

Marijuana:
Mainstream
in the U.S.

India:
Roads to
the future

Diamonds:
Zimbabwe's
blood stones

Haiti:
The killer
cholera

TIME

The 50 Best Inventions Of 2010

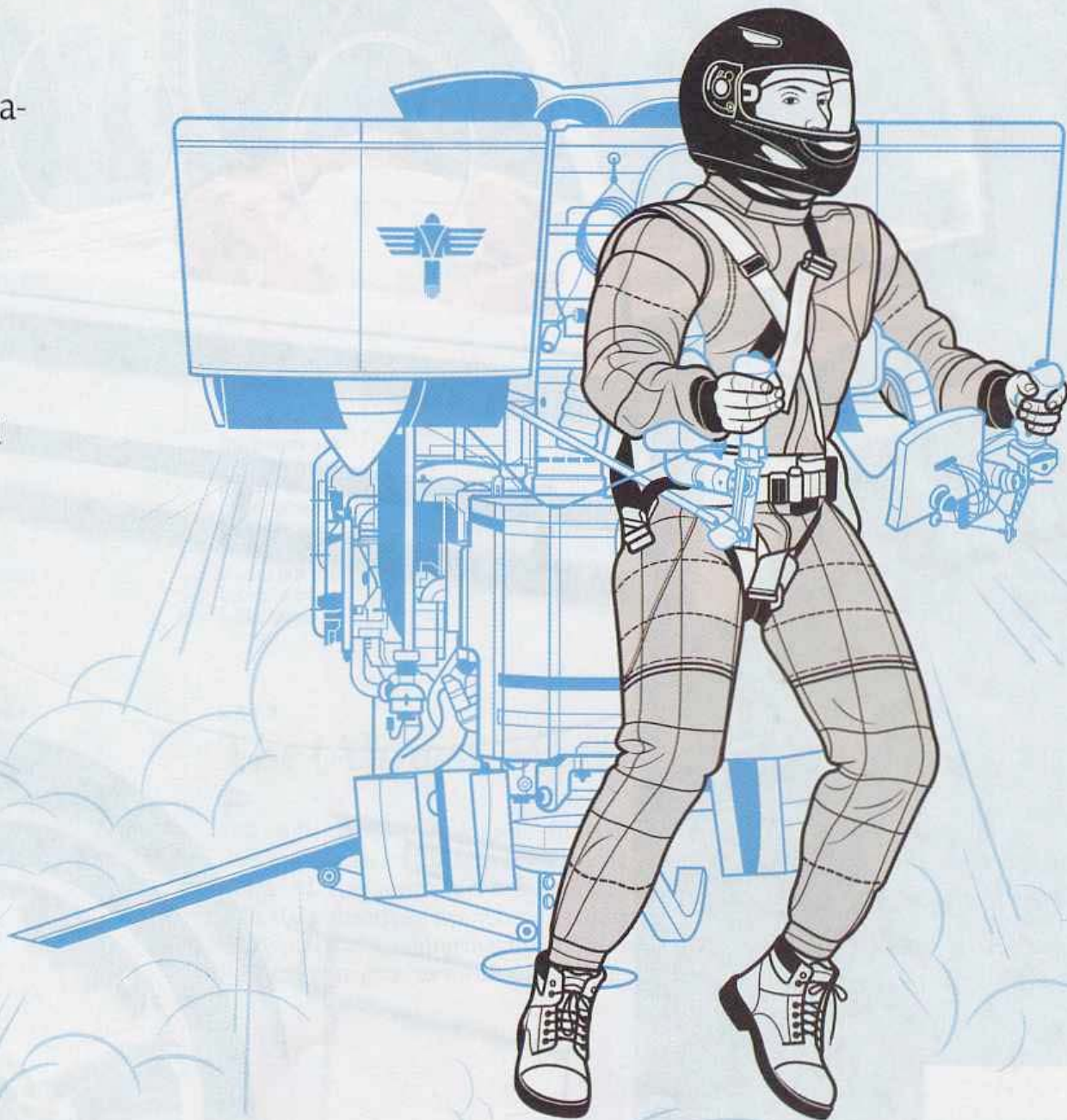
Jet pack
Teacher robot
Lab-grown lungs
Car-part incubator
Malaria-proof mosquito
Spray-on fabric
Beef-powered train
Blast-protection wallpaper
Flipboard
Sarcasm detector
Power-aware cord
Plastic-fur coat
Earpiece video camera
Synthetic cell
Driverless car

... and 35 more



The 50 Best Inventions Of the Year

Flying cars! Jet packs! Lasers that zap malaria-carrying mosquitoes! Here are 2010's biggest (and coolest) breakthroughs in science, technology and the arts



Inventions in Focus

To see some of the innovations on this year's list in action, visit time.com/bestinventions

NO. 1

NeoNurture Incubator



The genius of the NeoNurture incubator, developed by university students in the U.S., is that it employs an under-utilized resource (old car parts) to address a critical need: functioning incubators to nurture premature newborns. Headlights provide heat; a repurposed dashboard fan circulates air; a door-chime and signal-light assembly is rejiggered into an alarm system that alerts caregivers when things go awry with the heating mechanism. The device can even be powered from a motorcycle battery. Car engineers have nothing on these guys.



WE ASKED DIRECTOR JUDD APATOW FOR HIS FAVORITE MOVIE INVENTION:

'There have been no innovations in movies this year. Avatar was the high point. It is all downhill from there.'

CELL: THOMAS DEERING AND MARK ELLISMAN—NORMIE/UCSD; APATOW: PETER JAMES FIELD; WASHING MACHINE: JAMESON SIMPSON

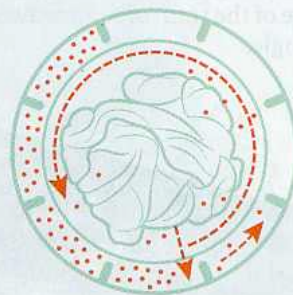
STEP 1

During the wash cycle, an inner and outer drum spin, mixing nylon beads with laundry



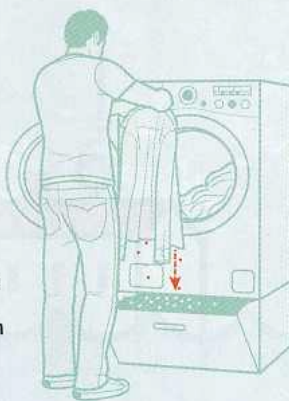
STEP 2

The outer drum stops spinning, causing the nylon beads to separate from the clothes



STEP 3

All but 1% of the beads are removed during the wash cycle; when you retrieve your clothes, you can shake out the last bits into a bin for reuse



STEP 4

If necessary, any errant beads can be removed with a vacuum



NO. 2

The (Almost) Waterless Washing Machine

You probably don't think about this every time you separate your whites, but the U.S. uses more than 1 trillion L of water on laundry each year, according to the British firm Xeros Ltd. The company is developing a machine that draws cleaning power from reusable, stain-absorbing nylon beads, requiring much less water—as much as 90% less—than a normal washing machine. (See above for how it works.) A commercial version is due out next year: good news for conservation and your monthly water bill.

NO. 3

First Synthetic Cell

Creating life in the lab? It wasn't such a stretch for J. Craig Venter, who successfully co-mapped the human

genome in 2001. Even while completing that feat, the genetic cartographer wondered if he could string together DNA and make life of the bacterial kind from scratch. So like a biological Lego builder, he started with off-the-shelf chemicals and, after 15 years of painstaking trial and error, managed to reconstruct the genome of a bacterium that

successfully "booted up," dividing and replicating just like any other bug. Such synthetic life, he hopes, will make it possible to, among other things, generate new forms of man-made biofuel and speed up vaccine production by making it easier to create large amounts of whichever strains of influenza are circulating in a particular season.



