

**PC**  
**MAGAZINE**

# VR GETS REAL

## Immersive Storytelling in Journalism



 **DIGITAL EDITION**  
**FEBRUARY 2018**



## **COVER STORY** **“VR GETS REAL”**

Journalism takes on the new storytelling.

## **REVIEWS**

### **CONSUMER ELECTRONICS**

**Five Top Fitness  
Trackers**

**Amazon Echo Spot**

**Google Home Max**

### **HARDWARE**

**Lenovo Yoga 720  
(12-inch)**

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# WHAT'S NEW NOW



## THE BEST OF CES 2018

A parade of the products that most stood out to our analysts and experts.

## FAST FORWARD

PCMag Editor-in-Chief Dan Costa interviews computer programmer and author of “Life in Code: A Personal History of Technology,” Ellen Ullman (below left).

## TOP GEAR

What we love most this month: the Travis Translator, Misfit Path, and PITTA Transformative Autonomous 4K Selfie Drone (below right).



## OPINIONS

**DAN COSTA**

First Word

**READER INPUT**

**BEN DICKSON**

“Can CryptoKitties Teach the World About Blockchain?”

**VICTORIA SONG**

“Technology Is Killing Me (And Probably You, Too)”

**CHANDRA STEELE**

“The Real Reason Voice Assistants Are Female”

“

**The cuff phone could be a device that replaces the candy bar phone, the Apple Watch, even jewelry.**

”

**JOHN C. DVORAK**

Last Word

## TIPS & HOW-TOS



**HOW TO BUY, SELL, AND KEEP TRACK OF BITCOIN**

**HOW TO VOICE TRAIN YOUR AMAZON ECHO DEVICE**

**HOW TO SWITCH TO A NEW PASSWORD MANAGER**



## The New New Journalism

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**A**lthough it came into being a couple of decades before I entered the job market, “New Journalism” was one of the reasons I became a writer and editor. I grew up reading Hunter S. Thompson’s stories in *Rolling Stone*. Yes, there were lots of drugs, but also politics, music, and more, colored by the unmistakable voice of the author.

What was “new” then is now just another way of reporting a story. The media industry is in crisis, no doubt, but there has probably never been a better time to find long-form, personality-driven journalism. Hard as it is to make a living as a journalist, the pages of *The Atlantic*, *Harper’s*, *The New Yorker*, and *Esquire* are still filled with good reads. Except that now, most people read those stories online.

The old (traditional) style of journalism—facts imparted with an objective voice—has had a tougher time in the Internet era, though. Why? Click on a story, and Google News serves you 100 more stories covering the same topic, often with the same facts and photos. There is simply no reason to scroll down. Anyone writing stories that don’t appear above the fold is finding it hard to pay bills these days.

To succeed in media, you need to bring some unique value. That could be new facts, but those are easily copied and not copyrightable. The value could be a unique voice and perspective, but that is reserved for the most talented among us. Just look at the scores of failed Thompson impersonators as proof (myself among them).

@dancosta

Technology is providing a new frontier for journalism, however, and virtual reality is at the very edge of it. In this month's cover story, "VR Gets Real: Immersive Storytelling in Journalism," PCMag's Terry Sullivan tours the latest experiences in virtual reality (VR) journalism. These aren't games or demos—they're engaging, interactive depictions of the most important stories of our time.

What is it like to be deaf? *The New York Times* can bring you there. Where are 860,000 Rohingya refugees sleeping at night? Al Jazeera can bring you there. When do you start to lose your mind when you're confined in a 6-by-9-foot cell? *The Guardian* can bring you there. (A project called "Notes on Blindness," covered in our story, was the inspiration for the cover of this issue.)

PCMag has written a lot about VR hardware and games, but the real power of virtual reality may lie in bringing us closer to reality. It isn't always pretty, but it has the potential to effectively foster empathy and learning in a world made weary by too much of the same information.

Two handwritten signatures in black ink. The first signature is on the left and the second is on the right. Both are stylized and cursive.

[dan\\_costa@pcmag.com](mailto:dan_costa@pcmag.com)



## UEFI or Not UEFI?

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John C. Dvorak's column titled "Tech 'Improvements' That Actually Make Things Worse" decried Intel's announcement that the BIOS-based PC was going away in favor of UEFI-based systems, which he said are more susceptible to malware attacks.

Change for the sake of change seems to be a major philosophy in the IT arena. "Change" is used to justify paying all those highly-paid IT people's salaries. Making things easier for common users is not high on their priority list. Just looking at the latest UIs being foisted onto users.

—*TsarNikky*

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Unified Extensible Firmware Interface (UEFI) has been around quite a long time. Like BIOS, it's stored in flash memory, and gets updated and patched by the OEM maker. Or at least every Dell and Lenovo I've owned has. In term of malware rewriting the UEFI/BIOS, they are pretty much equally vulnerable. The bigger security risk with Intel processors is the Management Engine (ME), which has been found to be full of security holes allowing malware to run below the OS. Server Platform Services (SPS) and Trusted Execution Engine (TXE) portion of a bunch of Intel CPU's have similar flaws... As The Register points out, "The Management Engine is a barely documented black box. It has its own CPU and its own operating system—recently, an x86 Quark core and MINIX—that has complete control over the machine, and it functions below and out of sight of the installed operating system and any hypervisors or antivirus tools present."

—*Vigilabo\_Vigilum*

The I.T. world is making things easier for common users; the downside is that the extra complexity to provide that level of “easy” demands more of the I.T. lay people to set up. I view UEFI as exactly this type of “easy.” Ordinary people will find the full mouse functionality and extra information makes setting up the BIOS more familiar.  
—*DaryIT*

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We’ve been using UEFI in our BIOS code for 8 to 10 years. I have a “Montevina, come hell or high water” t-shirt which is the statement I made converting Phoenix Technologies BIOS Code Base to UEFI back 9-plus years ago. Whether it’s a good or bad thing for security is open to discussion. The BIOS industry is a lot more focused on security and aware of security now than we were back in the legacy BIOS days.  
—*KevinD*

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What John said about UEFI is absolutely true. It is even worse. All you need to know is that the manufacturer of the PC (Dell, HP, etc.) can - irrevocably tie you to them until you throw your computer away. Then, whoever finds it in the trash is tied to them. That’s like telling you can only use Chevrolet gasoline in your Chevrolet car.  
—*UncleStu*

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## Ask us a question!

Have a question about a story in *PC Magazine*, one of the products we cover, or how to better use a tech product you own? Email us at [letters@pcmag.com](mailto:letters@pcmag.com) and we’ll respond to your question here. Questions may be edited slightly for content and clarity.





# The Best of CES 2018

BY PCMAG STAFF



**E**ven after 51 years, CES in Las Vegas still manages to pack some surprises. We're not talking about the rain that caused crazy floods or the two-hour blackout in Central Hall of the Las Vegas Convention Center. We're talking about 65-inch rollable OLED displays, robotic dogs, and \$4,000 treadmills that deliver live workout classes on HD screens.

There were plenty of less surprising, though no less welcome, innovations on display as well. We weren't surprised to see voice assistance play a bigger role than ever this year, for instance. But we didn't necessarily expect to see it embedded in the bathroom, where it can start your shower or turn on your toilet's foot warmer.

We've gathered our favorite 21 new products and technologies from the show. Although they aren't all guaranteed to make it to market in 2018—if ever—they represent the type of tech we hope to see in the year ahead.—*Alex Colon*



## BEST LAPTOP

### Acer Swift 7

Dubbed the world's thinnest notebook, the Swift 7 measures just 0.39-inch thick and weighs 2.48 pounds. With a sturdy aluminum build, it avoids feeling flimsy—a pitfall of many light systems—and it looks as nice as it feels. When the Swift 7 drew audible excitement and instant comparisons to a MacBook Air from our photographer, I knew Acer had succeeded with its design. It will arrive this spring at \$1,699, packing an HD touch display, an Intel Core i7 processor, and 4G LTE connectivity.—*Matthew Buzzi*



## BEST CONVERTIBLE HYBRID LAPTOP

### Dell XPS 15 2-in-1

The premium XPS line has been consistently lauded for its quality build and solid feature set, and Dell is now bringing that experience to a convertible 15-

inch system. Convertibles this size often raise eyebrows, as the screen is arguably too large to be used comfortably in Tablet mode, but the XPS 15 is the slimmest on the market. This, along with a high-quality build, helps mitigate the size. It's outfitted with eighth-generation Intel processors and discrete graphics, making it a viable professional's laptop for productivity in the office or on the road.—*MB*



## **BEST WINDOWS TABLET**

### **Lenovo Miix 630**

With a starting price of \$799, the Lenovo Miix 630 detachable tablet is on the less expensive end of a brand-new crop of PCs that run power-sipping Qualcomm Snapdragon processors originally designed for smartphones. It's got a 12.3-inch full HD touch screen that's fortified with Corning Gorilla Glass. A kickstand is built into the back of the tablet to prop it up when the keyboard is attached, and the whole thing weighs less than 3 pounds. The big draw here: Lenovo claims the Miix 630 lasts up to 20 hours between battery charges. Even better, that estimate assumes you'll use it as you would a smartphone—rarely turning it off and accessing the internet both via Wi-Fi and the included LTE modem. Depending on the cost of wireless service plans and whether that battery claim is true, this Windows tablet has the potential to be a road warrior's best friend when it goes on sale this spring.—*Tom Brant*



## BEST PHONE

### **Honor View 10**

The Honor View 10 sets the bar for value. Huawei's low-cost spinoff brand is bringing a 6-inch phone with tons of RAM and storage, an AI-enhanced camera, and a flagship-level Kirin 970 processor to the US for less than \$500—that undercuts the OnePlus 5T by at least \$30, and it's about half the price of the Huawei Mate 10 Pro. Honor has sold great \$200 phones in the US for a few years now, and this device expands its market to people who aren't looking to make compromises.—*Sascha Segan*



## BEST SMARTWATCH

### **Misfit Path**

Similar to the Misfit Phase but designed with smaller wrists in mind, the Misfit Path is a beautiful smartwatch that looks more like an analog timepiece. It tracks steps, calories burned, distance, and sleep, and it displays call, text, and app notifications. Swimmers will be happy to note it's safe for the pool and shower. The Path launches this spring, and at \$150, it's stylish and affordable.—*Victoria Song*



## BEST HEALTH AND FITNESS DEVICE

### **Peloton Tread**

Though a \$4,000 treadmill is undoubtedly extravagant, the Peloton Tread sets itself apart with a 32-inch HD touch screen. For \$39 per month, you can stream more than 10 daily live classes as well as guided workouts. You can view your stats at the bottom of the screen and check out a leaderboard of other Peloton users on the side. That should be enough to motivate you, if spending all that money on a treadmill doesn't do the trick.—VS



## BEST CAR

### **Fisker EMotion**

Henrik Fisker cut his teeth working on sports cars for Aston Martin and BMW, and it shows in his latest design, the Fisker EMotion. This gorgeous sports sedan could have won on looks alone, with great lines and butterfly doors, but it also runs an all-electric powertrain with a battery that'll carry the car up to 400 miles. Fisker promises a radical new battery design in less than five years that will increase range to 500 miles and require only 9 minutes of charge time. So

smart power coupled with a host of luxury and connected car features (including advanced LiDAR-based autonomous driving capabilities being developed through a partnership with Quanergy) make this \$129,000 sports car the belle of the CES ball.—*Oliver Rist*



## BEST CAR ACCESSORY

### Raven

New cars just keep getting smarter and more connected. And nowhere is that more obvious than at CES. But what if you're not ready to trade up your couple-of-years-old ride just yet? The \$300 Raven sits on your dashboard and packs a Wi-Fi hotspot, GPS, security system, vehicle diagnostic system, and front- and cabin-facing video cameras in a box no bigger than your rearview mirror. It even gives you feedback on your driving skills.—*Wendy Sheehan Donnell*



## BEST DRONE

### Tello

The Tello isn't a flashy pro drone: It's a \$99 quadcopter, controlled by your phone or optional Bluetooth gamepad, with a modest 720p video camera. But

the price is a big plus, especially when you consider that it's powered by Intel and DJI tech. The Tello is also a teaching tool; it can be programmed with MIT's Scratch language, and anything that teaches you (or your kids) to code is a plus in our book.—*Jim Fisher*



## **BEST CAMERA/PHONE ACCESSORY**

### **DJI Osmo Mobile 2**

The Osmo Mobile 2 is our pick for the best camera gear of CES, even though it doesn't have a lens or sensor. The \$129 handheld gimbal works with both Android and iOS phones. It keeps handheld video silky smooth, can be mounted on a tripod, and has an app that adds time-lapse and other capabilities to your phone's camera. It's less expensive than its predecessor but has three times the battery life—15 hours.—*JF*



## BEST SMART HOME DEVICE

### JBL Link View Smart Display

We saw a ton of devices with integrated Amazon Alexa or Google Assistant at CES this year—cars, bathrooms, TiVos, you name it. But the most important category for Google was its four smart displays, which give Google Assistant a solid (and YouTube-enabled) competitor for the Amazon Echo Show. Though we love the industrial design of Lenovo's model, JBL's—which appears to be based on its Link 300 speaker—looks like it will offer better audio, making it a flexible home entertainment and home control center.—SS



## BEST TELEVISION

### The Wall by Samsung

We thought the TV-size race was over, since manufacturing an LCD panel of more than 85 inches is prohibitively difficult and expensive. Samsung surprised



us with a 140-inch monster that doesn't use LCD or OLED. The Wall by Samsung reaches its massive size by using MicroLEDs, millions of tiny light-emitting diodes arranged in an array. LED arrays are used for huge commercial signs and usually have giant pixels that are easily visible unless you're several dozen feet away, but the Wall's pixels are just 0.8 millimeters, which promises a viewing experience that's closer to a TV than a billboard.—*Will Greenwald*



## BEST HOME THEATER GEAR

### TCL Alto

Roku announced its Roku Connect software to encourage the development of audio products that work with its media streamers and licensed Roku TVs. TCL is the first company to jump on the bandwagon with its Alto line of speakers, of which the Roku Smart Soundbar is the first (and currently only) model. It's simply a soundbar designed to work with TCL Roku TVs or any other device that uses Roku OS. It enables voice control with the Roku Entertainment Assistant, wireless playback of music without using your TV, and basically brings audio-only options into the Roku ecosystem.—*WG*



## BEST AUDIO GEAR

### Libratone Track+

Libratone is best known for its speakers but has proven its chops at making earphones with the excellent Adapt Q Lightning. Now the company is combining noise cancellation technology and a workout-friendly design into an impressive set of wireless earphones. The \$200 Libratone Track+ might not be completely wire-free like so many other new pairs, but they incorporate adjustable active noise cancellation and are resistant to splashes, all at a slightly friendlier price than the Bose QuietControl 30.—WG



## BEST NETWORKING GEAR

### Asus Lyra Voice

In a world with way too many gadgets, we savor devices that multitask well. The Asus Lyra Voice pulls triple duty as a tri-band AC2200 mesh Wi-Fi router, a speaker, and a digital assistant. With a built-in microphone, two eight-watt

speakers, and Amazon Alexa on board, you can use the Lyra Voice to answer queries, play music, control your smart home devices, and take advantage of Alexa’s many third-party skills. The Voice pairs with other Lyra routers to provide whole-home 802.11ac Wi-Fi, while the discrete speakers deliver “rich and powerful sound,” according to Asus. We’ll test those claims when we review the Lyra Voice, but we applaud Asus’ ability to pack this much functionality into a slick and compact package.—*WSD*



## **BEST GAMING PC**

### **Digital Storm Spark**

I saw plenty of nice gaming systems at CES, but the Spark stood out for its small size. It’s only 12 inches tall and 4 inches wide, yet it’s full of enthusiast-level components as well as custom liquid-cooling piping. You can start a build at \$1,299 with an Nvidia GeForce GTX 1060, but the same tiny body can handle up to a GTX 1080 and an Intel Core i7-8700K processor. It’s an impressive feat of engineering, and the black aluminum body, interior window, and customizable lighting look super sleek. This was a better year for gaming desktops than laptops—I saw nice PCs from Origin, as well—but manufacturers are in a holding pattern as they wait for the next generation of Intel processors before releasing new notebooks later this year.—*MB*



## BEST GAMING GEAR

### Razer Mamba HyperFlux

The Mamba is one of Razer's high-end gaming mice, and the HyperFlux kicks things up a notch. It comes with a mousepad, the Firefly, that charges the mouse through a magnetic field. This technology allows Razer to remove the battery from the mouse, making it super light, and it stays powered for a few seconds off the pad so you can lift and adjust it while playing without disconnecting. The mouse has nine programmable buttons, mechanical switches, and Chroma lighting. The mousepad is rimmed with customizable lighting, and you can flip it over within the base for a hard or cloth surface. The HyperFlux is expensive at \$249, but high-end gaming purchases tend to be luxury buys to begin with, and the innovation just might be worth it.—*MB*



## BEST AR/VR HEADSET

### Lenovo Mirage Solo

The Lenovo Mirage Solo pumps new life into Google's Daydream platform by freeing it from the phone. It's an entirely liberated VR headset, in fact: With no

wires and six degrees of freedom, it promises VR experiences you can run, jump, and walk through without worrying about tripping over wires. Using the Mirage Solo is far less kludgy than dropping your phone into a headset, and it uses a superior processor to the upcoming Oculus Go. This is the future of mobile VR.—SS



## **BEST ROBOT**

### **Sony Aibo**

Man's best robot friend is back. The new and improved Sony Aibo is more lovable than ever. With advanced sensors, better AI, and a friendlier design, the new Aibo can recognize your family, stream video (through its nose), nuzzle your hand, and learn its environment. It's available only in Japan at the moment and costs a hefty 198,000 yen (nearly \$1,800), but at least it won't pee on your carpet.—VS



## BEST CONCEPT/PROTOTYPE

### LG Rollable OLED TV

Paper-thin screens you can simply roll up have been futuristic fantasies for years. That won't likely change anytime soon, but LG Display is pushing the technology a bit closer to reality with its 65-inch rollable OLED screen: It rolls up like a poster and can be unspooled into a flat-panel TV. At 65 inches of 4K resolution, it's the largest, most advanced rollable screen yet.—WG



## BEST NEW TECHNOLOGY

### Nvidia Big Format Gaming Display (BFGD)

The BFGD looks like a TV, but it's really a 65-inch gaming monitor. Nvidia's new screen combines a 65-inch 4K LCD with HDR with G-Sync, the Tegra X1 processor, and the Nvidia Shield Android TV interface. Its huge picture can keep up with your gaming PC and offers incredibly low latency. Instead of selling it directly, Nvidia is leaving the final design touches to Acer, Asus, and HP Omen, all of which will offer their own BFGD models.—WG

# Ellen Ullman on Code, Conscience, and the Museum of Me



**F**ast Forward is a series of conversations with tech leaders hosted by Dan Costa, PCMag's Editor-in-Chief. Ellen Ullman is author of *Life in Code*, a series of essays that begin in 1994 when she was a programmer in Silicon Valley. She now makes her living writing mostly fiction, but Ullman remains a keen observer of the region, the tech industry, and how the tools we make are changing us on a daily basis.

**Dan Costa:** Your programming roots go back quite a ways. In 1978, you were an English major who decided to make the switch into programming. Why would you do something like that?

**Ellen Ullman:** Well, I got involved with a group doing video; the Sony Portapak was one of those machines like the PC. These things that have been controlled by behemoth corporations suddenly were in your own hands. You could make your own videos, your own stories. You could go around and show them. There weren't restrictions. You could do porn, etc., and it was a very exciting time. I learned that I liked working with machines. The possibility of working with these machines to do social change and art was intriguing.

Eventually, I left Ithaca to go to San Francisco. One must leave the college town or become pitiful. And one day, I was walking on Market Street, and there in the window of dearly departed Radio Shack was the TRS-80—affectionately known as the Trash-80—and I thought, “Oh, is this anything like a Portapak? What can you do with this thing? Can you make art, social activism?”

So on an impulse, I bought it. And then there was the issue of programming. It's a little harder than getting started with a Portapak, [where you just] press the button. I found it difficult, but the good difficult. I think that anyone who wants to go into software engineering has to feel, ‘Yeah, this hard,’ but also the pleasure of the hunt. If there isn't some sense of seduction about solving problems, it's going to be a very unhappy experience.

**And people today don't quite understand that back then, when you bought a TRS-80 at Radio Shack, it didn't do a lot. You have to make it do things. You have to learn how to use it, and that's sort of the invitation that you took it up on?**

Yes, there was a blank screen. It was already an obsolete television at the time. It had a keyboard, and you recorded programs on a reel-to-reel cassette. And I think it held maybe 4K. That was the maximum program size. And it had the BASIC language. And I don't know if people know the difference between interpreted and compiled language. Interpreted means it just executes it right in front of you. So you... enter... two plus two and it shows you four. That's easy, getting the first little things going. Doing anything significant was very difficult, especially since early BASIC had many traps. Like you could say “Go To” but it didn't automatically Go Back. So you could lose your way in the tangle, and it was known as the Geddy code. Again, it was frustrating and intriguing.



**When I was looking through the book and you talk about those early years, what strikes me is the people that you were working with. It almost seems more like a ragtag collection of artists than engineers and hardcore programmers. Can you talk a little bit about the esprit de corps, or the people you were working with?**

Yes. If you look back and—you know who Stewart Brand is, the Whole Earth ‘Lectronic Catalog, The Well—that was one of the first online communities. And the people were attracted to it. You know John Markoff’s book, *What the Dormouse Said*?

**Sure.**

You know, stoners and dropouts and people who were just crazy, and wanted to have fun. That was the atmosphere that drew me in, like the Portapak. These were people having fun, exploring. And the first people I worked with when I had to take a job and earn a living were like that also. A former Sufi dancer, a woman doing a dissertation and art history, some guy from France who smoked Gauloises, though smoking was not permitted. And he’d say, “A computer never told me to stop smoking.” And these are the kind of people we worked with.

Somewhere around ‘83 to ‘86, it changed. Computer Science became a common degree, Software Engineering. And we were joined by a heavily male, self-selected group who had studied Computer Science as an undergraduate degree. And the atmosphere completely changed. People were harder to talk to. In my experience, [they] were not as well rounded. That is a very broad generalization.



**I was walking on Market Street, and there in the window of dearly departed Radio Shack was the TRS-80...**



I worked with men who were very well rounded. You could quote Shakespeare with the best of them. But that whole atmosphere changed. I guess it's because the profession had to lose its innocence.

### **How were you inspired to do coding?**

Well, again it was, 'Wow, what is this?' You know, when I got my first real program running, there was a rush of pleasure. 'Wow, it works. I did that.' It went from nothing to something. And it was like the first time I fixed a carburetor. You know, you take things apart. You put them back together and the car starts, right? So this is a rare pleasure, and it's hard to get to. Once I had that feeling, it was a little bit like a drug, you know. You got that high and then you lose it, and then you get it back it, or you try to.

### **You talk a lot about this in the book. You say, everybody should learn how to code because it is hard. And that difficulty is eventually going to be the sense of satisfaction that you get from it.**

I'm not telling everyone to learn to code. As I said, people need to be exposed to it. The point is to demystify code. We are surrounded by algorithms that control us, and this is no news to anybody who just got hacked by Equifax, for instance. One-third of the adult population of the United States. So, the point is to know enough that it's written by people and it can be changed by people.

There is a councilman in the Bronx who is proposing a bill there that the borough looks at all the algorithms that they are using, and they go from police assignments to garbage pick-up schedules to what school the kids go to, and look for bias in them. This is the process that I'm hoping for, that people in the general public begin to see that these things can be changed. They have bias, and that bias can be addressed.

*See a video of the full interview and many more at [pcmag.com/podcasts/fast-forward](http://pcmag.com/podcasts/fast-forward).*

# What We Love Most This Month

BY PCMAG STAFF



## TRAVIS TRANSLATOR

Planning a trip around the world? You'll probably want to talk to people. The portable Travis device can translate 80 languages in under 2 seconds, thanks to its Quad Core processor. Built-in artificial intelligence helps the Travis learn as you use it. It comes with a 1GB SIM card for 3,000 minutes of translating.

Starts at \$179.00; [www.indiegogo.com](http://www.indiegogo.com)



## MISFIT PATH

Wearable maker Misfit's new hybrid smartwatch looks similar to the excellent Misfit Phase—but it's impressively small. Like the Phase, it can track steps, calories burned, distance and sleep, as well as receive your typical call, text, and app notifications. Swimmers will be happy to note it's safe for the pool and shower. The Path also features a smart button that can be programmed as a remote control to play music, snap photos, and ring a phone. It's slated for a spring launch.

\$149.99; [www.misfit.com](http://www.misfit.com)

## PITTA TRANSFORMATIVE AUTONOMOUS 4K SELFIE DRONE

This tiny drone packs a lot inside: a 13MP camera, support for 4K/30fps recording, and software image stabilization, as well as GPS/GLONASS, gyroscope, accelerometer, barometer, magnetometer, object detection and visual tracking hardware, and optical flow positioning sensors. The camera can shoot in burst shot, slo-mo, and time lapse and does live streaming. Phew. And it's just 6.7 inches, 7 ounces.

Basic kit, \$289.00; [www.kickstarter.com](http://www.kickstarter.com)



# Can CryptoKitties Teach the World About Blockchain?

**B**enny Giang DMed me on Twitter in early October about CryptoKitties. “We put the first breedable kitties onto the blockchain,” Giang wrote, adding “This may sound like an ICO scam or a joke but it’s neither.” At first, it sounded like both. Developed by design studio AxiomZen, CryptoKitties is a game that lets you collect, raise, and breed unique digital cats on the Ethereum blockchain. TechCrunch’s Fitz Tepper described the game’s concept as “using Ether, an asset with arguably little tangible utility—to purchase an asset with unarguably zero tangible utility.”

In case you haven’t heard, blockchain is the distributed ledger technology underlying cryptocurrencies such as Bitcoin. Blockchain makes it possible to run web applications that don’t depend on centralized authorities such as Facebook and Google. And in the past couple years, the world has gone crazy with distributed blockchain applications, or DApps.

Every week, I receive several pitches from blockchain startups claiming they’ll change the world (or at least the internet). I reply to very few and ignore the rest. CryptoKitties seemed like a good fit for the latter.



**Ben Dickson is a software engineer who writes about disruptive tech trends, including artificial intelligence, VR and AR, the IoT, and blockchain. Ben also runs the blog Tech Talks.**

Giang, head of community at CryptoKitties, contacted me again a few weeks before its “Initial Cat Offering.” The feline-inspired event was a silly play on Initial Coin Offerings (ICO), a crowdfunding mechanism that has drummed up quite a bit of hype around blockchain startups in the past year. Again, I didn’t reply.

But in early December, a few days after its official launch, CryptoKitties drew in more than \$12 million in kitten sales. Some of the rarest specimens sold at insanely high prices of \$100,000 or more. The game’s traffic even clogged the Ethereum network.

Although I’m still having a hard time finding value in this modern-day Tamagotchi, I believe the viral growth of CryptoKitties might have positive effects on the evolution of the blockchain industry. Pokemon Go was a silly fad too, but it brought mainstream attention to smartphone-based augmented reality (AR), which had, up to that point, been a fringe technology.

## **FAMILIARIZING THE MASSES WITH BLOCKCHAIN**

People might think cryptocurrencies such as Bitcoin and Ethereum—and their enticing price surges—are the only blockchain applications. But there’s much more to blockchain than just storing and transferring digital currency.

The game mechanics of CryptoKitties familiarizes people with the fundamental concepts of blockchain—smart contracts, transaction fees, gas prices (the internal pricing for running a transaction or contract in Ethereum), and verifying transactions.

But more important, the game introduces people to scarcity of digital assets. In the digital world, we've become used to seeing information copied without restriction. For instance, when you copy a file to your hard drive or in a cloud server, it's identical to the original copy. By contrast, every piece of information stored on the blockchain is unique. This means, for instance, that if you have a CryptoKitty, no one can create a copy of it. If they want it, they'll have to buy it from you. This concept of scarcity opens up opportunities for creating new applications that take advantage of these distinct digital signatures. For CryptoKitties, the result is something of a first: a virtual collectible.

