Wearable Tech Issue

DISTRO

OFFICIAL ONLINE NEWS SOURCE 2013 INTERNATIONAL CES

121412 #70

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Apple's Slimmed-Down Desktop

ASUS' LUXURY-LEVEL LAPTOP

Jawbone UP's Shot at Redemption

Gamblers, Cyborgs and Heads-Up Displays:
THE HISTORY BEHIND GOOGLE GLASS

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On the Cover: Illustration by Viktor Koen

GET READY TO EXPAND

DISTRO
12.14.12

EDITOR'S LETTER

This turned into a surprisingly busy week in news, and I'm proud to say we made a little of our own this week with the announcement of Expand. The brainchild of our very own Darren Murph, this is something we've been working on for roughly a year now and, with the pieces falling into place, it's finally time to tell you all about it. The concept is pretty simple. It's a gadget event not unlike the best in the world (your CESes, your MWCs) but with one crucial difference: this one's for you.

From the beginning we wanted to create something that would let us bring some of the feeling and excitement of a major gadget event and do it for the fans, giving you a chance to see and touch and interact with the latest and greatest devices plus listen to live interviews and panel discussions featuring some of the industry's biggest names. We'll be unveiling new products on the stage, where attendees will be among the first in the world to see them and, for those who can't make it in person, we'll be streaming almost all of it online for everyone to see.

Of course we hope you can be there. We've chosen to host our first Expand event in San Francisco on March 16th and 17th. Ticket information will be online soon and trust me when I say our entire team will be spending the next four months finalizing amazing speakers and giveaways to make sure that every attendee gets their money's worth. It's going to be an amazing event and I can't wait to see lots and lots of you there.

Yes, there was some *other* tech news this week, perhaps the biggest being the triumphant return of Google Maps to iOS, with Google flipping the switch and deploying a new app with full turn-by-turn navigation and public transit directions. That last bit addresses a major shortcoming of Apple's own Maps. In our hands-on impressions of the app, we found Google Maps on iOS to be even more intuitive than the Android version — though missing some functionality, like offline caching of data, bicycling directions and a low-contrast night version. Don't let that stop you from downloading this one before your next road trip, though.

The Twitter / Instagram spat continues to boil. Last week, Twitter disabled

EDITOR'S LETTER

Cards support for Instagram, meaning that service's alternatively hued photos wouldn't display properly within Twitter's web interface. Instagram responded over the weekend by pulling all Twitter photo integration together, meaning that you'll have to click on through if you want to see someone's sepia sandwich. And, finally, Twitter launched its own suite of photo filters to its iOS and Android apps, a move that surprised none and, frankly, impressed fewer. The next round of this micro-battle remains to be seen and no "winner" can be predicted yet, but so far I would say that absolutely everyone is losing.

While the anecdotal evidence of a lack of sales success for Microsoft's Surface with Windows RT continues to pile up, the company itself pledged to increase production as it begins rolling the device out to more major retailers. Staples and Best Buy will be the first to offer the productivity-minded slate, and it should be in stores by December 16th at the latest.

In a major step toward the real-world legitimacy of virtual currencies, Bitcoin-Central became the first exchange to be certified to operate like a legitimate bank. The service has organized a deal with French payment processor Aqoba and France's Credit Mutuel bank, meaning account-holders can maintain Bitcoin accounts — accounts that are fully insured. Even Bitcoin-capable debit cards are on the way and users will be able to easily exchange currencies into bits. This could extend the Euro Crisis to a whole new set of shores, both real and imagined.

Finally this week, Google released its top search terms of 2012. It published multiple iterations of its so-called Google Zeitgeist, showing some cultural differences between the search terms of nations. For example, the top search term in the UK was "Euro 2012," while the top search term in the rest of the world was "Whitney Houston." "Hurricane Sandy" topped the list for events while the "iPad 3" topped the consumer electronics list, followed by "Galaxy S3" which beat out the iPhone 5.

In this week's Distro we're taking you on a tour through the history and future of wearable technology, putting Google's Project Glass in context. Dana Wollman reviews the slinky new Apple iMac while Sarah Silbert tries out Windows 8 on the non-touchscreen ASUS Zenbook Prime UX51Vz and Terrence O'Brien sees if the new Jawbone Up fixes all the woes of its predecessor. Joshua Fruhlinger looks at cyber-snooping in Modem World while Ross Rubin explains why home automation isn't quite yet the thing that I so wish it were. We have new IRL and Recommended Reading entries and Pebble Founder Eric Migicovsky sits down for Q&A. As ever it's an awful lot of content and as ever I hope you enjoy. D

TIM STEVENS
EDITOR-IN-CHIEF,
ENGADGET

CAVEAT EMPTOR, RATING EXPECTATIONS AND CAMPHONE CONVERGENCE

Touch article names to read full threads

DISTRO
12.14.12

INBOX

CAN DAVID MARCUS FIX PAYPAL'S REPUTATION?
ISSUE 69, DECEMBER 7TH, 2012

"The only way to fix PayPal is for eBay to allow other forms of payment. That way PayPal has to compete in the free market. However, since eBay owns PayPal that will never happen."

— ROBERTO.ORTIZ

"PayPal needs to be regulated plain and simple. With all the money they handle, they SHOULD be treated like any other bank instead of now where they are allowed to do anything with your money without any avenues of recourse. There are way too many horror stories from them and I don't trust PayPal with my money at all."

— SOKOSI

"PayPal sides with the buyer in 99.99999% of all of their arbitration cases, even when (buyer) fraud is ridiculously apparent. They also punish small businesses for suddenly doing well, and have held the bulk of their earnings for months without batting an eyelash. Those are two damn big hurdles for them to overcome before I would place any faith back in them from the business end.

From a consumer perspective, I've always been very happy ... but knowing what's on the other side of the coin does irritate me quite a bit."

— HALIPHAX

"PayPal continues to be the payment option of last resort. I will use any other method of payment before PayPal. I have a hard time seeing that change. Use it at a retail store? Not on your life."

— LEJSMEED

REVIEW SITES ARE BROKEN
ISSUE 69,
DECEMBER 7TH, 2012

"Great points here in this article and all related to the inability to know how credible someone's review might be in relationship to others. One way to filter results quickly and ensure more authenticity is to restrict the ability to create a review unless you're actually there at that moment. The opportunity is to capture more credible opinion that is not dated or skewed, but coming from guests or patrons who have the exclusive perspective of being there right now."