Photograph by Jamie Chung for TIME

▼ NO. 4

The X-51A WaveRider

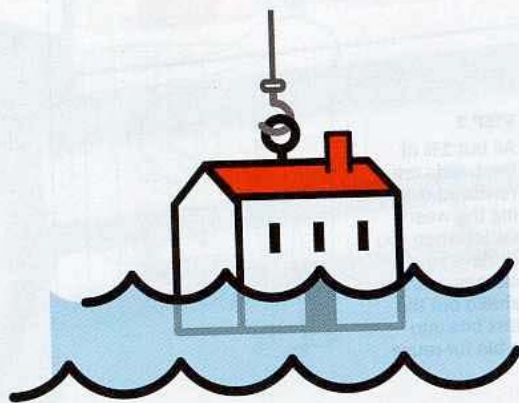
After decades amassing an immense arsenal to defeat entire countries, the U.S. military is developing tools to fight isolated conflicts requiring speed and precision. The X-51A WaveRider demonstration project, part of the U.S.'s Prompt Global Strike initiative to attack any spot on the globe within an hour, is a prime example. The WaveRider is hypersonic, traveling 965 km in 10 minutes. Even more incredible, its nose is designed to take advantage of the train of sonic waves it creates by making them break at the optimal angle.



► NO. 5

Responsible Homeowner Reward Program

Howard Hubler made the financial crisis worse: at Morgan Stanley, he lost \$9 billion on bad mortgage bets. Now he may speed the recovery. His company, the Loan Value Group (LVG), has launched a program that could dramatically reduce foreclosures in the U.S. According to studies, strategic defaults—in which the borrower has the money to pay but doesn't—account for as many as 30% of all home-loan defaults. Why? In an estimated 13 million cases, borrowers owe more than their home is worth. Under LVG's patented Responsible Homeowner Reward (RHR) program, banks promise to pay borrowers who continue to pay on time a lump sum—typically 10% of their original loan amount—when they sell or refinance their home. Miss more than one payment and the reward disappears. It's still early (fewer than 5,000 people have been enrolled), but LVG says fewer than 10% of the borrowers in RHR have ended up defaulting, compared with a redefault rate of more than 20% for other loan-modification programs. Hubler says he is confident his current mortgage bet is one that will help, not hurt, the housing market.



▲ NO. 6

Sony Alpha A55 Camera

A.k.a. the camera that never blinks. Traditional digital SLR cameras take the nicest photographs around, but they're hobbled by a decades-

old technical limitation: when you snap a picture, the mirror that's been redirecting the image to your eye and to a focusing sensor pops up momentarily as the image is captured. Until it goes back down, the camera can't focus. Sony's Alpha A55 (\$849.99 with lens) fixes that with an ingenious trans-

lucent mirror that stays put. That means you can shoot up to 10 perfectly focused photos a second and record HD video that never goes blurry. Bonus advantage: with no need to allocate interior space for a moving mirror, the Alpha is noticeably smaller and lighter than its Sony SLR brethren.



▼ NO. 7

Lifeguard Robot

Her nose isn't coated in bright white sunblock, but she might just save your life. EMILY, or the Emergency Integrated Lifesaving Lanyard, is a robotic buoy that can swim through riptides at a speed of up to 39 km/h. Her inventor, entrepreneur and engineer Tony Mulligan, says that makes her about 15 times as fast as human lifeguards. Powered with a tiny electric pump that shoots a forceful stream of water, the 1.2-m-long robotic buoy has been tested at California's Zuma Beach. The device is operated by remote, but next year's model features sonar technology controlled with an iPhone app that will allow EMILY to detect riptides and submerged objects.



CAMERA: SONY; HOUSE: OLIVER MUNDAY; X-51A: AIR FORCE RESEARCH LABORATORY; EMILY: KIMBALL HALL/HYDROMALLX



▲ NO. 8

The Plastic-Fur Coat

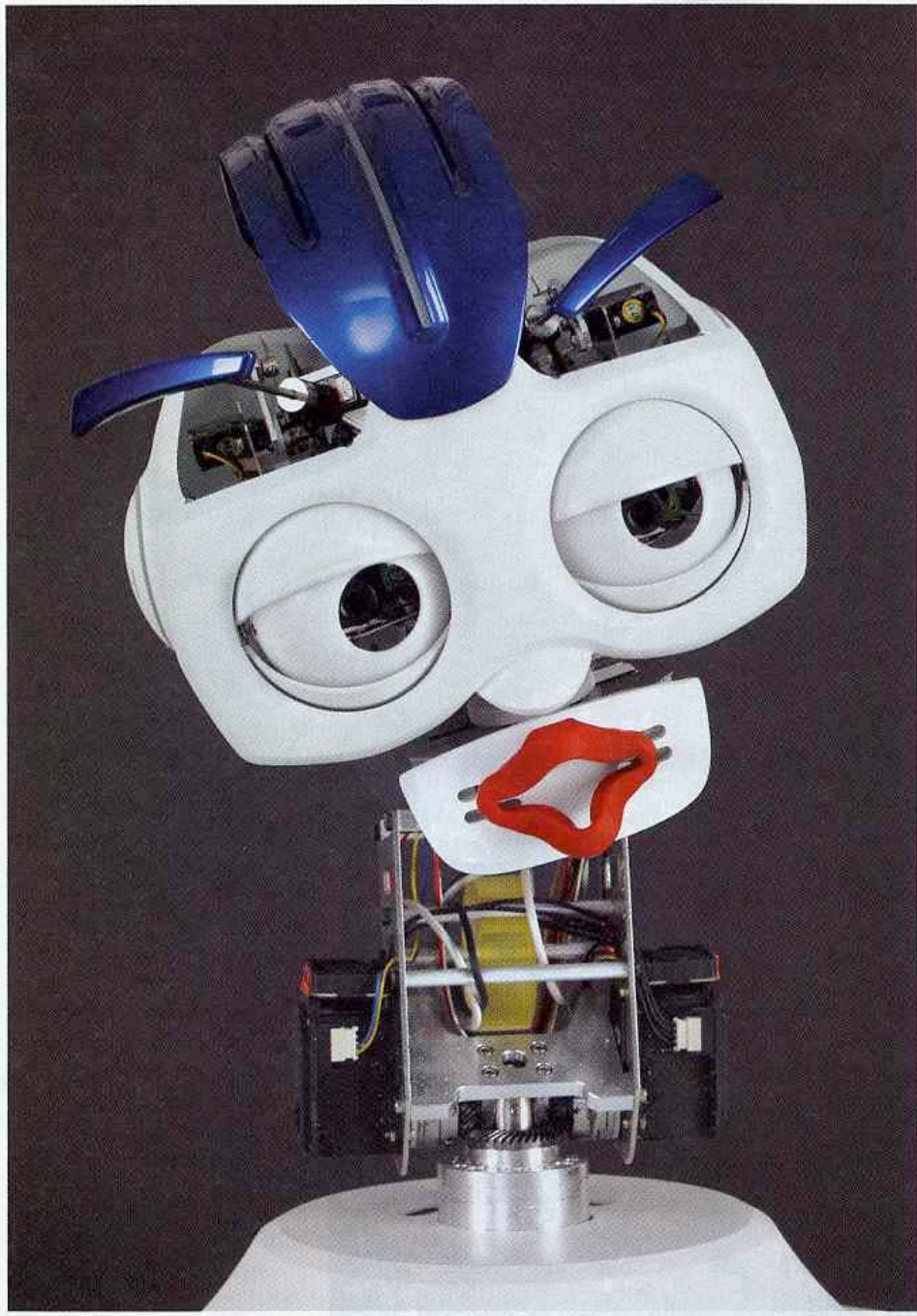
Most of us toss those annoying plastic price-tag fasteners (*above right*) without a second thought, but Maison Martin Margiela Artisanal's coat gives 29,000 of them a new life. The French avant-garde fashion house—known for transforming shoelaces, combs and wigs into couture dresses—spent 42 hours embroidering the fasteners in a herringbone pattern on a leather coat, turning the disposable into a fashion statement: fake fake fur. "It's a message about sustainability, but done with humor," says Matilda McQuaid, a curator at Cooper-Hewitt, National Design Museum, "saying we should look at reusing our resources. We need to stop and think about what we immediately discard."