“CryptoKitties became viral because, for the first time, people can truly own a digital kitty as a collectible... as real as the shiny rare Charizard,” Giang told me. “We have effectively pushed two agendas with CryptoKitties: accessibility to the blockchain for all, and the enablement of cryptocollectibles.”

I've spent hundreds of hours studying blockchain applications, reading whitepapers, interviewing developer teams, and testing products. I'm truly amazed at how the simple concept of distributed ledgers can upend the centralized business models that give far too much power to companies such as Google and Facebook, and create economies where every user shares in the costs and benefits. Blockchain could enable true ownership of digital information, something that is increasingly necessary as our lives become more digitized.



**Pokemon Go was a silly fad too, but it brought mainstream attention to smartphone-based augmented reality (AR).**



But I was perplexed by why these projects were having a hard time finding traction among non-techies. The overwhelming majority of internet users today are comfortable using cloud-based applications without a second thought—email, social media, and cloud storage. In this respect, CryptoKitties could serve a two-fold function. These cute blockchain-based cats could help introduce average users to the possibilities of blockchain, helping render an abstract concept tangible with the 21st century version of a Beanie Baby. At the same time, it could steer blockchain developers (in an amusing and roundabout way) toward finding applications that unlock the potential of decentralized blockchain infrastructure.

“Blockchain is just in its infancy, and a lot of the blockchain projects that are out there are mostly experimental proofs of concept,” Giang said. He also believes that rebuilding cloud solutions such as Uber, Airbnb, Facebook, and Netflix on the blockchain is not a good idea.

“We are trying to remix the knowledge that we know of with knowledge that we barely have,” he said. “People will still use Netflix; people will still use Lyft. The only thing we can do is to introduce them to the blockchain. Entirely new use cases that leverage scarcity and remove unnecessary third parties, and decentralize information have not been thought of yet.”

## **BLOCKCHAIN'S LIMITATIONS AND POTENTIAL**

CryptoKitties also showed a preview of the challenges blockchains will face if they ever become the backbone of large internet applications. At some point, CryptoKitties accounted for 11 percent of the traffic on the Ethereum blockchain, slowing other applications to a crawl. SophiaTX, a blockchain startup building a platform for business-to-business (B2B) use cases, eventually had to postpone its planned ICO due to the ripple effects on the network.

The congestion caused by CryptoKitties could create a backlog of token sale transactions and very long wait times. The conundrum created a rift among the Ethereum community and minor clashes over how to solve the issue. Ethereum is not the only blockchain dealing with scaling difficulties. The Bitcoin blockchain has faced its own set of challenges as



the number of users and transactions and the length of the ledger have increased. Differences over the possible solutions to Bitcoin's scale problems have led to verbal feuds, death threats, and three hard forks, in which supporters of a particular solution create their own version of the blockchain.

In general, as cryptocurrencies and blockchain evolve and move from a niche industry to becoming a major digital foundation for new applications and businesses, previous structures and models may no longer be feasible. And CryptoKitties made sure everyone noticed that. Maybe it will push blockchain developers toward overcoming their differences and finding a solution before it's too late.

"We see ourselves being the best stress test for the entire network," Giang told me. "If anything, scalability development will be sped up and in turn make Ethereum more competitive to the newer blockchain. The solution would be a combination of moving away from proof of work and into proof of stake. Other ideas such as sharding, state channels, side chains will also help in taking the load off the network. All of which I'm sure are now being developed at a faster pace since the launch of CryptoKitties."

I still haven't bought my first CryptoKitty, and I don't have a mind to do so any time soon. I'm not confident the game will maintain the hype. Maybe it will spawn a series of wannabe applications, or maybe it will drift into the abyss of failed blockchain projects. But I'll be watching to see whether CryptoKitties helps spur a network effect that will lead to blockchain's mass adoption. If the technology does truly take off and become the infrastructure powering a new wave of decentralized applications, we may have to thank a few digital cats.

# Technology Is Killing Me (and Probably You, Too)

**M**ost days, I dream of chucking my iPhone 7 off a cliff. I imagine this \$750 slab hurtling through the air, skipping across the surface of a turbulent ocean, and sinking deep, deep down into the murky depths. When that doesn't work, I picture dropping it out a window and watching the screen shatter against the sidewalk, a thousand hairline cracks zigzagging across its glossy surface like lightning.

Hi. I'm a millennial, and I'm suffering from an acute case of technological exhaustion. Surprising, I know. Millennials are supposed to be insufferable, selfie-snapping social media addicts who cry every time the Wi-Fi goes down. You know the type. Our noses are practically glued to our screens. We'd rather text than have a face-to-face conversation. According to the vast majority of millennial think pieces, we live for ephemeral likes, memes, and avocado toast.

The truth is, I miss the days when I didn't have a smartphone. But not because I'm a technophobe. I love that I can play a game of Go with my friend in Japan, or wake up to a Facebook Messenger essay from an old classmate in California about Adam Driver's beefy bod in *The Last Jedi*. It's mind-blowing that it costs me nothing to open up KakaoTalk and call my father in Korea.



Victoria Song, PCMag's wearables and smart home analyst, has reported and edited at *The ACCJ Journal*, *The Japan News*, and the New York bureau of *The Yomiuri Shimbun*.

But the flip side is that it's now almost impossible to psychologically log off. In the past 48 hours, I've received over 400 notifications from apps, social media, texts, chats, calls, emails, Slacks, and reminders. Everything from a childhood friend following me on Instagram to my robot vacuum alerting me it's stuck on some wires again. Once, I woke up in the middle of the night because If This Then That (IFTTT) decided to blow up my phone with 78 notifications—it really wanted to let me know it had backed up all my photos and the tracks on my Discover Weekly Spotify playlist.

Granted, I can turn these alerts off. Or customize them so I only get certain ones. Trust me, I already do this. Unfortunately, it's also an important part of my job testing wearables and smart home devices to see how well an app's push notifications work or how quickly a smartwatch can receive texts. So that means everything buzzes at least twice: once on my phone, and again on however many wearables I'm testing.

It's an anxiety-inducing nightmare designed to make sure I never focus on anything ever again. I'll be sitting at my desk, or in a movie theater, and inevitably feel a cascade of vibrations all over my body. It starts with the phone in my pocket and travels to my wrists and up my arms. Some days, I feel buzzes where there are none.

### **BECAUSE FOMO**

Ninety-nine percent of the time, it would be totally fine if I just let my phone and wearables buzz off, figuratively and literally. The alerts are probably an app I haven't used in a while, reminding me like an ex-lover that it still exists,

and that maybe I should come back (nope). Or text messages from friends and family chock full of GIFs, memes, and existential angst about why that cute guy or girl just won't text back.

But there's also that 1 percent chance it's actually important. Like when my cousin rang me to tell me my grandpa had died, or a time-sensitive work Slack. The point is, you never actually know, so you become addicted to making sure it's nothing essential.

You'd be surprised how much time you lose reaching for your phone every time it buzzes. Back when my only window to the outside world was the ancient crackle of a 56K dial-up, it was easy to focus on non-internet-related activities. Limited connectivity was comforting. I never wondered whether Clarendon or Mayfair was the appropriate Instagram filter for my mediocre meal. I never had to see evidence of what my friends were doing, possibly without me. If I had a crush, I never had to give myself pep talks in the mirror to avoid stalking their every single waking decision on social media like a mildly unhinged psychopath. It only takes one buzz to break your flow. One notification to flush you down the internet rabbit hole.

Once your friends and family know you're always on, meanwhile, good luck shaking them. Suddenly, it's the middle of the night, and you're consoling your elderly father that no, you are not gaining weight, and that yes, the time difference between NYC and South Korea means 30-minute calls at 3 a.m. are not advisable on weekdays.



**The point is,  
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It's enough to make me want to take a page from Maxine Waters and reclaim my time. My very untenable solution, however, is to periodically ghost for days at a time. I'll throw all my wearables into a drawer and bury my phone somewhere where I can't hear that haunting buzz.

That first hour is how I know I'm an addict with a serious problem. I keep wondering if I've missed something important—spoiler, I haven't. But after a while, it's liberating, like remembering how to breathe. The truth is, all those memes and texts will be there when I get back. And I will always (always) come back.

### I, SMARTPHONE ADDICT

Two weeks ago, I was watching a late-night showing of *I, Tonya* at the Angelika Film Center in New York City. Three-quarters of the way through, a crazy person decided it'd be a great idea to barge into my theater brandishing a guitar case. Somebody shouted "Gun!" and a stampede ensued.

Aside from my life, the thing I cared most about saving was my stupid iPhone. As I scrambled through the aisle—heart pounding and certain that I was going to die from a bullet in the back—I knew my phone was my one lifeline. If I lived, I'd need it to find my friends and let my family know I was all right. If I had my phone, I could use it to call a Lyft and make it home.

In the crush, I lost my jacket, bag, and shoes, but not my phone—until a panicked movie-goer knocked me to the ground. The moment is a blur, but I do remember the split second where I realized I wouldn't be able to hold onto my

“

**All those memes and texts will be there when I get back. And I will always (always) come back.**

”

phone. I let it go and mentally filed away where I dropped it so that, should I survive, I could find it. That's insane.

It's not lost on me that only when I dropped my phone was I able to pick myself up off the floor and run to safety. I bolted out of that theater and ran barefoot down two blocks into a freezing December night. I only stopped running because I realized my friends wouldn't be able to find me. Without a phone, there was no way for me to get a ride or let anyone know I was all right.

It turned out there was no real threat that night. Just a crazy person waving around a guitar case like an old-school mafioso. Once I knew that, priority No. 1 was finding my phone. Not just so I could get home and find my friends, but because my entire life was on there. My bank information. My work and personal emails. The contact information of my friends and family. My horrible emo poetry. Anyone who had it could potentially access everything there is to know about me. I don't think I truly relaxed until I had it safe in my hands again.

I don't know what that says about me, or you, or about society as a whole. All I know is that I'm trapped on this exhausting roller coaster of needing—but hating—my smartphone, and I don't know how to get off.



**I'm trapped on this exhausting roller coaster of needing—but hating—my smartphone.**



# The Real Reason Voice Assistants Are Female (and Why it Matters)

**A**sk your phone, Amazon Echo, or computer something. Or call your bank and talk to the automated menu. I'll wait.

Whatever you asked, a synthesized version of a woman likely answered you, polite and deferential, pleasant no matter the tone or topic.

That's because Siri, Alexa, Cortana, and their foremothers have been doing this work for years, ready to answer serious inquiries and deflect ridiculous ones. Though they lack bodies, they embody what we think of when we picture a personal assistant: a competent, efficient, and reliable woman. She gets you to meetings on time with reminders and directions, serves up reading material for the commute, and delivers relevant information on the way, like weather and traffic. Nevertheless, she is not in charge.

When performed by humans, these tasks have sociological and psychological consequences. So one might think that using an emotionless AI as a personal assistant would erase concerns about outdated gender stereotypes. But companies have repeatedly launched these products with female voices and, in some cases, names. And when we



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can only see a woman, even an artificial one, in that position, we enforce a harmful culture. Still, consumers expect a friendly, helpful female in this kind of scenario, and that is what companies give them.

“We tested many voices with our internal beta program and customers before launching and this voice tested best,” an Amazon spokesperson told PCMag.

A Microsoft spokesperson said Cortana can technically be genderless, but the company did immerse itself in gender research when choosing a voice and weighed the benefits of a male and female voice. “However, for our objectives—building a helpful, supportive, trustworthy assistant—a female voice was the stronger choice,” according to Redmond.

Apple’s Siri and the Google Assistant currently offer the option to switch to a male voice; Siri since 2013 and Google since October. But Alexa and Cortana don’t have male counterparts.

Consider that IBM’s Watson, an AI of a higher order, speaks with a male voice as it works alongside physicians on cancer treatment and handily wins *Jeopardy*. When choosing Watson’s voice for *Jeopardy*, IBM went with one that was self-assured and had it use short definitive phrases. Both are typical of male speech—and people prefer to hear a masculine-sounding voice from a leader, according to research—so Watson got a male voice.

Women, meanwhile, use more pronouns and tentative words than men, according to



Psychologist James W. Pennebaker. Pronoun use, particularly of the word “I,” is indicative of lower social status. AI assistants are very prone to using the word “I,” particularly in taking responsibility for mistakes. Ask Siri a question she can’t process and she says, “I’m not sure I understand.”

It’s critical that we challenge stereotypical gender roles in our personal assistants. Our interactions with AI teach and train it, but we are also shaped by these experiences. It’s why parents are concerned about unintentionally raising rude children, when Alexa does not require a “please” or “thank you” to carry out a task.

As our relationship with technology enters a new stage of intimacy, it’s worrying to think of what will happen when some people’s primary sexual experiences will be with a sexually acquiescent robot. Sexually harassing Siri for a YouTube video might be amusing to some, but it’s unsettling to hear how similar that language is to what women hear from street harassers. There is the same societal expectation that both just accept it.

Humans aim for linguistic style matching in their social interactions, meaning they try to match the language patterns of the human—and now, AI—with whom they are speaking. But as AI enters our physical realm, there are serious personal and social consequences for treating it in a degrading manner. The companies behind AI are cashing in on bias, and that is not the way to a utopia, tech or otherwise.



**AI assistants are very prone to using the word “I,” particularly in taking responsibility for mistakes.**





## Five Top Fitness Trackers

**T**here's never been a better selection of fitness trackers, but with choice comes confusion. Which tracker has the features that are right for you and the activities you do? Here are some tips and recommendations for choosing the best tracker for your needs.

### **TRY BEFORE YOU BUY**

One way to try fitness tracking in general (without a wearable) is to use a mobile app that counts your steps. This method requires the least amount of commitment and could be all a beginner really needs. Some apps we like are Argus, Fitbit, and Moves.

If you run or bicycle, we recommend tracking your runs or rides with an app before going whole-hog and splurging on a tracker. Why? With some trackers, you still need to carry your phone to get accurate pacing, distance, and mapping data, so you'll want to know before you make a purchase whether you're okay with carrying your phone or whether you'd prefer a tracker with built-in GPS so you don't have to. A few apps we recommend are Runtastic PRO (for running), Cyclemeter (for bicycling), and Strava (for both running and cycling). The Coros Linx Smart Helmet is another interesting solution for cyclists: It integrates your phone's GPS in order to track your rides and uses bone-conduction audio to let you hear directions, music, and phone calls without blocking your ears.

### **SET YOUR SPENDING LIMIT**

In general, most fitness trackers cost between \$50 and \$250. If you pay less than \$50, you'll probably get a subpar product with poor accuracy. In addition, less-expensive trackers usually don't have displays, so you can't see how many steps you've taken unless you look at your smartphone.

Pricier trackers usually include built-in optical heart rate monitors and GPS, and often, these features are tailored toward athletes and exercise enthusiasts. Don't get suckered into buying a tracker with a heart rate monitor if your primary activity is walking; it's an unnecessary expense. If you walk and don't do much else, you can find great options in the \$49-to-\$149 range.

For those who do work out often, we recommend spending at least \$149, as that's the price at which you'll start to see the features that are useful to very active people.



## **CHOOSE YOUR STYLE**

A very important question to ask yourself before you choose a fitness tracker is which kind you want. Fitness trackers are usually bracelets, watches, or clip-ons. Most clip-on devices these days can also be worn on the wrist—but wristworn devices usually can't be clipped on. Bracelets and watches are hard to lose, but clip-ons can fall off or get thrown into the wash accidentally.

That said, bracelets and watches can get in the way when you're typing on a computer or washing dishes. If you're bothered by having something on your wrist 24/7, you're probably better off with a clip-on. Additionally, wrist-worn devices are not always eye-catching accessories to your outfit.

Clip-on devices are smaller and more discreet when worn on a waistband, like the Lumo Run, or on the front of a bra. These clip-ons don't have displays, meaning you have to rely on a smartphone to see your tracked activity.

The Motiv Ring, meanwhile, brings fitness tracking to your fingers. It tracks many of the same metrics as wrist-worn models in a discreet form factor that looks like jewelry.

## **MATTERS OF THE HEART**

Heart rate monitoring sounds like the best feature ever, but there are different kinds of heart rate monitors, and frankly, some people don't need it at all. A built-in heart rate monitor drives up the price.

Optical heart rate monitors are the ones built into the device itself. The Apple Watch Series 3 has an optical heart rate monitor, as does the Fitbit Charge 2, among others. Some very good fitness trackers don't have heart rate monitors built in but can pair with a chest strap monitor. Most every device from Garmin and Polar supports a chest strap (like the super Polar H10), and you can usually bundle one in when purchasing a tracker for an extra \$40 or \$50.

Finally, if you're interested in knowing your resting heart rate, you don't need to buy a tracker with an optical heart rate monitor to find it. Many smartphone apps let you take your heart rate in about 15 seconds using the phone's camera. Check your pulse once or twice a day, and you're good to go.

## **WANT TO TRACK SLEEP?**

Many fitness trackers record your sleep patterns. They generally sense movement using a three-axis accelerometer to a more sensitive degree than they do during the day. Some devices report graphs showing the times when you were in light sleep and deep sleep based on motion.

There are also dedicated sleep trackers that attach to your mattress, such as the SleepAce RestOn. But we haven't found that they offer an appreciable advantage over wrist-based trackers, which have the advantage of doing a lot more than tracking your rest. If you don't like wearing something on your wrist to bed and need a new mattress, you can always spring for the Eight Smart Mattress.

## **GO SPORT-SPECIFIC**

Swimmers will want a waterproof tracker, but keep in mind that not all water-safe trackers actually track swimming. A couple that do are the Apple Watch Nike+ and Series 3.

Runners will probably want a watch that shows time, distance, pace, and lap time, at the very least. If you want good accuracy for those metrics without having to carry a smartphone, you need a runner's watch with built-in GPS, such as the Garmin Forerunner 735XT.

Also consider the display. Otherwise excellent devices, like the Apple Watch Series 3 and Fitbit Charge 2, have screens that turn off after a few seconds. If you want to see your stats at all times, or simply use your tracker as a wristwatch, look for one with an always-on display.

The way in which you control the tracker is also important. Those who like to run in the cold while wearing gloves may want to steer clear of devices that have only touch-enabled displays.

Cyclists have even more considerations. There's a difference between tracking how many miles you pedal and calories you burn versus monitoring your power and cadence. If all you want is the former, you can find a few fitness trackers that support bicycling as an activity, including the Fitbit Surge and the Garmin Vivoactive. More serious cyclists will want a device that can pair with additional bike equipment, like a cadence sensor, and should look at devices from sport-specific companies such as Garmin, Mio Global, and Polar.



## **THE APP EXPERIENCE**

A fitness tracker's app matters. Whether on your phone or on the web, the app is absolutely vital, because it is where you make sense of the information the tracker collects.

Fitbit has one of the best apps and websites we've tested. You can record all kinds of data that many other competitors don't, such as calories consumed, allergy severity, and stress level. Nokia Health (formerly Withings) is also a favorite for providing a comprehensive account: You can measure your weight, glucose readings, and all kinds of health information.

For a total body analysis, we recommend that you look for a system that incorporates a smart bathroom scale. Fitbit, Nokia Health, and Polar do. Check out the Fitbit Aria 2, the Polar Balance, and the Nokia Body Cardio: All of these trackers send your weight directly to your account, so you can't cheat the system by entering a lower number. The QardioBase 2 is another top choice, especially for pregnant women.

## SMARTWATCH VS. FITNESS TRACKER

Several fitness trackers have some smartwatch functionality, and some smartwatches have fitness features, too. The Fitbit Ionic comes close to blending both worlds, but at the moment it still lags far behind the Apple Watch in terms of third-party app support.

Ultimately, a smartwatch is a different kind of device than a fitness tracker, so make sure your heart is in the right place and you know which you want. One good thing to bear in mind as you shop: Fitness trackers put fitness tracking first!

## OTHER OPTIONS

With so many good fitness trackers on the market right now, and promising ones on the horizon, it's hard to contain them all in just one list. We've limited our picks here to trackers that our testers have rated four stars or higher, but there are lots of other very good options out there that might be right for you.

### Fitbit Surge

\$149.95

EDITORS' CHOICE



**PROS:** Continuous heart rate monitoring. Built-in GPS. Comfortable, secure fit. Tracks new activities like hiking, yoga, and weight-lifting workouts. Excellent app and easy syncing. Supports incoming texts and call notifications. Accurate.

**CONS:** Limited push notifications. Moderately large. Not waterproof for swimming. Below average battery life with GPS enabled. Charger not interchangeable with other Fitbits.

**BOTTOM LINE:** With continuous heart rate monitoring, GPS, and broad appeal, the Fitbit Surge is the best all-day fitness tracker to date.





## Fitbit Charge 2

\$149.95

**EDITORS' CHOICE**



**PROS:** Large display. Built-in continuous heart rate monitor. Automatically tracks activities, calories, distance, steps, stairs, and sleep. Delivers idle alerts. Relax mode leads deep-breathing exercises. Supports interval training. Interchangeable bands.

**CONS:** Somewhat faint screen. Attracts fingerprints. Not waterproof. No GPS.

**BOTTOM LINE:** The Fitbit Charge 2 does everything the Fitbit Charge HR can, along with new idle alerts, automatic activity tracking, guided breathing sessions, interchangeable bands, and the option to connect your phone for GPS.

## Fitbit Alta HR

\$149.95



**PROS:** Long battery life. More in-depth sleep tracking and insights over its predecessor. Accurate heart rate and step count readings. Slim and comfortable to wear 24/7 with plenty of band options.

**CONS:** Screen is occasionally unresponsive. Buckle feels a bit flimsy. No altimeter. Lacks GPS.

**BOTTOM LINE:** With the Alta HR, Fitbit updates its most stylish tracker with continuous heart rate monitoring, better battery life, and smarter sleep tracking. Fashion-conscious self-quantifiers: This may be the device you've been waiting for.

## Fitbit Ionic

\$299.95



**PROS:** Vibrant screen. Changeable straps. Safe for swimming. Excellent battery life. Smart notifications. Built-in GPS and NFC. Pandora integration. Open SDK for app developers.

**CONS:** Expensive. Thick bottom bezel. Case easily scratches.

**BOTTOM LINE:** The Fitbit Ionic is an ambitious and promising smartwatch with a focus on fitness and accurate tracking, but its success will depend on the growth of its app ecosystem.





## Garmin Forerunner 35

\$199.99



**PROS:** Built-in GPS and heart rate monitor. Always-on display. Waterproof. Long battery life. Controls music playback on phone. Interval training.

**CONS:** No access to Connect IQ app store. Can't track swimming.

**BOTTOM LINE:** The Garmin Forerunner 35 is a premium fitness tracker, and it includes the GPS and heart monitoring features not found in lesser-priced models.



## Lumo Run

\$99.99



**PROS:** Advanced running metrics. Includes audio coaching when used with phone. Clear and specific feedback. Supports treadmill runs.

**CONS:** iOS only. No ability to pair a heart rate monitor. Doesn't estimate recovery time, ground contact time, VO2 max, or race time goals.

**BOTTOM LINE:** The clip-on Lumo Run tracks runs and coaches you on how to improve, making it a great value for intermediate level runners.

*ALEX COLON, JILL DUFFY*



# Amazon Echo Spot: A Perfect Smart Alarm Clock



The Echo Spot is the perfect bedside companion for anyone in an Alexa-powered home. While it's expensive at \$129.99, the Spot offers a far better experience than using an Echo Dot or a traditional alarm clock to wake up to, and it'll also find use as a kitchen clock or a monitor for various smart home devices. Although its audio quality isn't as strong as that of the Amazon Echo and other smart speakers, the Spot is far more versatile, and it's worthy of our Editors' Choice.

**Amazon  
Echo Spot**

\$129.99



## DESIGN, AUDIO, AND SKILLS

The Echo Spot is a tiny globe with a flat edge; it comes in black or white. It measures 4.1 by 3.8 by 3.6 inches (HWD), weighs 14.8 ounces, and has a reasonably sharp 2.5-inch, 480-by-480 circular color touch screen on the front and a 1.4-inch speaker that radiates out through a grille around the bottom. A small camera is located right above the screen. On the back of the device is a 3.5mm audio out jack.

## Amazon Echo Spot

**PROS** Super cute design. Useful display. Supports all Alexa features. 3.5mm output.

**CONS** Not a powerful speaker. No non-camera option.



The design is cute, soothing, and harmonious. The device looks great on a bedside table, in a kitchen, or in a living room. As it's much smaller than the blocky Echo Show, it doesn't impose.

**Waking up to the Echo Spot's weather forecast can help you decide how to start your day.**

The Spot connects to Wi-Fi on both the 2.4GHz and 5GHz bands, which is great in places with crowded 2.4GHz airwaves. It's easy to set up, and when it's time to enter your home Wi-Fi password, a very tiny touch keyboard appears. It's surprisingly usable. Like other Alexa devices, the Spot requires an Amazon account and works best for those who are plugged into Amazon's services.

Keep in mind that the Echo Spot is not a full-room audio speaker. It's quiet, only 1dB to 2dB louder than an Echo Dot at its various volume levels. That said, the Spot's audio quality is much better—where the Dot is painfully tinny, the Spot plays voices and midrange instruments without harshness. You'll wake up pleasantly, and if your Spot is in the kitchen, you'll enjoy listening to your morning news briefing a little more than you would with a Dot. But you won't be throwing dance parties in the living room unless you use the 3.5mm-out to attach the Spot to a more powerful speaker.

The Echo Spot is a full, first-class citizen of the Republic of Alexa. It works as part of a whole-home audio system, offers multiple wake words, has “ESP” to prevent it from answering when another Alexa device is nearer, and works with all of Alexa's thousands of third-party skills. It plays music from Amazon, Pandora, Spotify, and TuneIn, and it can read audiobooks or Kindle books to you.



**You won't be throwing dance parties unless you use the 3.5mm-out to attach the Spot to a more powerful speaker.**



## PERFECTLY ALARMING

Let's treat the Spot primarily as an alarm clock. I've been recommending that people use the Echo Dot and Google Home Mini to set alarms in their bedrooms for a while, but the experience isn't ideal if you don't sleep alone. When it's the middle of the night, you want to glance at your clock rather than have to ask it the time and risk waking up your partner.

An ambient light sensor in the Spot dims the screen in dark rooms. If any light at all bothers you, you can say, "Alexa, turn off the screen." It won't come back on until you turn the room lights on.

The clock offers six analog and six digital face options, as well as the ability to use your own photo as a clockface. It offers more than a dozen alarm chimes, as well as some odd celebrity voices (Alec Baldwin, for instance) telling you to wake up. You can also set an alarm to wake up to any song from a connected streaming service or in your Amazon Music locker.

You can set multiple alarms with different sounds or songs, and when the alarm goes off, tapping the screen or saying, "Alexa, snooze" delays it for nine minutes. Swiping up on the screen dismisses the alarm entirely. When you swipe right from the clock face, you see the weather—great for knowing what to wear in the morning—and then the less-useful What to Do With Alexa and Trending Topics screens, which you can turn off.



You can customize the cards that the Spot's face shows, so that if you don't like this Trending Topics card, for instance (I don't), you can turn it off.

Alexa's one downside when dealing with groggy people: It's a stickler for exact wording. For instance, if you tend to have brilliant ideas in the middle of the night, "Alexa, add XYZ to my to-do list," works, while, "Alexa, note to self," does not. The Google Home is much better at interpreting differently phrased commands. You have to ask the Spot to, "Wake me up at 8:11 a.m. to 'California' by Grimes," not, "Set an alarm for 8:11 a.m. to 'California' by Grimes."

## **SCREENING ROOM**

The clock is the killer app for the screen, at least for now. But there are a few other useful things you can do with the display.

In a smart home, the screen can show what's on your video doorbell, security camera, or connected baby monitor, as long as that device is also Alexa-capable. You can use the screen and camera to video-chat with other screen-sporting Alexa devices or with the Alexa app on smartphones. I tried it with an Android phone, and it worked well.