— DAVIDMRUSH

"If only community review sites used the same algorithm that Netflix uses. I've never had a 4.5 star Netflix movie not be a 4 or 5 to me, and never had a 1 star movie turn out to be a 5 ... it's creepy how accurate and spot on Netflix review star thingies work... If Yelp had this it would be awesome."

— ZIBLE

"There will be no way to fix the flaws of these review websites because the fact of the matter is that there are people in this world with grossly exaggerated expectations of any type of service. For example, I work in a hospital, and a big problem I have are people who think they can order services at the hospital like they are going through a fast food drive through. Then they get all pissy when they discover things don't work that way. The reviews still work to an extent. Just gotta wait until they make robots with unbiased reviewing abilities."

— AB

SAMSUNG GALAXY S III MINI
ISSUE 69,
DECEMBER 7TH, 2012

"I think this proves one thing at least: Samsung can't make a top-end phone in a small form factor."

— MATT.TORRE

"I like how a 4[-inch] screen on a mobile is now considered 'mini.'"

— BITNINJA

TWO WEEKS WITH SAMSUNG'S GALAXY CAMERA
ISSUE 69,
DECEMBER 7TH, 2012

"This is just the first of many steps in a sort of convoluted convergence. Eventually lens, battery, sensor, OS will give rise to a true phone with not just camera functionality, but true image resolving power. We used to have an MP3 player, a phone, a camera and a tablet in our messenger bags. The dedicated MP3 player [is] soon to be a memory, point and shoot cameras soon to be a redundancy and tablets a fun transition technology. Only the phone will emerge as a player of the future."

— TONYMEDINA

"2003: Nice phone! But does it have a camera? 2013: Nice Camera! But does it have a phone?"

— KENJAMIN12

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EYES-ON

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GARMIN FENIX GPS WATCH

STAY ON THE PATH

Garmin has designed a wearable to ensure that you know your location at all times while exploring the great outdoors. The Fenix combines altimeter, barometer, compass and optional external ANT temperature sensors alongside Bluetooth connectivity and a GPS receiver inside a compact wrist unit.

THE DAMAGE: $399

PHOTOGRAPHS BY WILL LIPMAN

Click on product names to read full stories

NINTENDO Wii MINI

Nintendo's Wii mini has been a bit more elusive than we thought, but we snagged the entry-level console ahead of its official release for a quick shakedown. While it's not as pint-size as the name suggests it's certainly one of the smallest semi-modern TV consoles we'll see until the disc-free OUYA arrives. There's no SD card slot, and the connections are limited to the obligatory power, video and sensor bar along with one USB port versus the regular Wii's two. Before you ask: no, you can't fudge internet access with an Ethernet-to-USB adapter. Believe us, we've tried. Nintendo has switched to a top-loading disc drive instead of a slot-loader as well.

Our main gripe is that component video output doesn't appear to work; we've asked Nintendo if there are any compatibility changes, but for now we'd stick to old-fashioned RCA. The company does offer help finding a component cable on its product page. Firing up the Wii mini will be the real shock if you're used to the Wii, and especially the Wii U. When Nintendo said it had pulled internet access, it wasn't kidding; the only three channels are the disc, the Mii tool and a manual for the menus. If you buy this cheapest of Nintendo machines, there's no upgrading after the fact if you have a sudden craving for Netflix.

PRICE: $150 CANADIAN

AVAILABILITY: NOW AVAILABLE (CANADA)

THE BREAKDOWN: THE DROP IN PRICE BRINGS A SMALL STATURE, BUT NIXES WIFI WITHOUT OFFERING AN UPGRADE OPTION.

PRICE: $249 (CONTRACT-FREE)

AVAILABILITY: Q1 2013 (EUROPE)

THE BREAKDOWN: THE COMPETITIVELY PRICED LUMIA 620 TOUTS SEVEN COLOR OPTIONS AND ENOUGH OOMPH TO HANDLE WP8.

Click on product names to read full stories

NOKIA LUMIA 620

Surprising a few of us, Nokia revealed a brand-new Windows Phone 8 device, the 3.8-inch Lumia 620, in an explosion of colors. As its naming convention goes, this is the cheapest device running Microsoft's newly christened mobile OS so far. Nokia has a good eye for hardware colors and the Lumia 620 offers the most shades yet — seven in total. The covers apparently get their eye-catching look from their "dual-shot color" shells, with several of the cases being a mix of either two colors or a white base and a gently tinted outer layer.

While the phone's thickness is comparable to the Lumia 920, the smaller dimensions felt more comfortable in our hands. Thankfully, the phone isn't underspecced, with a dual-core 1GHz Snapdragon S4 Plus offering more than enough for the WP8 interface. There's both a removable battery and storage expansion via microSD (up to 64GB) with 8GB of built-in storage there to begin with. During our brief time with the prototypes, we were hard-pressed to discern much of a performance difference between this and the Lumia 820. Both phones have the same WVGA (800 x 480) display, although the 620's smaller screen made the relatively weedy resolution less of an issue.

TRANSPORTER

PRICE: $180 (DRIVE NOT INCLUDED)

AVAILABILITY: JANUARY 2013

THE BREAKDOWN: CURRENTLY ON KICKSTARTER, THE PEER-TO-PEER FILE-SHARING DEVICE BOASTS EASY SETUP, A WEB PORTAL AND DESKTOP APP.

Click on product names to read full stories

You may have missed Transporter's unveiling on Kickstarter, so let us provide a quick refresher — it's a device that, when used in tandem with one or more other Transporters, enables simple and secure peer-to-peer file sharing. Unlike many Kickstarter projects, however, Transporter's already in the beta testing stage of development and the hardware is ready for prime time. The device is made of black plastic, save for an LED ring that serves as a drive activity, internet connectivity and free-space indicator for the HDD that lies within. Connectivity comes via Gigabit Ethernet and a WiFi dongle protruding from its base; and a 5V socket provides the Transporter with power.