ACTUAL SIZE

**MOST
FASHION-
FORWARD
INVENTION**

Photograph by Jamie Chung for TIME



▲ NO. 9
The English-Teaching Robot

Call it the job terminator. South Korea, which employs some 30,000 foreigners to teach English, has plans for a new addition to its language classrooms: the English-speaking robot. Students in a few schools started learning English from the robo-teachers late last year; by the end of this year, the government hopes to have them in 18 more schools. The brightly colored, squat androids are part of an effort to keep South Korean students competitive in English. Not surprisingly, the proposal has worried a few human teachers—and with good reason. Experts say the bots could eventually phase out flesh-and-blood foreign English teachers altogether.

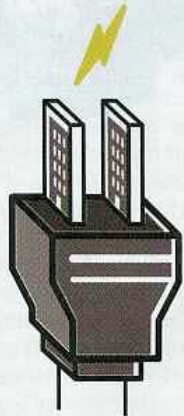


WE ASKED CHEF **DAVID CHANG** FOR HIS FAVORITE NEW INVENTION IN THE KITCHEN:

'The new iSi CO₂ carbonator. It's so simple and easy to carbonate anything, especially liquor. I have a prototype, and it's amazing. Probably going to be in all professional kitchens. And, no, I don't get paid to say this stuff, but it's definitely the coolest gadget I've seen this year.'

▼ NO. 10
Square

There might not be a piece of tech more due for an update than the cash register. Enter Square, a payment platform created by Twitter co-founder Jack Dorsey. With the aid of a tiny magnetic card reader that attaches to a smart phone, Square lets anyone process credit cards. It might not do away with paper entirely—plenty of people still prefer cash—but you certainly don't need to wait for a receipt: sign on the screen, and Square sends a copy straight to e-mail.

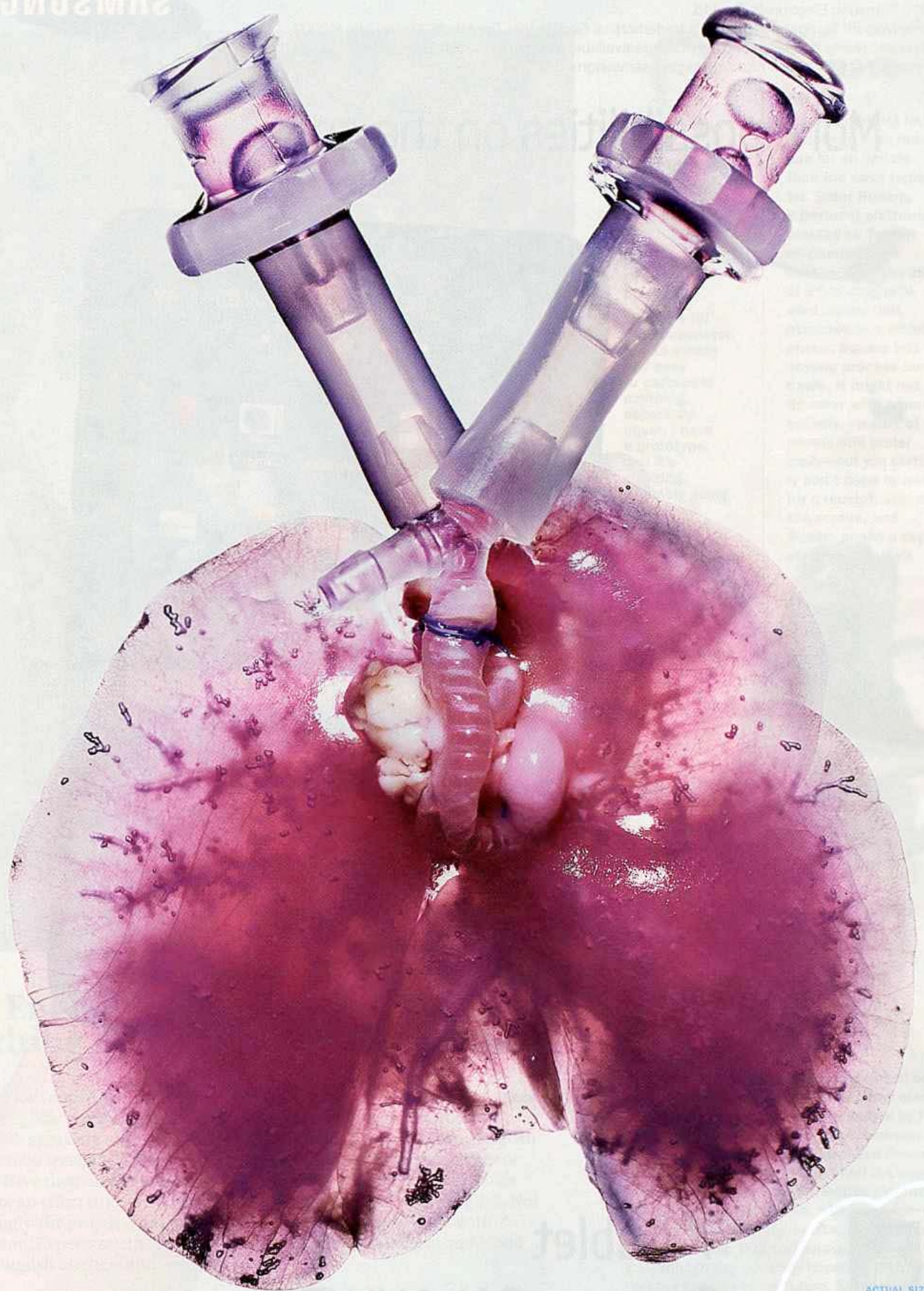


▶ NO. 11
Bloom Box

Inventors have tried to use hydrogen fuel cells as a cleaner way to create commercial electricity, but they've always been limited by the cost. That's beginning to change, however, thanks to a California start-up called Bloom Energy. Its Bloom Box—about half the size of a shipping container—generates electricity using solid oxide fuel cells, which provide juice by oxidizing a fuel source. In the case of the Bloom Box, that fuel source is natural gas, though the company hopes to substitute cleaner sources in the future. Silicon Valley companies like Google and eBay are already using Bloom Boxes for greener backup power, at a cost of about \$800,000 each.

CHANG: PETER JAMES FIELD; SQUARE: SQUARE; PLUS: OLIVER MUNDAY

SAMSUNG

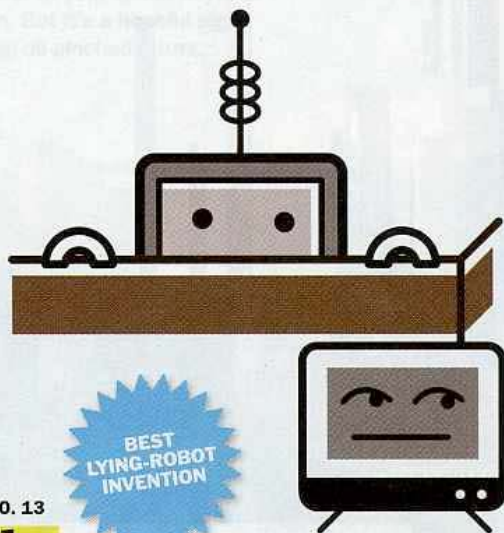


ACTUAL SIZE

NO. 12

Lab-Grown Lungs

Growing new body parts has always been more science fiction than science reality, but that balance may quickly be shifting, at least in the lab. Relying on more sophisticated biosimulators that can better mimic body conditions, researchers have re-created the delicate architecture of a rat lung accurately enough for it to assume 95% of a normal lung's inhaling and exhaling functions. The key to their respiratory success was starting with a skeletal rat-lung template, including a matrix of blood vessels and collagen and other connective tissue, then seeding it with stem cells and nutrients to generate lifelike tissue that exchanged oxygen and carbon dioxide just like normal lung tissue. The ultimate goal is to replicate the feat on a larger scale: to replace enough human lung tissue to aid patients with emphysema or lung cancer.



