaced with a sleek modular unit that is cheaper and also lighter, reducing the chance of injuries to sanitation workers. The Better Bin also has a hinged flip lid to prevent dumping microwaves and TVs, and a perforated shell to impede rats. Colin P. Kelly, design director of Group Project, the firm behind the updated bin, says it "garners more respect, rather than just being this beat-up object." *—J.W.*

SHOE (PREVIOUS PAGE), LEGO (THESE PAGES): ELIZABETH RENSTROM FOR TIME

HEALTH CARE AT HOME

About 71% of people think often about their physical health, according to a 2023 Ipsos survey—and that's likely an understatement. It's no wonder, then, that many inventions aim to give users more control over their well-being.

Having accurate data goes a long way in staying healthy. The **COROS Heart Rate Monitor** straps to the upper arm and measures heart rate more accurately than wrist monitors, and the **Lumen** is a home breathalyzer that tracks metabolism in real time.

Some products speed up muscle recovery. The **Therabody RecoveryTherm Cube** relieves soreness via infrared and cryotherapy, while the **Lumaflex Body Pro** is an FDA-cleared red-light-therapy device for pain relief at home.

Other innovations aim to improve quality of life. The **Salistick** saliva pregnancy test liberates people from the urine test, while the **Vibrant System,** a vibrating capsule, relieves constipation without medication. And the **CAN Go smart walking cane** promotes independence with tools like fall detection and emergency calling. *—Tara Law*

ACCESSIBILITY

Control for quadriplegics

Naqi Earbuds

When David Segal's friend Keith broke his neck and pelvic bone at 18 and became a quadriplegic, his life changed immeasurably. Keith's experience led Segal to invent Naqi Earbuds, which he calls "a safe, noninvasive, universal, invisible, and silent command and control system." Electrical signals made by clenching your jaw or lifting an eyebrow turn into commands; wearers hear a voice to help navigate the invisible user interface. The still-in-development device could be used to control wheelchairs or smart-home items. Segal sees pro gaming as another arena for the tech. *—Chris Stokel-Walker*

TRANSPORTATION

A supersmart e-bike

Acer Ebii

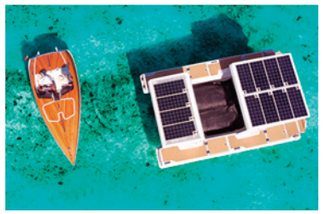
The Ebii, the first electric bike from consumer-electronics company Acer, has plenty of futuristic flourishes: a proximity sensor that automatically locks the bike when you walk away; built-in GPS to help in case of theft; a smooth, carbon belt instead of a greasy chain; and a battery that pops off and doubles as a portable charger for your laptop and phone. But it's the algorithmic smarts that set this bike apart. Sensors understand your pedaling force and elevation, and automatically adjust the electric power-assistance level for a smooth ride. No more gears. *—Pranav Dixit*

WELLNESS

A steadier hand

Cala klQ

Essential tremor afflicts up to 10 million Americans, and most experience life-complicating shaking of the hands. Cala klQ is a wearable, rechargeable device that sends electrical impulses from the wrist to the brain, to lessen the physical effects of misfiring neurons and temporarily let the wearer do things like hold a cup with more ease. It's also approved for patients with Parkinson's. A peer-reviewed study found that 80% of patients receiving the type of therapy delivered by Cala klQ saw tremor power cut at least in half. *—Jeremy Gantz*



DESIGN

Cleaner boating

Faro Powerdock Set

The Faro Powerdock is a solar-powered dock that charges an electric boat with clean energy. "The boat can [then] be used to power other components or even provide power to the electrical grid," says Luis Marinho Falcão, partner and head of communications and sustainable growth at Powerdock manufacturer Faroboats. The setup also elevates the boat above the water, eliminating the need for harmful antifouling paints that keep sea life from attaching to the hull. The dock fits Faro's own speedboats and is planned to fit any electric or hybrid boat up to 12 m. *—John Mihaly*

BEAUTY

A salve for new ink

Mad Rabbit Tattoo Repair Patch

The healing process for a tattoo can involve pain, infections, and allergic reactions. But the usual treatment of petroleum jelly can create scabs that might distort the ink. "It turns out the age-old recommendation was a bad one," says Mad Rabbit co-founder and CEO Oliver Zak. In the interest of faster and safer healing, Mad Rabbit's tattoo repair patch is made from water-based hydrogel, which keeps the tattoo hydrated (minimizing ink loss), avoids allergic reactions from latex, and offers 99.8% UV resistance to shield your tat from the sun. *—Jeff Wilser*

AI

Breaking down beats

AudioShake

When one of the biggest rock bands recently landed a deal to use its hit 1970s song in a commercial, its members were overjoyed. There was one problem: the admakers wanted only the instrumentals, and all the band had was the final mix. So the rockers' team approached AudioShake, whose AI program isolates elements of prerecorded audio to strip it into its constituent parts. "We make audio interactive and editable and make it possible to fuel these really practical uses that help artists make money," says co-founder and CEO Jessica Powell. *—C.S.W.*

CHEFDOODLER: ELIZABETH RENSTROM FOR TIME

FOOD & DRINK

Sweet success

ChefDoodler

As any pastry chef will tell you, sugar cracks quickly when hardened and needs intimidatingly high temperatures to melt. Which means that detailed sugar work on cakes and cookies often leads to frustration and burns. The ChefDoodler pen makes it simple, safe, and fun—like a hot glue gun for sugar decorating. Though it will also work with real sugar, the device comes with a flavor-neutral, diabetic-friendly sugar substitute, isomalt, that can be extruded in thin, moldable lines. One beta tester called it "a gingerbread house maker's dream come true," says Daniel Cowen, co-founder and CEO of maker 3Doodler. The gadgets are shipping to more than 1,500 Kickstarter contributors and early adopters in October. *—Jessica Klein*

CONSUMER ELECTRONICS

Accessible filmmaking

Sony FX3

The high-end cameras used to film today's blockbuster movies can cost upwards of $100,000. But director Gareth Edwards *(Rogue One: A Star Wars Story)* shot his recently released sci-fi epic, *The Creator,* primarily on Sony's FX3. The camera can be purchased at electronics stores for under $4,000, and most viewers won't see a difference in quality. The FX3 is light and compact, but its real superpower is a dramatically high ISO (the sensitivity of the camera's ability to capture light), which allowed Edwards to capture difficult night shots without the need for extra lighting. As the director said while promoting the movie, "You can basically film in moonlight." *—J.W.*

EVEN MORE INVENTIONS

- **AlertCalifornia's AI wildfire detector** uses AI cameras to detect wildfires earlier.
- **So-VITS-SVC** is AI software that's gone viral for its uncanny ability to speak or sing like any musician.
- **LeapFrog Magic Adventures Telescope** is an advanced educational telescope for kids.
- **Intel's Thunderbolt 5** is computer-connection tech with double the data-transfer speed of its predecessor.
- **Wavelogix Rebel Concrete Strength Sensors** measure concrete's durability and need for repairs in real time.
- The **Human Defense Platform** detects and stops online bot fraud attacks.
- **GoBoat 2.0** is an inflatable electric boat that fits in a backpack.
- **Equatic** uses seawater electrolysis to remove carbon from the atmosphere and generate hydrogen, which can be used for clean energy.
- The **Columbia University robotic hand** is a prosthetic that uses touch sensors and machine learning to interact with more dexterity. *—Emma Barker Bonomo*

ADVANCED AGRICULTURE

Agriculture can't afford to ignore climate change. The industry, along with forestry and other land use, contributes about a fifth of global greenhouse gas, while the changing climate endangers farmers' livelihoods. But innovations may reduce the industry's impact.