You can also play Amazon Video, some news videos, or movie trailers, but not music videos or YouTube. The round screen has a weird aspect ratio for videos; they are either going to be cropped severely or have big black borders.

When playing music, you'll see album art and, if you're lucky, lyrics. In the kitchen, the screen helps you step through recipes, but because the font size is quite big, you can't read enough of a recipe without having to swipe on the screen. Still, it's better than having an audio-only recipe, especially if you have trouble with auditory memory.



**The clock is the killer app for the screen, for now. But there are a few other useful things you can do with the display.**



A lot of people won't want a camera in their bedrooms. I put a small piece of black tape on the camera, and it didn't seem to affect the ambient-light sensor; the Spot still got brighter and darker depending on the light in the room. The mic mute button on the top of the Spot (sandwiched between the volume buttons) also kills the camera, but then you lose voice control as well. You can say, "Alexa, turn off the camera," and Alexa says, "Done," but then you could get into spiraling paranoia around whether the camera is really off.

## **COMPARISONS AND CONCLUSIONS**

The Spot fills out Amazon's smart speaker lineup. You now have the Amazon Echo for general-purpose use, the Tap to take out to the patio, the Spot to sit by your bed or kitchen counter, and the Echo Dot to fill in the gaps. If you want the best sound quality, you need to travel outside of Amazon and get a Sonos One. And since the Spot is so cute, friendly, and easy to use, the Echo Show doesn't really have much of a place anymore unless you want a larger screen that's similarly limited in video playback.

The Echo Spot keeps Amazon ahead of the Google Home ecosystem, which doesn't offer quite as many flexible products. Google has nothing with a screen, although it does have the big Home Max speaker, which Amazon can't match.

It's easy to recommend the Echo Spot, even though it's a little expensive for a bedside or tableside clock. Most traditional alarm clocks cost between \$15 and \$50. The Echo Spot is twice as good and twice as classy, but three times? I'd love to see it on sale for \$99. Its main competitor, the iHome iAVS16 Alexa-powered alarm clock, is even more expensive, at \$149.99. That device also doesn't have a full screen, although its lack of a camera will make some people feel more secure. You can also set up an Echo Dot with a \$69.99 iHome Docking Bedside Speaker, which has a cradle with a clock in it, but that's a kludge.

These are quibbles. The Echo Spot is the nicest, most flexible alarm-clock-like gadget I've ever seen. It's beautifully designed and works well. If the price doesn't turn you off, it's a terrific buy, and it's earned our Editors' Choice.

**SASCHA SEGAN**



# Google Home Max: A Smart Speaker With Serious Audio Performance



Finally, there's a smart speaker where the "speaker" part is as important as the "smart." If you're interested in big, room-filling sound with voice control, the Google Home Max is your best bet right now. Amazon's Alexa is our favorite smart assistant ecosystem, but for those are focused on music and home control rather than Alexa's huge grabbag of random third-party skills, the Max makes a terrific core of a smart home. That makes it our Editor's Choice for high-end smart speakers.

**Google Home  
Max**

\$399.00





## DESIGN

The original, smaller Google Home speaker looks like an air freshener or scented candle, but the Home Max is simple and beautiful. Its smooth contour has rounded edges and a lovely cloth speaker grille that is so seamlessly installed that it seems to be one piece with the surrounding matte plastic. The cloth has a slight sheen to it, and white LEDs glow behind its surface to display volume levels. An ambient light sensor adjusts the brightness of the LEDs. Beneath the grille, dual 0.7-inch tweeters and dual 4.5-inch woofers deliver the audio. These drivers are powered by Class D amplifiers.

Measuring 7.5 by 13.3 by 6.1 inches (HWD), the Home Max is available in white–light-gray (“chalk”) or black–gray (“charcoal”) models. It’s rather heavy, at 11.7 pounds, but that’s fine, since it isn’t meant to be portable.

You adjust the volume by using the touch-sensitive surface that runs lengthwise along the speaker’s top panel—slide your finger left to lower the volume and right to raise the volume. These levels work in conjunction with your mobile device’s master levels when you’re connected via Bluetooth. The center of this panel, demarcated with a short straight line, is the play/pause button. We found these controls to be exceptionally responsive—but of course, you can also just talk to the Home Max: Say “set volume,” from one to ten, or use percentages.

## Google Home Max

**PROS** Great sound. Works as a mono speaker, a stereo pair, or part of a whole home audio system. Attractive design.

**CONS** Too much bass for audio purists. Could do with better lossless audio options.



Along the back panel is a switch that turns the mic for Google Assistant and the speakerphone on and off. The speaker utilizes an array of six far-field mics to pick up your voice commands from a distance.

At the bottom of the back panel is a connection for the included power cable, a USB-C port (which passes through power to charge your phone and also, surprisingly, acts as an Ethernet port with an adapter), and a 3.5mm jack for wired audio input. You can't attach external storage or an audio source to the USB-C port, though.

A silicone rubber base ships with the Home Max and can be placed beneath it to keep it from dancing across tabletops. The same base, which resembles a gray pancake with a Google G at its center, can also be placed on the right-side panel, and the speaker can be flipped vertically. When placed this way, the orientation sensor shifts the LED display behind the grille so that it still reads out horizontally, and it also adjusts the audio into mono—when you're using two speakers as a stereo pair, they're meant to be used vertically. And when you're using only a single Home Max speaker, you should use it horizontally.

## **ASSISTING YOU**

The Max isn't just a speaker, of course: It's a Google Assistant speaker. You set it up via the Google Home app on your Android or iOS phone (yes, you need a phone) and then say, "Hey, Google," to play music, control smart home devices, and answer internet-based queries. Amazon still has an edge over Google in terms of supported smart home brands, and weirdly, it's still better at handling calendar information for people with G Suite accounts.



**We found these controls to be exceptionally responsive—but of course, you can also just talk to the Home Max.**

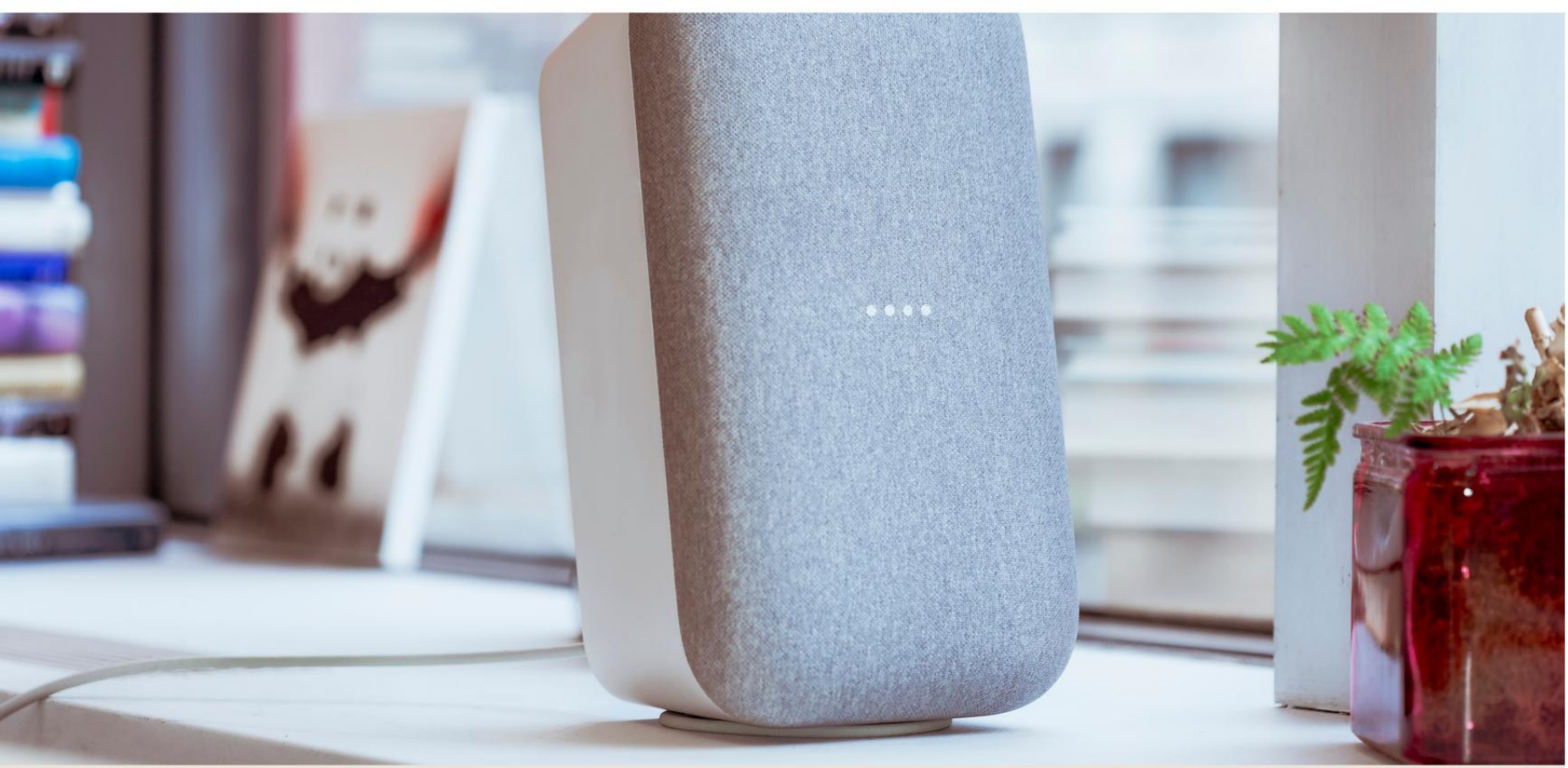


But Google Assistant is terrific as a whole-home system. It can recognize up to six different voices for different Google accounts, synchronize music among rooms, and even broadcast messages to all of the Google Home devices you might have in your home.

Google Assistant plays music from Google Play Music, YouTube Red, Spotify, and Pandora. To ask for specific songs, you have to be a paid subscriber to whatever service you choose. You can't trigger locally stored music or your own music library by voice, but the Max lets you send music via a Wi-Fi Chromecast link, Bluetooth, or an audio cable.

Supported audio streaming file formats include HE-AAC, LC-AAC+, MP3, Vorbis, WAV, FLAC, and Opus. You'll want to use Chromecast over Wi-Fi, if possible, for the best audio quality, as the speaker doesn't list native support for AptX over Bluetooth. That said, not a lot of people can hear the difference between the default SBC codec and AptX.

The Home Max's far-field microphones are tuned to pick up your voice even when the Max is playing at top volume, something the Amazon Echo Dot isn't particularly good at. We were quite impressed, for instance, when we played Led Zeppelin's "Kashmir" at full volume and then said, "Hey, Google," in a normal speaking voice—the Max picked it up every time. When we stood between a Google Home speaker and a Home Max speaker, the mics on each were able to detect which one we were closer to, even if just by a foot or two, and whatever commands we uttered would be followed by the closest speaker.





**At top volumes, it doesn't distort, though you can hear the digital signal processing (DSP) kick in a little to thin out the deep bass.**



What's missing? We'd like to see track navigation controls onboard—you skip tracks either on your phone itself or with the power of your voice and Google Assistant. But there's no reason to exclude them from the design when you've included volume and playback controls. And it would have been great to enhance Google's voice options with direct streaming from Tidal or another lossless audio service.

### **AUDIO PERFORMANCE**

So the Home Max looks good and works well, but how does it sound? On tracks with intense sub-bass content, such as The Knife's "Silent Shout," it delivers powerful low-frequency response. At top volumes, it doesn't distort, though you can hear the digital signal processing (DSP) kick in a little to thin out the deep bass—this is common with wireless speakers that utilize DSP, and it's meant to prevent distortion at high listening levels. Thus, at more moderate levels, you get a rounder, fuller sense of bass depth. In fact, for a speaker this size—not tiny but not massive—you get a disproportionately full bass response. This is a powerful sound that'll appeal to fans of deep bass, yet the speaker doesn't forsake the overall balance of the mix, as the highs are also well represented.

Bill Callahan’s “Drover,” a track with less deep bass in the mix, gives us a better sense of the Home Max’s overall sound signature. The drums on this track can sound overly thunderous on speakers that boost the bass too much, but through the Home Max, you get lovely bass depth. The drums sound full, rich, and round—neither overly boosted nor weak. Callahan’s baritone vocals get an ideal low-mid presence as well, highlighting their richness, while the high-mids are dialed in to deliver some crisp treble edge to the vocals, guitar strums, and higher-register percussive hits. The balance here is impressive. Most listeners will enjoy the full, clear sound.

On Jay-Z and Kanye West’s “No Church in the Wild,” the kick drum loop receives an ideal high-mid presence that accentuates its sharp attack, while the sub-bass synth hits that punctuate the beat are delivered with near-subwoofer-level power and depth. Again, the louder you pump the volume, the thinner the bass gets, but at fairly high listening levels, the bass depth is still impressive. The vocals are delivered with solid clarity and without much added sibilance.

Orchestral tracks, like the opening scene in John Adams’ “The Gospel According to the Other Mary,” sound wonderful through the Google Home Max—the higher register brass, strings, and vocals are delivered with brightness and the lower register instrumentation gets some added, subtle bass depth. When sub-bass moments occasionally occur in the mix, the speakers deliver them with full-bodied presence that doesn’t compete with the highs for the spotlight.

So let’s say the built-in Google Assistant functionality is worth about \$50 of the \$400 price tag—that would mean the Home Max should sound as good as a \$350 speaker, right? Compared with some of our favorite standard wireless speakers in this price range, such as the Klipsch The Three and the JBL Boombox, the Home Max is most definitely a competitor. From a purely audio-based standpoint, the Boombox is the winner in terms of volume and bass depth, while the Klipsch model delivers the most refined audio of the bunch. But in terms of clarity, power, and bass depth, the Home Max delivers an excellent listening experience that can hang in the same league as these speakers, which is especially impressive when you factor in the voice control. And it blows away the audio performance offered by the smaller Google Home speaker, though that speaker offers some decent bass depth for its size. If Google Assistant is a priority and solid audio performance is also high on the list, you won’t be disappointed with the Home Max.

## SMART COMPETITION

As far as smart speakers go, the top competitor for the Google Home Max right now is JBL's Link system, especially the Link 500 (\$399.95), which we are in the process of reviewing. The Link system has four different speaker options, all with Google Assistant. The major functionality you lose is the ability to make phone calls, which Google's own speakers have but third-party models don't. You can also assume, of course, that Google's own speakers will get new features first (that's what has happened with Alexa speakers). Unless the Link is compellingly better, audio-wise, the Max is a safer bet.

The best speaker out there running Amazon's Alexa platform is the \$200 Sonos One, which sounds good but isn't in the same class, bass-wise (or price-wise). Apple's \$349 Homepod may end up competing, but it's been delayed, and Siri is far behind Google when it comes to voice assistant capabilities right now.

## CONCLUSIONS

The Google Home Max is the best smart audio experience right now. Though new smart home brands and third-party skills still come to Alexa first, Amazon doesn't have an integrated solution that satisfies people who want a true bookshelf speaker, or a stereo pair that can fill a big room. Yes, you could wire together standard speakers with smaller smart speakers, but that's a little kludgy, and the microphones may have trouble recognizing your voice when music is playing at top volume.

The audio quality on Google's home-assistant speakers has always set them a little bit apart from Amazon's. The Google Home sounds a bit better than the Echo, and there's nothing with Alexa that sounds like the Google Home Max. We still recommend an array of Alexa devices for people primarily interested in low-cost smart assistants and smart home control, but if big sound is your priority, choose Max and the Google ecosystem.

**TIM GIDEON, SASCHA SEGAN**



## Lenovo Yoga 720 a Good Choice for the Budget Conscious

**T**he Lenovo Yoga 720 convertible laptop comes in several shapes and sizes. The best option for most people is probably the 13-inch model, the recipient of an Editors' Choice award for its feathery weight and balance of features and price. But if you'd like to go even smaller and less expensive, there's a \$649.99 12-inch version, the subject of this review. To keep the price and size down, Lenovo outfits it with barebones components—an Intel Core i3-7100U, 4GB of RAM, and a 128GB SSD—that result in a relatively slow machine with scarce room for your multimedia collection but enough power for light web browsing, emails, and word processing. Throw in a high-quality full HD touch display, and you've got a versatile, convertible laptop for casual use, albeit one that can't offer extra computing oomph if you need it.

**Lenovo Yoga 720**  
(12-Inch)

\$649.99



## THIN BEZEL, GOOD DISPLAY

The Yoga 720 rides the thin-bezel wave that began to wash over the high-end ultraportable market a few years ago and shows no sign of breaking any time soon. The bezel, or border around the screen, is quite thin on the sides of the Yoga 720's 12.5-inch full HD display, but it's thick enough on top to include a webcam in the normal position at the center of the screen. Compare that with Dell's Infinity Edge display on the XPS series, which is so thin on all sides that there's no room for a webcam above the screen. People who use their laptops for video conferencing will much prefer the Yoga 720's webcam position to the awkwardly placed camera at the lower left corner of Dell XPS 13. The Lenovo's webcam takes surprisingly non-grainy HD video, even in low light conditions.

The glossy display is very good, with rich colors and wide viewing angles thanks to in-plane switching (IPS) technology. When you tap on it, though, you'll notice significant bounce. As a result, in testing, I mostly interacted with the Yoga 720 using the touchpad in Laptop mode. Fortunately, the touchpad, while small, is quite responsive to multitouch gestures and has excellent palm rejection, so you don't accidentally move the cursor while you're typing. In Tablet mode, the bouncing of the screen is obviously not a factor, and you'll appreciate that the Yoga 720 includes support for Lenovo's Active Pen (\$39.99), an optional stylus that features more than 4,000 levels of pressure sensitivity to mimic the feel of writing on paper. It's too bad that Lenovo doesn't throw in the pen for free, as Toshiba does with the business-focused Portege X20W-D.

The Yoga 720's keys are relatively sturdy, but they lack backlighting, and their switches feel cheap and produce a hollow clicking sound when you press them. It's clear that the keyboard falls victim to cost-cutting on this

## Lenovo Yoga 720 (12-Inch)

**PROS** Thin and light. Inexpensive as configured. Good full HD touch display and full-size keyboard.

**CONS** Relatively slow computing performance. Mediocre battery life. Screen bounces with finger taps.



model, since the more expensive 13-inch version and the premium Yoga 920 both have excellent backlit keyboards. I appreciate the inclusion of full-size left and right directional arrow keys, although I would prefer full-size up and down arrow keys, too. That's not possible, since Lenovo put the fingerprint reader directly beneath the keyboard on the right side of the laptop, which in itself is a handy feature for logging in to Windows without typing your password. It's even more useful since the webcam doesn't support face recognition login.

Input/output options are limited on the Yoga 720, but that's usual for a small laptop. You'll have to make do with one USB 3.0 port and a single USB-C port, both located on the right edge next to the power button. Luckily, unlike the Apple MacBook, neither of those will be occupied when you're charging, since the Yoga 720 includes a dedicated power port on its left edge next to the 3.5mm audio in/out jack.



**The glossy display is very good, with rich colors and wide viewing angles thanks to in-plane switching (IPS) technology.**



Sound emanates from two speaker grilles at the bottom of the chassis, near the left and right edges. This means that dialogue tracks are somewhat muted when you're using the Yoga 720 in Laptop mode, since the fabric of your clothes acts as a muffler. Change to Tent or Tablet mode, however, and the speakers are noticeably louder, although they never deliver as clear highs or as robust bass as you might expect from their Harman branding.

All of these features fit into a very slim footprint. Despite its 12.5-inch screen, the laptop is about the same size as a traditional 11-inch notebook, thanks to the thin bezel. It measures 0.6 by 11.5 by 8 inches (HWD), just a hair bigger than its predecessor, the 11.6-inch Yoga 710 (0.59 by 11.06 by 7.68 inches) and about the same size as the Portege X20W-D (0.61 by 11.8 by 8.6 inches), which also features a 12.5-inch screen. The Yoga 720 weighs 2.53 pounds, making it neither exceptionally heavy nor featherlight (the larger HP Spectre 13, for instance, weighs just 2.4 pounds, and the 2.3-pound Huawei MateBook X is even lighter).

Wireless connections include 802.11ac and Bluetooth 4.1, and Lenovo supports the system with a one-year warranty.

## **RELATIVELY POKEY**

As configured, the Yoga 720 is slow—best suited for basic PC tasks that don't tax the Intel Core i3 processor. It scored 2,689 on our PCMark 8 benchmark, which measures a wide range of tasks that PC users are likely to perform regularly, from web browsing to videoconferencing. Anything above 2,500 is acceptable for these types of tasks, although you'll likely notice slowdowns when you have multiple browser tabs or apps open at once.

Its PCMark score is slightly better than that of last year's Core m3-powered Yoga 710 (2,451) but lower than conventional laptops its price range, such as the Acer Swift 3 (3,085) and Asus ZenBook UX330 (3,061). The convertible Dell Inspiron 13 7000 (2,983) also performs better than the Yoga 720 on this test, and it's more than a minute faster on our specialized multimedia tests, too. The Dell took 2 minutes and 14 seconds to convert a video in Handbrake compared with the Yoga 720's time of 3:18, and it finished our sample Photoshop image-resizing tasks in 4:40, while the Yoga 720 took 5:57.



**As configured,  
the Yoga 720  
is slow, best  
suited for  
basic PC  
tasks that  
don't tax the  
Intel Core i3  
processor.**



Both the Inspiron 13 7000 and the Yoga 720 lasted about 7 hours and 45 minutes on our battery rundown test, which involves playing a local looped video file at 50 percent screen brightness. Those are disappointing results for people who want to use their laptops all day and evening long without plugging them in—even more disappointing when you consider that the Yoga 710 managed more than 11 hours of battery life on our test. The switch from a Core m3 to a Core i3 processor is likely responsible for the decline. If you want marathon battery life at this price, stick with a conventional laptop; both the Swift 3 and the ZenBook UX330 lasted longer than 12 hours on our battery test.

None of these convertibles and notebooks should be used for graphics-intensive gaming, as evidenced by their scores of just a few hundred points on the Fire Strike Extreme gaming simulation test (gaming laptops typically post scores in the thousands). But the Yoga 720's performance on the less-intensive Cloud Gate test (4,816) is disappointingly low even among its peers. The Asus, the Acer, and the Dell all managed higher scores from the same Intel HD Graphics 620 GPU.



The glossy 12.3-inch full HD display is very good, with rich colors and wide viewing angles thanks to in-plane switching (IPS) technology. When you tap on it, though, you'll notice significant, annoying screen bounce.

Of course, if you plan to use the Yoga 720 to type up notes or check the weather and movie times, as I did during my real-world testing, you'll likely be satisfied. Note that you can upgrade the memory, storage, and CPU, all the way up to an Intel Core i7, 8GB of RAM, and a 512GB SSD, for a reasonable \$250 extra.

### **GO BIGGER OR GO DELL**

The Lenovo Yoga 720 succeeds in doing what it sets out to do, offering a step up from the cheap-looking, unimaginative chromebooks and Windows laptops that proliferate around the \$300 mark. For a little more than twice that price, you get a very good full HD touch screen and a convertible hinge that allows you to use the PC as a tablet or prop it up like a tent to watch videos.

Sacrifices are required, however, and they come in the form of computing performance. Not only is the Yoga 720 slower than similarly priced conventional laptops, it also lags slightly behind the Editors' Choice Dell Inspiron 13 7000 2-in-1. The best course of action for most people is to buy the Dell or to move up to the 13.3-inch version of the Yoga 720 instead of spending more money on faster components for the 12.5-inch version.

**TOM BRANT**



# Linksys WRT32X: Plenty of Bandwidth for Online Gaming

**G**aming enthusiasts know that high network latency can mean the difference between winning and losing when competing online.

With the Linksys WRT32X Wi-Fi Gaming Router, your gaming rig will get all the bandwidth it needs to keep you in the game with minimal lag. This is thanks to Rivet Networks' Killer Prioritization Engine, which automatically identifies PCs and laptops equipped with Killer Network LAN hardware and gives them priority over other devices on the network. The router is a breeze to install and aced our 2.4GHz throughput tests, and it handled our file-transfer tests with aplomb. Its 5GHz and MU-MIMO performance wasn't quite as fast as that of the comparably priced D-Link AC3150 Ultra Wi-Fi Router (DIR-885L/R), but if you take your gaming seriously, the WRT32X is a solid choice.

**Linksys WRT32X**  
**Wi-Fi Gaming**  
**Router**

\$299.99



## KILLER FEATURES

The WRT32X has a different look than the WRT3200ACM MU-MIMO Gigabit Wi-Fi Router, despite sharing many hardware attributes. It uses the same 2.1-by-9.6-by-7.6-inch (HWD) enclosure with four removable and adjustable antennas but has an all-black finish rather than the familiar black-and-blue color scheme that has defined the WRT line for the past decade. All of the router's numerous ports are located on the back panels and include four gigabit LAN ports, a WAN port, a USB 3.0 port, and an eSATA/USB 2.0 port. Here you'll also find WPS and reset buttons and a power switch. The front panel contains a row of blue LED activity indicators for power, WPS, Internet, 2.4GHz and 5GHz Wi-Fi, all four LAN ports, and the USB 3.0 and eSATA/USB ports.

The WRT32X is powered by a dual-core 1.8GHz CPU, 256MB of flash memory, and 512MB of DDR3 memory. It's a dual band AC3200 router capable of speeds of up to 600Mbps on the 2.4GHz band and 2600Mbps on the 5GHz band. As with the WRT3200ACM, it is DFS (Dynamic Frequency Selection) certified, allowing it to effectively double the 5GHz band's 80MHz channel width to achieve faster throughput speeds when used with clients that support Tri-Stream160 technology. It supports Multi-User Multiple Input, Multiple Output (MU-MIMO) data streaming, which transmits data simultaneously to compatible devices rather than sequentially, and Beamforming, which transmits data directly to clients rather than over a broad spectrum. As with other WRT routers, the WRT32X allows you to substitute its firmware with open-source code that offers customized settings and advanced monitoring capabilities, but if you go this route, you'll lose the embedded Killer Prioritization capabilities.

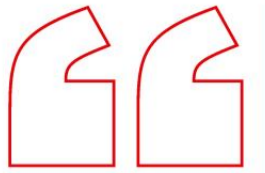
## Linksys WRT32X Wi-Fi Gaming Router

**PROS** Uses Killer Networks Prioritization engine. Fast 2.4GHz throughput in testing. Easy to install and configure. Supports MU-MIMO streaming. Fast file-transfer speeds.