NO. 13

The Deceitful Robot

O.K., its nose doesn't grow. But Georgia Tech's new robot, which uses algorithms to detect conflict and then assess the best method of escaping from it, can create a false trail, send erroneous communications and hide from an enemy. Although its main purpose will most likely be to aid military search-and-rescue operations, its ability to deceive also brings it closer to successful interactions with humans. And it would make the Jetsons' Rosie even more annoying.

NO. 14

Sarcasm Detection

This is the most important software ever invented. Of course, if a computer using the Semi-Supervised Algorithm for Sarcasm Identification read that last sentence, it would immediately detect the sarcasm. Developed at the Hebrew University of Jerusalem, the tool is designed to spot sarcastic sentences in product reviews. The algorithm has been fairly accurate even in its earliest stages: in a trial involving 66,000 Amazon reviews, it was right 77% of the time, pointing to a future in which computers won't just store your words, they'll interpret your intent.



NO. 15

BioCouture

Considering the unlovely grubs that produce it, silk is a remarkably beautiful textile. Now Suzanne Lee, a researcher at London's well-regarded Central Saint Martins College of Art and Design, has developed a material made by the bacteria that are usually used to turn green tea into the fermented beverage kombucha.

As they digest sugar, the bacteria produce a mat of cellulose, which Lee figured out how to harvest and dry. The resulting fabric, which has a vaguely skinlike texture, can be molded and sewn into shirts and coats. It's not perfect yet; if it gets wet, it absorbs up to 98% of its weight and "gets heavy and gooey," says Alexander Bismarck, a chemical-engineering professor at Imperial College London who is trying to devise a more water-repellent culture to grow the bacteria in. But it's a heckuva lot kinder to the planet than polyester.

NO. 16

Faster-Growing Salmon

Americans love heart-healthy salmon, but with wild populations dwindling, most of the salmon we now eat is farmed, not caught. The problem is that salmon make bad farm animals; it takes 3 kg of feed to grow 1 kg of salmon. AquaBounty's solution: splice in a gene from Chinook salmon with DNA from an eel-like creature called an ocean pout. AquAdvantage Atlantic salmon can grow twice as fast, making them easier to farm. Environmentalists wary of the first edible genetically engineered animal aren't so sure, however, and have dubbed the creation Frankenfish. A government hearing on the salmon ended inconclusively, but barring any changes, the fish could be headed to market soon.



▼ NO. 17

Road-Embedded Rechargers

It's no Soul Train, but some Seoul bus rides could soon be getting a lot more electric. Engineers from the Korea Advanced Institute of Technology are experimenting with embedding electric strips in roadbeds that magnetically transfer energy to battery-powered vehicles above. The prototype, at an amusement park in Gwacheon, just south of Seoul, is the first system in the world like it, and researchers say the technology could someday enable all electric vehicles to operate with one-fifth the battery size and at one-third the cost.

▼ NO. 18

The Straddling Bus

A boom in car sales has caused traffic mayhem in many of China's major cities. One company wants to improve the situation—by putting even more people on the road. But rather than add more cars, Shenzhen Huashi Future Parking

BEST ANTI-GRIDLOCK INVENTION

Equipment is developing a massive "straddling bus." Cheaper than a subway, the partly solar-powered behemoth will span two lanes and carry up to 1,200 people in a carriage raised 2 m above the roadway, thus allowing cars to pass, or be passed,

underneath. Passengers on the new bus should rightly expect to feel above it all. The company is awaiting government approval for a trial project in Beijing. If that comes through this year, test runs could begin by the end of 2011.

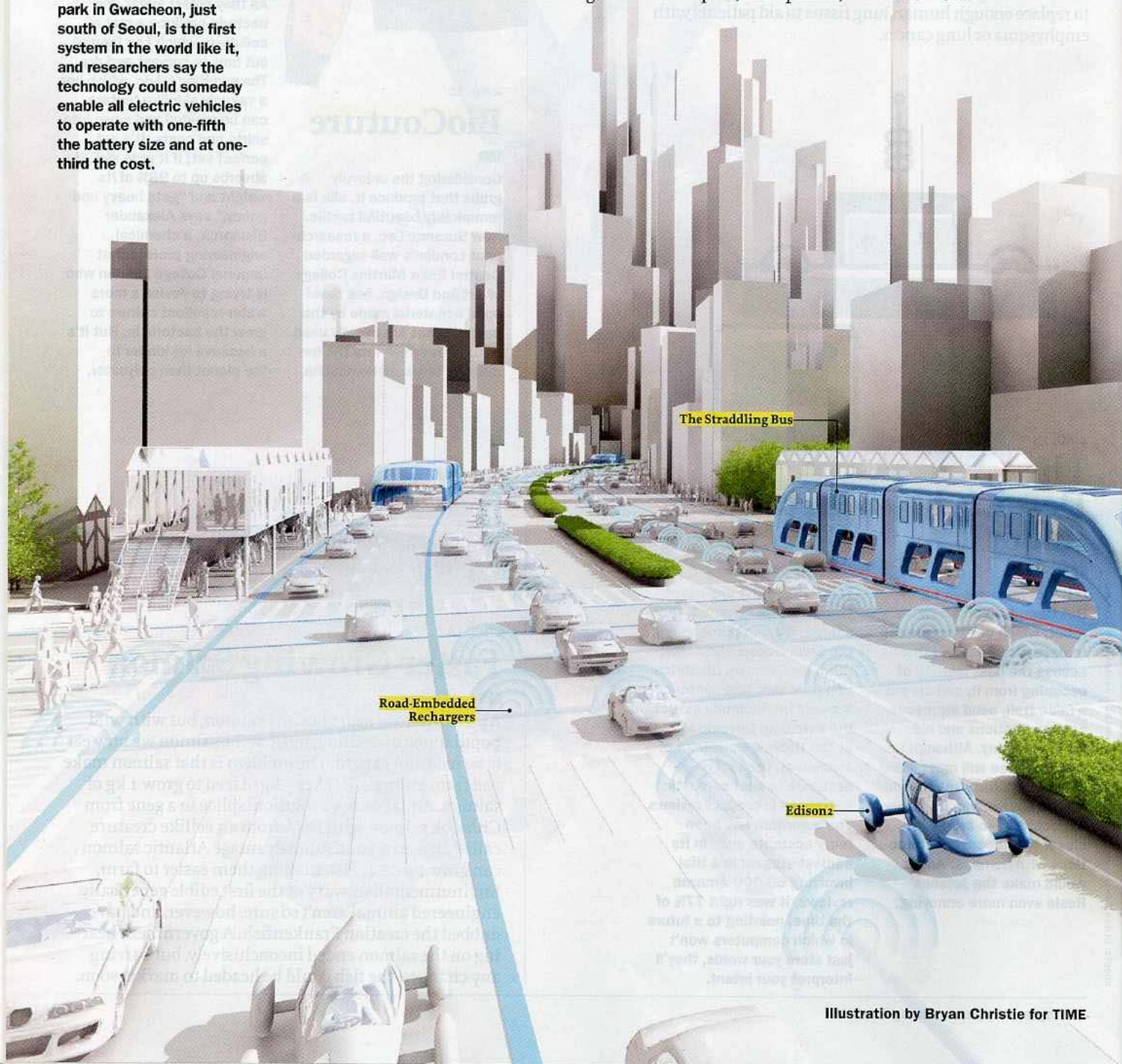


Illustration by Bryan Christie for TIME

Edison2

Perhaps the easiest way to make a car more fuel-efficient is to make it lighter. The designers of the Edison2 concept vehicle have taken auto dieting to the extreme. The car—as aerodynamic as it is anorexic—weighs less than 400 kg, which helps it get 2.29 L/100 km. That was good enough to share the Progressive Insurance Automotive X-Prize, an award set up to encourage development of production-ready cars that are super-fuel-efficient. Sadly, Edison2 team owner Oliver Kuttner says you won't see the car at your dealer anytime soon. But it's a hopeful sign for an oil-pinchd future.