Pivot Bio Proven 40 On-Seed uses microbes to generate nitrogen for plants, cutting back on synthetic fertilizer and emissions. The **Monarch Tractor MK-V** is a completely electric, cloud-connected tractor that doesn't require a driver. And the **Ryse Recon** is an electric aerial ATV—like a small personal helicopter—that lets farmers soar over fields that would be otherwise difficult to traverse.

Other devices reconsider humanity's relationship with animals and ecosystems. **Good Meat Cultivated Chicken** is one of the first lab-grown meats okayed for sale in the U.S. **Dalan Animal Health Honey Bee Vaccine** is the first USDA-approved vaccine for a plague that kills honeybees, and **BeeHome 4** is a hive that keeps bees healthy and ready to pollinate with AI and robotics. *—Tara Law*

MEDICAL CARE

Accurate insulin

Beta Bionics iLet Bionic Pancreas

Nearly 7.5 million American adults take insulin, but getting the dosage right can be tough, says Ed Damiano, co-founder of Beta Bionics. Inspired by his diabetic son, Damiano spent 20 years creating the iLet, a credit-card-size, AI-powered smart device that links to a tube plugged into a patient's body. Similar to existing options, it monitors glucose levels every five minutes. Unlike others on the market, it dispenses appropriate insulin microdoses when needed. The device was approved by the FDA in May, and recently gained Medicare and Medicaid approval.

—Chris Stokel-Walker

AR & VR

Revolutionary reality

Apple Vision Pro

Just about every big tech company has tried to develop virtual or augmented reality headsets with mass appeal. Apple might be the first to pull it off. Unveiled in June and set to hit shelves in early 2024, the Vision Pro features micro-OLED displays, a dozen cameras, six microphones, five sensors, and a new Apple-designed R1 chip. There's plenty that makes this headset unique, including gesture controls—wearers can navigate with eyes, hands, and voice—and the sheer number of apps it supports. An external screen shows users' eyes to communicate their immersion as they toggle between augmented and virtual reality. CEO Tim Cook says the aim is to "blend digital content with the physical world in a profoundly new way." *—Jared Lindzon*

ACCESSIBILITY

The beauty of stability

Lancôme Hapta

Loss of dexterity caused by conditions like strokes or arthritis can make applying lipstick tricky. The Hapta by Lancôme is a lipstick holder that uses stabilizing tech and adapts to users' needs to get their lipstick on evenly, in a smooth swipe. Guive Balooch, global managing director of augmented beauty and open innovation at L'Oréal, says the company hopes to take the tech beyond lipstick. "No community should be removed from the ability to use beauty products," he says. *—T.L.*

DESIGN

For flexible work

Lenovo Yoga Book 9i

Lenovo's Yoga Book 9i was built based on the ways people actually use their computers in the remote-work era. "The original idea came from being in a coffee shop and seeing multiple people take their laptops, elevate them on stands, and then use little accessory keyboards," says Brian Leonard, a vice president of design. The portable, two-screen setup (each 13.3 in.) has four configurations: a classic PC, a tablet, a tent position, or standing. It's the world's first OLED dual-screen laptop, and can expand apps across both screens with a single hand gesture. *—John Mihaly*

EXPERIMENTAL

Weeded out

Seaweed Generation AlgaRay

Invasive sargassum seaweed helpfully absorbs CO_2, but also washes ashore in huge quantities from the Gulf of Mexico to Florida, emitting a foul-smelling gas and hurting ecosystems and tourism economies. The AlgaRay robot glides through the sea, scooping up floating mats of the plant. It then dives 200 m, where pressure and gravity sink it to the seafloor, taking the CO_2 it has absorbed with it. Seaweed Generation has a 49-year license for trials in Antigua and Barbuda while it develops an autonomous version of the bot.

—Alison Van Houten

FOOD & DRINK

Tastemaker

Heinz Remix

Personalized sauce dispenser Heinz Remix is coming to restaurants, stadiums, and movie theaters in early 2024, perhaps sooner. Using a touchscreen, you select one of four "bases" (ketchup, ranch, BBQ, or Heinz 57) and add tweaks and spices to customize the flavor. The machine is capable of 200 combinations, with names like Jalapeño Ketchup and Smoky Chipotle Mango BBQ. Meanwhile, it feeds data on customer preferences to Heinz, which will use it to inform future recipes. *—Jeff Wilser*

BIRD BUDDY; ELIZABETH RENSTROM FOR TIME

OUTDOORS

Avian AI

Bird Buddy

Bird-watching just got high-tech. Buddy's wi-fi-connected, battery-operated bird feeder has a discreet camera that snaps high-quality pictures and videos of your feathered friends and sends them right to your phone. Even better, each image is processed through Bird Buddy's own AI model, which can quickly identify over 1,000 species. And if it can't name a certain bird, worry not—an Ask the Community feature lets other users figure it out for you (a staffer reviews it for accuracy). In September, the company added the Bird Buddy Explore feature, which is like streaming for bird watchers: anyone with the app can check out feeds from dozens of Bird Buddy cameras across the globe. *—Pranav Dixit*

CONSUMER ELECTRONICS

Rich sound

Ultimate Ears Pro UE Premier

Ultimate Ears, which is known for the in-ear monitors your favorite musicians wear during performances, has launched a new product that's a stab at the "ultimate listening machine," says Philippe Depallens, the product's general manager. The UE Premier earbuds, which require professional fitting, pack an unprecedented 21 drivers (the tech that converts electrical signals into sound) into each side, for an immersive, detail-rich listening experience. The company hopes it will attract not only performers but audiophiles as well. "You will hear things in a recording that you've never heard before," says Depallens. *—T.L.*

PARENTING

A safer smartphone

Bark Phone

Most kids want a smartphone; many parents are wary. Bark Technologies has a solution for teens and tweens: a customizable Android unit that lets parents manage contacts and track the device, while an algorithm monitors social media posts and texts for inappropriate content. And unlike other parental controls, "our algorithm is baked into the phone," says Titania Jordan, Bark's chief parent officer. "It can't be removed." *—C.S.W.*

TRANSPORTATION

A self-driving first

Mercedes-Benz Drive Pilot

Current cars' "self-driving" modes still require hands near the wheel and eyes on the road. But with an advanced new multisensor system called Drive Pilot, Mercedes-Benz's 2024 S-Class and EQS Sedans are the first cars certified for Level 3 self-driving in the U.S. (in California and Nevada). It means that under certain conditions (mainly highway traffic jams, with low speeds and a well-mapped road), you can completely cede control to the vehicle. *—J.W.*

EVEN MORE INVENTIONS

- The **LG Signature OLED M 97-In. Television** is the world's first to offer a wireless 4K transmitter, for visually lossless video without the cables.
- The **Keystone Tower Systems spiral welded wind tower** allows for easier turbine installation. Steel is shipped in flat sheets, and spiral welded on-site.
- **Framework's** new **Laptop 16** can be continually modified and upgraded by swapping out parts, even the CPU and graphics card.
- The **Muon positioning system,** developed at the University of Tokyo, picks up where GPS fails; it measures subatomic "muon" particles to determine location even through water and buildings.
- **Eion's Enhanced Rock Weathering** algorithmically measures how much CO_2 rocks and soil absorb, and how that process can be sped up by adding minerals.
- The **Sightful Spacetop** is a laptop that consists of AR glasses and a keyboard with touch pad. Put on the glasses and see a 100-in. virtual screen, anywhere.
- **CRG Automation Improved Cavity Access Machine** safely demilitarizes chemical weapons.