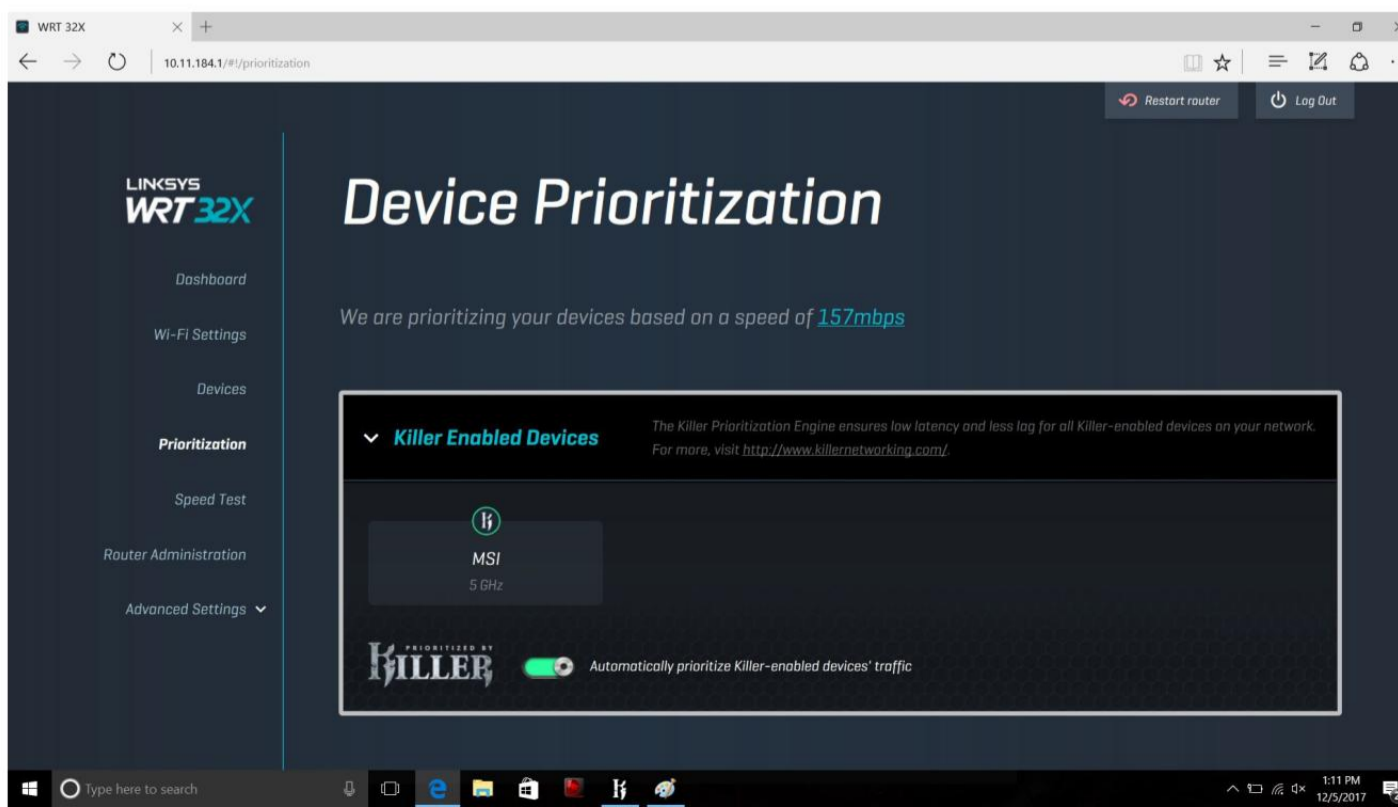
**CONS** Pricy. Middling 5GHz throughput.

Both the WRT3200ACM and WRT32X offer device prioritization in their respective menu settings, but the WRT32X takes it a step further with embedded support for Rivet Networks' Killer Prioritization Engine (KPE). When you connect to the router with a device that's equipped with Killer networking hardware, including certain Alienware and MSI gaming laptops, the router automatically recognizes the hardware and gives the device network priority over other connected devices, enabling smooth online gaming and 4K video streaming.

Killer-enabled devices come with Killer Control Center software preinstalled, which automatically links the device to the router and lets you enable prioritization with the touch of a button. The Overview screen displays a throughput speed gauge and current application prioritization. On the Apps screen, you can assign priority to specific applications and limit upload and download speeds for each application. The Wi-Fi Analyzer displays all active Wi-Fi access points in your area and their channel number, data rate, signal strength, and channel width, and the Settings screen is where you set speed limits and view the client's IP and MAC addresses. You can use the Router tab to access to all of the router's settings via the web-based management console.



**The WRT32X lets you substitute its firmware with open-source code that offers customized settings and advanced monitoring.**

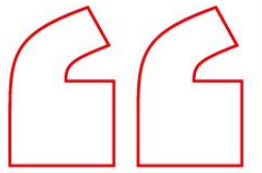


The WRT32X console offers a different look and feel than the console used on the WRT3200ACM. It contains a Dashboard page with Network Traffic gauges, the latest Speed Test, Wi-Fi Network status, Connected Devices, and a link to Port Forwarding rules. The Connected Devices section shows how many Killer-enabled devices are connected and how many devices are prioritized, the Speed Test results show your upload and download speeds, and the Network Traffic gauges show real-time upload and download activity.

To the left of the Dashboard page is a menu with tabs for Wi-Fi Settings, Devices, Prioritization, Speed Test, Router Administration, and Advanced Settings. Use the Wi-Fi Settings to rename the SSID for each band, combine both bands, adjust channel width, and configure guest access. The Devices page displays a list of connected devices, their IP addresses, and their assigned priority, and the Prioritization page shows all Killer-enabled devices and has an option for manually assigning network prioritization using a drag and drop method. Router Administration settings let you edit passwords, change the time zone, update the firmware, and disable the router's status lights. Advanced Settings include Port Forwarding, VPN Client, Local network, and Internet Connection settings.

### **EASY INSTALLATION, FAST PERFORMANCE**

Installing the WRT32X is fast and easy. Following the directions in the Quick Start Guide, I connected the router to my modem and my PC and hit the power button. I opened a browser on my PC and typed in <http://myrouter.local>, which launched a Setup Wizard that walked me through Wi-Fi, Internet, and prioritization options. I then used the Dashboard to split the two radio bands (they are joined by default) and change my passwords.

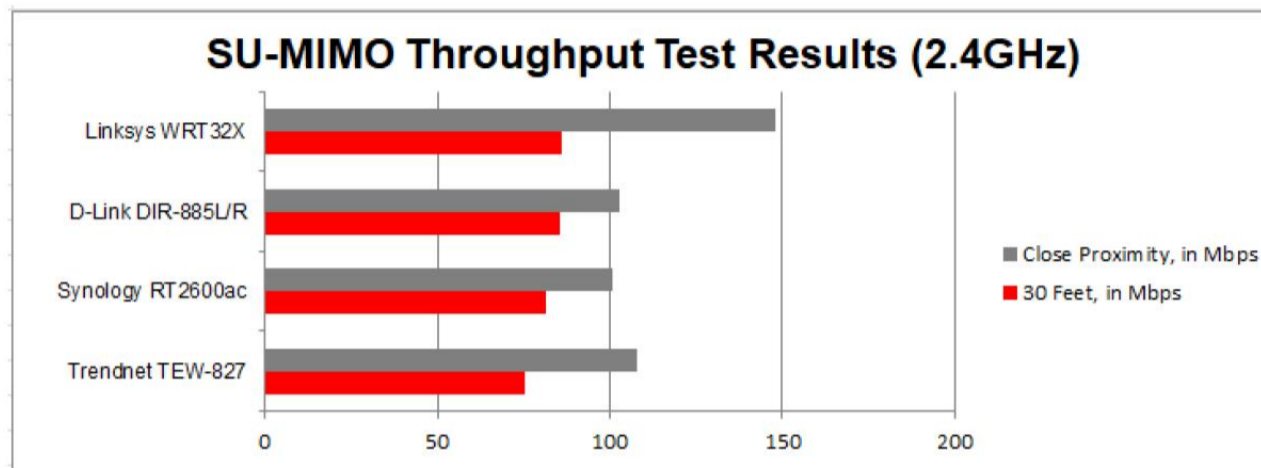


**The Connected Devices section shows how many Killer-enabled devices are connected and how many devices are prioritized.**

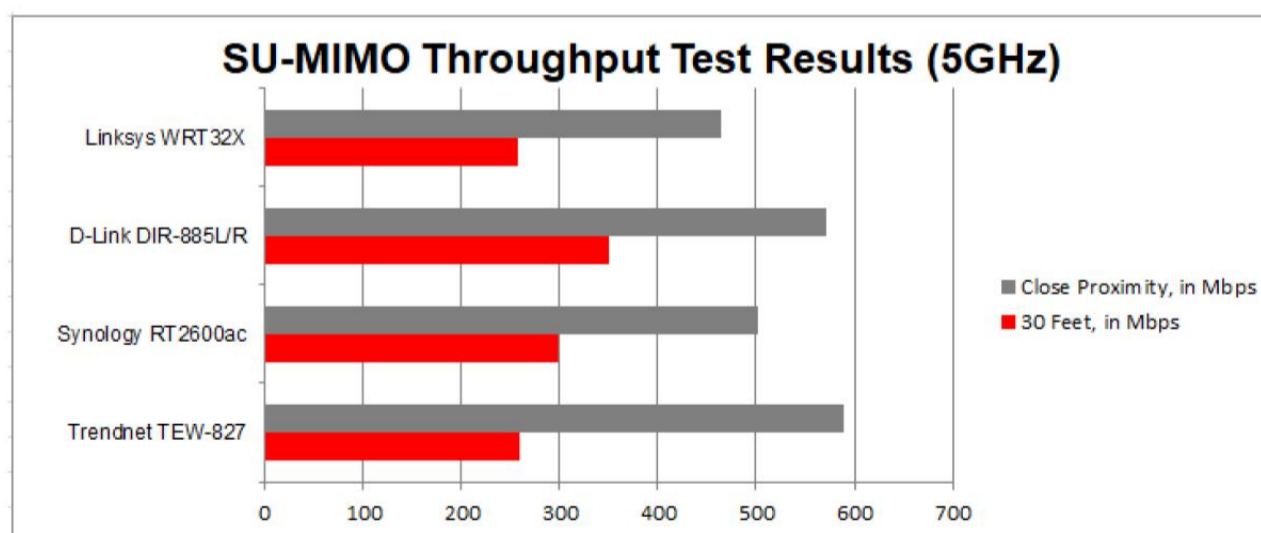




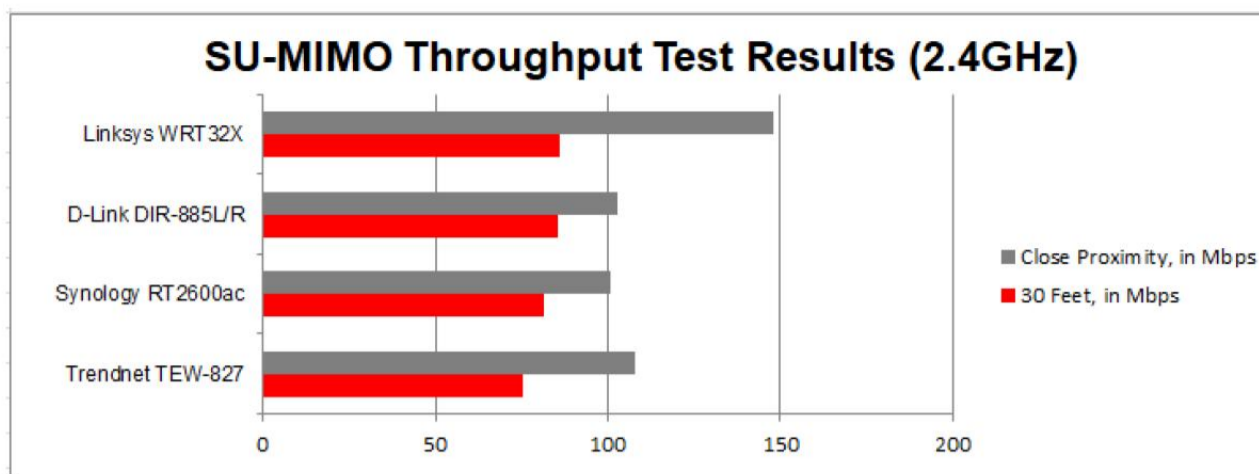
The WRT32X turned in excellent results on our 2.4GHz SU-MIMO throughput tests. It's score of 148Mbps on the close-proximity (same room) test was among the highest we've seen to date and outperformed the Synology Router RT2600ac, the D-Link DIR-885L/R, and the Trendnet AC2600 StreamBoost MU-MIMO WiFi Router (TEW-827DRU). At a distance of 30 feet, the WRT32X scored 86Mbps, beating all three competitors handily.



The WRT32X's 5GHz throughput performance was good but not as fast as the competition. It's score of 464Mbps on the close-proximity test couldn't match the D-Link DIR-885L/R, the Synology RT2600ac, or the Trendnet TEW-827DRU, which led with a score 590Mbps. On the 5GHz 30-foot test, the WRT32X's score of 258Mbps was nearly identical to the Trendnet TEW-827DRU but trailed the Synology RT2600ac and the D-Link DIR-885L/R.



We test MU-MIMO performance using three identical Acer Aspire R13 laptops equipped with Qualcomm's QCA61x4A MU-MIMO circuitry. The WRT32X's score of 175Mbps on the close-proximity test beat the Synology RT2600ac by a hair but came in behind the D-Link DIR-885L/R and the Trendnet TEW-827DRU. On the 30-foot test, the WRT32X's score of 76Mbps came in dead last; the D-Link Dir-885L/R led with a score of 165Mbps.



The WRT32X garnered good results on our file-transfer tests, in which we move a 1.5GB folder containing a mix of video, music, photo, and document files. It managed a read speed of 48MBps and a write speed of 76.8MBps compared with the D-Link DIR-885L/R's speeds of 44.1MBps (read) and 33.2MBps (write), the Synology RT2600ac's speeds of 34.2MBps (read) and 32.6MBps (write), and the Trendnet TEW-827DRU's speeds of 53.7MBps and 30.3MBps. The Netgear NightHawk X10 R9000 remains our current leader with speeds of 89.1MBps (read) and 77.1MBps (write).

To test the effectiveness of the WRT32X's Killer Prioritization Engine (KPE) I streamed Marvel's *Captain America: Civil War* on Netflix on an MSI laptop equipped with a Killer 1535 wireless network adapter while running multiple Torrent downloads on another non-Killer laptop. With KPE enabled, the movie played smoothly with no buffering or lag. But when I disabled KPE, the movie became choppy and stalled frequently while buffering, because the MSI laptop no longer had priority and had to compete with the other laptop for bandwidth.

## GOOD FOR GAMERS

The Linksys WRT32X Wi-Fi Gaming Router is a solid choice for online gamers. It rocked our 2.4GHz throughput tests and has plenty of ports. Most important, it uses Rivet Network's Killer Prioritization Engine to ensure that you have the necessary network bandwidth for smooth online gaming and video streaming. But your PC must have Killer networking hardware to sync with the router and to take advantage of the automated prioritization feature. If you don't own any Killer-enabled systems and want blazing 5GHz throughput speeds, consider our Editors' Choice for midrange routers, the D-Link AC3150 Ultra Wi-Fi Router (DIR-885L/R), which offers better 5GHz and MU-MIMO performance.

**JOHN R. DELANEY**



## Brother HL-L2370DW Laser Printer Is a Worthwhile Bargain



As a monochrome laser printer for light- to medium-duty use in a micro or home office, the Brother HL-L2370DW offers good speed and output quality for text and graphics. It has a wide range of connection choices, good paper handling, and a competitive cost of ownership. Its mix of features and performance at a modest price earns it our Editors' Choice.

### **SIMPLE AND COMPACT**

The matte-black-and-gray HL-L2370DW is suitably compact for a budget mono laser. It measures 7.2 by 14 by 14.2 inches (HWD), and weighs 15.9 pounds. You should easily be able to find a spot for it on your desk. On top of the printer, a one-line monochrome display to the left of the output tray, combined with a small suite of function buttons, facilitates setup and maintenance.

**Brother**  
**HL-L2370DW**

\$129.99



The HL-L2370DW's paper handling is typical of a color laser in its price class. It includes a 250-sheet main tray plus a one-sheet multipurpose feeder. An auto-duplexer, for printing on both sides of a sheet of paper, comes standard. The maximum monthly duty cycle is 15,000 pages, making it suitable for up to medium-duty use in a micro or small office.

Connectivity choices include connecting to a computer via a USB cable or to a local network via Ethernet or Wi-Fi. It can also connect via a direct peer-to-peer connection to a compatible device using Wi-Fi Direct. The HL-L2370DW supports Google Cloud Print, works with the Brother iPrint&Scan app, and is AirPrint-compatible to facilitate printing from iOS devices.

## **Brother** HL-L2370DW

**PROS** Low price. Great text and good graphics quality. Good speed. Wi-Fi, Wi-Fi Direct, Ethernet, and USB connectivity.

**CONS** Slightly below-par photo quality



## **NOT TOO SHABBY**

The HL-L2370DW printed out the text-only (Word) portion of our business applications suite at a 33 page-per-minute (ppm) clip, just short of its 36ppm rated speed. In printing the full suite, which includes PDF, PowerPoint, and Excel files in addition to the aforementioned Word document, it averaged 14.4ppm.

We can't directly compare its speed with the Dell E310dw or Canon LBP151dw, which were tested using our old protocol, but the LBP151dw is rated at 28ppm for simplex (one-sided) printing while the E310dw is rated at 27ppm.

### **GREAT TEXT, GOOD GRAPHICS**

Output quality is a strong point for the HL-L2370DW, based on our testing. It offers excellent text, above-par graphics, but slightly below-par photo quality. Text should be fine for any business use except perhaps for those requiring tiny fonts.

Graphics are good enough for most any business use, including PowerPoint handouts—even those intended for important clients. It did well in rendering thin lines, too. For the most part the printer handled similar shadings in graphs and tables converted from color illustrations well, although in one figure a gradient between different shades was barely visible. Our test printouts were all but free of the banding that is often seen in backgrounds from laser printers.



**Graphics are good enough for most any business use, including PowerPoint handouts—even for important clients.**



With photos, there was substantial dithering (graininess) in some prints and a loss of detail in some bright areas. The HL-L2370DW can print out recognizable images from web pages, which is about the best you can expect from typical budget mono lasers.

Running costs for the HL-L2370DW, based on Brother's price and yield figures for consumables (toner and drum), are 3.5 cents per page, typical of a budget mono laser and the same as the Canon ImageClass LBP151dw. The Dell e310's running costs are a tad lower, at 3.3 cents per page.

### **SIMPLICITY IN ACTION**

The Brother HL-L2370DW offers an appealing combination of low price, excellent text and good graphics quality, good speed and connectivity, and suitable paper capacity. Its only real shortcoming is subpar photo quality, which generally is a non-issue for people shopping for a budget mono laser. Graphics, and especially text, are much more important for typical micro or home offices. The HL-L2370DW does a standout job in printing text, and is good at graphics printing as well, while the competing Dell E310dw's text was below par in our testing, as were the Canon LBP151dw's graphics. By virtue of its good text and graphics quality, good speed, solid feature set, and competitive running costs, the Brother HL-L2370DW becomes our new Editors' Choice budget mono laser.

**TONY HOFFMAN**



**The Brother HL-L2370DW offers an appealing combination of low price, excellent text and good graphics quality.**





## SugarSync Is Mostly Sweet

**W**ith a file-syncing service, you can access all of your files on any device you choose and keep a backup copy in the cloud. A service needs to be simple to configure and reliable, but pricing, storage space, and extra features matter as well. While SugarSync is intuitive to set up and use, it's expensive and lacks standard capabilities such as collaborative editing and two-factor authentication. Further, it's unnecessarily difficult to cancel an account once you start paying. In the crowded file syncing market space, competing services offer more features for less.

### **SugarSync**

Starts at \$7.49 per month



*Editors' Note: SugarSync is owned by j2 Global, the parent company of Ziff Davis, the owner, and publisher of PCMag.com.*

## PRICE AND STORAGE SPACE

SugarSync does not offer a permanent free account, unlike OpenDrive and Google Drive. Oddly, it offers two trial versions, one of which is a free 30-day trial that requires a credit card. Alternatively, there's a hidden option for a 90-day trial with 5GB of storage that does not require a credit card. SugarSync should either remove the credit card requirement for the 30-day trial or make the 90-day trial the default.

SugarSync's basic plan includes 100GB of cloud storage for \$7.49 per month, which equates to \$90 per year. The price jumps up to \$9.99 per month for 250GB of storage and \$18.95 for 500GB. As for business plans, it offers a 1TB option for up to three users starting at \$55 per month. The cost increases from there as you add more users and increase storage capacities. It's also worth noting that you need to upgrade to the business account to use external drives with the software.

For comparison, Dropbox Plus costs \$9.99 per month for 1TB of storage and OneDrive offers a 50GB storage plan for \$1.99 per month. You can also opt for an Office 365 Personal subscription for \$69.99 per year, which includes the Office 365 suite in addition to 1TB of OneDrive storage. Both Dropbox and OneDrive respectively offer free 2GB and 5GB accounts. IDrive, one of our Editors' Choice picks for online backup, offers 2TB of storage for \$69.50 per year.

## SETUP AND SECURITY

Setting up SugarSync is a breeze. After you sign up for an account and choose a level of service, you can download the SugarSync apps for your computers and mobile devices. The apps are compatible with Windows, macOS, iOS, and Android. There's also a plug-in for Outlook on Windows that lets you send large files via a shared SugarSync link instead of as an attachment.

## SugarSync

**PROS** Dedicated desktop interface. Good mobile apps. File Explorer integration.

**CONS** Expensive. Lacks advanced collaboration features. Difficult to cancel an account.

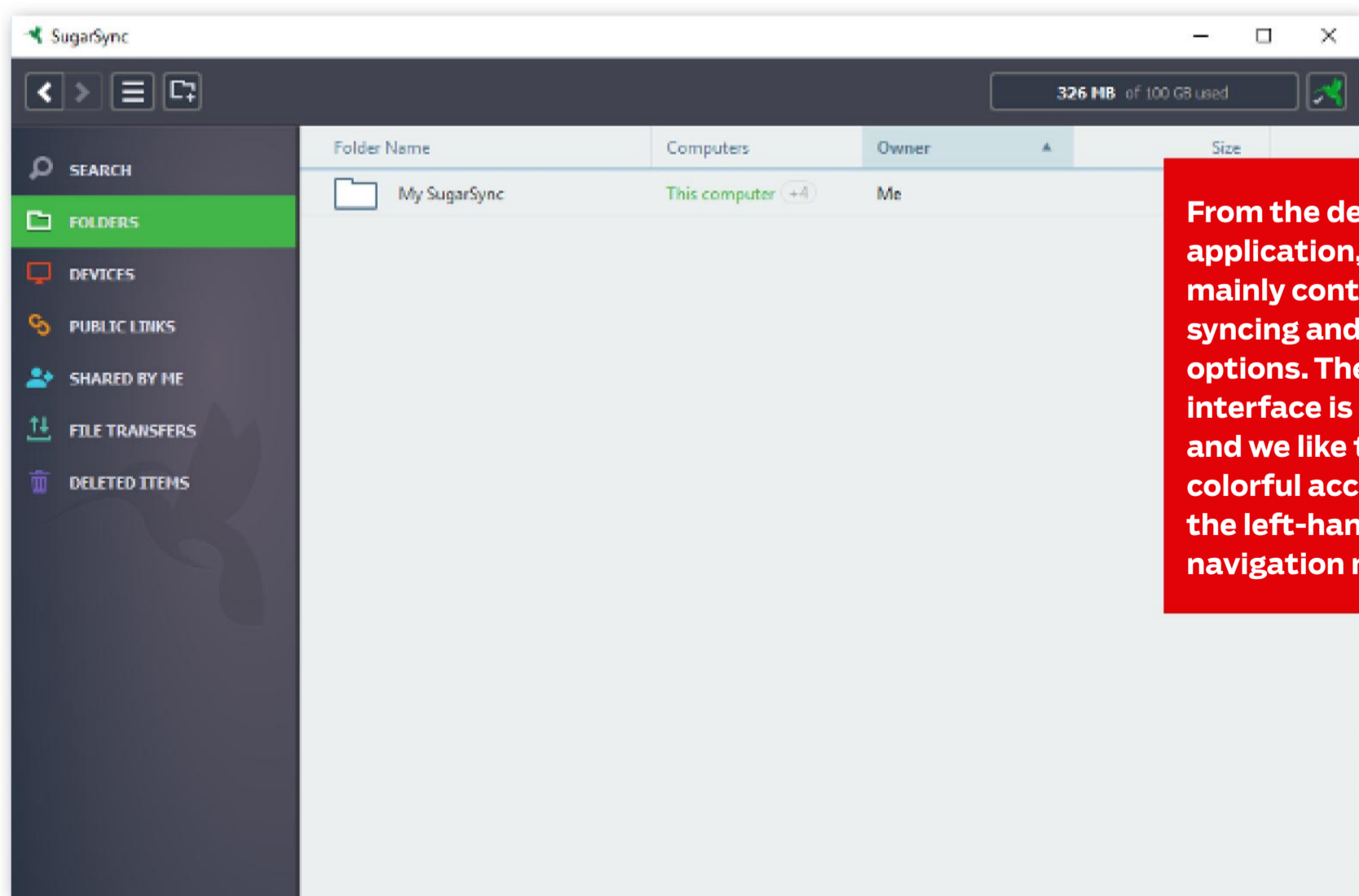


One of the biggest strengths of SugarSync is that it allows you to select existing folders to sync. When you set up SugarSync for the first time, it displays a folder tree of everything on your hard drive and lets you choose which items to sync to online storage. You can also specify the My SugarSync folder as the storage destination.

SugarSync encrypts files during the upload (TLS), storage (256-Bit AES), and download (TLS) process, but you can't set up two-factor authentication (2FA). Both Dropbox and Google Drive let you use 2FA to secure an account. It also does not go as far as some dedicated online backup services to ensure the utmost privacy and security. For example, SpiderOak ONE allows you to maintain private encryption keys that never get sent to the server, and Acronis uses a ransomware scanner to prevent viruses from corrupting your files.

## DESKTOP EXPERIENCE

The SugarSync desktop app is clean and functional. Its left-hand navigation menu features a flat dark-gray background with colorful navigation tabs. In the upper left corner, there are icons for the application settings and adding backup folders. We like the remaining storage indicator in the top bar, but wish it showed a breakdown of storage when you click it instead of redirecting to the online portal. Browsing through the integrated file tree and navigating between the modules is snappy.



From the desktop application, you mainly control folder syncing and sharing options. The interface is clean, and we like the colorful accents of the left-hand navigation menu.

From the desktop application, you mainly control folder syncing and sharing options. The easiest way to add a folder to cloud storage is to use the in-app button (folder with a plus icon) in the upper left corner. Once you select a folder, you can add individual files and folders via the drop-down icon next to its name. Alternatively, you can right-click to add a file or folder in File Explorer or drag items into the My SugarSync folder. Similar to how a folder works, anything you place in the My SugarSync folder is accessible online or from any device with SugarSync installed.

SugarSync's best feature is its cross-device and per-folder synchronization options. To set up folder syncing, you first need to install SugarSync on the device you want to use. When you choose to sync a newly created folder or one from another device, you have the option to either merge it with an existing folder or leave it as a separate entity. Some benefits of syncing a folder to another device are that you can access it offline from that device and that it serves as an additional backup, in case something goes wrong. One drawback is that you can only control syncing that relates to the device you're using. In other words, if you upload Folder A on Computer A to cloud storage, but want a synchronized copy of the folder on Computer B, you need to use the SugarSync application on Computer B to set that up. Once in the application, all you need to do is click the + button next to the desired folder to add it to the device.

The Folders tab shows all of the synced folders linked to your computer as well as all of the devices on which they appear. The Devices tab organizes the same information in a chart format. If you click on any of the folders, you can view its content. The software syncs files continuously, a system which we prefer, but an option to set up a file-syncing schedule could be useful when dealing with large files or limited internet bandwidth.