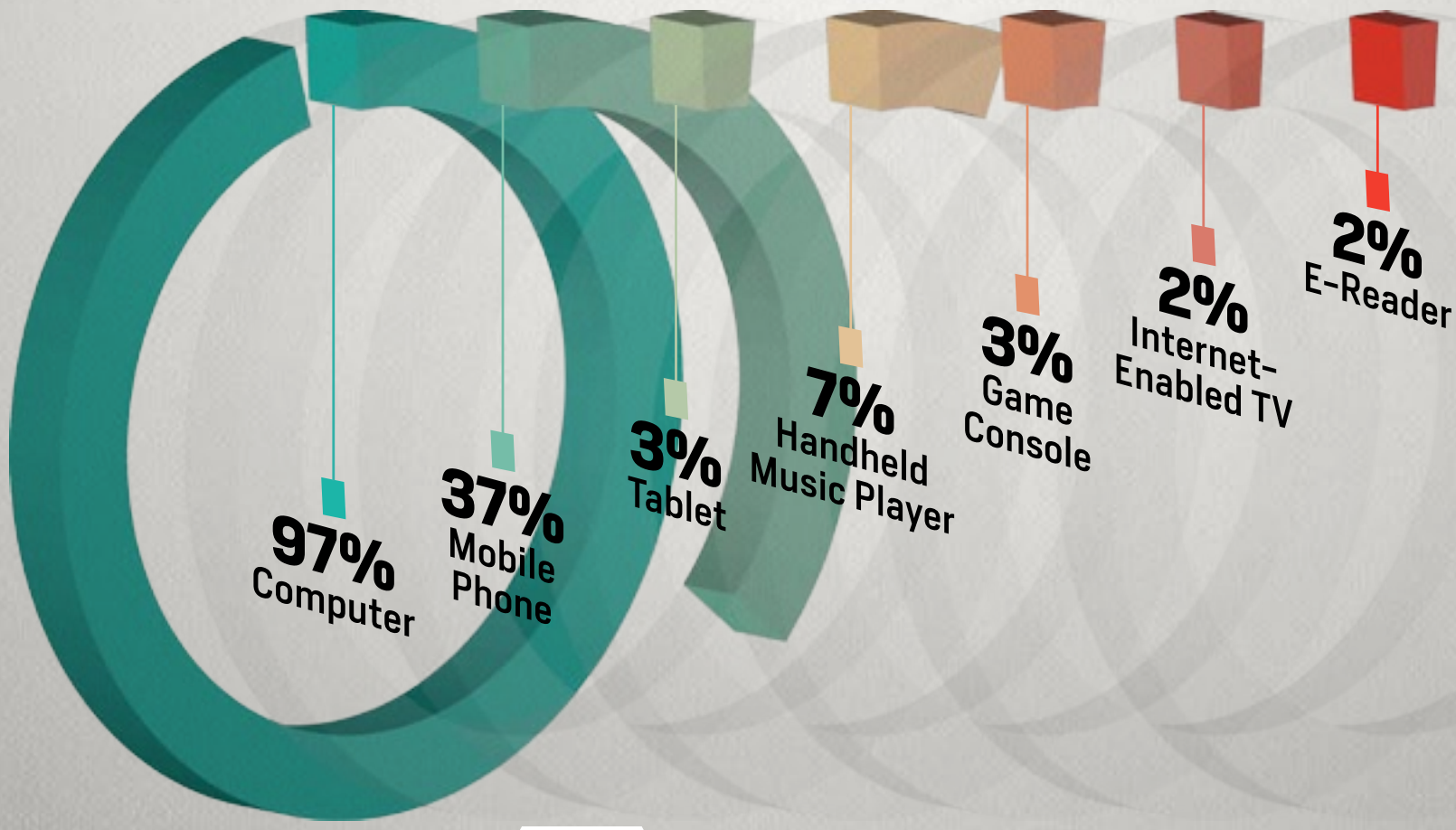
Accessing the 2.5-inch HDD inside is easy peasy: just pop the top off and pull out the drive. Swapping storage is simply a matter of dropping another HDD in the cradle. We got to briefly chat with Transporter's makers, and they told us that while the Transporter hardware is ready to roll and its web portal is solid, the desktop application still has some kinks to be worked out. Needless to say, the company's confident that the software components of the Transporter system will be finely tuned by the time units begin making their way into the hands of backers. D

How Do You 'Like' It?

According to Nielsen's latest social media report we're not just checking Facebook on our desktops anymore. (Surprise!) While the report *does* show that 94 percent of people still check-in with their friends using a desktop or laptop (down from 97 percent in 2011), usage on all the other connectable gadgets is on the upswing. The most dramatic increases in socializing have been seen on tablets and internet TVs. Use of social media on slates is up a whopping 16 percent over the previous year, and access via internet-enabled TVs is up from 2 percent in 2011 to 4 percent this year. Accessing social media using mobile phones is also making some progress, going from 37 percent in 2011 to 46 percent this year. And, if you hadn't noticed, there's an ever-increasing assortment of devices to choose from for your social surfing fun, from PMPs to gaming consoles and even e-readers.

— *Jon Turi*

How We Connect To Social Media



2011 — TAP YEAR FOR INFO — 2012

SOURCE: NIELSEN

Everyman's McLuhan

By W. Terrence Gordon, Eri Hamaji and Jacob Albert
Mark Batty Publisher

Considering how well-known he is for his catchphrases, it should hardly come as a surprise that some books *about* Marshall McLuhan take on a similarly brief, easily consumable format. That's included coffee table books — *Forward Through the Rearview Mirror: Reflections on and by Marshall McLuhan* is also recommended — and this pocket-sized volume from McLuhan biographer W. Terrence Gordon. A biography, however, this is not. Instead, Gordon focuses on McLuhan's major works and ideas, breaking them down with an eye towards how they relate to the present day. That's done with the aid of some striking design from Eri Hamaji, who stretches the relatively brief text over 150 pages, with changing typefaces, bright colors and plenty of photographs used throughout; it's often more reminiscent of an early *Wired* magazine than your average paperback. That also means that the book can easily be read in one short sitting, but you likely won't be left feeling short-changed — especially considering that it can now be had for well under $10. — *Don Melanson*

Click on headlines to read full stories

Tim Cook's Freshman Year: The Apple CEO Speaks
By Josh Tyrangiel
Bloomberg Businessweek
You've no doubt heard some of the highlights from this or seen Tim Cook's interview on NBC, but *Bloomberg Businessweek's* interview with the Apple CEO is well worth reading in full. While there are plenty of familiar talking points, it's still one of his most extensive sit-downs to date, covering everything from Steve Jobs to the company's competitors to Cook's own background and his current day-to-day at Apple.

Making the Impossible Approachable: The Amazing Illustrations of NASA's Storyboarder
By David Zax
Co.Create
NASA's illustrations of future cosmic endeavors will be instantly familiar to anyone that follows space news, but chances are you're less familiar with the actual artists behind them. Fast Company's *Co.Create* goes some ways towards addressing that with this feature, though, talking to 30-year NASA veteran Pat Rawlings about his work with the space agency and the challenge of thinking cinematically.