—Emma Barker Bonomo

BEAUTY

The home dermatologist

Lyma Laser

While examining a 62-year-old whose knee had been treated with low-level laser therapy to rebuild cartilage, Paul Clayton, Lyma director of science, noticed that the knee's skin looked 20 years younger. This revelation sparked Lyma's handheld laser, which users can apply to the face or body while relaxing on the couch. Used just 15 minutes daily, it works to clear scars, rosacea, and wrinkles. Its 500-milliwatt laser "tricks your skin into producing more collagen," says founder Lucy Goff. Encased in medical-grade plastic, it's the first clinical-grade laser FDA-approved for at-home consumer use. *—Jessica Klein*

EXPERIMENTAL

A better prosthetic

Utah Bionic Leg

Science fiction is filled with high-tech prosthetics, but according to Tommaso Lenzi, an assistant professor at the University of Utah, real prosthetic legs for lower-limb amputees have been stuck in the 1990s. Enter a new bionic leg created by Lenzi and his team, capable of movement that's much closer to that of a natural leg and knee, making it easier to move around, including on stairs. The leg still needs more testing and FDA approval, but the team has partnered with prosthetics leader Ottobock to help bring it to the public. Testers have been excited to walk up steps for the first time in years, says Lenzi. "Hopefully, we can have more people walking, and get them out of a wheelchair," he says. *—Tara Law*

ACCESSIBILITY

Brushing away decay

Curaprox Samba Robotic Toothbrush

In more than 20 years working in the oral-care industry, Steffen Mueller has noticed one group that's consistently underserved: people with disabilities, nearly 88% of whom experience tooth decay. Some vibrating toothbrushes for people with mobility difficulties leave them unable to clean hard-to-reach spaces, says Mueller, managing director of Swiss oral-health company Curaprox: "There's no movement in the mouth." The company's brand-new Samba Robotic Toothbrush corrects this. Shaped like a U and featuring 12,900 soft bristles, it moves around the gumline and oscillates at both high and low frequencies to cover every tooth and groove, with no motion required of the user. *—J.K.*

CONSUMER ELECTRONICS

Bedtime buddy

Loftie Clock

Smartphones make for problematic alarm clocks. When they're in your bedroom, you're tempted to squeeze in some extra screen time, which is bad for sleep quality. The Loftie Clock has many of the same features available on your smartphone—from white noise to guided meditation to a soothing wake-up alarm—without the urge to doomscroll. The device will even lull you to sleep with AI-generated bedtime stories, personalized to what you find relaxing. If the light's too bright, just hold down the snooze button and the clock completely darkens. *—Jeff Wilser*

FITNESS

A smart jacket

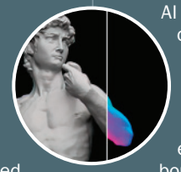
Nike Aerogami

Typically you have two options when jogging in the rain, and neither is particularly pleasant: don't wear a jacket and get wet, or wear one and sweat profusely. To address this conundrum, Nike designed its Aerogami jacket with tiny vents that pop open when they sense sweat, and close when your body cools off, thanks to a moisture-reactive film on the fabric. "This almost acts as an extension of our body's ability to regulate itself," says Jahan Behbahany, senior apparel innovator on Nike's Advanced Innovation team. Versions of the jacket marketed to women are for sale now, with men's to follow soon. *—J.W.*

CURAPROX. BIRDIE: ELIZABETH RENSTROM FOR TIME

THE AI REVOLUTION

Throughout history, innovations' potential to do good has been counterweighed by their ability to wreak havoc, or at least generate controversy. No recent tech illustrates this like AI, including **OpenAI's GPT-4,** the best-known large language model. When it launched in March, it shifted understanding of what AI can do and raised alarms around human replacement in just about every industry.



Some AI tools, however, simply limit the unpleasant parts of work, like **UiPath Clipboard AI,** which acts as a smarter copy and paste to speed up filling text into forms. Or **Adobe Liquid Mode,** which makes reading a PDF on a mobile device more user-friendly by allowing font-size changes and search.

AI has also powered up our creative abilities, regardless of our technical expertise. Consider **Adobe Photoshop Generative Expand and Generative Fill,** which enable people to seamlessly fill in imagined content beyond the borders of a photograph and easily alter pictures based on text prompts. Or **Runway Gen-2,** which can create full videos solely from text prompts or other images or videos. Or **Stable Audio,** which creates music and sound based on a user's text inputs. Then there's **Nvidia Neuralangelo,** an AI model that can convert 2D images into lifelike 3D replicas.

AI has even reduced boundaries between people. The **Humane Ai Pin*** attaches to your shirt magnetically and does many of the tasks smartphones can do—calling, texting, answering questions, maintaining a calendar—all without a screen in front of your face. **Meta Seamless-M4T** can instantaneously translate and transcribe conversations in nearly 100 languages. And the **Zoox Autonomous Employee Shuttle Service** has been bringing the company's workers to and from the office since February, like an AI-powered car pool.

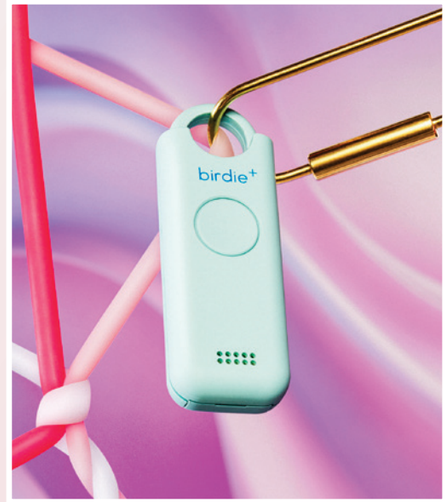
AI could also tackle a persistent problem for consumer goods: counterfeits. **Alitheon's FeaturePrint** uses AI to stop such theft, by analyzing photos to distinguish between real and fake products. *—T.L.*

HOUSEHOLD

Command center

Amazon Echo Hub

Smart homes are getting smarter, but that means a raft of apps and a tangle of cables. Thus, the forthcoming Amazon Echo Hub, the retail giant's first Alexa-enabled smart-home control panel. Talk to or tap the 8-in. screen to manage all your smart-home devices—it's compatible with over 140,000 gadgets, even ones from other manufacturers. "Millions of our customers have more than 20 devices connected to Alexa," says Melissa Cha, vice president of smart home at Amazon, "and we want to make it as easy as possible to manage and control those devices in a single place." *—Chris Stokel-Walker*



CONSUMER ELECTRONICS

Safety on the job

Birdie+ Enterprise

One in 3 women experiences sexual or physical violence in their lifetime. That sobering statistic is a motivator for She's Birdie, the company behind Birdie+, a popular personal-safety alarm on a key chain that features a button users can tap to receive emergency assistance and a small handle they can pull to trigger a siren. In 2022, Goop became the first outside retailer to carry Birdie+, and in October, She's Birdie expanded its reach with Birdie+ Enterprise, a partnership program with businesses in industries like realty, whose employees tend to meet clients alone. *—J.K.*

DESIGN

The ultimate glamper

Romotow T8+

Combine the luxury of a yacht with the technology of *The Jetsons* with the functionality of an RV, and you've got the Romotow T8+, the mobile camper that looks like it came from an Apple Store. Tow it via hitch, and when you arrive at your destination, just press a button and the entire cabin swivels 90 degrees from its shell. This reveals an L-shaped floor plan with sleek panels, modern decor, and a panoramic window. At $270,000, the T8+ isn't cheap, but Romotow Holdings co-founder Matt Wilkie says it's built to last: "This is the sort of thing you pass down, and it's going to live 50-plus years." *—J.W.*

* INVESTORS IN HUMANE INCLUDE TIME CO-CHAIRS AND OWNERS MARC AND LYNNE BENIOFF

HIGH-TECH HOMES

Over 120 million households in Europe and North America had a least one smart-home device in 2022, per research firm Berg Insight. But the sea change has just begun: innovators have found a growing number of ways to give humble home appliances new life.