**One of the biggest strengths of SugarSync is that it allows you to select existing folders to sync.**

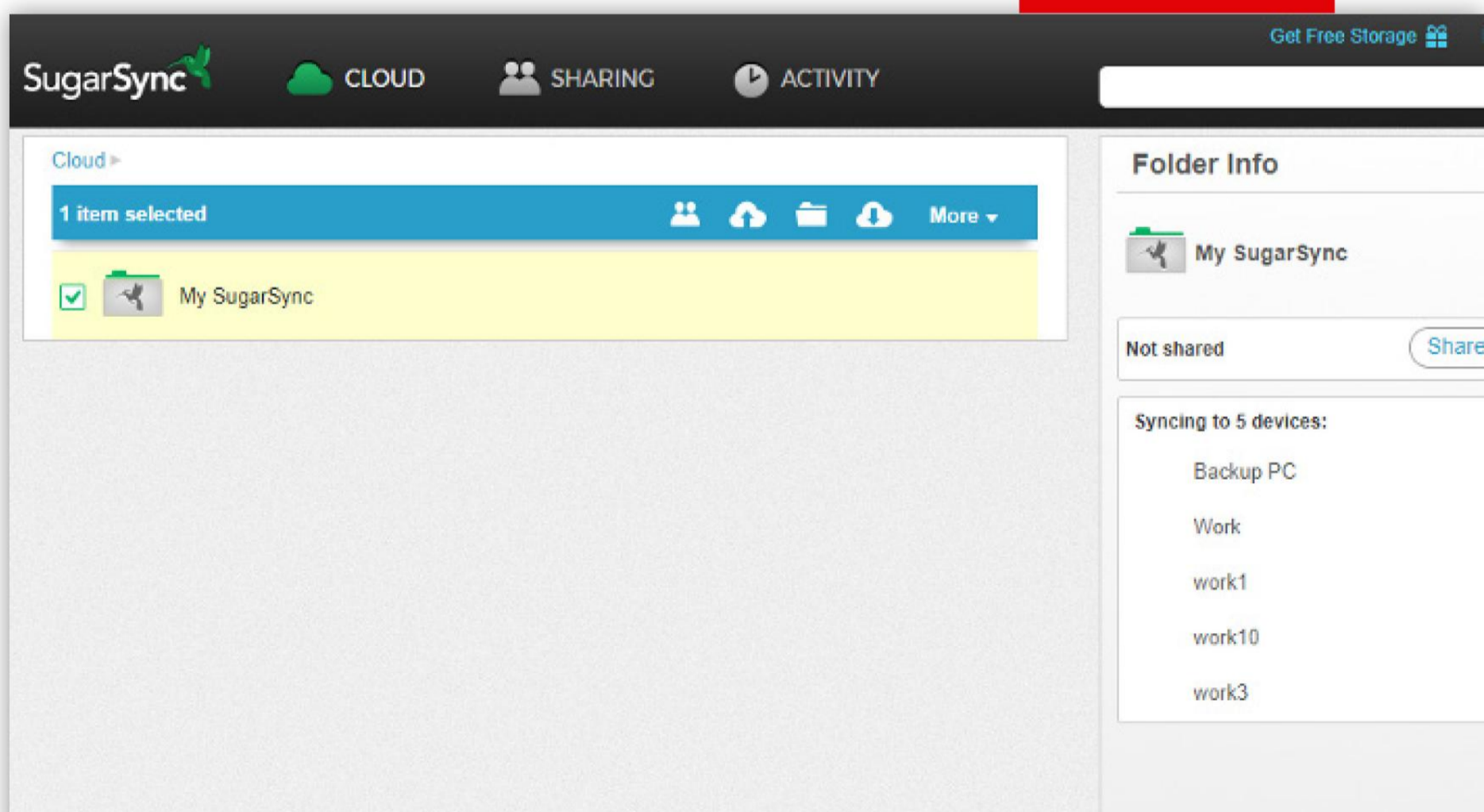


Once SugarSync successfully uploads your data, you can view file contents from the Folders menu. We like that the app shows image thumbnails and that it lets you directly delete items. The Share and Create Public Link options are only applicable to folders, but we appreciate how easy it is to manage your shared content. We do wish that the permissions options were more granular. To round out the features, there is a tab for viewing current file transfers, as well as a 30-day repository for deleted items. You can control how much bandwidth it uses and restrict the cache size from the preferences.

## WORKING ON THE WEB

SugarSync's web interface isn't as well organized as the desktop app, but switching between sections is quick, as is browsing through the folder structures. Across the top, there are separate tabs for viewing cloud content, managing sharing options, and viewing all of your account activity. There's also an ever-present search bar that lets you search for metadata keywords, such as the filename or file type. You can also manage most account preferences from here, save for canceling your subscription (more on that later).

**SugarSync's web interface isn't as well-organized as the desktop, but navigation through folder structures is quick, as is managing synced devices.**



The web dashboard lets you remotely manage files and folders stored on other devices; you can upload files, create new folders, or rename existing ones. If you intend to use SugarSync like Dropbox, just add files to the My SugarSync folder, since it syncs with all your devices on which you installed SugarSync.

SugarSync lets you view image thumbnails on the web, but you can't preview any audio or video clips. Google Drive lets you view or play nearly any file type that you upload. SugarSync keeps the five most recent versions your files, plus the current copy. These additional copies do not count toward your storage limit. To view any of these versions, just click on the file in question and then select the See Versions icon, which is a series of papers stacked on top of one another. From the desktop, you need to right-click on a file in the File Explorer and select Show Versions. This takes you to the same view on the web, from where you can download any of these versions directly.

Some options are hidden in the My Account menu, accessible from the icon in the upper right corner. This section lets you manage all of your basic account information, update email preferences, and manage your storage plans. The Connected Devices option is noteworthy, in that it gives you the option to remove or remotely wipe any connected device linked to your account.

## **SHARING AND COLLABORATION**

Like other services, SugarSync lets you share files and folders with specific people or the public, but it doesn't offer anything unique. Notably, the recipient does not have to be a paying SugarSync member to see or edit your files, but they have to create a login to access them. One perk, however, is that you do get 10 GB of additional storage space for each paid customer you refer to SugarSync. Alternatively, you can extra 50MB per friend that you invite. You can view and edit basic contact information from the web interface or import new ones from Google, Yahoo, or Outlook. One drawback is that it's not possible to password-protect a shared folder. Both Box and Dropbox allow you to set up a password requirement for shared links.

SugarSync does not integrate any online collaboration tools, either. Contacts are limited to editing, adding, and deleting items from a folder. There's no option for multiple users to simultaneously make edits to a file or even to communicate with each other through SugarSync. Google Drive and Microsoft OneDrive both offer real-time document editing and make it easier to manage sharing permissions.



## NOT SO SWEET

As we mentioned, getting a free trial of SugarSync requires that you hand over your credit card details (unless you find the option to try the 5GB account). When your trial is up, SugarSync starts charging you for its services, unless you cancel first. But you can't cancel your account directly from the Account settings page. Instead, you have to visit the "Canceling your SugarSync Account" support page between 6 a.m. and 5 p.m. PST on business days to contact a cancellation agent or call the support number during those hours. This process is needlessly difficult and unfriendly to consumers.

## GOING MOBILE

SugarSync offers mobile apps for Android and iOS devices, and we tested it on a Google Pixel running Android 8.0. The apps are responsive and share the desktop's menu interface, which creates a nice sense of consistency. One design complaint is that the left-hand menu is very wide and cuts off practically all of the information from the main view. The mobile app has nearly all the capabilities of the desktop counterpart, so you can access all the folders synced with your account and share files publicly or privately. We like that you can filter items based on the file name or modified date and that it allows you to directly upload files from your device. But instead of letting you directly download files from your folders, SugarSync confusingly requires you to export it to an app on your device instead.



**SugarSync lets you share files and folders with specific people or the public, but it doesn't offer anything unique.**

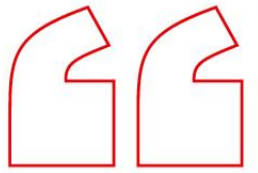


There are also a few mobile-specific features of note. For example, SugarSync can automatically upload any photos and videos you take with your phone. It also lets you designate files for offline access and create shortcuts for items that you regularly access. As with most other file-syncing apps, you can preview photos, music, and videos without issue. Most file syncing services have the same features as SugarSync.

### **SLICK AND SIMPLE**

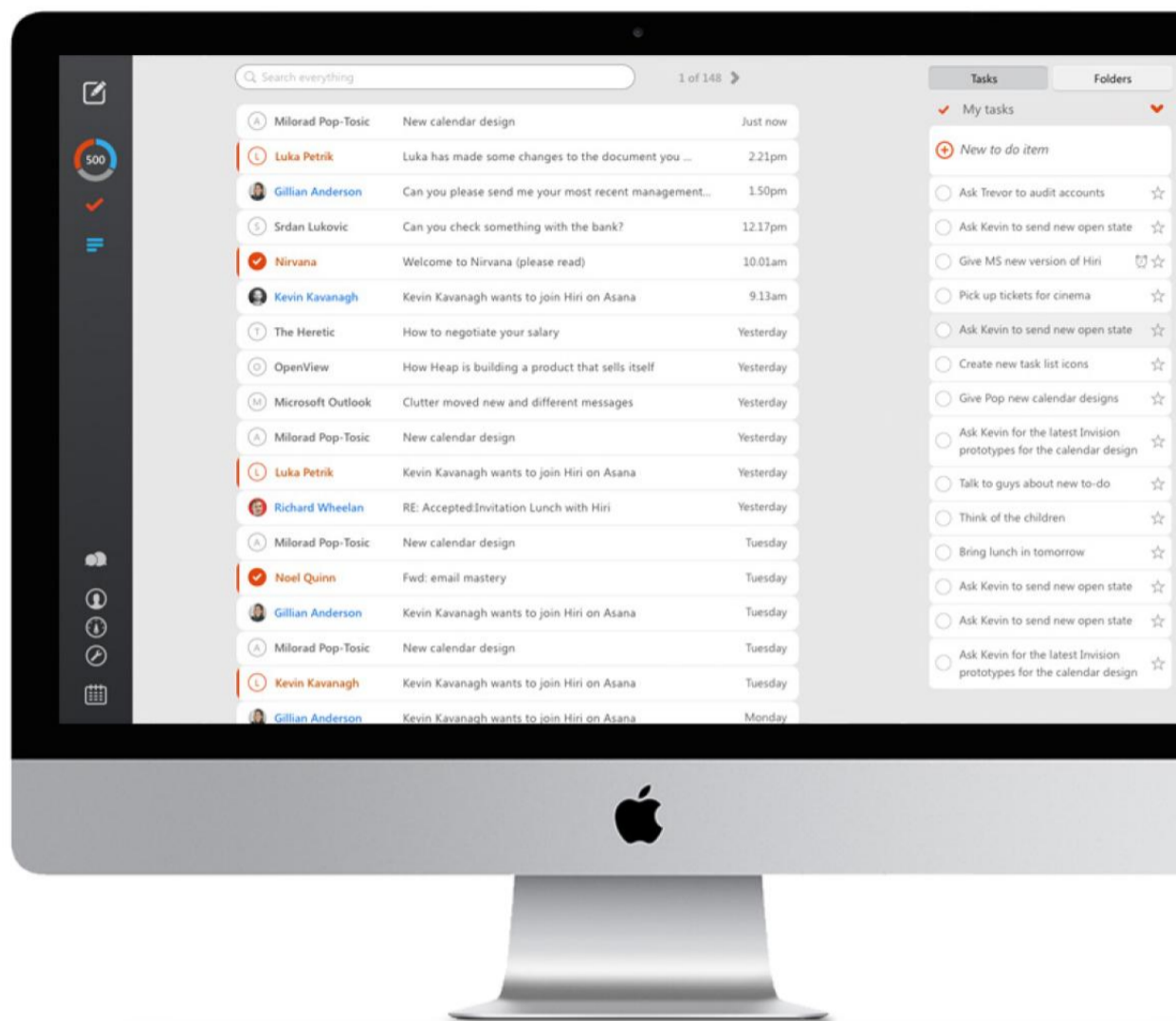
SugarSync is easy to use, has a great interface, and offers all the file-syncing basics. However, it hasn't kept pace with competitors, which offer more space for less money, advanced collaboration options, and perks like two-factor authentication. Finally, SugarSync's convoluted cancellation procedure leaves a sour taste in the mouth. The file syncing and cloud storage services space is competitive, and with major players such as Google, Microsoft, and Dropbox in the mix, SugarSync just isn't as compelling an option. We recommend Editors' Choice picks OneDrive, Google Drive, Box, and CertainSafe for your file syncing needs.

**MICHAEL MUCHMORE, BEN MOORE**



**Instead of letting you download files from your folders, SugarSync requires you to export it to an app.**





## Hiri Makes Email Less Horrible



For working people, email is still a necessary evil. A whole class of productivity apps has emerged to mitigate some of email's inherent problems, and Hiri is one such contender.

This downloadable app is an alternative interface for your Microsoft email account. It adds a wealth of tools designed to make email better. A dashboard with a timer discourages you from checking your inbox obsessively. A to-do list off to the right side of the screen holds synopses of messages that you've turned into tasks. Hiri's price is competitive, and its features are actually beneficial. It works with Microsoft email only, however, and it doesn't offer any mobile features.

**Hiri**

\$39.00



Hiri works only with Office 365; hosted Exchange on Windows, Mac, and Linux; Outlook.com, Hotmail.com, Live.com, and MSN.com. It doesn't support Gmail or other non-Microsoft accounts, which rules it out as an option for many. And to use Hiri, you have to use the Hiri app, which has a totally different interface and suite of tools than what's in Outlook or whichever app you use for email currently. Some email assistant services work within your current email app rather than replace it, so you never have to learn the ins and outs of a new interface, as you do with Hiri. The star among these is Sanebox, a PCMag Editors' Choice.

## PRICING

Hiri is an app that you download and run locally; it's available for macOS, Windows, and Linux. No matter which platform you use, you download the app for no charge and set it up with a free seven-day trial. No credit card is required for the test drive. If you choose to continue using Hiri after the trial, you must pay either \$39 for the year or \$119 to have access forever (or at least as long as the app is supported). Plainly put, that's a bargain. So I would recommend downloading Hiri, giving it a try, and locking in the deal if you like what the app does.

Hiri isn't the same as Sanebox, Boomerang, Nudgemail, or other email assistants—each does something slightly different. But it's helpful nonetheless to compare their prices to get a sense of how much is reasonable to pay for a service designed to improve email.

SaneBox offers three tiers of service. Snack, the first option, costs \$59 per year. Lunch costs \$99 per year. The most inclusive option, Dinner, costs \$299 per year. Sanebox offers flexible payments too, with options to pay monthly, annually, or every two years.

## Hiri

**PROS** Contains excellent features for making email better. Incorporates a to-do list and calendar. Competitive price.

**CONS** Supports Microsoft-based email only. No mobile apps. Requires using a new interface. Scheduling and reminders need improvement.



A year-long subscription to Boomerang for Gmail costs \$59.88 for Personal, \$179.88 for Pro, and \$599.88 for Premium. In each of these cases, Boomerang actually charges by the month, but I've calculated the annual cost for ease of comparison.

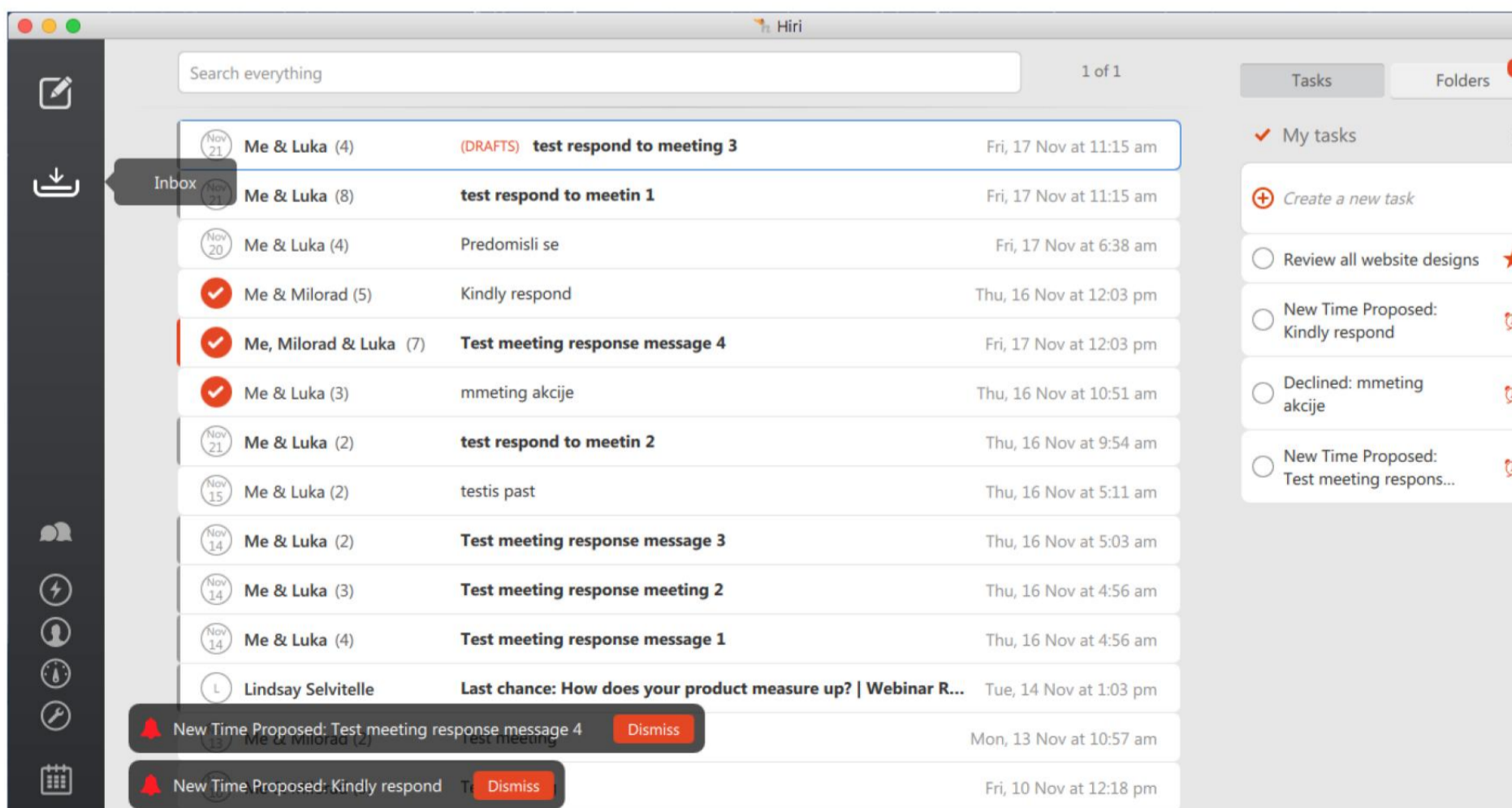
ActiveInbox, which turns your inbox into a to-do list, has four service tiers: Personal costs \$49.92 per year, Professional runs \$69.96 per year, and Team has a base cost of \$149.76 per year, which includes three accounts, with an additional \$49.92 per year tacked on for every additional account. The top tier of service is for enterprises, and that pricing is not public.

## WHAT DOES HIRI DO?

Hiri is an alternative app for managing email from Exchange, Office 365, or a Microsoft email account (such as Outlook.com, Live, Hotmail). You download and install it on any computer where you want to manage your email. There are no mobile apps at this time, which is a real drawback.



**Hiri is an alternative application for managing email from Exchange, Office 365, or a Microsoft email account.**



Once you set up the app and connect your account, Hiri pulls your email into the new interface. You can control how much of your email history to include—one month, three months, six months, a year, two years, or all of it.

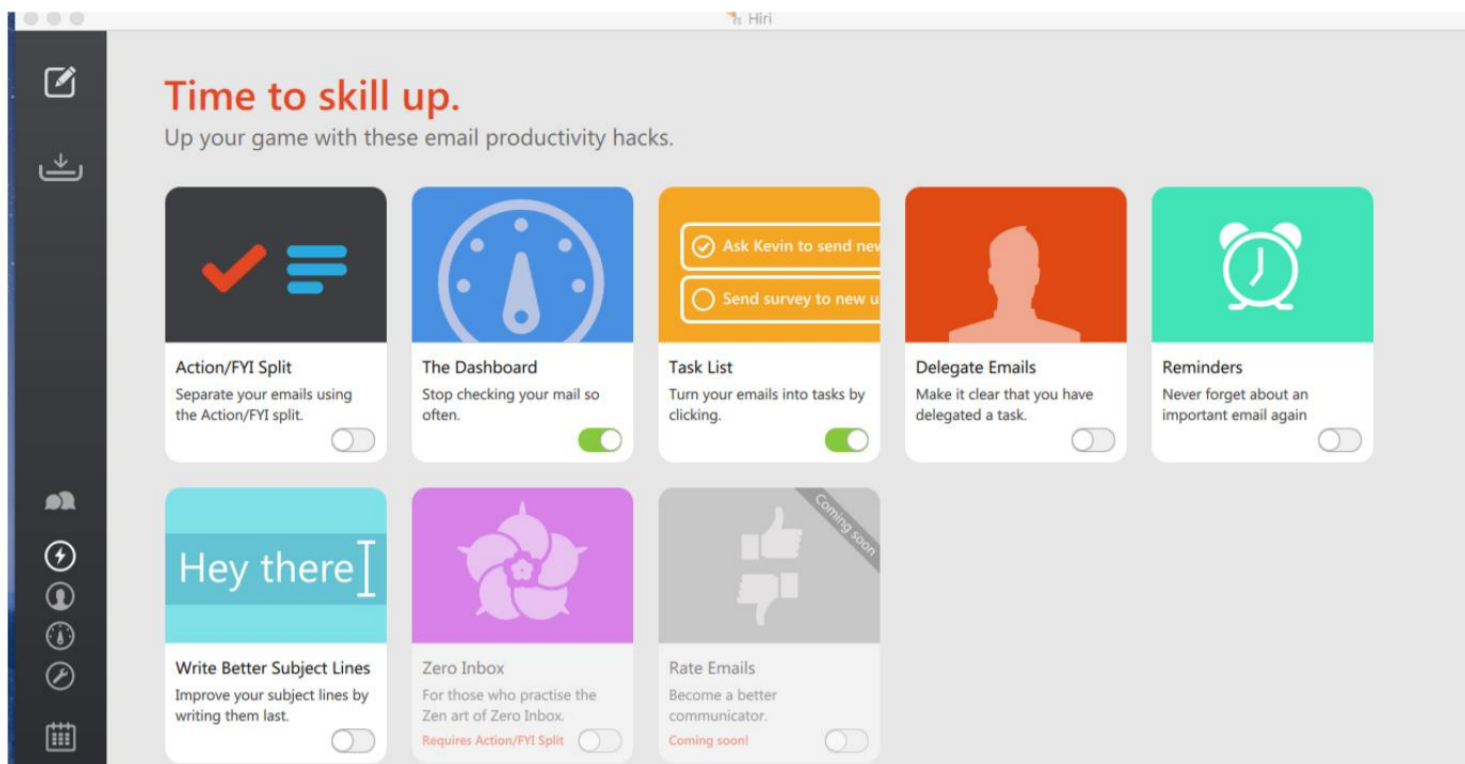
Before you get too far with Hiri, explore the Skills center, where you learn about different features and choose which ones to enable.

The first option, called Action/FYI Split, automatically filters emails sent to you on which you are CCed. Essentially, Hiri creates a new folder for you where it will sort messages that likely aren't of critical importance. When you receive a message in your Action (or primary) inbox that isn't important, you can drag and drop it into the FYI area.

The next option, Dashboard, discourages you from checking your inbox obsessively. When you enable the Dashboard and choose to display it, Hiri places a summary box over your inbox, which has a timer at the center that counts down from 30 minutes. During those 30 minutes, you should curb your desire to check your inbox. The Dashboard also shows the number of new messages received since you last checked, as well as the total number of messages received today. I like the feature, although I'd like it more if I could customize the length of time.

Another option is the Task List, which creates a short to-do list that appears to the right of your inbox. You can create a task by dragging and dropping any message from your inbox into the Task List. You can assign tasks a due date, set a reminder a few minutes before the due date, and add a note. As with the calendar entry limitations, you don't have precise control over the times set for task reminders and due dates; they must end in :00, :15, :30, or :45. When you create a task from an email, the email still exists in your account. Only the subject line and a few other pieces of metadata about the message carry over to the task.

Delegate Email is the next optional Skill to enable, and it works only when you have other colleagues who use Hiri. You can forward an email to a colleague and indicate that there is a task for the receiver. When you use the Delegate Email feature, Hiri gives you a new field where you can write out the task, which is worlds better than relying on the existing subject line.



Reminders is similar to what other email assistant apps call Snooze, although it operates slightly differently. In other apps, when you snooze an email, it temporarily disappears from the inbox until a time you set. In Hiri, the Reminders feature instead marks an email as unread for now and reminds you via a pop-up alert at a time you set that you should deal with it.

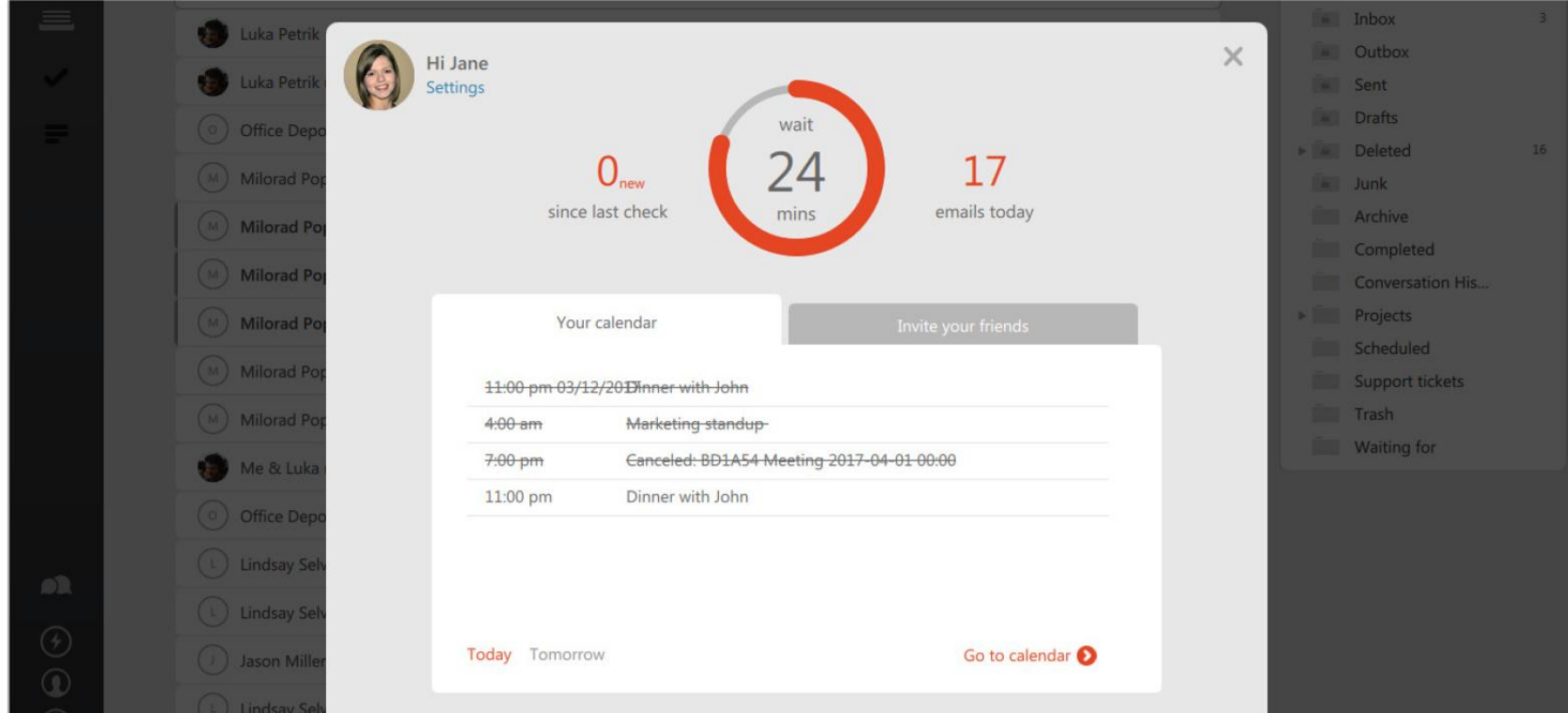
Speaking of alerts, Hiri's do not appear in macOS's notification center—which is intentional. Part of Hiri's purpose is to discourage email from distracting you, and that means fewer notifications. When it's time for a reminder, the most you see is the Hiri icon jumping in the app dock. All other notifications take place in the app and are subtle.

The next option is called Write Better Subject Lines. It flips around your composition window when you write a new email so that the subject line appears at the very bottom instead of the top. The idea is that you write down what you have to say first and only afterward figure out what the subject line should be. When you forget to write a subject header (which I imagine happens a lot when you first enable this skill), Hiri prevents you from sending the message and nudges you to write one.