The Dream and the Myth of the Paperless City
By Matt Stroud
The Verge
People have been predicting the death of paper as a way of doing business for decades now, but the paperless future seems to have a way of getting continually pushed further away. In this piece for *The Verge*, Matt Stroud looks at the challenges one big city, Chicago, faces in moving towards that future, and why it ultimately may still be relying on paper for years to come.

THE ROADS TO HOME AUTOMATION

DISTRO 12.14.12 | FORUM | SWITCHED ON

BY ROSS RUBIN

At a dinner event several years ago, a former editor-in-chief of a major computing trade magazine told attendees that his first published article was about home automation. That article ran back in 1979 — just two years after the debut of the Apple II and two years before the introduction of the IBM PC.

Indeed, in its early days, home automation, like the PC, was confined to hobbyists more concerned with being able to do things rather than their practical value. However, the PC proved itself first in business and then with games, word processing and the consumer web as the internet grew. Meanwhile, home automation has largely remained the province of the very wealthy and corporations. Indeed, we're still likely many years away from all of us having smart homes, but there are signs of that future approaching and putting the squeeze on today's high-end installations both from above and below.

DIY

One reason why home automation has been so challenging for the non-technical has been the confusing array of different wired and wireless standards. Take lighting. At least three major wireless protocols — INSTEON, ZigBee and Z-Wave — vie for adoption in wall switches for lighting. And even if you pick one, it's not every consumer who is comfortable working behind the wall plate.

But recently we've seen encroachments from two of the most popular wireless networks: WiFi and Bluetooth. In lighting, for instance, we've seen the development of light bulbs that can not only be turned on and off (and dimmed) via WiFi, but also change color — from companies as diverse as lighting giant Philips and Kickstarter campaigner LIFX. WiFi has been the first radio standard supported by connected thermostat startup Nest. And now door locks such as Lockitron and remote doorbells like DoorBot are planning to work together to enable unmanaged remote monitoring and unlocking of homes.

WiFi makes sense for products that have access to a permanent power source. For sensors expected to last months or a year on batteries, though, such as those used in security applications like window

openings and motion detection, Bluetooth Smart is developing into a competitor to other low-power radios. It has the advantage of already being built into virtually every smartphone, a device that will invariably be used to control homes, particularly remotely.

Another way around the longstanding standards morass has been to simply support multiple ones. Home improvement chain Lowe's, for example, now offers two home automation sets under the Iris brand. The Safe and Secure kit focuses on security monitoring while the Comfort and Control Kit centers on energy management. Both cost $179 (or are bundled together in a Smart kit for $299) and both mix and match ZigBee and Z-Wave components.

INSTALLED

But while the DIY model might be getting simpler, the real push in home automation in 2013 and beyond is coming from service providers looking beyond the "triple play" of voice, video and (mobile) broadband. Security companies such as Vivint and ADT have been pushing home automation as an outgrowth of their security businesses with the panels acting as hubs for Z-Wave components.

The market is also attracting the attention of service provider heavyweights such as Verizon, AT&T, Comcast and others. First, home automation is rapidly becoming tied into wireless data and broadband. Got an alert on your phone that someone is at the door? Perhaps you want to peek in via remote camera for a quick chat with whoever is there?

Second, it is one of an emerging breed of consumer subscription-based services like health monitoring and payments that may not be universal for some time, but which are supplementing today's slow-growth or declining markets such as pay TV and VoIP. These services may not be adopted as widely as, say, cellular service, but rather they represent a new tier of services built on top of broadband.

BEYOND THE HOUSE

"Home automation" has always been, at best, an incomplete description of what are sometimes now called smart buildings. Indeed, a lot of so-called home automation installations have taken place in small businesses and a lot of the actions are done manually and not really automatically. In addition, many people's homes are apartments — too small to justify the kinds of elaborate, multi-room systems facilitated by advanced, low-power mesh networks.

One opportunity to increase the adoption of home automation is to offer more basic capabilities to people who live in smaller dwellings. An option on the market today comes from SimpliSafe, an inexpensive, but monitored system that costs only $15 per month. If companies with tens of millions of customers such as telcos or cable companies could tack even that small premium on to their monthly fees, it would represent a substantial revenue boost. D

E-SNOOPING ON OUR LOVED ONES IS BAD. OR IS IT?

DISTRO 12.14.12 | FORUM | THIS IS THE MODEM WORLD

BY JOSHUA FRUHLINGER

I recently had the displeasure of consoling a friend about her rocky history with a boyfriend who appeared to be looking outside their relationship for companionship. She said that the man was talking to other women, flirting and even setting up dates to meet up in the future during business trips.

As I told her that no one deserves to be cheated on — "You deserve better!" — I soon learned that the manner in which she found out her man was seeking strangers was a curious — and potentially dangerous — sign of our times.

"Was he doing this in front of you?" I asked.

"No, I saw his emails."

Wait a second. Whoa. While this girl had every right to be upset, I thought, the truth is that she was poking around his digital life. There's nothing good about cheating, let's be clear on that, but I have to wonder what the rights and wrongs are when it comes to snooping on others.

"So… you just happened to see his inbox?"

"Oh, I know his password."

Here we go. She was actively seeking out some dirt on the guy. I had to dig deeper.

Turns out that not only did she parse his inbox, but she also looked through the text messages on his iPhone where she found flirtatious bits and even studied his browsing history to discover that he was doing some travel planning to places she'd never heard of.

Sure, it's possible that he was planning a surprise getaway for the two of

them, but given the wider context of the emails and texts, it was unfortunately unlikely.

There I was, stuck between making the girl feel justified in her anger over being betrayed and feeling for the dude for being digitally snooped to the core. Yes, he done bad, but hadn't she done bad as well when she cracked into his private iLife?

Back in the day, wives found lipstick on collars, husbands sniffed strange cologne on jackets and numbers dashed inside matchbooks described salacious evenings. But those things were found, not actively sought based on distrust. Maybe some more sleuthy individuals employed private detectives like some film noir turn of romantic events, but for the most part, people had no way of easily snooping on their loved ones' communicative naughtiness.

Nowadays, we have — just behind a password typically handed to us on committed relationship silver platters — access to our better halves' entire social world. One quick look at dating advice sites and one finds stressed-out lovers looking for advice on dirty emails, tawdry Facebook exchanges and lewd SMSes.

I know my wife's iPhone password. I've had to look up directions in emails while she was driving, and she has no reason to be concerned about me seeing what she has going on in there, which, in my estimation, has a lot to do with *Tiny Tower* and very little to do with other men. Either way, I can't be bothered.