Take the **Hunter Douglas Aura Illuminated Shades,** which block the sun's heat for energy efficiency while simulating daylight indoors. Or the **RainStick Shower,** which sanitizes and recirculates water to save resources. Developed by a New York City apartment-building manager, the **Water Automation aquaHALT** also conserves water (and prevents damage) by detecting moisture and stopping toilet leaks.

The kitchen calendar can be replaced by a **Hearth Display** wall-mounted touchscreen, which serves as a hub for all your family's to-do lists, schedules, and chore charts. And even the open flame has been updated by **Graphene Radiator**'s futuristic warming virtual fireplace and the **BioLite FirePit+,** a Bluetooth-controlled firepit and grill that reduces smoke. *—Tara Law*

PARENTING

An on-the-go bottle warmer

Ember Baby Bottle System

Heating breast milk or formula for babies is notoriously tricky; they prefer it warmed, but their sensitive mouths can be easily scalded. Placing a full bottle in hot water is the most common method, but it's nearly impossible to do on the go. Ember's system avoids danger and headache with sleek, BPA-compliant bottles that attach to magnetized "pucks," which safely and evenly heat the bottles, are fully portable, and can be controlled via an app. The bottle's removable dome—sort of like a thermos—maintains temperature for four-hour stretches. *—Jessica Klein*

BEAUTY

A more strategic straightener

Dyson Airstrait

Hair straighteners have been a part of beauty routines since their invention in 1909. But they require dry hair, the hot irons can burn skin, and the devices weaken locks over the long run. Dyson has hit on a 21st century solution: the Airstrait. The straightener, used with wet hair, blows 11.9 liters of hot air a second through 1.5-mm slots at a 45-degree angle, speeding up the process while preventing the sort of damage created by scorching-hot irons. The machine is powered by the company's Hyperdymium motor. "It's more than 100,000 r.p.m.—five times faster than an F1 engine," says Low Chen Nyeow, senior design engineer at Dyson. *—Chris Stokel-Walker*

REUSE & RECYCLE

Cut kitchen waste

W&P Reusable Stretch Wrap

Plastic wrap and aluminum foil are fantastic kitchen aids, but people generally use each piece just once before tossing it in the trash. Now home chefs can cut down on waste by replacing them with W&P's silicone stretch wrap. At just 3 mm, it's about as thin as silicone can be without tearing. The reusable wrap can cover a casserole dish or stretch around a cheese block, and W&P says it's safe to put in the oven, microwave, dishwasher, and freezer. The product, says Kate Lubenesky, president of W&P, is "designed to be a workhorse in the kitchen." *—J.G.*

EVEN MORE INVENTIONS

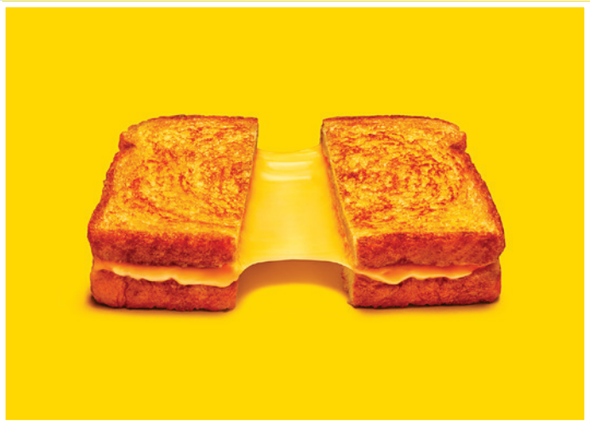
- **TrailGuard AI** uses AI-powered cameras to monitor endangered animals and catch the poachers that threaten them.
- **Samsung's Less Microfiber Filter,** installed in the brand's washing machines, catches microplastics that leach into wastewater from laundry.
- The **Adidas Adizero Adios Pro Evo 1** is the new super-light supershoe that runner Tigist Assefa wore to set a world record at September's Berlin Marathon.
- **Tabeeze Bottom-Up Bodysuit** is a onesie intended in part for babies in the NICU attached to monitors and tubes. It snaps at the shoulders instead of the bottom, and aims to ease skin-to-skin snuggling.
- **Plumis Automist** is a targeted sprinkler system that puts out fires faster with a mist that also reduces water damage.
- **Music: Not Impossible** is a haptic bodysuit that lets deaf and hard of hearing people experience music as vibrations.
- The **Axiom Holographics Hologram Zoo** in Brisbane, Australia, allows visitors to see animals up close and in action via holograms, no captivity needed. *—T.L.*

FOOD & DRINK

Crunchy convenience

Kraft Heinz 360Crisp

Microwaved food is convenient, but not as satisfying as fresh-cooked fare. Kraft Heinz has a solution: the 360Crisp process, which debuted with a new product, Lunchables Grilled Cheesies. The sandwich comes in a paperboard container with a susceptor that, when microwaved, directs heat to all the right places, leaving no bite undercooked or singed. "You have that perfectly crispy outside, that gooey melty inside, and none of that sogginess or dryness," says Alan Kleinerman, vice president of disruption. *—T.L.*



MEDICAL CARE

Visible cancer

Cision Vision InVision

Today's standard of care for finding lymph nodes, through which cancers spread, isn't quite high-tech: clinicians examine samples of body tissue by hand. That's changing with InVision, a first-of-its-kind microscope that uses shortwave infrared technology to show lymph nodes contrasted against surrounding fat tissue. By enabling more accurate cancer staging, the tool could save lives. "You end up with more suitable treatment plans," says Jeremy Li, CEO and co-founder of Cision Vision, which launched InVision in April. It is already in major hospital systems across the country, including Stanford and Northwestern. *—Jeremy Gantz*

EMBER; DYSON; ELIZABETH RENSTROM FOR TIME

OUTDOORS

Boosted mountain biking

Trek Fuel EXe 2023

Mountain bikes make for awkward e-bikes. If you're climbing uphill and turning the bike to avoid rocks or trees, for example, pressing the electronic "burst" can be scary or even dangerous. So Trek built a new engine for its Fuel EXe electric mountain bike that provides smoother and more granular e-boosts. It's also quieter, lighter, and 20% smaller than a typical e-bike motor. The Fuel EXe looks, feels, and sounds like a traditional mountain bike, so you don't even have to tell your friends you're getting a boost. *—Jeff Wilser*

HOUSEHOLD

Cleaner H_2O

LifeStraw Max

More than a million people die each year from unsafe drinking water, often in conflict zones or after natural disasters. To address this, LifeStraw invented a solution that strips water of bacteria, parasites, and viruses at scale. Its compact, 16-lb. system attaches to an existing water supply, cleaning 40 gal. of water an hour using hollow-fiber filters that block anything larger than 20 nanometers from passing through. "We wanted something that could work both at a refugee-camp level but also where you have flooding and wildfires," says chief brand officer Tara Lundy. *—C.S.W.*

EXPERIMENTAL

The drive to fly

Alef Aeronautics Model A

Plenty of startups are working on the sci-fi dream of flying cars, but not many look like, well, a car. "We started calling everything a flying car, and that was wrong," says Jim Dukhovny, co-founder and CEO of Alef Aeronautics. The company's Model A, a two-seat, all-electric vehicle with a flight range of 110 miles, indeed looks made to be parked in a garage. In July, the Federal Aviation Administration gave the vehicle a special airworthy certificate, allowing Alef to make test flights. The company hopes to deliver the first Model A's by 2026. *—Alejandro de la Garza*