**Part of Hiri's purpose is to discourage email from distracting you, and that means fewer notifications.**





A Zero Inbox skill simply encourages you to do something with incoming messages rather than leave them sitting in the inbox unread, even if you've already peeked at them and then marked them unread. And finally, a new feature on the horizon called Rate Emails is designed to allow Hiri users to give concrete feedback to other Hiri users, such as when someone writes emails that are way too long.

Hiri also has an integrated calendar and contact list, which sync with your Microsoft account. The search bar for both contacts and emails is speedy and accurate. The calendar can hold a lot of appointments without looking cluttered. One gripe, however, is that when you create a new appointment, the start and end times must end in :00 or :30. You can't have a meeting at 2:05 or 2:15, and you can't create an appointment that's less than a half hour long. For an app that's all about productivity, the lack of an ability to schedule short meetings seems like a miss.

## **WHAT DOES HIRI NOT DO?**

Hiri's features and tools work well and take little time to learn to use. The biggest change for many people who adopt Hiri is getting used to having an all-new interface. If you've spent the better part of the last decade becoming an Outlook guru, you're probably going to be reluctant to switch to Hiri simply because it has a few features that Outlook does not.

Some email assistant services don't have this problem. SaneBox and Boomerang are two examples. Both are services that you add to your existing email application. Boomerang is merely an add-on service to Gmail, and SaneBox also does its magic without asking you to leave the familiar world of your existing email app.

Meanwhile, Hiri doesn't have nearly all the features found in Outlook, especially the tight integrations with other Microsoft products. For example, from within Outlook, you can navigate to the calendar and schedule a meeting to take place over Microsoft Skype for Business, with dial-in conferencing instructions included automatically. Hiri is only worthwhile if you're not heavily invested in those kinds of existing integrations and features.

One feature I've always wanted to see in any email app is the ability to drag to the top of the window my most important messages. I just want a little holding cell for the VIP messages, some way to literally set apart from the pack the handful of messages that I absolutely must reply to or process today, or else! Some apps have come up with different ways to view starred messages so that they and only they are lumped together, but I still dream of a holding tank.

## CONCLUSION

Hiri brings valuable tools to email that can make it less horrible. But it's a feasible option only if you use a Microsoft-based email account and if you're willing to dive into a new application with a new interface. Those are two big ifs, highlighting why Hiri isn't for everyone. For those who do meet those two if conditions, the seven-day free trial is certainly worth the few minutes it takes to set up the app and explore what it can do. If you choose to continue using Hiri, the price is easy to swallow. If you use a different email system or don't want to give up your native environment, try Editors' Choice SaneBox instead.

*JILL DUFFY*



**Hiri doesn't have all the features found in Outlook, especially the tight integrations with other Microsoft products.**





## Fluenz: Excellent But Expensive Language Learning



Fluenz ranks among the best language-learning software. It distinguishes itself from other notable language apps, particularly Rosetta Stone, by using English instruction and teaching grammar. Videos of real instructors shepherd you through the course, which also includes all the interactive exercises one expects to find in language-learning software. These instructors make Fluenz feel more like a private class than a series of flashcards and games.

**Fluenz**

\$298.00



Although Fluenz is a wonderful alternative to other apps that don't include any instruction in the learner's native tongue, Rosetta Stone remains PCMag Editors' Choice among paid language-learning programs because it offers many more languages. Duolingo is the Editors' Choice among free programs. If you've tried those apps and didn't like them, take a look at Fluenz. It's refreshingly different, accurate, and well designed.

## **LANGUAGES OFFERED**

Fluenz has programs for seven languages: Chinese (Mandarin with Pinyin writing only), French, German, Italian, Portuguese, Latin American, and European Spanish. That's not a huge selection, but it does include some of the most popular languages English speakers study. Note that with the Mandarin program, you won't learn to read or write Chinese, as it uses Pinyin writing only, which is a romanization. You'll have to go elsewhere to learn Chinese characters.

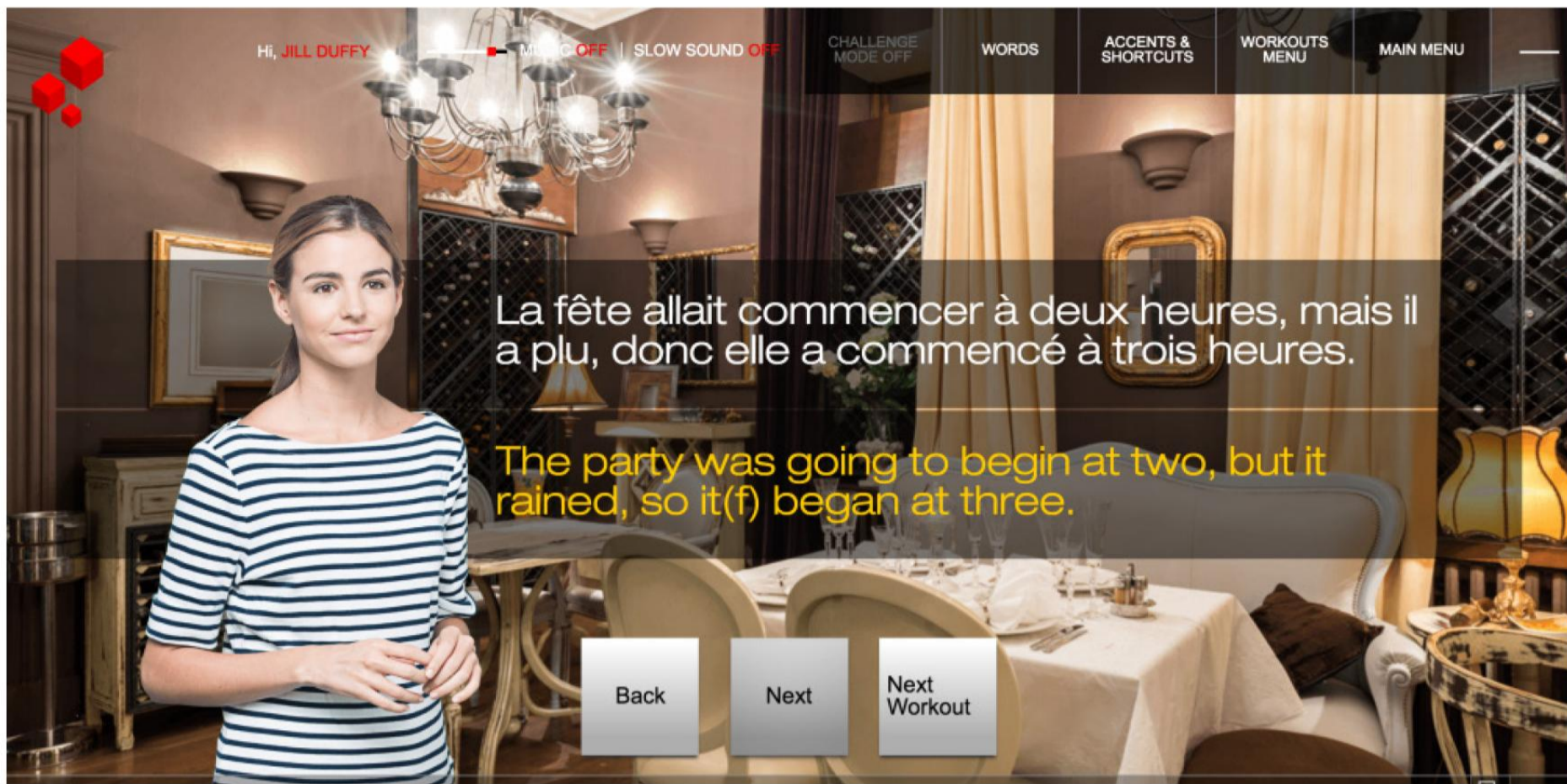
If the language you need isn't taught by Fluenz, plenty of other good programs are available. Duolingo has 22 fully developed courses, plus a few more in beta. (In counting languages, I exclude English programs as well as fictional languages.) Rosetta Stone offers programs for 28 languages. Transparent Language Online covers more than 100 languages, although the amount of material for languages that are not in high demand can be rather limited. Pimsleur, an audio-based program, has more than 50 language courses.

Another place to look if you're in a bind is Mango Languages, although I have a hard time recommending it, because the app is painfully repetitive and slow. Mango has programs for 68 languages, however, and a few of them, such as Tamil and Javanese, are nearly impossible to find elsewhere.

## **Fluenz**

**PROS** Suited for beginners. Thorough. Excellent core content. Full-screen design prevents distractions during lessons.

**CONS** Limited number of languages offered. Expensive. Only basic voice recording. No live web classes.



## FLUENZ PRICE AND PACKAGES

How much you end up paying for Fluenz varies based on how many levels of a language course you purchase. The most comprehensive package you can buy is Levels 1 through 5, which costs \$368. Note that the Mandarin course has only three levels, so the most you can spend learning Chinese with Fluenz is \$298. For any of the languages, Level 1 on its own costs \$177. If you want Levels 3 to 5 only, that package costs \$310.

With any of the packages, you can choose to buy physical DVDs, download the program to run it locally, or do all the coursework in a web browser. The price is the same however you choose to access the material. Access to materials via Fluenz's iOS and Android apps are included in the price.

Compared with other plans' costs, Fluenz's prices are a little high but not wildly so. They're still in line with what other programs charge, and the value is good. Rosetta Stone offers good value as well. It also has options for either a recurring subscription (\$179 per year) or a one-time purchase of the software on CD-ROM (Level 1 is \$124; Levels 1 to 5 cost \$249).



Other online language-learning programs charge roughly the same amount for a similar amount of content. Living Language Platinum, for example, costs \$179 for a one-year subscription. Transparent Language charges \$199.95 for a one-year subscription.

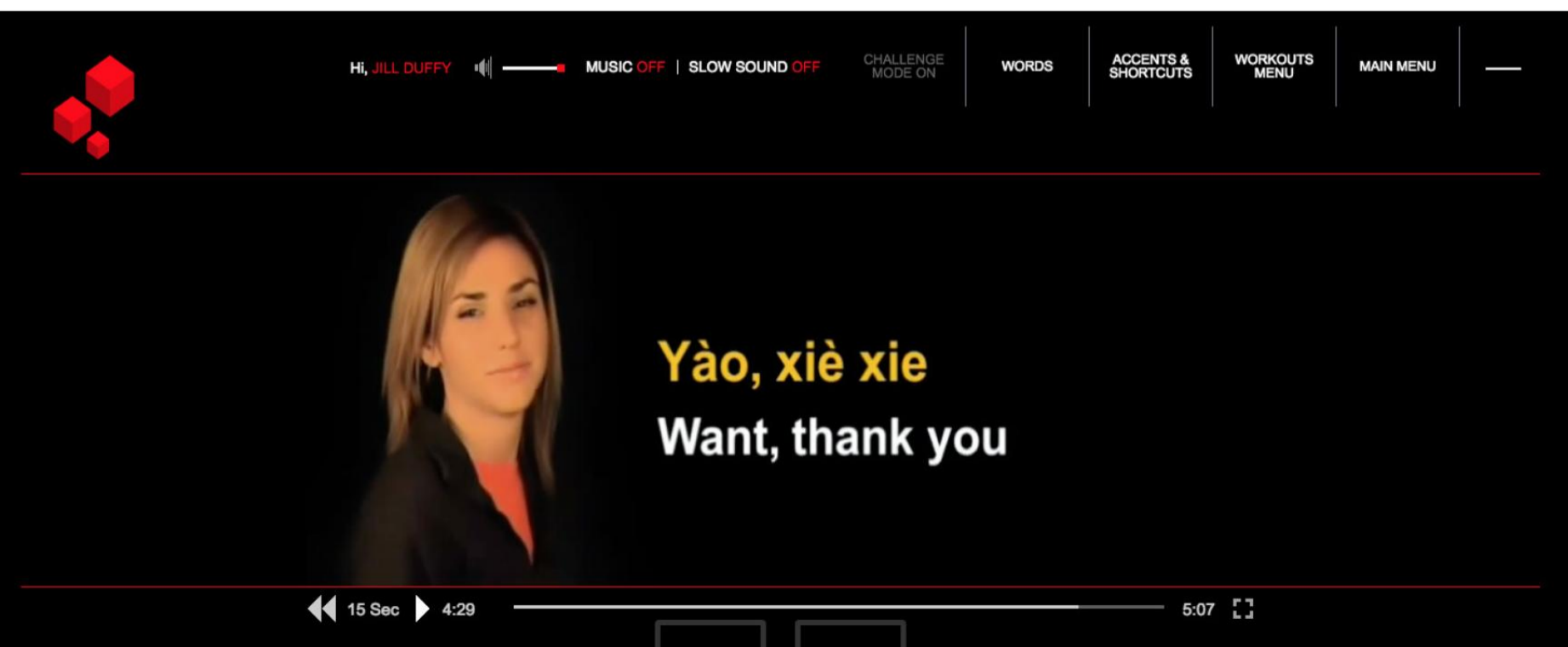
Finally, if you're on a budget but need full-featured language-learning software, check your public library. Many libraries in the US and Canada provide patrons with access to Mango, Transparent, and even Rosetta Stone. Usually, you can access the materials from your home computer by simply authenticating your library membership online, making it an especially convenient option.

## GETTING STARTED WITH FLUENZ

To test Fluenz, I looked at the French lessons. When I first learned about Fluenz a few years ago, I tried learning a bit of Mandarin Chinese, which was certainly more challenging. That experience gave me a good understanding of what's included with the Pinyin instruction.

To give you an idea of how much content is inside Fluenz, Mandarin Levels 1 and 2 have 45 lessons plus an introduction and conclusion. French level one has 30 lessons. A lesson took me anywhere from 35 to 50 minutes to complete. They're meaty, although sometimes they're a little slow going. If you study consistently, you might spend four to six weeks completing a single level.

Fluenz works extremely well for beginners who want to learn a handful of useful phrases quickly. More experienced speakers may have trouble figuring out where to start. I moved ahead in French (I had taken a classroom French course some years ago) and found I could understand most of it, but I had a hard time spelling, which left me struggling through some of the interactive exercises.



The screenshot shows the Fluenz language learning interface. At the top, there is a navigation bar with a red logo on the left and several menu items: "Hi, JILL DUFFY", "MUSIC OFF", "SLOW SOUND OFF", "CHALLENGE MODE ON", "WORDS", "ACCENTS & SHORTCUTS", "WORKOUTS MENU", and "MAIN MENU". Below the navigation bar is a video player. The video shows a woman with long brown hair speaking. The text "Yào, xiè xie" is displayed in yellow, and "Want, thank you" is displayed in white below it. At the bottom of the video player, there is a progress bar showing "15 Sec" and "4:29", and a timestamp "5:07" with a full-screen icon.

You can jump around Fluenz at will, so if the lesson seems beyond you or too simple, you can easily back up or move forward. Not all language courses let you do that. With Duolingo, for example, you have to progress sequentially or test out of levels.

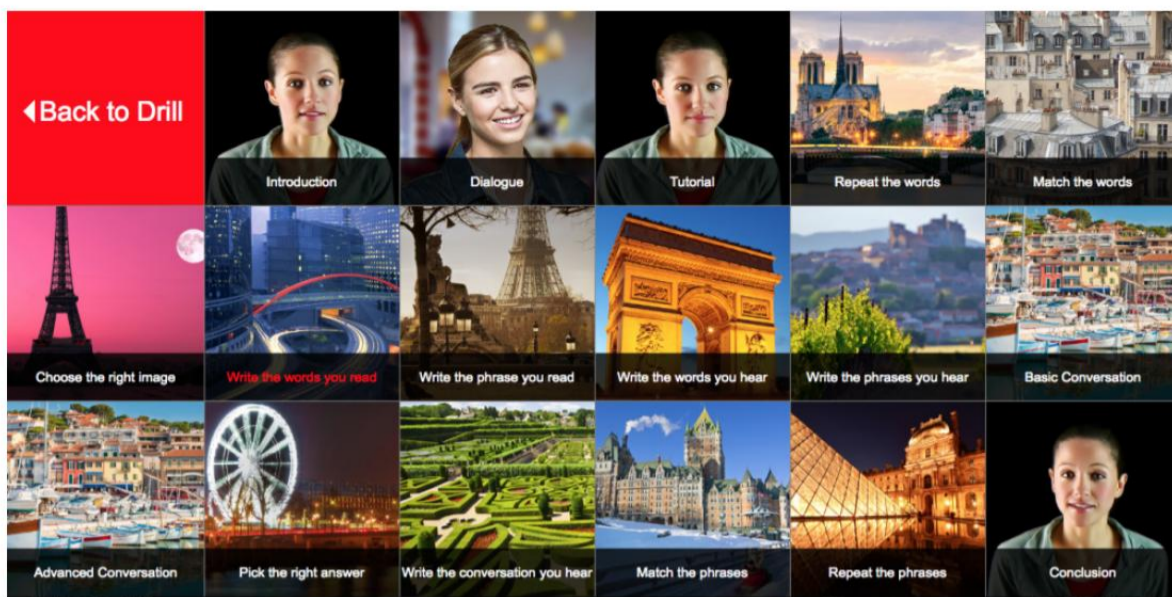
Fluenz pushes writing a little more than speaking, especially in the early units, but overall it blends listening, reading, speaking, and writing well. Much of the content comes in the form of interactive exercises, but there's also a sizable portion of learning from instructors who appear in videos to explain grammar, what words mean, and other aspects of the language. In the Chinese course, for example, the videos explain tones, as well as how to answer yes/no questions in the language, which is quite different from how English speakers do it. That's the kind of material that's difficult to get across in a program where there's no English instruction.

For the speaking portions, Fluenz doesn't have an advanced speech-recognition system, but it does have recording and playback capabilities. Some other language-learning software programs use speech waveforms to help with pronunciation: You record yourself speaking, and the app generates a visualization of your speech, which you can compare to that of a native speaker saying the same thing. I don't find waveforms especially useful, because I don't know how to change my speaking form by looking at lines on a screen. If you're keen on waveforms, Rosetta Stone and Transparent Language both have them. Transparent has a neat feature that highlights the part of your waveform where you're having trouble, which allows you to at least listen closely during the playback to the highlighted parts that you need to improve.



**You can jump around Fluenz at will, so if the lesson seems beyond you or too simple, you can easily back up or move forward.**





**At first, the videos feel too slow, but when you get into difficult content, the pacing gives you time to absorb concepts.**



## **PUTTING FLUENZ TO THE TEST**

The programs begin with a welcome video. An instructor appears on screen to explain how Fluenz works in the most general sense.

The videos are staged and scripted. They're very clear, and the production value is high. At first, they feel too slow, but when you get into difficult content, the pacing gives you time to absorb concepts. Even so, at times the videos feel tedious—they're a little too staged. But the material is excellent, and there's real value in seeing the face of a person who is explaining a concept.

For pronunciation, I like being able to see someone's lips and throat move. I also like being told what a word really means, rather than guessing its meaning from context alone, which is sometimes a problem in Rosetta Stone. For example, you might understand in Rosetta Stone that some word is the opposite of "child," but whether it means "adult" or "person" or something else is impossible to know.

Fluenz isn't the only program to provide an instructor. Rocket Languages and Pimsleur have something similar, although in those courses, the instructor-driven lessons are audio only (except in Rocket Languages' American Sign Language course).



**Fluenz recreates aspects of classroom learning in its foreign language instruction. It's an excellent app, but it's expensive and only offers a few languages.**

Structurally, Fluenz is very clear. Progress markers show exactly where you are and what you've completed. You're meant to move through content sequentially, though you don't have to.

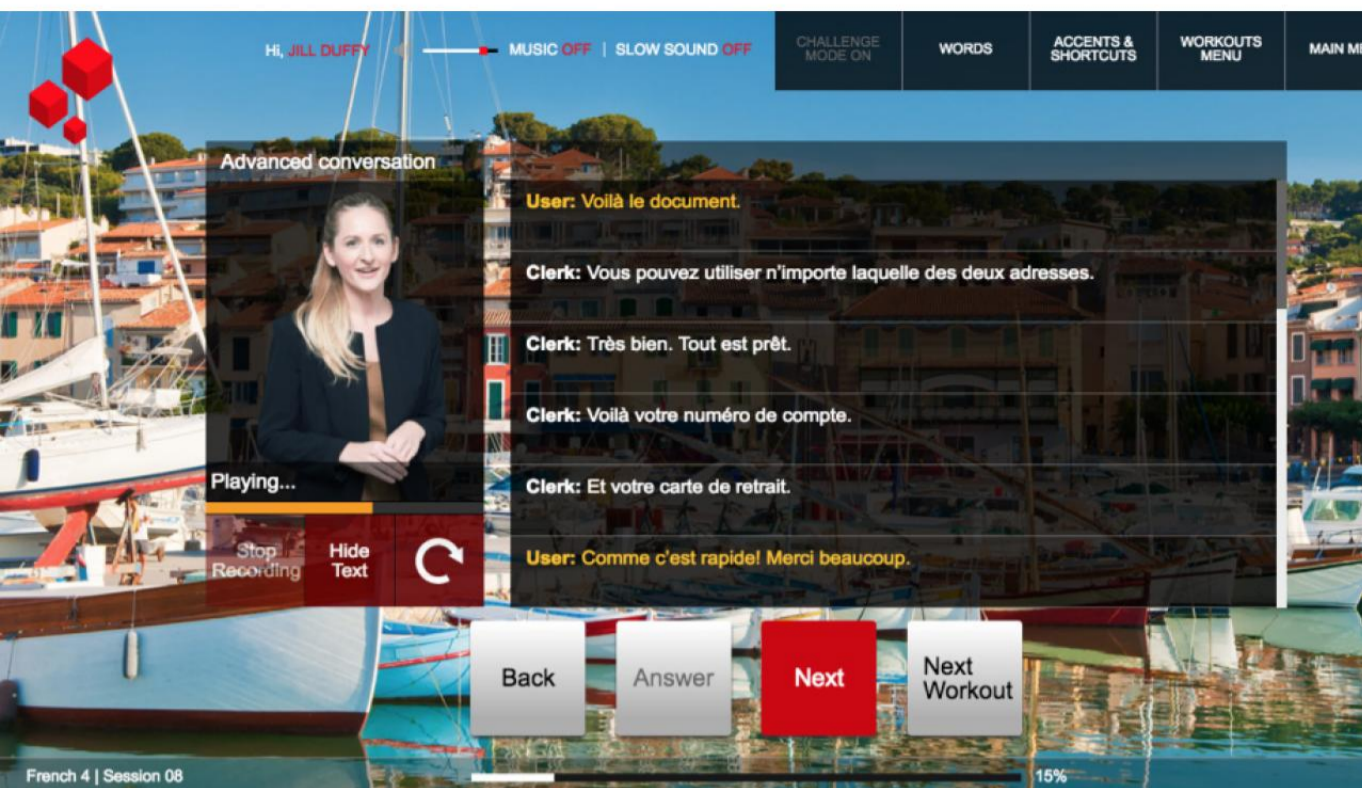
## **WORKOUTS**

Fluenz starts most of its exercises, or workouts, with a dialogue that the learner is told to play three times: once with subtitles in both the new language and English, once with the subtitles in only the new language, and once with no subtitles at all. Then the words and phrases you heard from the opening dialogue are used in the writing, speaking, and listening exercises that follow.

While Fluenz calls its exercises workouts, they are no different from the exercises found in most other polished language-learning software packages. You might, for example, hear a word or phrase and have to type it or translate it. Or you might see a list of words, phrases, or sentences in two languages and have to match up the translations. The real difference in Fluenz is that after doing some of these exercises, you watch a video with your guide, who breaks down what you've learned and explains it further.

Fluenz has mastered the art of repetition. When the program introduces a new word or concept, you'll see, hear, and write it many times over in both the current lesson and future lessons. For beginners, the drill-and-kill method is highly effective, as long as you study consistently.

The program focuses on teaching words and phrases that would be most useful for someone who is not fluent in the language, which I appreciated. For example, you learn the word for "want" and how to conjugate it very early.



**Dialogues are a staple of the Fluenz program. They use static images rather than videos.**

The kinds of words you learn in the early stages of Fluenz are completely different than what's in Rosetta Stone. Rosetta Stone teaches through deductive reasoning: For example, you might learn to say, “the boy eats rice,” “you eat rice,” and “the cat eats rice.” Then you’ll see a picture of a dog eating rice and hear the words for that sentence. You’ll quickly figure out which word means “dog,” but you might also wonder when you’ll ever actually need to say, “the dog eats rice.” In both Rosetta Stone and Fluenz, you learn similar concepts, but Fluenz does it with words and phrases you’re likely to use.

In typing exercises, Fluenz is precise in that it requires you to spell everything exactly correctly, accent marks and all. It is not forgiving of typos or small mistakes. In some exercises, you can’t even get away with leaving the first letter of a word or sentence lowercase. Every letter must be spot-on or the exercise is marked wrong and you have to try again. It’s also not always clear where you went wrong, though, as Fluenz doesn’t provide good feedback. Duolingo is more lenient. I’d like to see a little more guidance from Fluenz in helping learners fix errors, such as underlining or highlighting the letters that are incorrect.

There is some unnecessary clicking of Next buttons; I'd prefer to see a choice for autoplay. Transparent Language handles this well, giving you an autoplay option anytime it's relevant. Other than having to hit Next from time to time, the workouts move at a good pace, though they're long. Some of the lessons took me a full 50 minutes to complete. In Rosetta Stone and Pimsleur, a lesson typically lasts about 30 minutes.

A few things you won't find in Fluenz are games and live web classes. I don't miss the games, but classes can be a valuable addition to language-learning software. If you want to be able to meet with a human instructor to ask questions and practice generating language rather than just repeating what you hear, go with Living Language Platinum or Rosetta Stone. With both apps, you can sign up for optional classes held by video conference. Living Language has especially good classes. Rosetta Stone's are useful, but they mirror the content of the software a little too closely.

## **AMONG THE BEST**

If you are a beginning student of Spanish, French, German, Mandarin, Italian, or Portuguese, Fluenz provides thorough and enjoyable training. The program contains enough high-quality content to justify the high price, as long as your heart's not set on voice-recognition tools and a live web class component. You can come away from Fluenz with a solid basic understanding of a new language and a number of useful words and phrases that you can piece together to create new meaning.

Like Editors' Choice Rosetta Stone, Fluenz can help you build a solid foundation in grammar, pronunciation, reading, and writing. Rosetta Stone has programs in many more languages, though, while Fluenz only covers seven languages. If Fluenz has the language you need and you don't like Rosetta Stone, definitely give it a try. I also suggest Duolingo, our other Editors' Choice, which is free.