Antro Electric Car

The car of the future, now coming from: Hungary. Yes, it sounds like communist propaganda circa 1967, but the Hungarian designer Antro might just have made a super-efficient, supercheap car that could put Western manufacturers to shame. The Antro Solo can hold up to three people—a driver and two passengers,

one on either side—who pedal to help drive the ultralight car. The rest of the forward motion comes from an electric motor that's partly powered by solar panels. If you need a bigger car, Antro has a solution: two Solos can be combined, Transformers-style, to create the family-friendly Duo. Look for it in 2012.

Electric-Car Charging Stations

It's the chicken-and-egg problem of electric vehicles: until there's a network of road-embedded rechargers (see No. 17) or a series of stations where drivers can charge their batteries—similar to the gas stations we depend on



now—an electric car is inherently limited. Coulomb Technologies is working to break that deadlock. The company is building a system of automated charging stations in public places that are connected to utilities, so the charge for your charge can be added to your home electricity bill. And if your utility hasn't partnered with Coulomb, you can call a toll-free number and pay with your credit card.



▶ NO. 22

Sugru

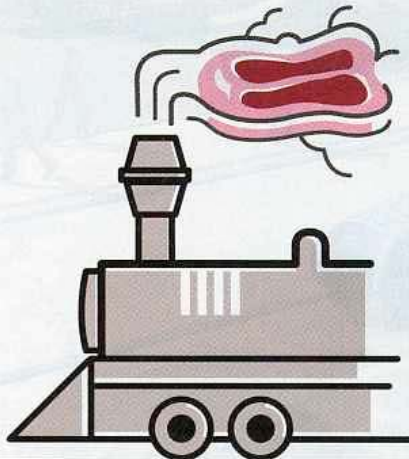


Looks like Play-Doh, acts like Super Glue. Sugru, a brightly colored silicone rubber, is the brainchild of designer Jane ni Dhulchaointigh, who worked with scientists for five years to develop a material soft enough to mold yet durable enough to fix or “hack” things so they work better. Sugru (Gaelic for *play*) sticks to everything from metal to fabric and can be used to craft an array of improvements—softer corners, grippier handles, more comfortable shoes, even more decorative glasses.



WE ASKED AUTHOR AND COMEDIAN AMY SEDARIS FOR HER THOUGHTS ON THE YEAR'S BEST INVENTION IN COMEDY:

‘Zach Galifianakis lighting up a joint on Bill Maher. The doors are wide open now!’



▲ NO. 23

The Plastic-Bottle Boat

In the four months it took British adventurer and banking heir David de Rothschild and crew to sail a boat made of discarded soft-drink bottles from San Francisco to Australia, Americans used some 8.7 billion plastic bottles. Drawing attention to that waste was the point of Rothschild's voyage aboard the *Plastiki*, an 18-m catamaran built with 12,500 recycled plastic bottles and a fully recyclable plastic material called Seretex and held together with organic glue made from cashew-nut husks and sugarcane. The bottles were packed into the *Plastiki*'s pontoons in a pomegranate-like structure, giving the boat 68% of its buoyancy. Rothschild's mission to change the public's perception of plastic continues as his team brainstorms new ways to reuse the commonly discarded material in everything from surfboards to wind turbines. “Every year in the U.S., we are throwing away a billion dollars' worth of building material,” he tells TIME.

◀ NO. 24

Amtrak's Beef-Powered Train

Compared with its ultramodern counterparts in Europe and Japan, Amtrak is not a font of

innovation. But on its Heartland Flyer—a daily service between Oklahoma City and Fort Worth, Texas—Amtrak is taking tentative steps toward a greener, low-carbon future. Since spring, the Heartland Flyer has been running on 20% biodiesel rather than the carbon-heavy diesel fuel on which Amtrak's other trains—with the exception of

the electric Acela Express—currently operate. The biodiesel reduces air pollution and helps cash-strapped Amtrak save on fuel. And appropriately for a train in cow country, the biodiesel is made from rendered cattle fat. Biodiesel from beef burns cleaner than plant biodiesel, though it may not be scalable outside the beef belt.



Cradle to sea
Bottles keep the boat afloat

TRAIN: OLIVER MUNDAY; SEDARIS: PETER JAMES FIELD; SUGRU: JAMIE CHUNG FOR TIME; PLASTIKI: MATTHEW GREY; BOTTLE: DORLING KINDERSLEY; GETTY IMAGES

NO. 25

eLegs Exoskeleton

For paraplegic patients, being able to stand—not to mention take a few steps—under their own power is a cruelly unattainable goal. Or at least it has been. But the makers of eLegs, an innovative exoskeleton, are hoping to change that, one step at a time. The robotic prosthetic legs use artificial intelligence to “read” the wearer’s arm gestures via a set of crutches, simulating a natural human gait. It’s the first such device to do so without a tether, and it was inspired by military exoskeletons that soldiers strap on to lift heavy packs. The device requires some getting used to, so it will initially be available only at rehabilitation centers for use with a trained physical therapist, but it may hit the home market by 2013.



NO. 26

Woolfiller

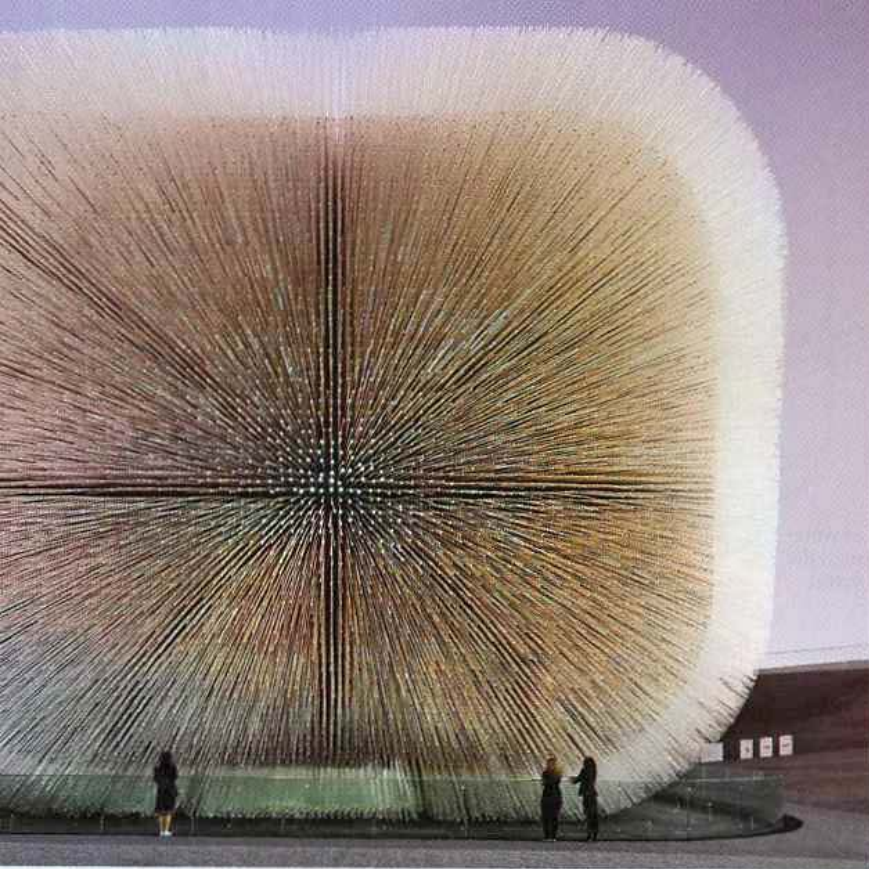
Not many solutions to moth holes have inspired fan pages on Facebook. But Woolfiller provides a surprisingly easy solution to the age-old problem of holey sweaters. Take the special wool and felting needle and poke the needle—which has small hooks along the point—through the wool and your

moth-eaten garment. The repeated action binds the fibers together, making a felt patch on your cardigan, sock or rug. Haleen Klopper of the Netherlands created Woolfiller as part of an interactive museum exhibition on sustainability, and so many visitors wanted to buy it that she started making kits. Klopper has come to see moths as design collaborators. Their damage is her opportunity to add a twist—a red square, say, on a blue turtleneck. “When something is broken,” says Klopper, “people dare to do new things.” Moths, eat your hearts out.