Ever stumble upon your loved one's inbox just sitting there, open on a browser? We all have. Most of us couldn't care less, but it wouldn't be beyond any of us to have stolen a quick glance. Chances are nothing was there, but imagine stumbling upon something titled "See you tonight?"

You would look.

And I have to wonder if that is wrong. On the surface, yes. Yes it is 100 percent wrong to invade the privacy of another person. Nothing about it is right. But in the case of my friend, perhaps when we suspect something is up, a digital folio filled with everything going on in our significant others' lives is just too tempting. Of course, we all hope that we never get to the point of suspecting in the first place.

In the end, it's clear that my friend is in a caustic relationship and should bail at her earliest opportunity, but we all know that relationships aren't so simple. Add in social networking, texting, email and all their surreptitious potential, and we have the recipe for a whole new kind of relationship mistrust.

Cheating is never excusable. But what's the verdict when it comes to snooping on our loved ones? Are we justified if we find exactly what we suspected? Was my friend acting out her insecurities and mistrusts and pushing the dude away until he did exactly what she feared until she found it?

I'll be over here under my rock. D

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REVIEW

JAWBONE UP (2012)

After a failed initial launch, the Jawbone UP returns with beefed-up hardware and a fresh new app.

By Terrence O'Brien

Second chances are rare in the tech world. Unless you're one of the big boys — say a Samsung or an Apple — one spectacular failure is enough to doom a product line or even an entire company. Just ask Gizmondo, 3D Realms, Helio, Palm, Netscape, DivX, Sega... the list goes on and on. All it takes is one mistake and a hyped device or marquee company can end up as little more than a nostalgic Wikipedia entry. After last year's debacle with the Up, we thought Jawbone might give up on the fitness market entirely. In case you missed the drama last holiday season,

JAWBONE UP (2012)

Resilience and flexibility are back on track with this new UP.

here's a quick recap: within weeks of launching, the Yves Behar-designed motion-tracking bracelet simply stopped working for many customers. We even had two units fail during the course of writing our original review. It quickly became apparent that the problems were not just widespread, but near ubiquitous. Up was pulled from the shelves, customers were issued refunds and Jawbone went back to the drawing board.

We have to hand it to the company for quickly taking ownership of the problem and cutting checks to the unfortunate souls who ponied up $100 to buy one. But, while seeing a company readily admit failure was a pleasant surprise, we were even more shocked when Jawbone didn't simply cancel Up entirely and cut its losses. Instead it tracked down the root issues — water permeability, flexibility and a barebones app — and redesigned the bracelet from the ground up. The basic functionality and aesthetic choices are the same, but the materials, the iOS data logger and actual internal assembly are all completely different. Unfortunately, all these upgrades mean last year's $100

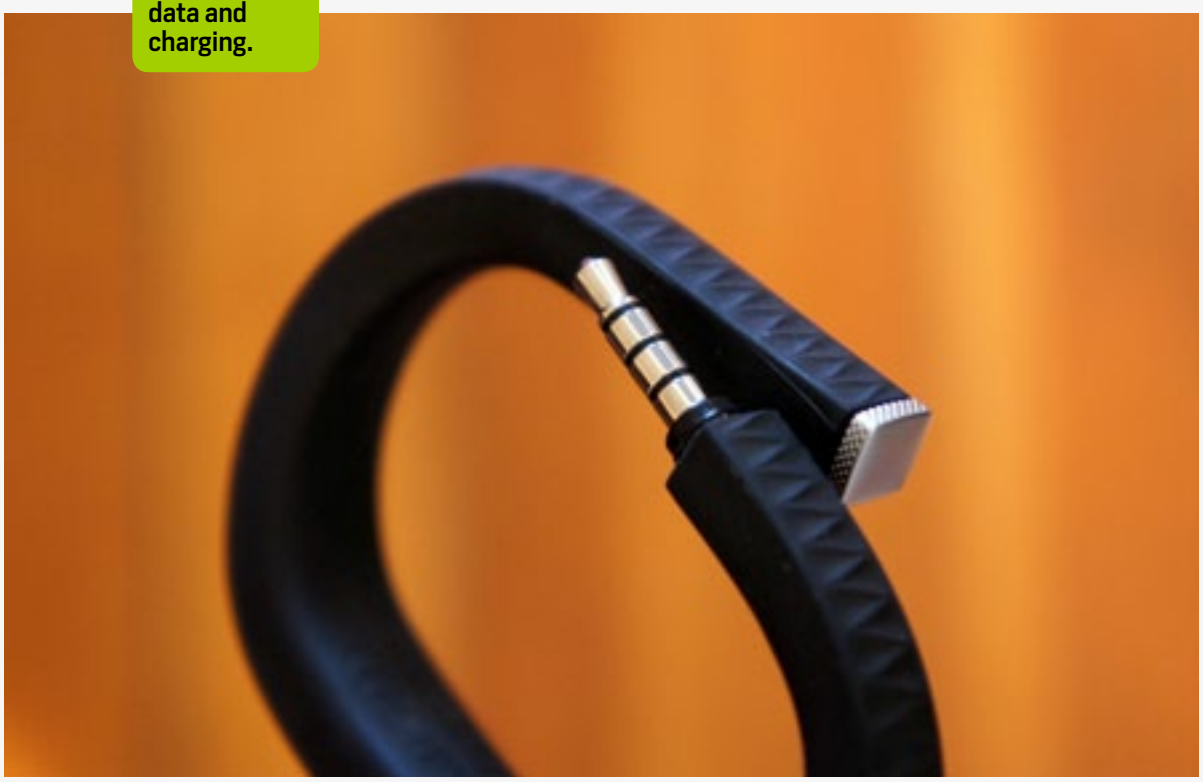
bust is this year's $130 shot at redemption. And the real question is, even if it works, is the Up something you'll want or need?

HARDWARE

Behar played it pretty safe with the design of the Up. From close up it's pretty clear it's not just a fashion accessory, but no one is going to point and stare at it from across the street. It's downright subtle when compared to the LED-riddled (and overpriced) Nike+ FuelBand. It's got the same zigzag pattern across the top as the original, an aesthetic choice that's a little too reminiscent of a bad tribal tattoo for this reviewer's tastes. (One person asked if it was meant to prevent sea sickness.) What *is* problematic is the textured button on one end and the cap covering the 3.5mm plug on the other. They constantly got in the way, catching on things and scraping against the palm rests of our laptops. The rubberized body is clearly supposed to be inconspicuous, but we constantly had to turn the bracelet around so the Jawbone-branded cap and button were facing outwards, giving away its non-decorative function.

