

Virtual-reality headsets let users travel the world without leaving home.



it's been taken. Temporary tattoos and Band-Aids worn on the skin will not only monitor a patient's health but also deliver lifesaving medication. Researchers are currently working on an "artificial pancreas," which is not a replica organ but rather an automated system—ideal for diabetes patients—that ties implanted devices to smartphone software. The system keeps tabs on a person's blood sugar along with variables like meals eaten, activity, sleep, stress, and metabolism, and delivers the right amount of insulin when necessary.

Technology for retirees

Innovations that will help retirees live longer, healthier, more active lives

Wearable technology won't just help retirees keep active—it will also keep them safe. Fitness bracelets like Jawbone and Fitbit already have people of all ages tracking everything from the steps they take to the hours they sleep, but an emerging family of sensor-packed apparel is being developed with retirees in mind. Prototype smart shoes with vibrating insoles have been shown to improve balance and prevent falls, which are the leading cause of death by injury among seniors. Other smart clothing—like heart-rate-monitoring smart shirts or socks with intelligent textiles that can detect complications from diabetes—could alert care providers to potential emergencies.

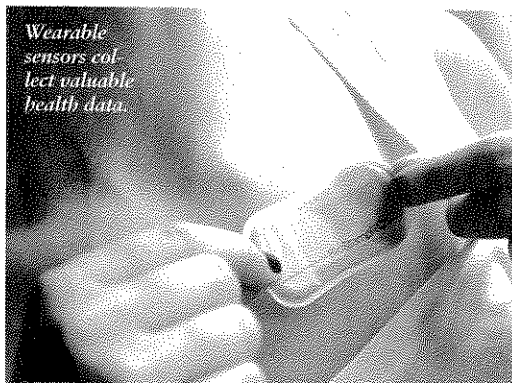
The Internet of Things will help retirees stay in their homes longer. Web-connected, smartphone-controlled home devices will give seniors a hand in running the house: automatic lighting that turns on and off at programmed hours, smart doorbells that show who is knocking, and appliances that know to shut off when no one is in the house. Artificial intelligence will also make its way into the home. It's already possible to switch lights on and off or change thermostat settings just by talking to Amazon's wireless speaker Alexa. The company is opening up its technology to developers who could embed voice controls into all manner of household appliances. And monitoring systems like Emerald, a kind of home radar developed by MIT researchers, can detect when someone in the house has fallen without the person needing to wear a special device.

Smart medication will simplify health care for retirees managing complex prescription regimens. Some 125,000 deaths occur annually in the United States because patients either forget to take drugs prescribed to them or otherwise don't follow their doctor's instructions. New types of medical products, however, aim to change all that. Proteus Digital Health, based in Redwood City, Calif., is conducting trials of a digestible "smart pill" that signals a smartphone app when

maybe even companionship. The technology is still in its infancy, but researchers are already hard at work developing caring robots in Japan, where a quarter of the population is already over age 65 and birth rates are plummeting. One such experiment is "Robear," an anthropomorphic mechanical nurse in the shape of a bear that's designed to help patients stand up or lift them out of a hospital bed. Companion robots like Paro, a cuddly baby seal that coos and blinks when it's petted, have already been used in Japan to treat conditions like dementia. In the U.S., University of Illinois roboticist Naira Hovakimyan recently received a grant to develop small drones capable of performing simple household chores, such as fetching a bottle of medicine. "I'm convinced that within 20 years drones will be today's cellphones," Hovakimyan recently told *The New York Times*.

Social media is keeping retirees connected throughout their golden years. Today, 35 percent of Americans ages 65 and older use social media, a number that has more than tripled since 2010, according to the Pew Research Center. In addition to apps like Facebook and Instagram, video chat apps like Apple's FaceTime and Skype make it possible to connect face-to-face with adult children and grandchildren no matter where they are. Online dating is also taking off among seniors. The over-50 dating site OurTime.com, which is partners with Match.com, has added 2 million users in the past two years, according to *The Wall Street Journal*. While younger users complain of digital overload, there's evidence older adults appreciate the connectivity. More than 80 percent of seniors describe their smartphone as "freeing," according to Pew.

Wearable sensors collect valuable health data.



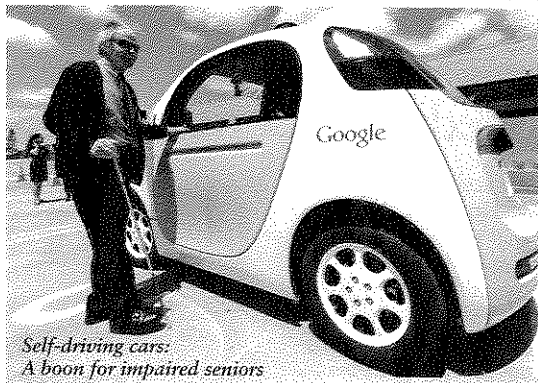
Virtual reality promises retirees who are otherwise limited by means or mobility the ability to travel anywhere in the world without leaving home. While the first generation of high-end headsets—like the recently released Oculus Rift—are primarily targeted at video gamers, the technology is expected to explode in use over the next decade. Analysts expect some 500 million headsets will be sold by 2025, and be used

Illustration: iStock

for everything from attending virtual concerts to visiting with far-flung friends and relatives. While still in their infancy, virtual-reality headsets are already being used to provide immersive, 360-degree tours of the National World War II Memorial in Washington, D.C., for elderly veterans too frail or ill to travel. Want to give virtual reality a test drive without having to splurge on a pair of high-tech goggles? Google Cardboard, a smartphone-powered virtual-reality viewer, starts at \$15.