WOOLFILLER: OLIVER MUNDAY; SEED CATHEDRAL; IWAN BAHN—HEATHERWICK STUDIO; SEED DETAIL: CHINA PHOTOS/GETTY IMAGES

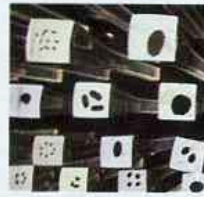


Photographs by Bartholomew Cooke for TIME



NO. 27

The Seed Cathedral

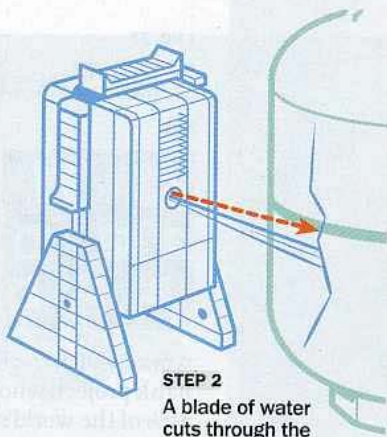


A house of worship for biodiversity, the British pavilion for the 2010 World Expo in Shanghai is constructed of 60,000 light-funneling fiber-optic rods, each with one or more seeds implanted at its tip. British designer Thomas Heatherwick worked with the Kew Gardens and the Millennium Seed Bank project, whose mission is to collect seeds from 25% of the world's plant species by 2020. The result was a living structure that embodied the Expo's theme of "Better City, Better Life" and rooted digital dreams in the soil from which all life springs. That combination helped make the Seed Cathedral one of the most popular national pavilions at the Shanghai Expo, where Chinese visitors nicknamed it *pu gong ying*, the dandelion.



STEP 1

A clear plastic device filled with water and a small explosive charge is aimed at a roadside bomb



STEP 2
A blade of water cuts through the bomb's metal exterior



STEP 3

The roadside bomb is pulverized and safely disabled before it can harm troops or civilians

▲ NO. 28

Super Super Soaker

The squirt gun has gone professional. Troops in Afghanistan are using a new "water disrupter" to disable roadside bombs. The clear plastic device is filled with water and a small explosive charge that, when set off, generates a thin blade of water that pulverizes the target. Developed at Sandia National Laboratories in New Mexico, the so-called

fluid-blade disablement tool was invented by Steve Todd, an engineer with extensive Navy experience fighting IEDs; Chance Hughs, a retired Navy Seal explosives expert on contract to Sandia; and Sandia mechanical engineer Juan Carlos Jakoboski. So far, TEAM Technologies of Albuquerque, N.M., has produced about 7,000 of the \$58 units for shipment to Afghanistan.

▶ NO. 29

Martin Jetpack

MOST ANTICIPATED INVENTION

Every depiction of future transport since Buck Rogers includes a jet pack, so who are we to mess with invention convention? The Martin Jetpack positions itself as the planet's first practical jet pack—as if it were some kind of airborne Swiffer. New Zealand inventor Glenn Martin spent nearly 30 years developing a successor to the proven but impractical Bell Rocket Belt, which first flew in 1961.

Martin's version doesn't look practical: he appears to have welded two enormous leaf blowers together and thrown on a harness. But the carbon-fiber composite frame houses a gasoline-fueled, 200-horsepower engine—more power than a Honda Accord—that turns a pair of carbon-Kevlar rotors. Theoretically, the Martin Jetpack could take its operator up 2,500 m. Since it holds only 30 minutes' worth of fuel, though, you won't want to linger. The commercial application may be more for first responders than for early adopters. The Jetpack will sell for about \$100,000; field tests start in 2011.

▶ NO. 30

Better 3-D Glasses

Avatar raised the bar for 3-D movies, but the eyewear lagged behind: 3-D glasses reduce the brightness of the image as much as 50%, and if you're nearsighted, you have to put them on over your regular glasses, doubling the nerd quotient. To the rescue come new products from Oakley Inc., which has partnered with DreamWorks Animation to create specs (above) with optically correct lenses (more clarity, less ghosting), and Samsung, which is releasing prescription glasses for its 3-D TVs. In both cases, seeing will be believing.





▲ NO. 31

Google's Driverless Car

Is it an autoautomobile? An aut2.0mobile? Whatever you call it, Google's new Prius—tricked out with radar sensors, video cameras and a laser range finder—has driven itself 230,000 km without an unscheduled meeting with a light pole. Other geek squads have been running driverless vehicles in the California desert for years, partly at the behest of the U.S. Department of Defense. But only Google can rev the petabyte-sucking mapping technology that guides its car along busy streets and highways. The goal is safety—an admirable one given the world's million-plus auto fatalities each year. Driverless technology is logical and efficient, and in the near future, it could transform your commute into stress-free transport on a motorized sofa. The sad part for road hogs: if Google is successful in marketing its technology to automakers, you may never get to flip the bird at another driver again.

GLASSES: JAMIE CHUNG FOR TIME; SUPER SOAKER: JAMESON SIMPSON; GOOGLE: OLIVER MUNDAY



▲ NO. 32

Deep Green Underwater Kite

Swedish company Minesto's underwater kite resembles a child's toy as it swoops and dives in ocean currents. But since seawater is 800 times as dense as air, the small turbine attached to the kite—which is tethered to the ocean floor—can generate 800 times more energy than if it were in the sky. Minesto calls the technology Deep Green and says it can generate 500 kilowatts of power even in calm waters; the design could increase the market for tidal power by 80%, the company says. The first scale model will be unveiled next year off the coast of Northern Ireland.

▶ NO. 34

iPad

How does Apple keep out-inventing the rest of the tech industry? Often, it's by reinventing a product category that its competitors have given up on. In theory, the iPad is merely a follow-up to such resoundingly unpopular slate-style computers as Microsoft's Tablet PC. But Apple is the first company that designed finger-friendly hardware and software from scratch rather than stuffing a PC into a keyboardless case. When it calls the results "magical" and "revolutionary," it's distorting reality only slightly. One analyst says the iPad is the fastest-selling non-phone gizmo in consumer-electronics history.

BEST
INVENTION
BY APPLE
THIS YEAR



◀ NO. 35

Flipboard

Even if you dote on Facebook and Twitter, spending time with them can feel like getting pelted in the face by thousands of undifferentiated updates from your friends—exhilarating, perhaps, but also exhausting. The killer iPad app Flipboard ends the chaos by grabbing updates, photos and links from your friends and other interesting people, then reformatting everything in a wonderfully browsable, magazine-like format. You can also add feeds from your favorite blogs and websites and share items with friends via social media and e-mail. With its oversize images and crisp typography, it's a glossy digital publication that feels as if it's been edited by your pals just for you.

▶ NO. 33

Looxcie



Just when you thought you'd seen it all—and recorded it—Looxcie, a camera worn over the ear, ups the ante. Invented by a parent who found himself fumbling with video cameras while trying to record children's parties, Looxcie can capture everything the user sees for up to five hours, hands-free. And with the press of a button, a clip of the last 30 seconds of film can be sent to a Facebook page, YouTube or a preset e-mail address—making Looxcie the perfect device for the age of audio-video oversharing.