We had to turn the bracelet around so the branded cap and button faced outwards, giving away its non-decorative function.

Last year's model was built to be "rugged" according to certain industry standards. The new Up goes well beyond those measurements, and that's good since underneath the rubber exterior are some rather delicate electronics. Gone are the issues with warm water and soap seeping in or its tendency to break apart internally when bent. We've showered with it, washed dishes, scrubbed floors, yanked it roughly off our wrists and needlessly bent it back and forth just out of boredom. Weeks



The 3.5mm jack is used for syncing data and charging.

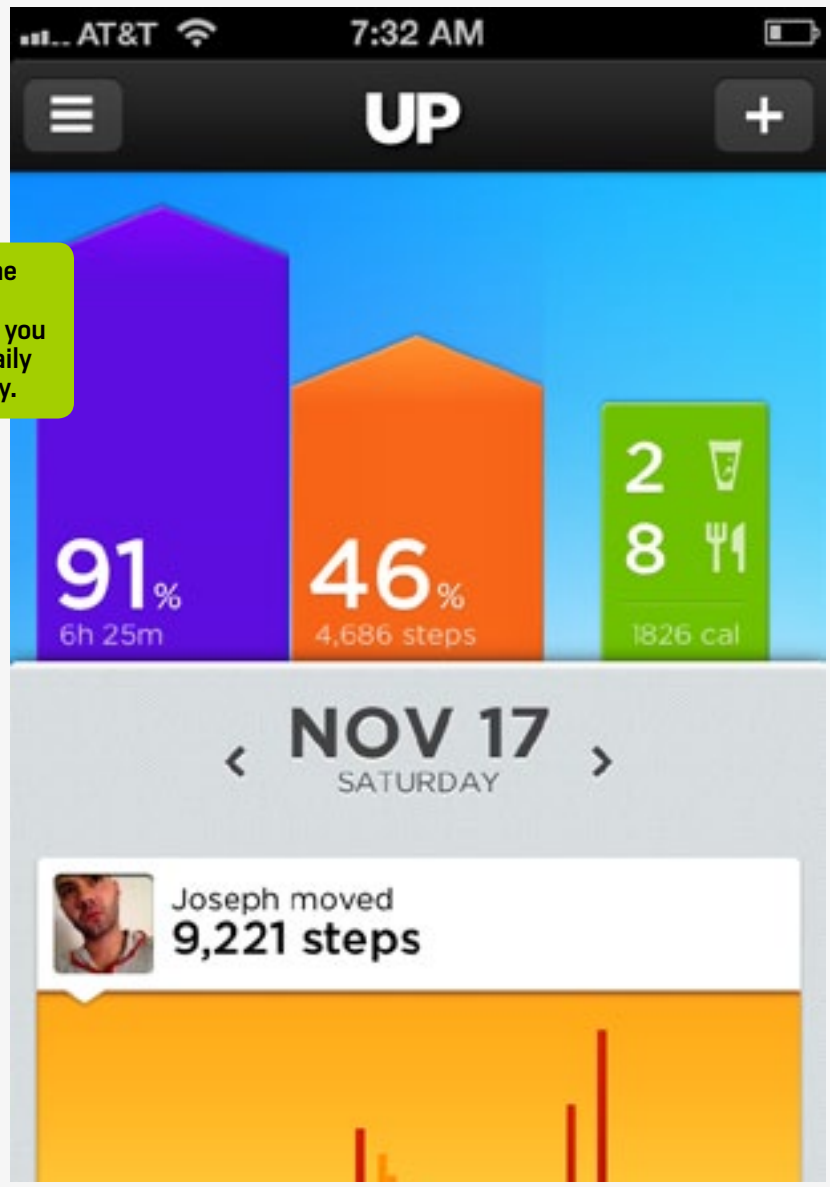
later, it's still ticking. Jawbone even built special machines like the Big Shower 2000 to put its durability to the test before shipping.

Sadly, the more things change, the more they stay same. There's still no Bluetooth or other wireless syncing option (point: Fitbit), nor is there a micro-USB port for charging. Instead you'll still have to rely on the repurposed headphone jack for both these tasks. So yes, that means you'll have to plug the band into your iPhone or iPad every time you want to upload your steps or change your settings. Though, you might not want to bother with the iPad since the app doesn't scale natively. It also means you'll need to keep close tabs on the cap and proprietary charging cable, both of which we've come dangerously close to losing more than once in the last few weeks. On the plus side, if you did lose the charger, you'd have plenty of time to order a new one and have it shipped to you; Jawbone claims the Up has a battery life of 10 days. And the company is pretty darn close: we were able to go nine days before our review unit finally demanded that we plug it into our computer's USB port.

SOFTWARE

The other major complaint leveled against the original Up was that its companion app was rather lackluster. The software, currently compatible with iOS devices only, is an essential part of the data-tracking package — without it the Up is little more than a piece of plastic jewelry. Thankfully Jawbone buckled down and polished up the app. In fact, whereas last year it felt like an afterthought, now the bracelet seems like an accessory to the app. Many of the major aesthetic elements have returned, but there's a fresh coat of paint, a more modern layout and, most importantly, tons of new features.

The "Me" page is now the home screen and there have been some minor tweaks to the design. It still uses bars to represent your progress towards sleep, step and food goals, but you can now scroll down through the day's updates —



The Home screen provides you with a daily summary.

The social aspects serve two purposes — to motivate you through a sense of companionship and competition, and to shame you through public humiliation.

including any exercise or meals you and your friends (teammates) have entered. In addition to presenting you with more information and context up front, the new home screen also more readily exposes the app's social features. If you want to comment on your own or a teammate's progress all you have to do is tap on the tiny speech bubble at the bottom of each update card. Making the social aspects more visible serves two purposes — to motivate you through a sense of companionship and competition, and to shame you through public humiliation. Though Jawbone and most other fitness-tracking services will deny that shaming is an intentional component of their products, there's no ignoring reality. Publicly confessing that you just ate a 1,400-calorie Chocolate Chip Cookie Dough Blizzard from Dairy Queen at 11 AM on a Wednesday is probably the best way to ensure you never do it again. Similarly, seeing your calories pile up in a public forum will make you more conscious of what you put in your body.

The left menu lets you view your info and change settings.