EVEN MORE INVENTIONS

- The **Sony Alpha 7R V** mirrorless camera uses AI to hold humans—or animals, cars, insects, etc.—in sharp focus.
- **Sharrow's MX Propeller** reinvents the traditional propeller, which hasn't changed in a century, making boats quieter and more efficient.
- Speaking of quiet, **Lockheed Martin and NASA's X-59** is the quietest supersonic jet ever designed. It's planned to take flight next year.
- The **Jackery Solar Mars Bot** puts solar panels on wheels. The small vehicle uses AI and light sensors to zip around terrain and seek optimal sunlight.
- **Lenovo's Rollable Laptop** prototype features an expandable screen that goes from 12.7 in. to 15.3 in. on the go.
- **Iambic's Model T** is a custom leather sneaker, based on photos of your foot and a comfort questionnaire. For subsequent orders, Iambic analyzes your tread wear.
- Bots have learned to evade CAPTCHAs, but **Arkose Bot Manager** is a new way sites can stump bots using a combo of 3D, visuals, and audio, without frustrating customers.

—Emma Barker Bonomo

ACCESSIBILITY

Smoother moves

Zeen

Each year, tens of thousands of people in the U.S. go to the emergency room after falling using walkers and canes. The Zeen was designed to be a safer walker, using a gas-spring technology that inventor Garrett Brown developed when creating the Steadicam movie-camera stabilizer in the 1970s. It allows users to smoothly move the chair up and down, so they can more easily shift between walking, standing, and sitting modes. "There was something missing between walkers and wheelchairs," says Brown, co-founder and CEO of Zeen maker Exokinetics. He believes the Zeen fills that void.

—Jeff Wilser

PRODUCTIVITY

Group speak

Catchbox Plus

A speaker poses a question to the audience—and thus begins the awkward dance of passing a microphone down rows and over heads. Catchbox reinvented that kind of audience and group participation by putting wireless mics inside plush boxes that can be tossed from person to person. The latest version, the Catchbox Plus, is a major upgrade, offering better sound quality, less lag, and a clip-on lavalier for the person leading the discussion. With more businesses embracing hybrid work, says Pyry Taanila, a company co-founder and chief design officer, the device is often used in meetings to make sure every speaker is audible. —Tara Law

DESIGN

Otherworldly entertainment

Sphere

When the $2.3 billion Sphere first lit up on July 4, "it was like something out of a sci-fi movie," says David Dibble, CEO of MSG Ventures, which developed the Las Vegas entertainment venue's tech. "People got out of their cars and were just staring up." Its 366-ft.-tall exterior is earth's biggest LED screen—a lattice of 1,230,000 pucks that can make it look like a ball or planet or … anything. Inside it boasts a 160,000-sq.-ft. curved screen and an advanced concert-grade audio system, both now put to use for a residency by U2. *—Alison Van Houten*

REUSE & RECYCLE

Robotic recycling

AMP Robotics Cortex-C

Recycling rates have been stagnant for years. One big reason? Properly sorting crowded conveyor belts covered in a grimy array of glass, metal, and plastic is tricky and labor-intensive. AMP Robotics has a solution: the Cortex-C, a compact and adaptable robot for recycling facilities. Paired with AMP's AI-backed computer "vision" system, it can correctly identify, say, a specific strawberry company's plastic clamshell. "What's powerful about AI is its ability to handle ambiguity and imprecision," says CEO Matanya Horowitz. The robot's speed and accuracy could also lower sorting costs. *—Jeremy Gantz*

APPS & SOFTWARE

An e-passport

Digital Travel Credentials

Plane tickets, loyalty cards, and more have moved from wallets to cell phones. But one key document has not: the passport. Unless you're in Finland. In August, it began the world's first digital-passport program, for Finnish citizens flying on the national carrier, Finnair, between Finland and London; Manchester, England; or Edinburgh. To qualify to use the app, people must register with their local police, have their photograph taken, and sign a consent form. But once onboarded, all travelers have to do is get their phones scanned at airport immigration, and the fear of losing their one paper passport is gone. —Pranav Dixit

APPS & SOFTWARE

The language of song

Duolingo Music

Duolingo is bringing its gamified learning style—fun, bite-size sessions on your phone—to music later this year. The new curriculum, which is free with ads and will appear in the original Duolingo app, uses an on-screen piano to teach principles like harmony, meter, pitch, and beat. You learn by interacting with over 200 popular songs (from nursery rhymes to Beethoven's Ninth), matching sounds to notes and contributing to the larger musical piece. Karen Chow, a Duolingo senior learning scientist, says there's a misconception that you need innate talent to learn music, but "we're trying to break those boundaries—you don't have to feel intimidated." —J.W.

PARENTING

Lifesaver

Doona SensAlert

In the U.S. about 40 children die each year because they are left alone in a hot car. It's an extra risk for babies in rear-facing car seats, because they're not visible to the driver. SensAlert, a removable car-seat insert by car-seat maker Doona, uses sensors to detect the presence of a child to help prevent tragedy. New to the U.S. market, it automatically connects to smartphones via Bluetooth, and triggers three incremental alerts if a child is unattended in the car.

—Leslie Dickstein

REUSE & RECYCLE

Sustaining the chill

Cruz Cool

Styrofoam takes over 500 years to decompose—and yet we still use it for insulation. The Cruz Cool cooler, which can insulate frozen goods for 48 hours, is made out of chitin, a polymer that's found in fungi, insects, and shrimp. But the real difference is how it's produced. Typically, eco-friendly alternatives to styrofoam come in odd shapes and sizes that flummox supply chains. Parent company Cruz Foam pounds the chitin into large flat pellets that snap into a partner's current processing plant. That's how Cruz Foam is already partnering with Atlantic Packaging, an industry leader. *—J.W.*

CONSUMER ELECTRONICS

Spatial sound

Sonos Era 300

Audio company Sonos began developing the Era 300 spatial audio speaker after Dolby released its groundbreaking Atmos immersive audio format. "The brief to the team was: 'How do you create one product that makes you feel like there are seven or eight speakers in the room?'" says CEO Patrick Spence. The result is the amazing Era 300, a single speaker that sounds like a full system. Almost every part, from tweeters to waveguides, was built afresh for the speaker. Spence says it's already in every Universal Music studio, where it's used to test Dolby Atmos track mixes. —Chris Stokel-Walker

SUSTAINABILITY

New rings on the road

GACW Air Suspension Wheel

A decade ago, the smoke of a tire-dump fire prompted Zoltan Kemeny to investigate. He discovered that such fires are just one example of rubber tires' impact on the environment—everyday wear and tear leads to microparticle accumulation. So Kemeny invented Air Suspension Wheels, swapping out rubber for polyurethane or steel treads encircling a steel core. Kemeny's company, Global Air Cylinder Wheels, plans to sell its 100% recyclable tires to a number of industries, starting with the mining sector, where wear on tires is often most severe. *—C.S.W.*

GREENER POWER

When the **H2FLY HY4** became the first fully electric plane powered by liquid hydrogen to take piloted flight in September, it carried hope for a cleaner airline industry. And as EVs and solar panels proliferate, so do other green-energy innovations.

Form Energy's iron-air battery uses the process of rusting iron to outlast other batteries without using rare-earth metals, and the **Antora Thermal Battery** stores energy in blocks of carbon. **Brenmiller Energy's bGen** stores heat in crushed rocks that can create steam for industrial power.