▲ NO. 36

STX-III Instant Infrastructure

BEST WAY
FOR E.T.
TO PHONE
HOME

It's not a bird or a plane. It's a lighter-than-air, unmanned flying vehicle made of ripstop nylon that, if test flights are anything to go by, will be able to soar as high as 2,700 m for as long as three days. What will it do up there? If fitted with surveillance equipment, it can keep an eye on war or disaster zones, or it can carry communications technology to link people cut off from the world by, say, a catastrophe that takes out a bunch of cell-phone towers. Eel-shaped for a reason, the STX-III works through an interchange of gases. In the head, there's a pouch of helium in an envelope of regular air. A pouch in the three back sections contains ethane for power. As the eel rises, the air surrounding the pouches is vented so the helium and ethane can expand. This means the vehicle should be able to ascend and descend without bursting. A ride like this one doesn't come cheap: the estimated price is \$2 million to \$3 million.



Rising inflation The STX-III can be programmed with coordinates in advance or flown remotely via satellite or from the ground

NO. 37

3-D Bioprinter

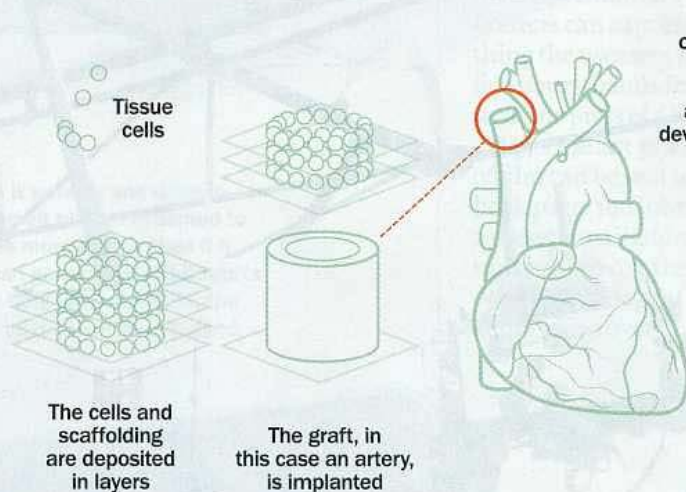
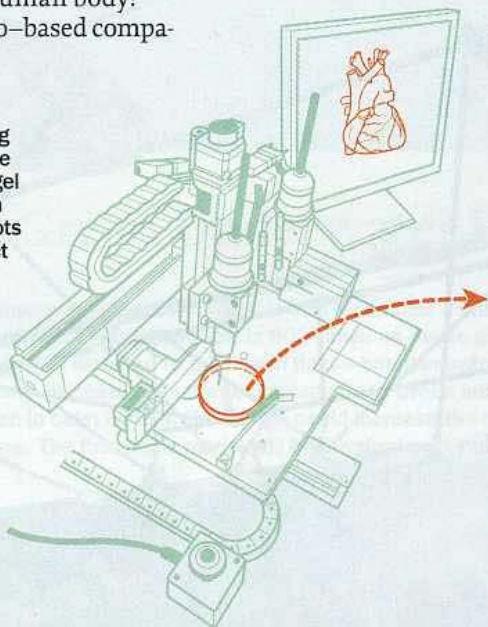
Spare parts are available for virtually any machine ever invented. So why not the human body? San Diego-based compa-

nies Invetech and Organovo have developed what amounts to a dot-matrix printer for human organs. The device, small enough to fit into a sterile biosafety cabinet, consists of two printheads—one that

sprays out a gel that forms a sort of armature for an organ and another that fills in that scaffolding with living cells. The printing tip positions cells with a precision within microns. Livers, kidneys and other replacement components—including

teeth—could be built on demand, with no wait for a donor and less risk of rejection, since the cells are harvested straight from the patient. No word yet on a parts-and-labor warranty.

Two printing heads place structural gel and cells in precise spots to construct an organ



NO. 38

Spray-On Fabric

Cheese, insulation, hair—a lot of surprising things can come out of spray cans. Now we can add clothing to that list. The British company Fabrican has developed a way to bond and liquefy fibers so that textiles can be sprayed out of a can or spray gun straight onto a body or dress form. The solvent then evaporates, and the fibers bond, forming a snug-fitting garment. Not just for clothes, the technology has household, industrial, personal and health care applications. The first runway show of spray-on clothes took place this fall—we'll see if the trend will stick.



WE ASKED TIME'S SENIOR POLITICAL ANALYST MARK HALPERIN FOR THE YEAR'S BIGGEST INVENTION IN U.S. POLITICS:

'The 140-character political endorsement. Forget the travel, the bunting, the balloons, the rallies and the pesky follow-up questions from the lamestream media. Sarah Palin has re-engineered the laying on of campaign hands with her Twitter and Facebook nods to favored candidates.'

MOST AWESOMEST INVENTION



▲ NO. 39

Iron Man Suit

If you're a kid, here's one more reason to be a geek: when you grow up, you get to build indescribably cool stuff. Take the XOS 2, developed by Salt Lake City-based Raytheon Sarcos. An honest-to-goodness Iron Man suit, the XOS 2 allows even its least muscular wearer to lift 90-kg weights without breaking a sweat and, as seen in demonstration videos that have gone viral, punch through slabs of wood that a person would be at pains to even saw through ordinarily. Raytheon hopes to roll out the XOS 2 first to the military, allowing soldiers in theaters of operation to lift heavy ordnance or other equipment with ease. The affordable home model, alas, is still the stuff of geek dreams.



▲ NOS. 40-42

Body-Powered Devices

Everything we do generates power—about 1 watt per breath, 70 watts per step. This year, Michael McAlpine of Princeton University and colleagues figured out how to turn locomotion into power by embedding **piezoelectric crystals** into a flexible, biocompatible rubberlike material that, when bent, allows the crystals to produce energy. Put the crystals in shoes, say, or implant them directly into the body and they could produce enough power to charge personal electronics or internal medical devices. Elsewhere, telecommunications provider Orange introduced a prototype of **Orange Power Wellies**—rubber boots that convert heat into current. Campers at Britain's Glastonbury Festival were the first to demo the footwear. (With the current model, it takes 12 hours of walking to charge a cell phone for an hour.) Of course, if you assemble enough people in a tight space, they don't even need to move to generate energy: in Paris, engineers have captured the warmth generated by bodies on the Métro subway to heat a public-housing project on Rue Beaubourg. By 2011, the **Métro heating system** will cut carbon dioxide emissions from the housing project's heating system by a third.



BOMB: OLIVER MUNDAY; IRON MAN SUIT: CIPHERPINE; BODY POWER: JAMIE CHUNG FOR TIME; WELLIES: PLUM DIGITAL/GOOT WIND

▲ NO. 43

Less Dangerous Explosives

Traditional TNT is relatively unstable and can detonate when dropped or when a vehicle carrying it is hit by an IED or a

bullet. But the new IMX-101 explosive—while packing the same punch as TNT—is “more thermally stable,” says Philip Samuels, a chemical engineer at Picatinny Arsenal's Armament Research, Development and Engineering Center. Researchers spent four years working on the material, which is scheduled for production next year. IMX-101

is more expensive than TNT, with an initial price of about \$8 a pound, compared with \$6 a pound for the usual stuff. But the U.S. Army is happy to pay the price—for soldiers' safety, and because the less volatile explosives can be packed more tightly into storage areas, making them more accessible to soldiers in the field.



Terrafugia Transition



WE ASKED PANDORA FOUNDER TIM WESTERGRN FOR HIS FAVORITE MUSICAL INVENTION:

'I recently discovered the iReal-Book iPhone application. The app contains bass, drum and piano tracks for all the jazz standards. It's the perfect technology for a practicing musician: high-quality digital audio, mixable, transposable into any key and completely mobile. Now every aspiring musician has a backup band in their pocket. Man, I would have killed for this back in the woodshed days.'



The Terrafugia Transition could redefine the convertible. And door-to-door travel. Designed by a team of MIT aeronautics engineers, including Terrafugia co-founders Carl Dietrich and his wife Anna Mracek Dietrich, the Transition is a street-legal, airworthy, airbag-and-parachute-equipped flying car that at \$200,000 is priced less than a Lamborghini.