Self-driving cars mean retirees won't have to give up their freedom of movement as they age. Google expects its autonomous vehicle to be on the road within the next four years. Meanwhile, cars are already incorporating self-driving features like automatic brakes, steering, and acceleration. Some 10 million vehicles with at least some self-driving features should be on the road by 2020, according to a recent report by BI Intelligence. Nearly all vehicles—both private and commercial—will be self-driving cars by 2050, according to a forecast by IHS Automotive. In the meantime, retirees without wheels can already summon rides with the push of a button, through ride-hailing apps like Uber and Lyft, although both those companies are also pouring money into research on self-driving cars.

Three-dimensional printing is enabling manufacturers to quickly and cheaply create products that are specially designed for aging consumers, like custom-fit orthotics and hearing aids. Additive manufacturing, as it's called, lays down thin layers of material like plastic, ceramics, or even metals to build an object from a downloadable digital file, removing the need for costly cus-



Self-driving cars:
A boon for impaired seniors

tomized dies and molds. Businesses are already embracing the technology, but the growth of consumer-friendly 3-D printers could mean that one day it will be commonplace to simply print something like a pair of made-to-order shoes rather than going to the store or ordering

Startups could fill in the blanks. Silicon Valley is embracing what's becoming known as the "longevity economy." The 106 million Americans over age 50 account for \$7.1 trillion in annual economic activity, a figure that's expected to balloon to more than \$13.5 trillion by 2032, according to Oxford Economics. Venture capitalists have begun to eye this expanding market. Marc Andreessen, an early Facebook backer and one of Silicon Valley's most prominent investors, last year led a \$20 million funding round for Honor, an online marketplace for at-home caregivers. Aging 2.0, a technology accelerator that funds startups for older consumers, has graduated 31 companies from its program since being founded three years ago. That includes True Link, the maker of a fraud-resistant debit card for older adults that raised \$3.4 million in 2015.

Rise of the 'robo-advisors'

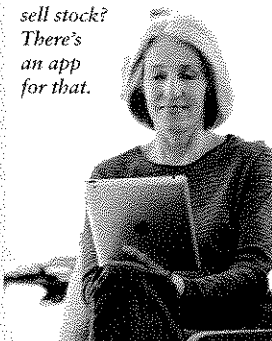
A growing number of apps and websites are providing automated investment advice far more cheaply than human financial planners

How they work: Robo-advisors use software algorithms to create and manage diversified portfolios of assets, usually by investing in low-cost index and exchange-traded funds. Investments are recommended based on a questionnaire, filled out by the investor, which usually includes his or her age, salary, personal goals, and tolerance for risk. From then on, the portfolio mostly goes on autopilot, with the robo-advisor automatically adjusting for the ideal mix of stocks and bonds as the investor gets older. Today, robo-advisors have some \$53 billion in assets under management, up from \$2 billion in 2013, according to researchers at Aite Group.

Who provides them: Since 2009, more than 200 companies have begun offering online portfolio planning, according to *The Wall Street Journal*. That includes venture-capital-funded startups like Betterment, Wealthfront, and Personal Capital, although old-guard asset managers and brokerages have also gotten in on the act. Vanguard, Fidelity Investments, and Charles Schwab all now offer their own spin on the robo-advisor.

What they cost: Price is one of the major selling points for these services. While traditional advisors typically charge 1 percent of assets or more each year, many robo-advisors charge as little as 0.25 percent. Some are even free, depending on the size of an investor's portfolio, and unlike many traditional

Time to sell stock? There's an app for that.



brokers, most robo-advisors require only a small upfront investment. Some, like Betterment and Bloom, don't even have account minimums.

Who uses them: Millennials, who are perhaps more accustomed to entrusting computers with the most sensitive aspects of their personal lives, have been quick to embrace robo-advisors, but the technology is catching on among all age groups. About half of investors using Schwab Intelligent Portfolios, Charles Schwab's robo-advisor, are Baby Boomers and older seniors, according to *Kiplinger.com*. It's important to keep in mind, however, that robo-advisor services can vary greatly. Retirees or soon-to-be-retirees have specialized investing needs that aren't offered by every robo-advisor, like calculating required IRA distributions

or how much money should be withdrawn from a portfolio each year in retirement. You can find side-by-side comparisons of features on personal-finance sites like *NerdWallet.com*.

What are the risks: Because they've emerged since the financial crisis, robo-advisors are relatively untested when it comes to managing severe market downturns. Then there's the whole "robo" thing. Going this route usually means there isn't a dedicated, on-call human advisor who is available to talk when things get hairy, although some offer online chat or telephone help lines. Services like Vanguard Personal Advisor Services and Personal Capital combine technology with human advisors, but are more expensive. When markets were roiled in January of this year, many users received email messages advising them to ride out the storm and little else. It was good advice—but not that reassuring.