New devices also aim to replace diesel, like **Moxion Power MP-75,** a battery-powered outdoor generator, and **Sesame Solar's Mobile Nanogrids,** which use solar and mobile green-hydrogen power in disaster zones.

Others make clean energy more accessible. **Oklo's Aurora Powerhouse** is a small, prefabricated nuclear reactor that makes the energy cheaper and safer. And **Dyaqua Invisible Solar Rooftiles** are attractive solar panels that look like terra-cotta tiles. *—T.L.*

SPHERE: BRIDGET BENNETT—THE NEW YORK TIMES/REDUX; DUOLINGO; CRUZ COOL: ELIZABETH RENSTROM FOR TIME

FITNESS

Smart boxing

Bhout Bag

The first AI-powered boxing bag is laced with sensors and comes with a 3D computer-vision camera, allowing it to measure the accuracy, power, speed, and technique of every strike—all in under 250 milliseconds. A companion app uses that data to create a personalized training experience; pugilists can also compete virtually in real time and soon will be able to earn "JAB$" credits to exchange for prizes. The idea, says founder and CEO Mauro Frota, is to gamify boxing fitness.

—Jared Lindzon

MEDICAL CARE

Frontline OR

SurgiBox SurgiField

In war, injuries can't always be treated in a sterile operating theater. "We offer high-quality care and safe surgery at the point of need," says Debbie Teodorescu, founder of MIT spinout SurgiBox. Its SurgiField system is a three-part, battery-powered surgical environment: a bubble inflated from a backpack and pumped with filtered air. SurgiBox has donated dozens to Ukraine's army; the country's military says they've saved at least 31 lives.

—Chris Stokel-Walker

DESIGN

Sustainable sneakers

Zellerfeld 3D-printed shoes

Cornelius Schmitt, CEO and co-founder of Zellerfeld, has grand ambitions: to put fully recyclable 3D-printed shoes "on every foot in the world." The startup currently uses 200 3D printers of its own design to create custom-fitted shoes based on smartphone scans of the buyer's feet. Each piece of futuristic footwear is made entirely of a single material, thermoplastic polyurethane, eliminating the sorting headaches that prevent mixed-material items from being recycled. At the end of their life—or the end of a season—the shoes can be sent back to Zellerfeld and turned into new designs. The company has worked with designers from Kanye West to Moncler on a range of sneakers and sandals, with more high-profile collaborations on the horizon. *—Cheyenne MacDonald*

PARENTING

Breakthrough bassinet

Happiest Baby Snoo Smart Sleeper

"Babies are used to sleeping with a rhythm [in utero]," says inventor Dr. Harvey Karp, co-founder and CEO of Happiest Baby, maker of the Snoo. "Why should we rip that away the instant they're born?" The popular bassinet lulls infants with automated rocking and shushing. It also secures them on their backs, reducing the threat of sudden infant death syndrome—which is why, in March, the FDA granted De Novo approval to the Snoo, making it the first medical device to be approved for infant sleep. Happiest Baby hopes insurance coverage for the $1,700 Snoo comes next. *—Charlotte Alter*

CONSUMER ELECTRONICS

Powerful pixels

Canon MS-500

Even if a count of 3.2 megapixels per 1-in. single-photon avalanche diode image sensor means nothing to you, you can appreciate that combined with a super-telephoto broadcast lens, Canon's new MS-500 camera captures sharp videos from some six miles away—even at night. The camera's sensor precisely counts the number of photons, or light particles, in each pixel, explains Ryan Kamata, senior product marketing manager at Canon Europe, eliminating the image "noise" that plagues other cameras. Canon is marketing it to government agencies for surveilling sensitive areas. *—Jessica Klein*

ACCESSIBILITY

Walking with ease

Cionic Neural Sleeve

Frustrated by the mobility-support options offered to his daughter Sophia, who has cerebral palsy, Jeremiah Robison, founder and CEO of Cionic, set out to make a garment to power "a more normative gait." Cionic's Neural Sleeve, which began shipping in January following FDA approval last year, analyzes real-time data from sensors in the fabric, then sends electrical signals to elicit targeted muscle contractions in the legs.

—Jeremy Gantz

SUSTAINABILITY

Undersea AI

Tidal

"The ocean is the most misunderstood and mismanaged resource we have," says Neil Davé, general manager for Tidal, Alphabet's (yes, Google's parent company) moon-shot project to protect the seas. Tidal's first commercial product is an underwater AI camera that gathers insights for salmon farmers, with the goal of promoting more-sustainable practices. The technology can spot evidence of sea-lice infestations early for less invasive interventions, and help reduce waste by tracking exactly how much food the fish need. Mowi, the world's largest salmon farmer, this year installed 230 of the systems across Norway.

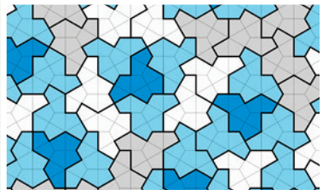
—Jessica Hullinger

CONSUMER ELECTRONICS

A modern flip phone

Samsung Galaxy Z Flip5

Cell phones are addictive by design, but sometimes you just want to check an email without getting sucked into apps. The Samsung Galaxy Z Flip5's key feature, its Flex Window, fixes that. The flip phone has a 3.4-in. external screen, next to its back-facing lenses, that allows you to dip into important notifications without being lured in. The Flex Window is also customizable: Peter Park, senior manager for product in Samsung's smartphone division, has Spider-Man wallpaper on his. ("You know, with my name and whatnot," he says.) Flip it open for a full 6.7-in. display. *—C.S.W.*



DESIGN

A long-sought solution

The einstein shape

Unless you're renovating a bathroom, you may not think a lot about tiles. But mathematicians do. One of their long-standing quests has been to design a tile shape that can cover a plane of infinite size without repeating the pattern with which the tiles fit together. Formally an aperiodic monotile, it's also called an einstein—from the German for "one" and "stone." Last November, David Smith, a retired printing technician in Yorkshire, England, hit einsteinian pay dirt by creating this 13-sided shape. Did the world need an aperiodic monotile? No. Are we a little smarter now that one exists? Absolutely. *—Jeffrey Kluger*

TRANSPORTATION

Autonomous ferry

Callboats CAT 10-L

Up to 70% of the cost of maintaining a passenger-boat fleet comes from paying captains. In the interest of economics and sustainability, the Finland-based Callboats has developed the world's first AI-powered autonomous boat, which is all-electric and partly charged by solar energy. Pending regulatory approval, the 30-passenger 10-L water taxi will run between Helsinki and a nearby archipelago with only one crew member on board (just in case anything goes awry). Users will be able to hail the vehicle, which can reach a top speed of 12 knots (nearly 14 m.p.h.), via a mobile app. *—C.S.W.*

FOR WHAT AILS YOU

Pharmaceutical companies had a big year in 2023. Among their innovations are novel solutions that promise to save lives. **GSK's Arexvy,** for instance, is the first vaccine for RSV, a respiratory illness especially dangerous to babies and older adults.

Others, while groundbreaking, were not immune to controversy. **Novo-Nordisk semaglutides Ozempic and Wegovy** are effective treatments for weight loss and diabetes, but this year triggered concerns about significant side effects and the high cost.

In hospitals, the **Targeted Real-Time Early Warning System** uses AI to detect signs of sepsis.

Several new products address maternal health problems. The **Thermo Fisher Scientific preeclampsia blood tests** can now identify women at risk of the pregnancy-complicating illness. And **Sage Therapeutics and Biogen's Zurzuvae** became the first FDA-approved oral treatment for postpartum depression, a designation that alone could increase screening and diagnosis of the condition.