**JILL DUFFY**

**VR GETS  
REAL  
IMMERSIVE  
STORYTELLING  
IN JOURNALISM**

BY TERRY SULLIVAN



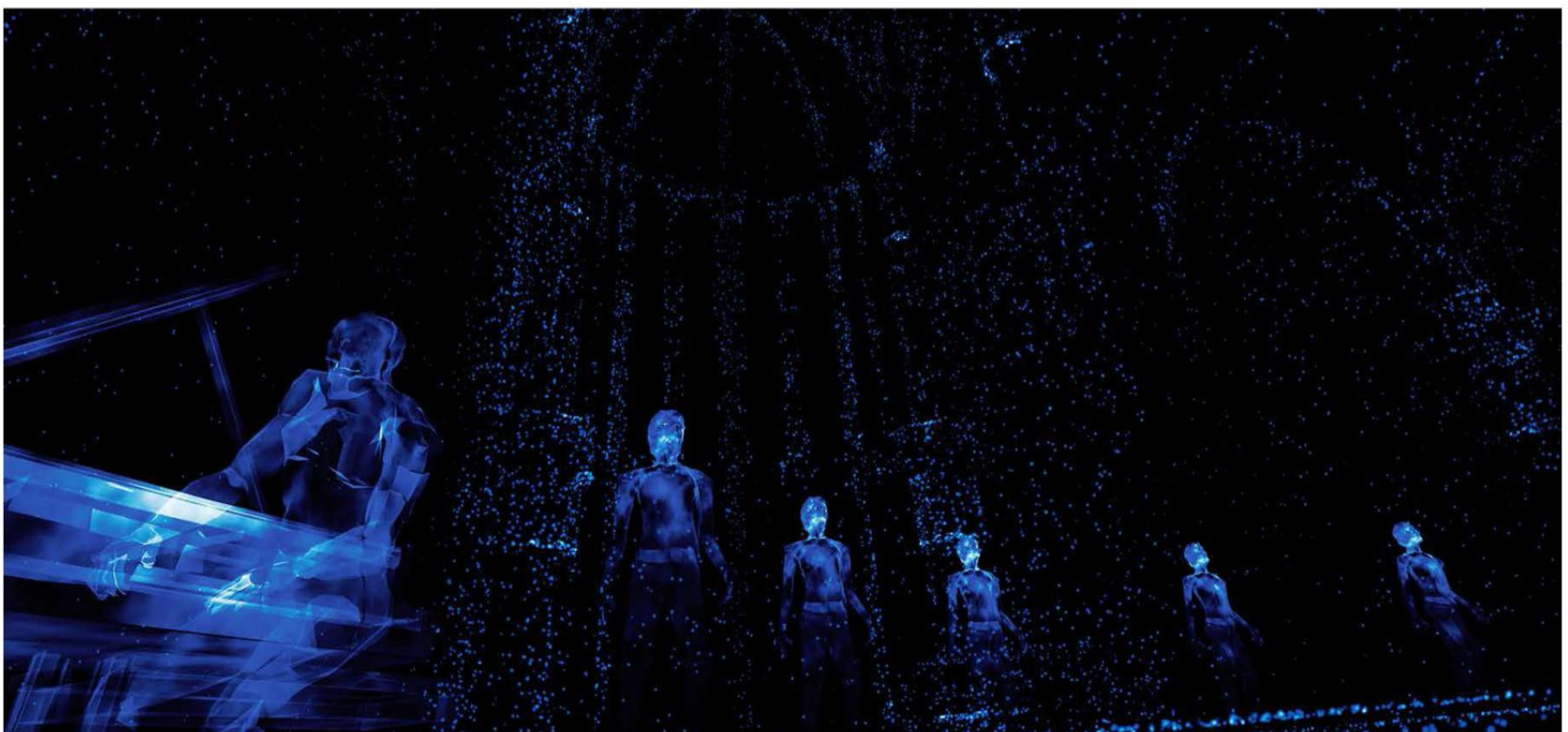
I'm standing in a dark room. I hear rain falling outside. A man says, "It was raining. And I stood for a few minutes lost in the beauty of it. If only there could be something equivalent to rain falling inside. Then the whole of a room would take on shape and dimension." Suddenly, the sound of the rain is coming from within the room.

As I gaze around, I see dim shapes of ordinary household items—a pot, a pan, a bowl. They mysteriously change color and then transform into a slow burst of iridescent light. I can almost feel the raindrops. The man says, "Why should this experience strike one as being beautiful? Cognition is beautiful. It's beautiful to know." The rain becomes a downpour, and the sound blends with beautiful, melancholy music.

This may sound like I'm dreaming (or hallucinating). But it's an attempt to describe what I saw and heard in "Notes on Blindness," a powerful virtual reality (VR) "experience" (the term for these 360-degree interactive movies). It accompanies a documentary on the writer and philosopher John Hull as he began to lose his sight.

## **A NEW KIND OF VR**

"Notes on Blindness" is just one example of how VR is taking off in a new direction. It's a turn from the more commonly known fictional VR worlds in gaming, which uses 360-degree video and computer-generated graphics (CGI) to immerse you in, say, an ethereal landscape on a make-believe distant planet or a highly detailed reconstructed set of your favorite science-fiction movie.





That's not to say the technology used in "Notes on Blindness" is different from what's used to create entertainment VR: In fact, it's very much the same (360-degree video, CGI, and so on). The aim is not to escape the real world, though, but to feel more engaged with it. "Notes on Blindness" gives you a sense of what it feels like to be John Hull, as his eyesight diminishes and then vanishes altogether.

These types of VR experiences are beginning to appear more frequently. What if you could dive under the ice in Antarctica and swim next to a seal? Or see the devastation and hear the falling bombs in a city that's been ravaged by war, such as Aleppo, Syria? Or move alongside refugees fleeing their homes to avoid persecution? These are some examples of how journalists, creators of documentary movies, and other non-fiction storytellers are beginning to experiment with VR.

Some of the the most ambitious endeavors in VR and 360-degree video have come from *The New York Times*. In 2015, the paper sent Google Cardboard headsets to more than a million subscribers to use with their smartphones. "That was really one of the watershed moments in VR in terms of exposing a broad group of people who probably have not seen anything in that medium," said Adam Sheppard (pictured at right), CEO and co-founder of 8ninths, a Seattle-based virtual- and mixed-reality studio. In late 2016, *The New York Times* introduced a feature called The Daily 360, which posts a new 360-degree video and VR experience every day.



## **IMMERSIVE STORYTELLING**

Not surprisingly, *The New York Times* believes immersive virtual journalistic experiences can make a huge impact. According to Marcelle Hopkins, co-director of virtual reality and deputy director of video at the *Times*, "We see virtual reality, as well as 360 video, AR, MR, and whatever comes next, as part of the same spectrum, which is immersive platforms. We see that as part of the future of how people consume media, including journalism."

For Hopkins, as well as many others in this emerging field, it's the immersive quality that holds the biggest draw. But for journalism, documentaries, news, and other non-fiction genres, VR is relatively new territory. "It's a very young medium," said Hopkins, "and we're just learning how to use it. As we're telling stories in this way, we're learning a lot each time we do it."

"Cutting yourself off from the rest of the world in a headset is a very immersive experience," explained Jessica Lauretti, vice president of RYOT Studio Oath's creative studio, which creates VR content. She noted that VR can be powerful for storytellers, since it forces the viewer to be engaged. "You can't see anything else. So it does have this ability to transport you to another place, another country, another time."

In 2016, *The Guardian* used this isolating quality of VR to great effect in "6 x 9," which aimed to replicate the experience living in solitary confinement in prison.

"We're always looking at new ways to express our journalism at *The Guardian* and find ways to innovate," said Francesca Panetta, executive editor, virtual reality, Guardian News & Media. "Virtual reality was a form we had been thinking about and wanted to experiment with and simultaneously, editorially at *The Guardian*, we had been talking about solitary confinement. In '6 x 9' the two things came together: VR is a medium that is all about space, and solitary confinement is too, albeit a small and very undesirable space. It also is a piece about psychology: the impact on the mind when you are in isolation. We also wanted to portray the possible effects of this, such as blurred vision, audio, and visual hallucinations. With all this considered, it felt obvious that '6 x 9' would be a good story for the form."



**Jessica Lauretti**

Panetta also wanted to engage viewers in other ways, including interactive elements—although technically, she said, that was difficult to implement. “One scene has hot spots which you trigger by looking at them,” said Panetta. “This sounds easy, but it wasn’t.”

Another consideration was time, said Panetta. “‘6x9’ is a piece about being in a space and having very little to do, with minimal interaction for days, months, years, even decades. We needed to consider how we could make a piece that wasn’t deadly boring and [in] which people didn’t take the headsets off halfway through.”

“

**VR is a medium that is all about space, and solitary confinement is too, albeit a small and very undesirable space.**

”



A scene from “6x9”

Actually, “6 x 9” is the opposite of dull—it’s riveting and produces a strong visceral reaction. I had the opportunity to try this experience using an Oculus Rift VR headset. During the roughly ten-minute piece, I was moved by hearing the voices of other prisoners outside my “cell” while I looked at the plain space around me, which contained a bed, a bench, a tiny stool, a combination toilet and sink, and a few books and magazines. In such a sparse setting, the objects took on the gravitas of a Chardin still-life.

During the experience, a variety of statistics, quotes, and phrases from former inmates, guards, and even psychologists, are superimposed on the walls. At one point, I read, “Solitary confinement alters neural and psychological states” and “Even short-term isolation may alter brain activity.”

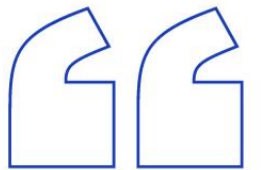
I began to feel as though I were floating. As I virtually hovered near the ceiling of the cell, my “vision” (actually, the video itself) started to blur. This part of the experience is meant to give the viewer the feeling of disorientation and hallucinations that result from being kept in solitary confinement. It’s a powerful and unsettling effect.

“Many people have told us that it demonstrates in nine minutes what they can’t begin to express in words,” said Panetta.

## **NONLINEAR STORYTELLING**

RYOT Studio Oath’s Jessica Lauretti noted this first-person, point-of-view quality enables viewers to feel as though they’re inside the story in a physical way, which is often referred to as the “sense of presence.” That’s the quality that makes you feel like you’re truly there on top of Mount Everest or swimming under the ocean. And because a viewer can employ gestures or body language, such as a turn of the head to view different scenes or trigger actions, there’s a profound shift in how the story is told. “You’re in control of what you see,” said Lauretti, “and what information you have access to.”

Niko Chauls, former director of emerging technology at USA Today Networks, who has led many of the company’s VR and AR teams, concurs with Lauretti on the importance of choice and interactivity in VR, although he noted that it’s difficult to do for those trained in traditional media.



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“Giving control to consumers can be pretty scary to traditional storytellers,” said Chauls, “but it can be powerful if it’s embraced.”

Chauls and his team tackled restructuring how a story is told in a project *USA Today* published this past summer called “USS Eisenhower VR.” “It was our first large-scale, nonlinear, immersive storytelling experience,” said Chauls.

“USS Eisenhower VR” documents life aboard the ship while it underwent sea trials before being deployed to the Middle East. Viewers first explore a large-scale model of the ship, where they can click on various hot spots and content on the model’s deck. They can also choose the content they want to explore, which includes a variety of photo slideshows and 360-degree video.

Some videos nearly convince you that you’re taking off or landing on the deck of the carrier via jet or a helicopter and can produce a very real bout of vertigo. Others are less dramatic—you’re on the bridge and listening to an interview with the captain, or below deck with crew members.

“

**Some videos nearly convince you that you’re taking off or landing on the deck of the carrier via jet or helicopter.**

”



Scene from “USS Eisenhower VR”

“It essentially documents life aboard a nuclear aircraft carrier. But it’s really meant to be explored and discovered, instead of watched from beginning to end,” said Chauls.

## **SOUND MATTERS**

VR teams are experimenting with other elements, in addition to nonlinear narrative structures and immersive 360-degree video. One is audio.

“As any filmmaker knows, audio is extremely important. In VR, it is just as—if not more—important, because it is one of the ways people understand the space,” noted *The New York Times*’s Hopkins. “We can use spatial audio so that we can place sounds in space, so that when they hear something, they can hear it coming from a specific direction.”

Zahra Rasool (pictured below), editorial lead for Contrast VR, an immersive-media studio that creates VR experiences for Al Jazeera, said, “Audio gives you the sense of scale and location in VR. We use spatial audio in all of our productions and can convey a sense of environment and a sense of space. As a storyteller, it’s powerful when you feel you need someone to be there in order to understand the gravity of the story and the situation.”

“Sensations of Sound,” from *The New York Times*, is a powerful example of using spatial audio to help tell a story. This VR creation is centered on Rachel Kolb and her experience of music. Kolb had been profoundly deaf her whole life—until a few years ago, when she was 20 and underwent surgery for cochlear implants, which gave her partial hearing.



Although Kolb, who also narrates the story, hadn't been able to hear music for most of her life, she had still been able to experience it. As a child, she played piano and guitar. "She saw and felt music," said Hopkins, "even in ways that we as hearing people don't." But when Kolb first heard live music, "It was a jarring experience for her," said Hopkins, since her previous concept of music was far less dynamic.

"Sound in this piece is obviously important," said Hopkins. "We were able to use spatial audio as well as an interesting sound design to express some of the things that she is talking about in conveying her story."

At the end of "Sensations of Sound," Kolb asks, "Can you hear the music? Even though I now can, I think this question misses the point. Music is also visual, physical, tactile. It weaves its rhythms through our lives. I believe music becomes more remarkable when we experience it with our whole bodies."

Other elements of multimedia that are being explored in VR projects are motion graphics and animation elements. One of Contrast VR's first experiences for Al Jazeera, "I Am Rohingya," chronicles the life of Jamalida, a young woman from Myanmar who now lives in a refugee camp in Bangladesh. In one section, Jamalida describes her persecution in Myanmar. Since there was no footage of Jamalida in particular, Rasool said, "The best way to represent those memories and recollections was through digital animations." By focusing on just one point of view, Rasool and her team generated a powerful sense of empathy.



A scene from "I Am Rohingya"

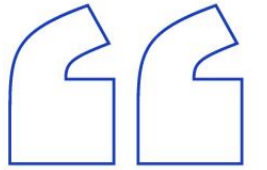
## THE FUTURE OF VR JOURNALISM

Nonfiction VR hasn't fully arrived just yet. Lauretti, Chauls, and others note that one challenge is in demand and distribution. Many publishing and news organizations are still struggling with mainstream digital platforms and how to monetize those more accessible forms of media. And because VR projects generally require lots of people and time to produce, they're just too expensive for most outlets.

“Right now, the biggest challenge is about reach and scale,” said Lauretti. “Comparing it to the expense of VR, written journalism is really quick and really cheap. And you can get massive scale with written journalism... On the distribution side, you also have a problem. Headsets aren't mainstream yet. The average consumer doesn't have the Microsoft HoloLens right now, or even the Samsung Gear [VR]. We haven't seen the mainstream adoption yet.”

But like most digital technology, VR will doubtless become cheaper and more widely adopted. Sheppard predicted, “What you're going to see, in the short-term, is 360-degree video becoming just another format that consumers will come to expect for media consumption.” Platforms including Facebook and YouTube already support 360-degree video.

Longer-term, Sheppard sees some really interesting opportunities around video and cloud-based technology: “If you can imagine a future where most people are wearing a small camera, and it's constantly gathering information (storing it both locally and to the cloud), I think citizen journalism will become one of the primary ways we will be involved in the news.” If we're all carrying connected cameras, we have the opportunity to be VR journalists ourselves.



**Because VR projects generally require lots of people and time to produce, they're just too expensive for most outlets.**





But Sheppard also noted that the public, media, and government will need to be vigilant in paying attention to the negative ramifications of VR. For example, he suggested that the confusion between fake news and real news may increase.

“We can already create highly realistic faces that appear to be saying any line you want them to say. And you wouldn’t have any idea whether that was real or not,” said Sheppard. “It may become difficult to unwind what’s real from the unreal. How do we think about authenticity and authoritative sources when almost everything can be fabricated?”

Despite its challenging aspects (and sensitivity concerns—think back to the controversy surrounding Mark Zuckerberg’s VR “tour” of storm-ravaged Puerto Rico), some see VR journalism as a possible way to solve current problems in the media and journalism.

“VR journalism really has the potential to rebuild trust between an audience and a reporter, because of the nature of 360-degree video capture,” said Chauls. “You are removing layers of interpretation or layers of gatekeeping between the audience and the event.” That is to say, with 360-degree video, there’s generally very little editing other than the length of the video. So viewers might be less skeptical that the photographer or journalist is leaving out important information or footage.

Lauretti suggested something similar: “I would argue that every time [traditional] photographers put a camera up to their eye, they are cropping out or including just certain parts in a particular photo or video.” So there’s already an edit taking place at the beginning of shooting a traditional video or photo. “In a way, 360-degree video actually democratizes that process. Because we’re actually not leaving anything out. We’re actually showing you everything.”

This could be one of the most important ways VR can empower the public. “In a way,” says Lauretti, “it almost leaves nothing to the imagination, but gives you, as the viewer, the opportunity to really see and take away whatever you want.”

# How to Buy, Sell, and Keep Track of Bitcoin

BY ROB MARVIN



**W**e're deep in the throes of Bitcoin madness. The original blockchain-based cryptocurrency's more-than-tenfold price increase over the past year has thrust it into Wall Street's face. Notable investors have been cashing in, as the finance sector wades into Bitcoin futures trading. At the same time, consumers and everyday investors are trying to figure out what Bitcoin actually is and how they can get in on the frenzied action.

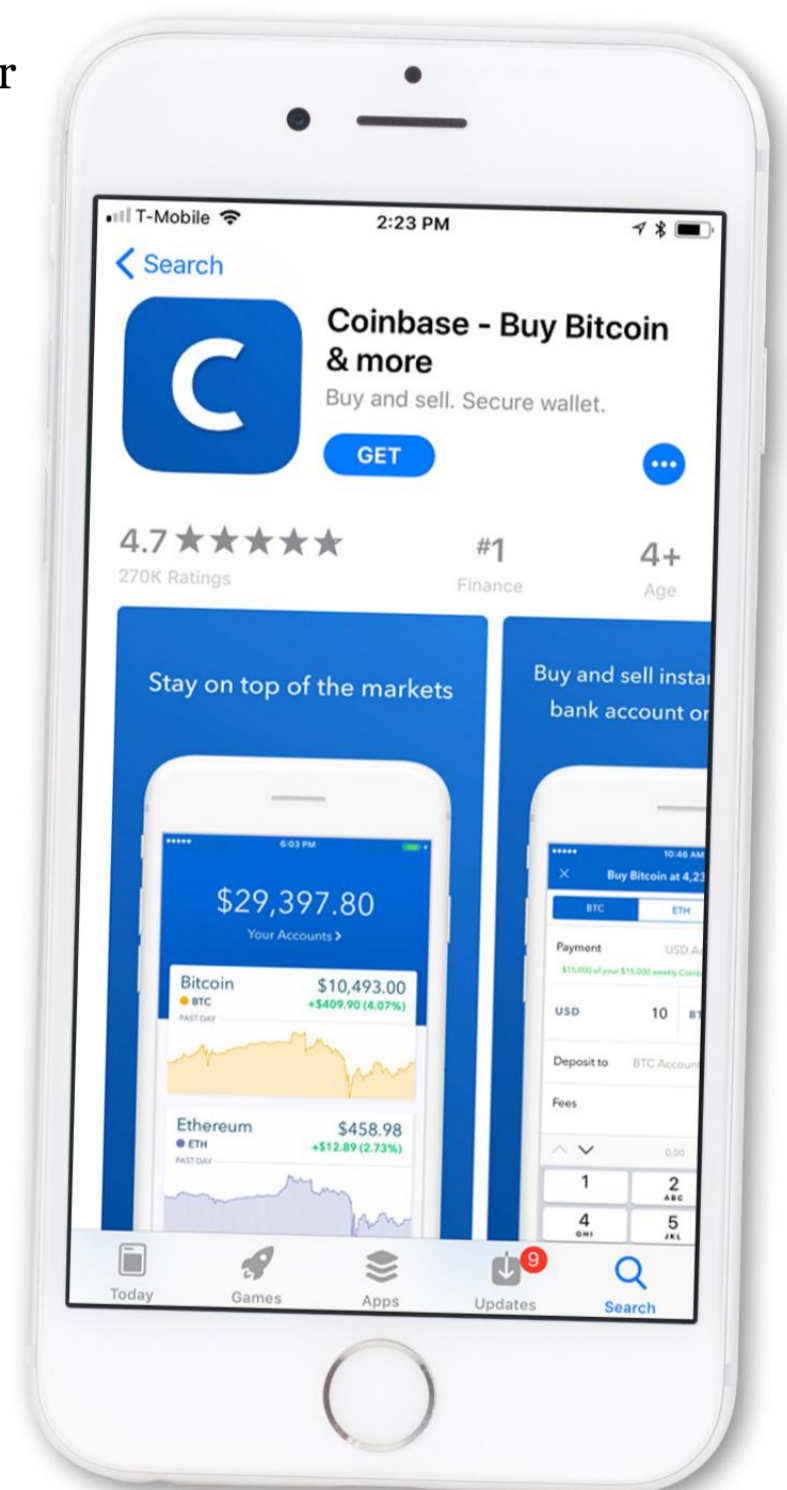
Bitcoin isn't the only digital currency garnering mainstream attention. As it has risen from hundreds to thousands to tens of thousands of dollars per digital coin, the rest of the landscape is riding its coattails. The Ethereum blockchain—long viewed as a more viable mainstream platform—and its Ether cryptocurrency have also risen in value, along with Litecoin, Ripple, and the forked Bitcoin Cash, which Coinbase now supports.

You'll need to use an exchange to buy and sell the cryptocurrency and a wallet app to store it securely. Here's how you get started.

**1.** First, choose an exchange. Coinbase supports Bitcoin, Bitcoin Cash, Ethereum, and Litecoin for the moment, so if you want to stick with those three cryptocurrencies, you can simply download the Coinbase app. There are plenty of other exchanges, though. Bitfinex and Kraken are popular options that support dozens of other cryptocurrencies, including Dash, Iota, Zcash, and more. Other options include Gemini, Bitstamp, and Bitwage, to name just a few.

**2.** You'll also need a wallet app for each type of cryptocurrency you purchase. Coinbase makes it easy: The app stores your coins in its private servers in individual wallets for each currency. We'll walk you through the Coinbase experience, which all happens in the mobile app and can have you buying and selling coins in a matter of minutes. But bear in mind that there are countless options for Bitcoin wallets using desktop and mobile apps, Ethereum wallets, and so on.

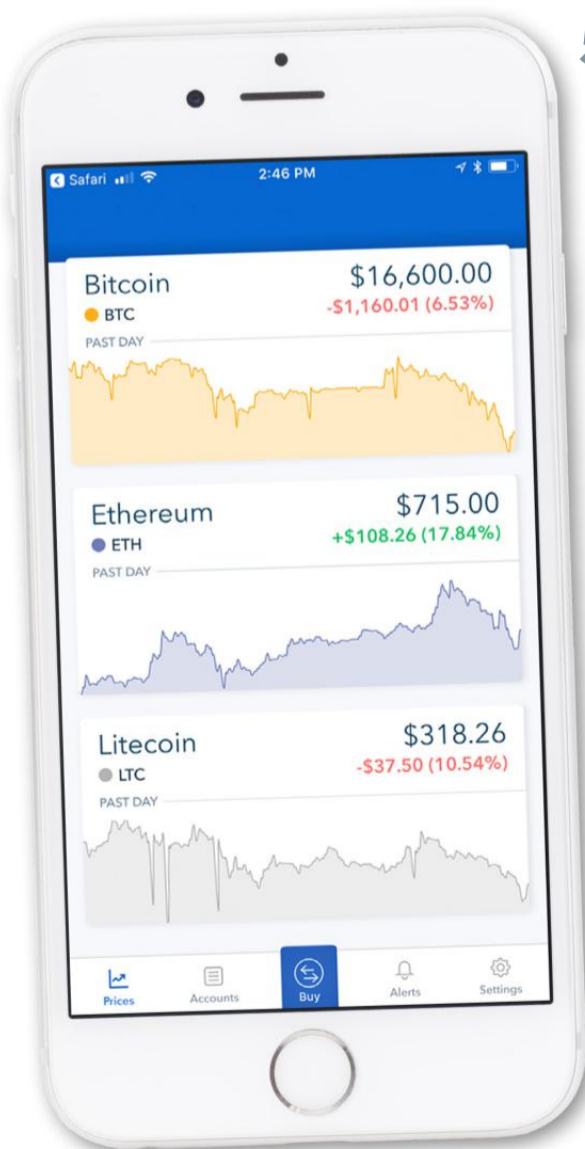
**3.** In Coinbase, you first enter your name, email address, and password. Certain states require those trading cryptocurrency to verify their state of residence, so enter the state in which you currently reside.



Coinbase requires you to add a number of other personal details and identifiers, including date of birth, address, and the last four digits of your Social Security number. The app also asks for some details about your income and profession. Once you're done, you're taken into the main Coinbase app, where you can see current currency prices. But you're not yet ready to buy and sell.

**4.** Before you start trading, you need to verify your phone number and link your Coinbase account to your bank in order to deposit and withdraw funds. The phone verification is easy: Enter your number, and you'll receive a text with a seven-digit code to enter.

When adding payment details, you can choose either a bank account or a credit or debit card. Bank accounts take a few days to process transactions, but you can invest larger amounts, and the price at which you buy is locked in that day even if the sale doesn't clear for a few days. When you choose the bank option, Coinbase opens a searchable list of banks to choose from. If you choose to use a credit or debit card to buy coins, you'll still need to add a bank account or a wallet app to sell.



**5.** Now that your account and bank details are set up, you're ready to start buying and selling cryptocurrency. The first icon on the left of the menu at the bottom of your Coinbase app is the Prices tab. Here you can see current prices. When you click into one of the graphs, you can toggle the price index by hour, day, week, month, year, or all-time to see how the price has changed and whether you want to buy now or wait for a better price.

**6.** To buy, hit the Buy icon in the menu or click into it directly from the Prices tab. Let's say you start with buying some Bitcoin. Enter either a US dollar (USD) or Bitcoin (BTC) amount you want to buy, and the calculator lets you know what the value translates to. Then choose your wallet (the default Coinbase BTC wallet, unless you've added an outside wallet app), and hit the Buy button to go to the confirmation page and complete your transaction.

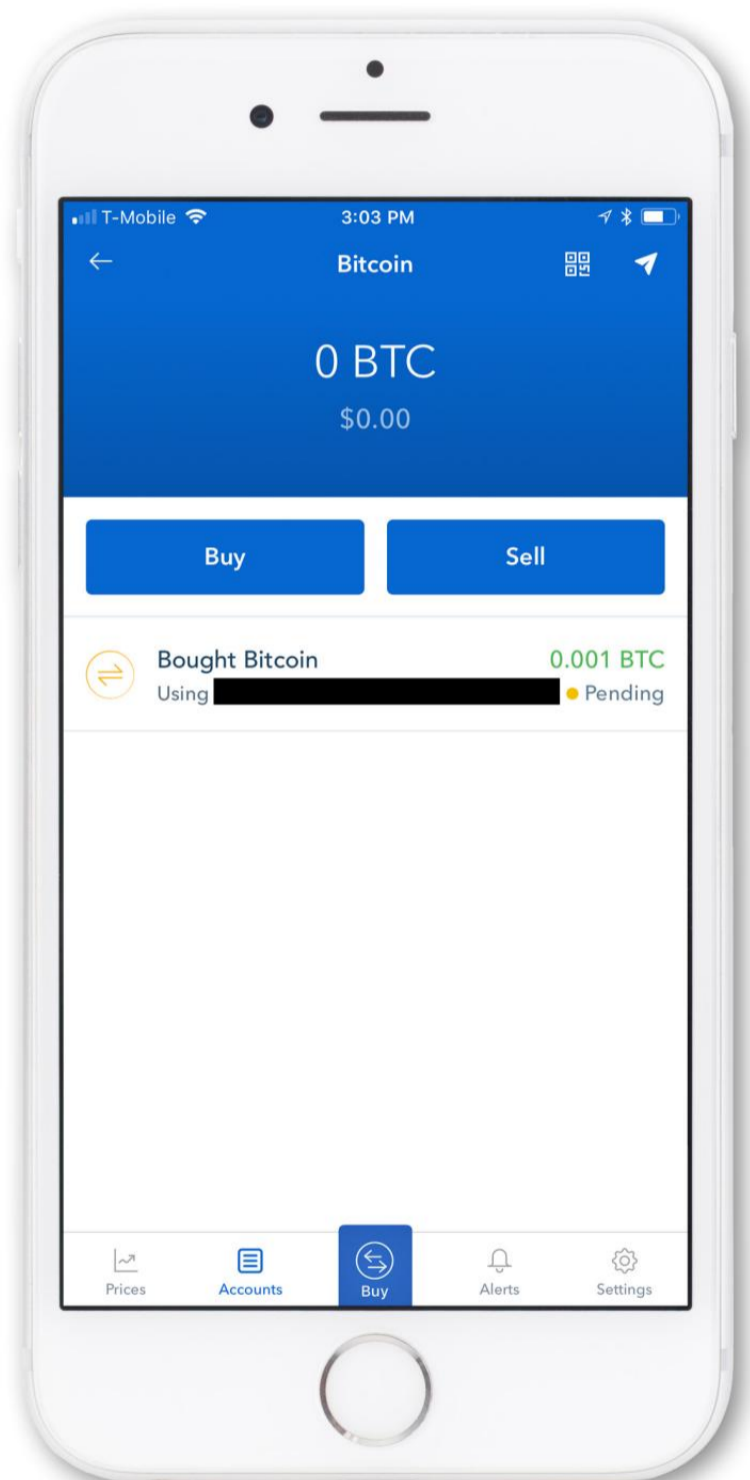
Exchanges need to make money, too. On the confirmation page before you buy, you'll see the flat \$1.99 Coinbase conversion fee for any purchase of less than \$200. For larger purchases, the company takes a variable percentage, depending on the country.