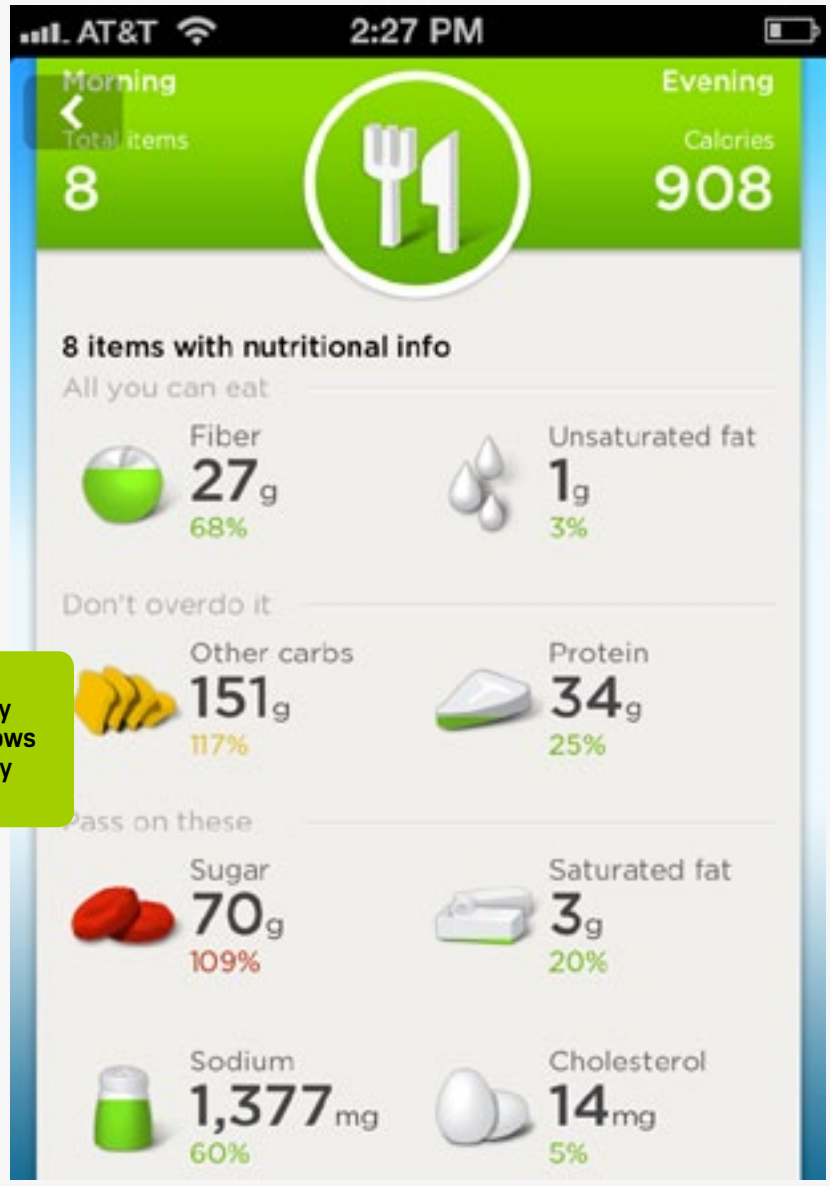
If you're more concerned with putting all that data in context, you can simply tap the back and forward buttons to browse through your history. You can see a more direct comparison however by exposing the left-hand menu bar (either by swiping right or by tapping the menu icon in the top-left corner) and viewing your Lifeline or Trends. Lifeline simply plots your sleep and activity on an endlessly scrolling horizontal plane, allowing you to quickly see your sleep and movement patterns in a detailed bar graph. Trends simplifies things a bit, compressing your sleep, movement or other info

into day, week or month chunks. That makes it much easier to quickly spot patterns — as the name of the pane implies. As the weather cools, are you moving about less? Are you getting your best night's sleep on Sundays and your worst on Fridays? And while the default options are total sleep and steps, you can break it down into time spent in a deep sleep or how much protein you consume. Finally, the Up app actually presents you with useful information presented in a useful way. While the simplistic progress bars and celebratory halo effect are still present for at-a-glance tracking, there's now a much deeper well of information to dig through.

FOOD TRACKING

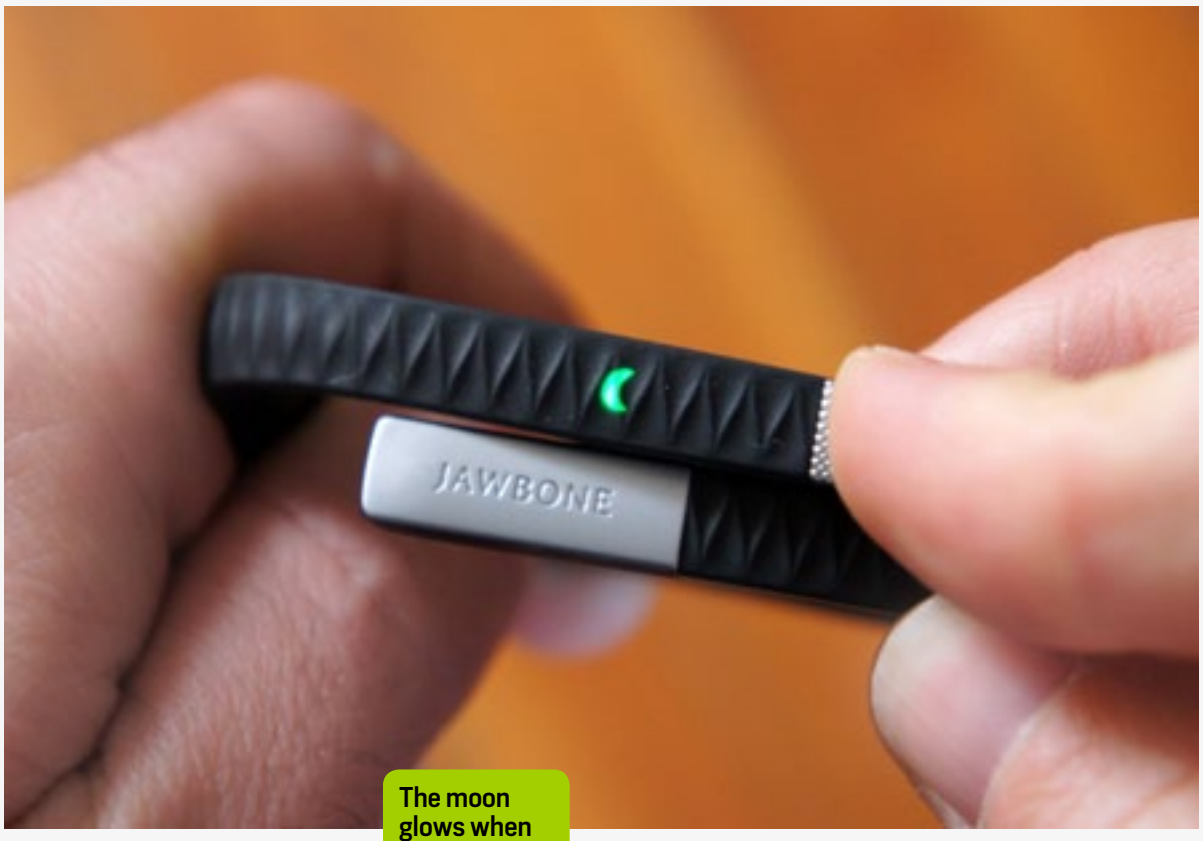
One of the most improved aspects of the Up app is its meal-tracking feature, which actually lets you monitor your caloric intake. Last year's Food Diary was just that — a diary. You took a photo of your food, labeled where and when you ate it, and how it made you feel. It was less a way to actually quantify your nutrition than it was a poorly implemented FoodSpotting clone. Thankfully that part of the app has been rebuilt from the ground up with a reasonably robust database of dishes and foods, and includes a barcode scanner for quickly compiling your intake with nothing more than your iPhone's camera.