Some new drugs fell short of cures but are important steps forward. **Eisai and Biogen's Leqembi,** the second drug approved for treating the underlying causes of Alzheimer's, has been shown to reduce cognitive decline by 27% vs. placebo. **Provention Bio Tzield,** meanwhile, is the first drug to treat the underlying cause of Type 1 diabetes, and may delay onset of the disease. Cosmetically, medicine hasn't yet beaten aging, but **Revance Therapeutics'** new **Daxxify** was found to last longer than Botox at reducing wrinkles. New devices also aim to improve patients' quality of life. The **Abbott Aveir DR Dual Chamber Leadless Pacemaker System** is the first that works in both chambers of the heart but doesn't need a lead (external wires), sparing patients discomfort. The **Micro-Transponder Vivistim Paired VNS System** for chronic ischemic stroke survivors can improve hand and arm function when paired with therapy. And the **Luminopia** is a VR headset that offers a fun and less stigmatizing alternative to eye patches for lazy eye. *—Tara Law*

ZELLERFELD; SAMSUNG; ELIZABETH RENSTROM FOR TIME; EINSTEIN: DAVID SMITH/JOSEPH SAMUEL MYERS/CRAIG S. KAPLAN/CHAIM GOODMAN-STRAUSS; LEQEMBI: REUTERS; WEGOVY: MICHAEL SLUK—UCG/UIG/GETTY IMAGES

FIXING SHIPPING

New innovations are trying to address the inefficiencies that back up the supply chain and contributed to global inflation of 8.7% last year.

At the warehouse stage, the **ArcBest Vaux** system uses wheeled platforms and AI-powered software that smartly moves freight off trucks.

Robots like the **Sanctuary AI Phoenix,** which does small workplace tasks, and **Simbe Tally 3.0,** which scans shelves for inventory, reduce workload on humans (and are often more reliable).

Other tools track goods throughout the supply chain. The **Ember Cube** is a cold-shipping box that delivers real-time temperature and humidity data for medical shipments. The battery-free **Oppo Zero-Power Tag** transmits location and other data, powered only by ambient heat and radio waves. And the **Wiliot IoT Pixel** transmits carbon-emissions data at each stop a product makes.

Meanwhile, ***Laura Maersk,*** the first green-methanol-powered container ship, aims to reduce the carbon footprint of ocean shipping.

—Tara Law

FITNESS

Strength with less pain

Katalyst

Plenty of people, from athletes to those with busy lives or past injuries, would like the benefits of a two-hour workout in just 20 minutes without excess strain on their joints. That's the promise of Katalyst's four-piece bodysuit, the only FDA-approved consumer device to use full-body electrical muscle stimulation, or e-stim. When you use Katalyst for a strength session, strategically placed pads gently zap your muscles with electricity, which founder and CEO Bjoern Woltermann says activates double the number of muscle fibers that standard training does. Sessions, he says, will leave you tired. *—Ashley Mateo*

PARENTING

Kid's best friend

WowWee Dog-E

For a pet without the expense or time commitment, the new WowWee Dog-E is a remarkably smart and customizable robot canine. Each bot has unique features, such as eye color and shape, and even personality traits and preferences, and the app-compatible pet responds to your interactions and remembers them, building memories and learning new tricks—all without the need for early-morning walks. Still, prepare to become attached. "You love your [actual] dog for its unique, quirky personality," says Andrew Yanofsky, vice president of marketing and operations at WowWee. "And our dogs are one in a million. —*C.S.W.*

CONSUMER ELECTRONICS

A small-space racer

Logitech Playseat Challenge X

Gamers using sophisticated race-car simulators have traditionally had two options when picking a steering wheel and pedal setup for their home: go cheap but lose realism, or buy an expensive, high-end chair that takes up a lot of space. The new Playseat Challenge X—Sim Racing Seat, Logitech G Edition finally finds a middle ground. At $299, the 26-lb. carbon-steel frame is a snap to assemble and folds down for easy storage. But it also accurately mimics life in the fast lane, with six seating positions depending on your driving style. —*Chris Stokel-Walker*

FITNESS

A flexible foundation

Stakt Mat

Like so many, Millie Blumka and Taylor Borenstein began working out at home during the pandemic—and quickly found the yoga mats they had on hand weren't versatile enough for other forms of exercise. So they created the Stakt Mat, which is twice as thick as the average yoga mat, at 12 mm when flat. The 3-lb., double-sided EVA-foam mat is foldable along five panels. Fold it all the way up to make a yoga block or raised surface for incline exercises and lunges; flip a panel or two down for extra elbow cushioning during planks. *—Katie MacBride*

AI

Listen up

Project Gutenberg Open Audiobook Collection

Project Gutenberg is the oldest digital library, started in 1971 to make e-books more accessible. But CEO Greg Newby says it "isn't great at either creating or distributing." So Microsoft and MIT teamed up to make the Open Audiobook Collection, using text-to-speech tech to turn 5,000 books into free, synthetically narrated audiobooks, now available on Spotify. The software fueling the project was also released at no charge. *—C.S.W.*

CONSUMER ELECTRONICS

Fresh tricks

Apple Watch Ultra 2

Apple's new Ultra 2, its highest-end watch, allows you to simply tap your index finger and thumb together twice to answer the phone or snooze an alarm. This cool trick is enabled in part by an algorithm that detects tiny changes in blood flow when you tap those fingers. In addition, it's among Apple's first carbon-neutral products. Apple says 30% of the material is recycled, while many units are shipped from factories by sea instead of by air. Apple plans to eventually take the same approach with all its products. "We will keep innovating to meet the urgency of the moment," says Lisa P. Jackson, vice president of environment, policy, and social initiatives. —*Pranav Dixit*

OWALA: ELIZABETH RENSTROM FOR TIME

CONSUMER ELECTRONICS

Easier fixes

Nokia G22

Last year, about 5.3 billion mobile phones fell into disuse. This waste has led to a push for tech that can be fixed more easily rather than replaced. Nokia's G22 is the latest, most advanced phone to be fully repairable. Anyone with a small screwdriver and five minutes can replace its screen, charging port, or battery—the parts that most often break, says Lars Silberbauer, chief marketing officer at manufacturer HMD Global—keeping it off the scrap heap. —*Don Steinberg*

AR & VR

Doctor's aid

Medivis SurgicalAR

Surgeons frequently must pivot from looking at a patient's data on a screen or clipboard to looking at the patient. That's changing with the SurgicalAR platform. Now, a surgeon can wear an AR headset that superimposes data on a patient's body during an operation, creating a visual guidance system that can assist with complicated procedures like brain-tumor removal, and reduce errors. It's already in action at hospitals like Houston's MD Anderson Cancer Center. *—Jeff Wilser*

FITNESS

Hydration made fun

Owala FreeSip

A water bottle must be something special to merit a hashtag (#owala) that's been viewed 272 million times on TikTok—not to mention a resale value of roughly $400 for limited editions. Trove Brands' stainless-steel Owala FreeSip is leakproof and offers two drinking methods—a straw and a larger opening for guzzling that conforms to the shape of the user's mouth. A variety of color palettes with fun names like Shy Marshmallow have helped the bottles go viral. "We took boring," says inventor Steve Sorensen, co-founder and CEO of Trove Brands, "and added a little magic." —*Jessica Klein*

DESIGN

Audiophile style

Teenage Engineering TP-7

Digital audio recorders are plentiful, but few look—or feel—like the TP-7 from Swedish company Teenage Engineering. "A main theme when we develop products is to rethink what a tool is," says CEO and head of design Jesper Kouthoofd. "We felt [an audio recorder] could be done in a more creative way." The palm-size device records podcast-quality audio and features three chunky buttons akin to those on a 1970s hi-fi system. A side-mounted "rocker" scrubs through tracks. Another retro touch: as the TP-7 records and plays back, a motorized "tape reel" in the center of the gadget actually rotates. *—C.S.W.*