The first models will be delivered next year. True, with its wings retracted like football goalposts, the Transition, whose 100-horsepower engine gets it 7 L/100 km on terra firma, isn't going to be a match for an Italian sports car. But extend the vehicle's gull wings—and you are requested to do this at an airport—and the rear-propeller-powered Transition can fly two passengers about 800 km at a cruising speed of 169 km/h. After you land, you will not be heading to the rental counter.

FROM CAR ...



In car mode, the 100-horsepower Transition gets 7 L/100 km

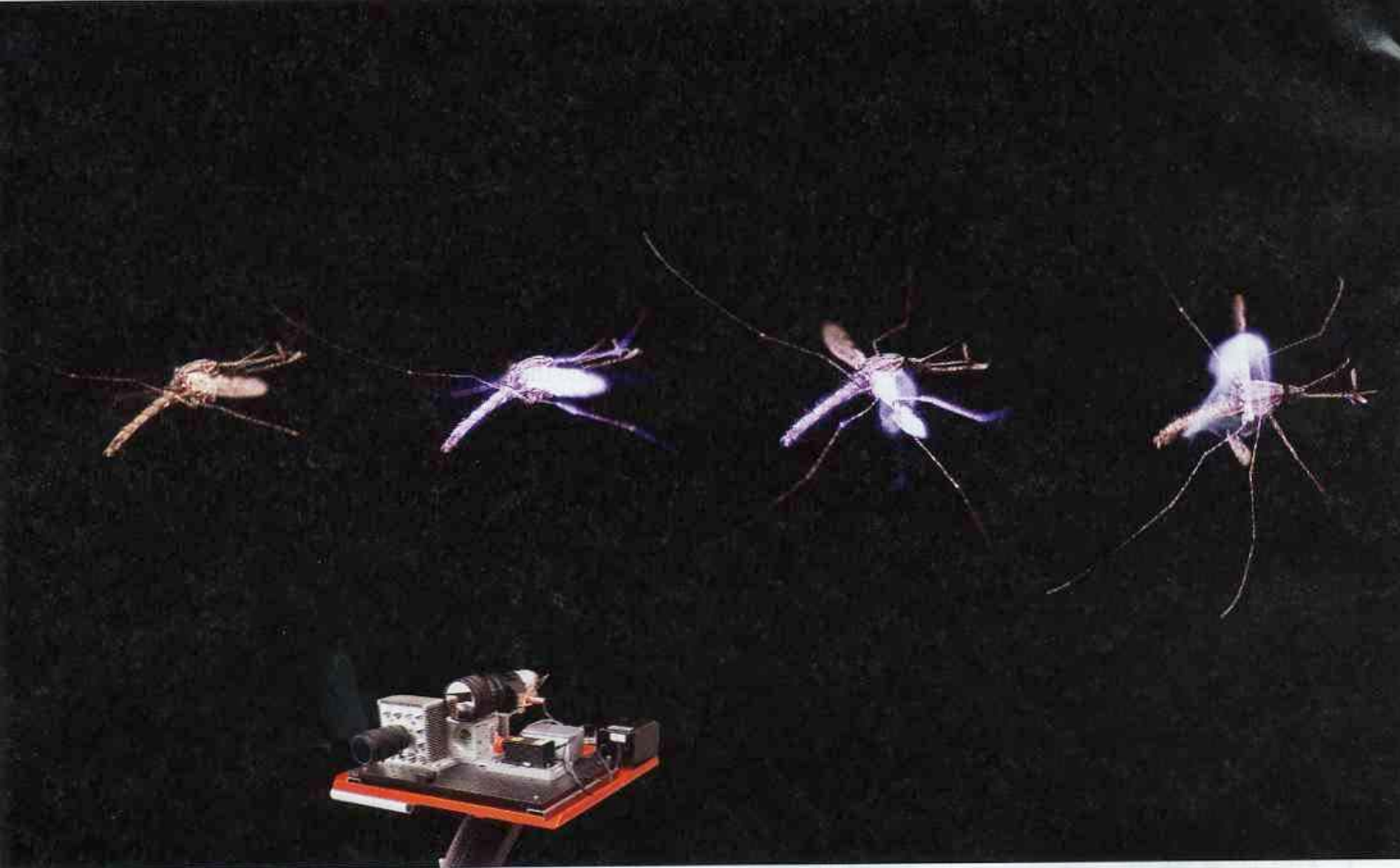


The company recommends that pilots open the gull wings only at an airport

... TO PLANE



The plane needs a mere 520 m of runway to achieve liftoff



▲ NO. 47

Power-Aware Cord

We'd all like to be more energy-efficient. But watching the meter doesn't intuitively show how much juice is being used minute to minute. The Interactive Institute, a Swedish nonprofit that explores technology and design, had an idea: what if you could actually see the electricity flowing into your



machines? The Power-Aware Cord embeds wires around a cable that pulse light in relation to how much electricity is being drawn off the grid. The more current, the brighter and faster the blue light spirals. In testing the device, researchers found that making the invisible visible tuned consumers in to their bad habits, nudging them to power down and offering some surprising appliance insights: when a radio broadcasts drumbeats and bass riffs, its electricity consumption jumps. Talk about being plugged in.



▲ NO. 48

X-Flex Blast Protection

X-Flex wallpaper won't make your walls aesthetically pleasing, just safe from collapsing from lethal force. This startlingly resilient covering is designed to reinforce buildings against man-made blasts, flying shrapnel and destabilizing natural disasters. Once the wallpaper is stuck to the wall and clamped to the floor and ceiling, its Kevlar-like material, combined with an elastic polymer wrap, becomes virtually stronger than the wall it's shielding—so strong that it's being considered to protect U.S. military bases overseas. Now if only they could make some to cover the windows.

BEST
LIFESAVING
INVENTIONS

◀ NOS. 45-46

The Malaria-Proof Mosquito and The Mosquito Laser

It's been a bad year to be a mosquito. The world's most annoying insect is responsible for 250 million cases of malaria per year—and 1 million deaths. But scientists at the University of Arizona have genetically engineered a mosquito that's immune to the *Plasmodium* parasite, the malaria-causing agent it transmits with its bite. The next step is to make the new mosquito hardier than the ordinary kind, then release it into the wild (perhaps within 10 years), where it will displace the deadly variety. Meanwhile, former Microsoft exec Nathan Myhrvold, working with the Lawrence Livermore National Laboratory, is developing a laser that can zap mosquitoes without harming other insects or humans. The laser targets the mosquitoes' size and signature wing beat and sends the bugs down in a burst of flame, making their deaths good for public health and, well, kind of cool.



▲ NO. 49

EyeWriter

How do you communicate when your brain is active but your body isn't? The EyeWriter, a collaboration from the Ebeling Group, the Not Impossible Foundation and Graffiti Research Lab, uses low-cost eye-tracking glasses and open-source software to allow people suffering from any kind of neuromuscular syndrome to write and draw by tracking their eye movement and translating it to lines on a screen. The device was created for Tony "Tempt" Quan, an L.A.-based graffiti artist who was diagnosed with Lou Gehrig's disease in 2003. After trying the EyeWriter—the first time he'd drawn anything since he was fully paralyzed—Quan said, "It feels like taking a breath after being held underwater for five minutes."

◀ NO. 50

Kickstarter

Think of Kickstarter as crowd-sourced philanthropy—a website where anyone can donate any amount to a project in development, with no money changing hands until a minimum threshold has been met. Case in point: Californian Magen Callaghan wanted to launch a new comic about a half-human, half-zombie character. To create and market a first issue, she estimated a cost of \$1,500, so she wrote a pitch letter and solicited a sliding scale of donations. (Five bucks gets you a signed copy, \$100 a bag of zombie swag.) Only after she passed the \$1,500 benchmark were her pledges called in. Additional proof that this strategy works: the success story of the EyeWriter (see No. 49), a project launched by Kickstarter. It's low-risk, grass-roots fundraising—\$1 at a time.