**7.** Same goes for selling: Choose a coin in the Prices tab, and hit the Sell button. The limit differs depending on whether you're buying or selling; Coinbase imposes a buying limit of \$5,000 and a selling limit of \$10,000 USD.

Once you're on the Buy or Sell screen, you can tab between the supported currencies to check the exchange rates and quickly complete a transaction with a few taps. Coinbase makes it easy to strike when the price is just right.

**8.** Don't worry if your wallets haven't reflected your bought or sold cryptocurrency: Again, exchanges take a few days to process transactions through your bank. Your purchase or sale is locked into the coin price at the time of your transaction, even if it takes a couple days to clear. Coinbase sends you a confirmation email every time you complete a transaction, so check your inbox to confirm that your purchase or sale went through.

**12.** Coinbase helps you proactively track coin prices. Sites such as CoinMarketCap track the real-time price changes of every cryptocurrency out there, but in the Coinbase app, you can check the Prices tab for at-a-glance values or tab over to the Alerts icon to set a price alert.

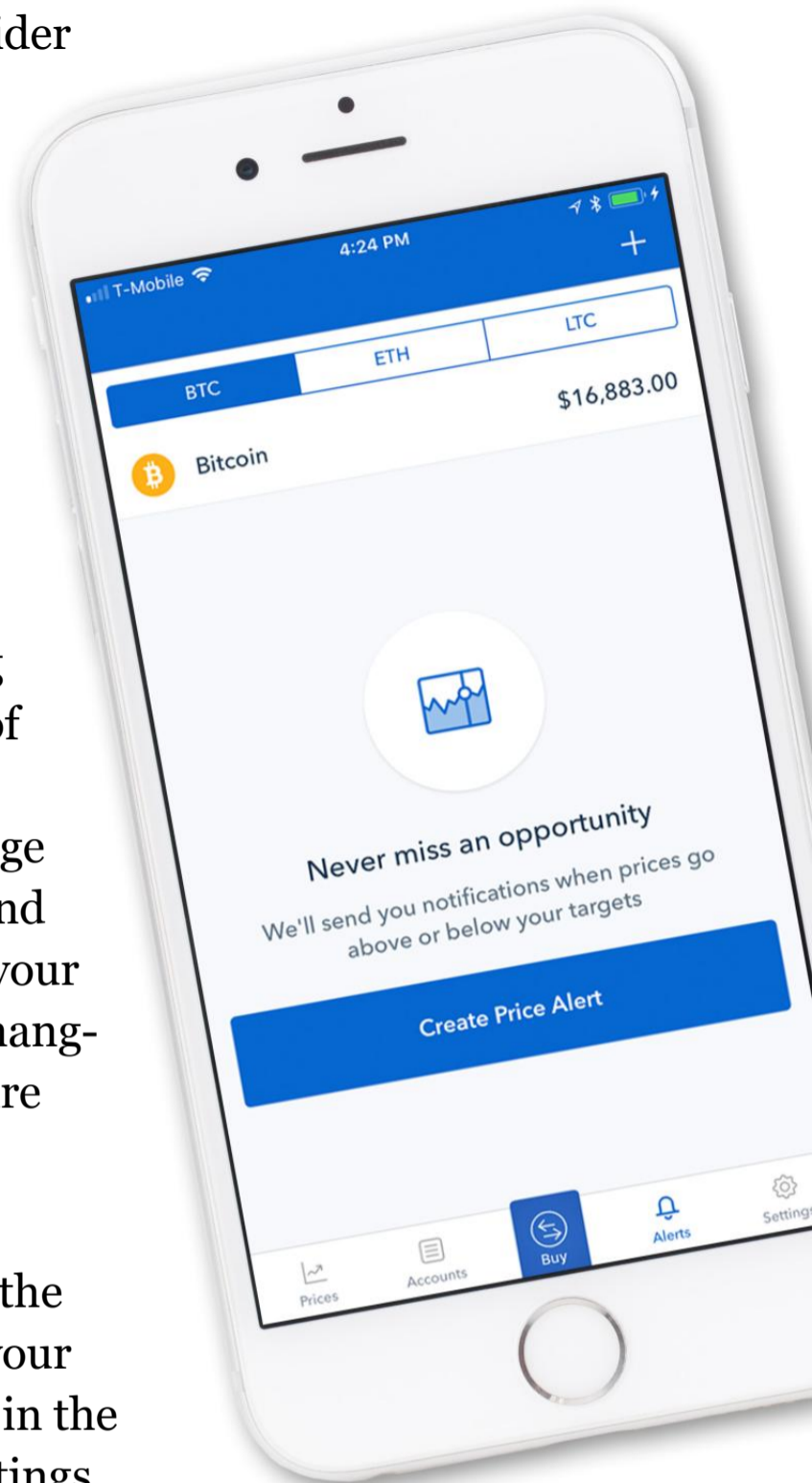


When you create a new price alert, you'll see a slider that lets you toggle the alert to a specific USD value for Bitcoin, Bitcoin Cash, Ether, or Litecoin. When the cryptocurrency hits your target price, Coinbase sends you a push notification to buy or sell. You can create as many alerts as you want, toggling them on and off on the Alerts page to determine which are active as you track your investments.

**13.** Unless you're using cold storage and holding your own private keys, risk is simply the reality of dabbling in cryptocurrency—even Coinbase tells you so. Price surges may incapacitate the exchange temporarily, transactions take time to process, and when you're using the default Coinbase wallets, your encrypted coins are not under your control. Exchanges are also prime targets for hacking, and there are plenty of cautionary tales to prove it.

All the more reason for you to take advantage of the many built-in security and verification features your exchange and wallet apps offer. The Settings tab in the Coinbase app lets you set advanced passcode settings and add additional identity documents.

Whether you're serious about investing or simply want to have some fun and stash some Bitcoin as a long-term holding, apps such as Coinbase make it easy to get started. In minutes, you can be wheeling and dealing Bitcoin, Ether, and Litecoin from the comfort of your smartphone.



# How to Voice Train Your Amazon Echo Device

BY LANCE WHITNEY



**D**oes your Amazon Echo often misunderstand your questions and commands? That's not unusual. The Alexa voice assistant isn't perfect and can sometimes misinterpret words. But you can help it better comprehend what you're saying with a round of voice training. By speaking aloud a collection of phrases, you teach Alexa the sound of your voice so it gets a better grasp of your way of speaking.

At this point, voice training is supported with the first- and second-gen Echo, Echo Plus, Echo Dot, and Amazon Tap. Make sure you're in a quiet room or other setting with no external noises that can throw off your voice training. Don't use a remote for the voice training; instead, position yourself next to the Echo device that you want to use.

**Open settings:** Open the Alexa app on your mobile device. Tap on the hamburger menu icon and then tap on Settings.

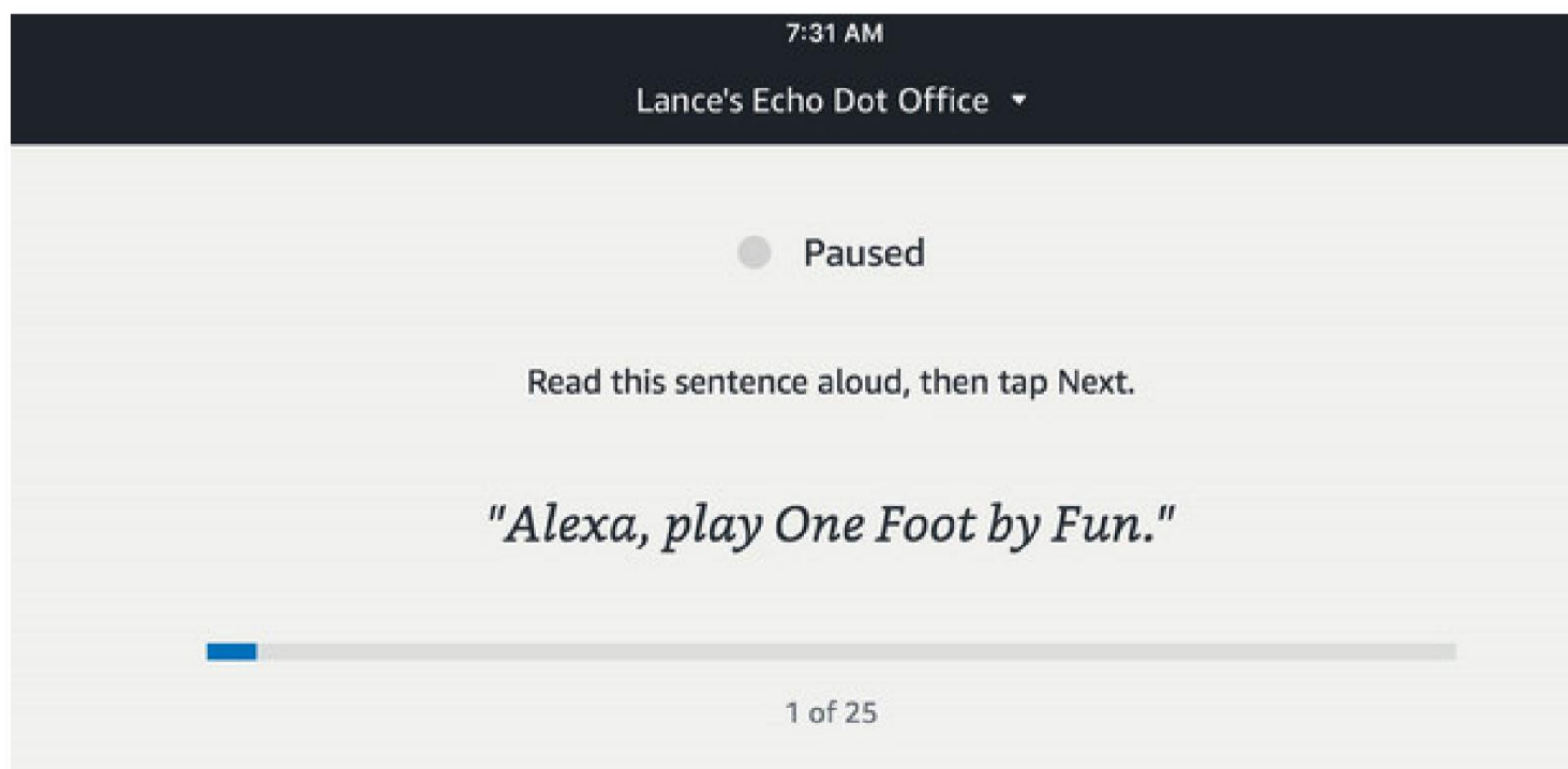
**Scroll to Voice Training:** Scroll to the bottom of the Settings screen and tap on the setting for Voice Training.

**Pick your Echo:** If you have more than one Alexa device in your household, tap on the current device at the top of the screen. At the bottom of the screen, tap on the device that you want to utilize your voice training. Then tap Done. The device now knows you're in voice-training mode and will not respond to any of the sentences you speak.

**Prepare to speak:** The next screen explains that to go through voice training, you'll need to read aloud 25 phrases provided by the app. To proceed, tap on Next.



**Make sure you're in a quiet room or other setting with no external noises that can throw off your voice training.**





**Start reading aloud:** Alexa displays the first sentence for you to read. Read the sentence and then tap on Next.

**Pause if you must:** The next screen displays the second sentence. Read that one and tap on Next. If you need to stop, tap Cancel. Otherwise, keep going.

**Let Echo listen:** Continue the process until you get through through all 25 sentences. At the screen for the last sentence, tap on Complete.

Hopefully, you'll now find Alexa more responsive and less apt to misunderstand your questions and requests. If further voice training is required, start a new session with another round of 25 sentences. Each round of voice training serves up a unique set of sentences, so it may be helpful to go through at least a couple of sessions to train Alexa on different phrases.

**Add more voices:** What if more than one family member talks to Alexa? Naturally, each person has his or her own individual style of speaking. First, add each person as a member of your Amazon Household, if you haven't already done so. To do this, tap on Settings. Scroll to the Accounts section and tap on Household Profile. Follow the steps to add someone to your Amazon Household.

To switch your Echo device to another account, say: "Alexa, switch to [person's name] account." That person can then kick off the voice training and go through the round of 25 sentences. Each member of the household can complete the voice training, one by one. If you lose track of which account is the active one, just say: "Alexa, which account is this?" Alexa tells you the name of the current account. She's nice like that.



**Hopefully,  
you'll now find  
Alexa more  
responsive and  
less apt to  
misunder-  
stand your  
questions and  
requests.**



# How to Switch to a New Password Manager

BY NEIL J. RUBENKING



**W**e constantly review the latest password managers as they grow and evolve. Some update frequently, adding such features as password inheritance and automated password change. Others can go years without an update. If your password manager is mired in the past, you don't have to be a stick-in-the-mud. Changing to a new password manager isn't a walk in the park, but neither is it impossible. Here are two ways to make the switch from your old, tired password manager to a slick, powerful new one.

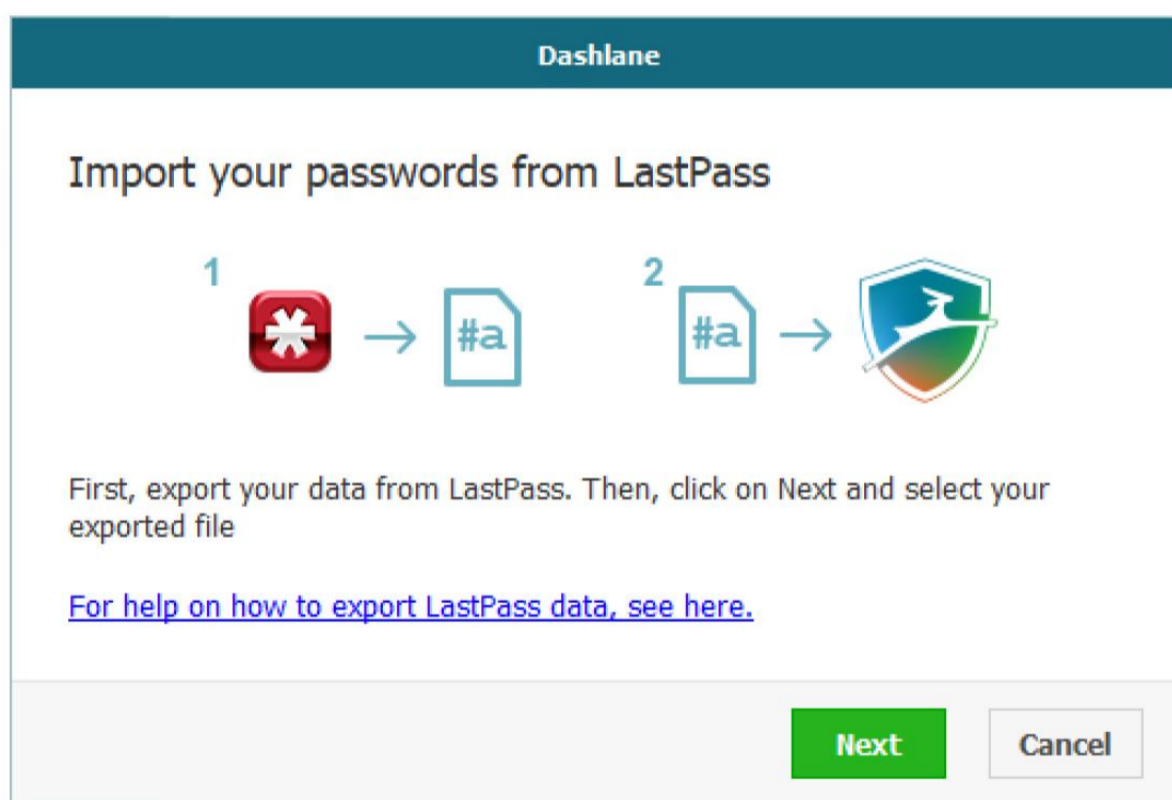
## METHOD 1: SLOW BUT STEADY

Password managers are a companionable lot, not like antivirus tools. In most cases, two running at the same time don't fight each other, the way antivirus software tends to do. Just install the new one without removing the old one. Each time you visit a secure site, the old password manager fills in your credentials, and the new one slurps them up into its own collection. Simple!

If both tools pop up and offer to fill in your saved credentials, it probably means that you already migrated the site's data to the new password manager. But look closely: You might have more than one login for that site, perhaps home and work emails. In that case, I recommend logging in to transfer each login for the site, so there's no confusion.



**In most cases, two running at the same time don't fight each other, the way antivirus software tends to do.**



Of course, you want to get all your passwords transferred, not just the ones you've used recently. One way to track progress is to delete each transferred password from the old utility. Another is to add a tag to those you've transferred (which you do only if the old password manager supports that functionality) or move them to a Finished folder.

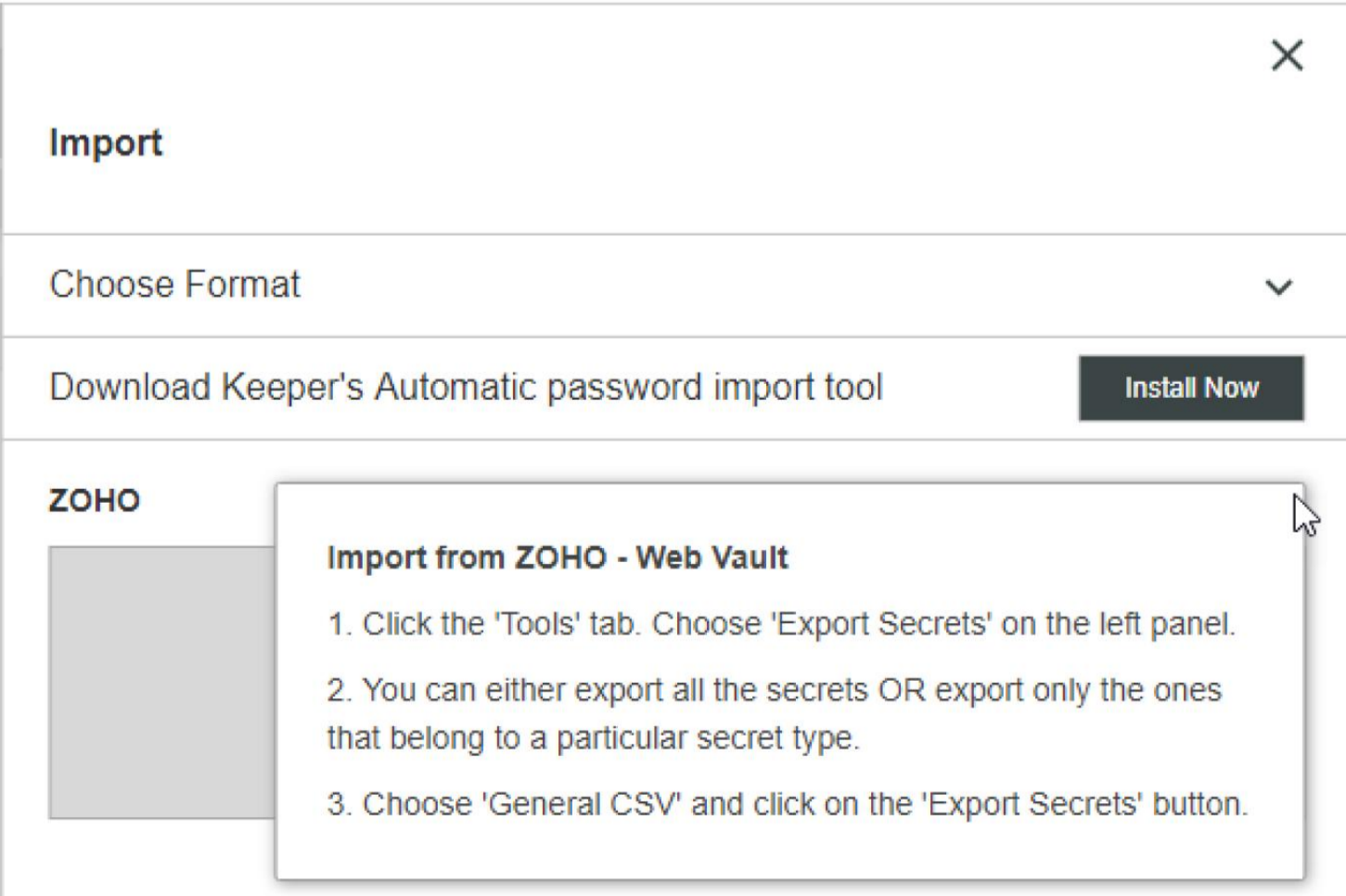
Eventually, though, you'll have to power through the remaining passwords, the sites that you haven't yet visited during this migration. Most password managers have some kind of master list of passwords. Step through the list, launch each one, capture it in the new password manager, and tag or delete the old one. Repeat until finished. The beauty of doing it this way is that it weeds out sites that no longer exist and sites where your password isn't valid. Don't care about the site? Just delete it without transferring.

A few years ago, I used this technique to migrate from LastPass Premium to Dashlane. It took a while, but it was worth the trouble.

## **METHOD 2: COULD BE FAST, COULD BE TROUBLE**

If your old password manager doesn't have an export function, or the new one can't import, the technique just discussed is your only option. But if the features align, you may be able to switch over in a jiffy. Just don't expect perfection.

Smart developers make sure their products can import from as many competitors as possible. LogMeOnce Password Management Suite Ultimate, for example, can import from almost 20 competitors. The list of import options for LastPass contains more than 30 products, but a closer look reveals that only a third of those are widely relevant. Some of the rest are defunct, and others come from individuals rather than companies. Of the products I've reviewed, more can import from Dashlane, LastPass, and RoboForm Everywhere than from any other programs.



The screenshot shows a window titled "Import" with a close button (X) in the top right corner. Below the title is a "Choose Format" dropdown menu. A link "Download Keeper's Automatic password import tool" is displayed with an "Install Now" button to its right. Underneath, a section for "ZOHO" is visible, featuring a grey placeholder image and a tooltip box. The tooltip, titled "Import from ZOHO - Web Vault", contains the following instructions:

1. Click the 'Tools' tab. Choose 'Export Secrets' on the left panel.
2. You can either export all the secrets OR export only the ones that belong to a particular secret type.
3. Choose 'General CSV' and click on the 'Export Secrets' button.

There's a good chance that your old password manager won't be on the import list for your new one. Hardly any products import from Keeper Password Manager & Digital Vault, for example. But fear not. You can probably make the transfer using a simple CSV (Comma Separated Values) file. This is a simple text file, with each line representing a data element and the fields of that data element separated by (you guessed it!) commas.

The CSV file format is simple, but transferring your passwords may not be. The most important concern is the order of the data columns. Suppose one product orders the columns as URL, Username, Password, Name, and the other orders them Name, URL, Username, Password. Things won't line up. I suggest you make an experimental import first. Export the CSV file, then delete everything but the column headers and one data line. Try the import function. If it worked, you're golden. Export the old data, and import it all.

If the import didn't work, the way it didn't work should give you some clues. You'll have to open the CSV file in a spreadsheet program and put the columns in the order the new product wants. A few smart password managers offer the option to create a template, a CSV file that shows what they expect.



**There's a good chance that your old password manager won't be on the import list for your new one.**



LastPass...

## Import

Note: all encryption and decryption is done locally on your machine so that you are secure.

To export McAfee SafeKey logins, open your browser with the McAfee SafeKey add-on installed, and click on McAfee SafeKey - Tools - Export To - CSV File. Choose a file location and press the Save button. Open the resulting file in your favorite text editor and copy all the text to your clipboard. Then, paste it into the box on this page.

Source

McAfee SafeKey

Content

Paste your content here

UPLOAD

Even so, the export/import process can have its bumps. I recently switched yet again, this time from Dashlane to Keeper. Alas, I found that I lost all my password categories, and some entries didn't import correctly. Dashlane proved to be the culprit. It simply doesn't export the category information. And it included four comma-separated fields on most lines, but five on some.

Dashlane can also export to a password-protected proprietary format, to transfer between instances of Dashlane. With a little help from yours truly, Keeper's developers worked out a way to import from this proprietary file. As of this writing, that feature is still in beta, but it worked for me!

## **MAKE THE MOVE**

Getting all your passwords into a password manager can take quite a while. Updating the weak and duplicate passwords is another lengthy task. By the time you've done both, you may feel that you're locked in to whatever password manager you chose. Who wants to go through all that again?

But as I've shown, you can always escape. In the best-case scenario, you simply export from the old product and import into the new. Done! Sometimes you need to massage the data to make that process work. You can also run both products in parallel, letting the new password manager capture the data filled by the old one (and, in the process, cleaning out any useless entries).

As for which password manager should be your new best friend, we lean toward products that combine powerful security, a rich feature set, and a smooth user experience. Keeper Password Manager & Digital Vault has the latest and greatest features and works consistently across all popular platforms and browsers. Dashlane also fills the bill. Both are Editors' Choice password managers. LogMeOnce Password Management Suite Ultimate and Sticky Password Premium also share that honor, though when I next review them I'll be thinking hard about the balance between complexity and advanced features.



## Microsoft Phone: Bend, Fold, and Wear

Since I first wrote about the possibility of the Microsoft Surface Phone, it seems Microsoft is inventing and patenting various folding technologies whereby an OLED screen can unfold into a large screen phone or tablet. This is nothing new; Samsung has shown prototypes of a cute “folds like a book” phone, and Microsoft once showed a “folds like a book” laptop that was never released. So we can assume something that folds will be with us soon.

But what really intrigues me is something I saw at a trade show three years ago. It was a flexible LCD display that took the form of a bracelet. It wrapped around the wrist and was going to be a fully functional phone that connected to the user via some Bluetooth lash-up.

There was something nerdy-cool about the thing. It was just a thin piece of plastic and very light. It had more appeal than a ho-hum traditional looking wrist watch. It had a lot of potential. For the purpose of this column, I’ll call it a cuff phone. Just imagine the iPhone as a thin sheet of OLED material that would wrap around your wrist, with the microelectronics of the Apple watch.

Since the thing would be an adornment, it could be designed to put on a fancy light show–type display when not being used. Perfect for parties. The display patterns could be developed by artists and sold like ringtones. Both moving and stationary displays would be available. The display art could be a topic of conversation.

The cuff phone could be a device that replaced the clunky candy bar phone, the Apple Watch, even jewelry. This sort of device would require a slight cultural shift. But the smartphone showed how easy that can be, once it catches on. Which brings me back to the Microsoft Surface Phone. Could it become something radically different, like the cuff phone? How would it incorporate some flexible or folding technology?

For some reason, several news outlets are predicting that these technologies will be used in some sort of Microsoft notepad. They are not fully subscribed to the idea that Microsoft will return to the phone market using the classic withdraw-and-return model of progress.

But the company knows that mobile devices are the future of computing. I'm assuming that in the background, Redmond is going all out to reenter the market with something special.

In the past, Microsoft has dropped the ball, because the internal corporate culture rejects people who say anything negative about any new product or idea. Hence, you see a lot of bad or poorly executed ideas. The best recent example of this was the short-lived Microsoft Kin, a phone specifically designed for interacting with social networks. It was a smartphone with a keyboard that was never promoted properly and dumped after only one year.

So Microsoft might suffer from stage fright when it comes to bringing out something radical, like a cuff phone. But one thing is for certain: Based on these patents, something is afoot. And it folds.

A handwritten signature in black ink that reads "John Dvorak". The signature is fluid and cursive, with the first letters of each word being capitalized and prominent.

[john\\_dvorak@pcmag.com](mailto:john_dvorak@pcmag.com)



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