EVEN MORE INVENTIONS

- The **Hewlett-Packard Enterprise Frontier** is the world's most powerful supercomputer.
- **Spotify DJ** uses AI to create your perfect playlist, with commentary from an AI-generated DJ.
- **Goodbill** analyzes and negotiates hospital bills to save patients money.
- **PitchCom** is an encrypted device that lets baseball pitchers and catchers covertly call pitches.
- The **Kia EV6 GT** gives drivers high-end EV performance at an affordable price.
- **Tended Wearables** use geofencing to precisely alert workers of nearby dangers on jobsites.
- **Super-salt-resisting solar-still technology,** developed at MIT, is the first to create drinking water from salt water cheaply, using only solar power.
- The **Navtek Naval Technologies Zeetug** is the first all-electric tugboat.
- **Dedrone City-Wide Drone Detection** uses sensors and AI to track unauthorized drones.
- **Row 7 Seed Company Sweet Garleek** is a delicious leek-garlic hybrid, in grocery stores now. *—T.L.*

FOOD & DRINK

Next-gen avocado

Luna UCR

The Luna UCR is one very special avocado. The result of a decades-long breeding program at the University of California, Riverside, it has a flavor similar to that of its popular relative, the Hass, but a bit more "floral," says program horticulturist Mary Lu Arpaia. The Luna UCR is ripe as soon as its skin turns black—which takes the guesswork out of slicing in—and it stays fresh long enough to transport. Luna UCR trees are as bountiful as Hass trees, but smaller, meaning they're easier to harvest and require less land—and potentially less water and electricity. It'll take a few years before they hit grocery stores. —*Tara Law*

AI

Picturing your imagination

OpenAI DALL-E 3

When OpenAI unleashed ChatGPT on the world in November, it radically changed the AI landscape. The company hopes DALL-E 3—the new and vastly improved version of its AI image generator—will have the same impact. Previous image generators, says OpenAI's Aditya Ramesh, the inventor of DALL-E 3, require learning a new technical language, including appending strings with minuses and numbers, to get the best results. Not so with DALL-E 3, which folds into ChatGPT so users can enter conversational commands and get an image that matches their description.

—*Chris Stokel-Walker*

TRANSPORTATION

An airless wheel

SMART Tire

At a 2020 NASA program for entrepreneurs, Earl Cole and Brian Yennie learned about an unusual metal alloy called nitinol, which the agency used to build airless wheels tough enough to roll over the rocky surfaces of the moon or Mars. Intrigued, Cole, now CEO of the SMART Tire Co., and Yennie, its CTO, developed an airless bicycle wheel made from a spiral largely made of nitinol. The tire, set to ship next year, will never go flat, and "actually could last the life of your vehicle," says Cole, if you replace the cheap rubber tread on the exterior as it wears down. —*T.L.*

EXPERIMENTAL

Electric speed

Academic Motorsports Club Zurich Mythen

Electric vehicles are good for the planet, but they're not known for being good on the racetrack. The Mythen could change that. Thirty students and alumni of the Academic Motorsports Club Zurich at ETH Zurich university set out to make the first racing EV that can go from 0 to 100 km/h in less than a second, and in September, at a race in Dübendorf, Switzerland, the Mythen did just that—in 0.956 seconds. The team took a year to engineer the 309-lb. car, using a vacuum fan that hugs the vehicle to the tarmac, significantly reducing drag. —*C.S.W.*

BETTER MATERIALS

As humanity works to build a future that avoids the worst effects of climate change, the materials we use are taking center stage. Manufacturing and construction are two of the most harmful human activities: the cement industry alone is responsible for 8% of man-made carbon emissions. But creative minds are proposing clever new solutions to build cleaner.

One leader in the cement industry is **Brimstone,** whose **carbon-negative cement** replaces limestone with calcium silicate rock. It became the first in the industry to receive third-party certification that its product is as strong as standard cement.

Others are working to replace or reuse plastic. **UBQ,** for instance, is a biologically based thermoplastic made of organic and unrecyclable waste. **MicroPET** is a system that uses specially engineered bacteria to convert single-use plastic into nylon. And **Choose Planet A's The Good Cup** is a paper cup that replaces sealants with a water-based glue, making it leak-proof, easier to recycle, and biodegradable. The cups also fold closed, eliminating the need for plastic lids.

Other innovations aim to limit the environmental impact of mining metals needed for green energy. **Niron's Clean Earth Magnet** is made from plentiful iron and nitrogen, which is stronger and eliminates the need for rare-earth magnets. **Li-Metal's lithium-production process** makes the metal widely used in batteries more sustainably by dissolving lithium carbonate in molten salt.

Some companies are working to make supply chains more traceable, to ensure goods are produced ethically. **FibreTrace** embeds a luminescent pigment in fiber, which makes the final garment scannable to verify its origins.

And to increase energy efficiency, scientists have taken on the question of how to better insulate homes and cars. At Purdue University, the answer is **whiter paint,** which is composed of chemicals that better scatter UV rays and, when used on exteriors, can reduce the need to cool buildings and cars by reflecting more heat than ordinary white paint. —*T.L.*

MYTHEN: ALESSANDRO DELLA BELLA—ETH ZURICH; MOONWALKERS: ELIZABETH RENSTROM FOR TIME

OUTDOORS

Walk the city

Shift Robotics Moonwalkers

These battery-powered wheeled shoes allow you to walk normally (not skate), just faster and more easily. The Moonwalkers use AI to sense when you're speeding up or slowing down and adjust themselves accordingly, and the wheels lock when you're taking the stairs. Tested in Pittsburgh, Baltimore, New York City, and Washington, D.C., the shoes allow you to walk at speeds up to 7 m.p.h.—250% faster than your average gait—so you can travel farther without tiring out. —*Pranav Dixit*

OUTDOORS

Nature views

OnX Recent Imagery

When planning a hunt or a backcountry hike, knowing the latest on-the-ground conditions—like whether a cornfield has been harvested or a mountain pass is dry—is invaluable. OnX, which makes apps geared to hunters, off-roaders, and other backcountry adventurers, this year added a "recent imagery" feature, which provides paying users (in every U.S. state but Hawaii) unparalleled visibility thanks to satellite images provided by Planet Labs. The cloud-free imagery—twice as detailed as that of competing apps, OnX's Brian Riordan says—is updated every two weeks. —*Jeremy Gantz*

APPS & SOFTWARE

Safer period tracking

Flo Anonymous Mode

When the U.S. Supreme Court overturned the right to abortion access in June 2022, fears arose that legislators might leverage companies' data to track women's reproductive health. So that September, period-tracking app Flo put out a new option called Anonymous Mode, which can "completely decouple health information from the identity of the user," according to chief technology officer Roman Bugaev. The constantly updated service, available to Flo subscribers at no extra charge, was developed with web-infrastructure company Cloudflare. Earlier this year, Flo released an open-source version. —*Haley Weiss*

ACCESSIBILITY

Gaming for all

Sony Access Controller for PS5

More than a third of the world plays video games, but participation remains a challenge for the 16% of the population living with a significant disability. Enter PlayStation's Access Controller, a customizable kit that features a joystick along with 22 swappable components that can be configured into various layouts and combined with other accessories to meet different physical needs. Sony Entertainment's senior vice president of platform experience, Hideaki Nishino, says the PlayStation 5–compatible device's creation involved five years of research and development alongside accessibility experts.

—*Jared Lindzon*