Unfortunately, there are still some rough edges. The ability to add header images based on food category seems superfluous. Not only that, but you can only add them as part of a generic food selection before you scan a barcode or search the database. Selecting sweet cereals under the breakfast heading doesn't actually filter out non-cereal items from your search and simply adds an extra step to the food-logging process. It may add a touch of style, but it's likely the sort of thing that might actually dissuade a person from monitoring their caloric intake. We also encountered several items that simply weren't in Jawbone's repositories. Our Midland Farms 1 percent milk returned an error and Trader Joe's vegetable samo-



The Eat summary page shows your daily intake.

sas were incorrectly identified as organic ketchup — despite existing in the database. The calorie-tracking element is greatly appreciated, but other services like MyPlate and FatSecret offer much more accurate and robust tools for those that want to manage the minutia of their nutrition and do so for free.



The moon glows when ready to start tracking your slumber.

Publicly tracking our meals did make us much more conscious of what we put in our bodies. Not that there was a ton of junk food in my diet, but the last remnants of it had been banished after just a couple of weeks of being forced to share my habits. Jawbone would say that the Up was simply making you aware and presenting you with hard-to-ignore data, but there's definitely a certain amount of shame involved. There are only so many times you can enter whiskey and Red Bull (never mixed, of course) before you start to assume your teammates are judging you.

SLEEP TRACKING AND ALARMS

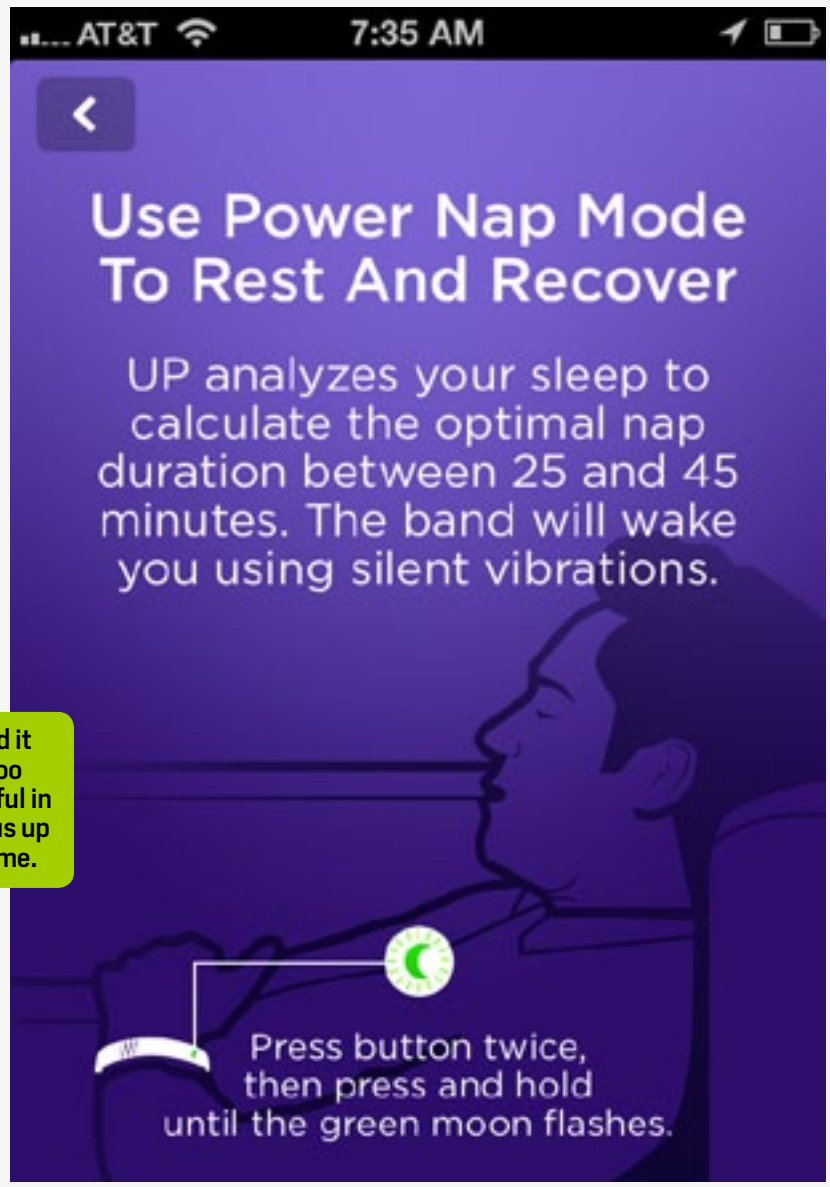
Perhaps the feature we were most excited about was Up's ability to track sleep patterns, something Fitbit has done for a couple of years now. The promise is that, with the aid of a special algorithm, the band will help you sleep better, wake up happier and nap more effectively. At the end of the night, you tell it you're going to sleep by pressing and holding the lone button until the Up vibrates and the tiny moon-shaped light glows. From that moment on the Up keeps extremely close tabs on your movement using actigraphy to tell when you've fallen asleep and whether you're in a deep REM stage or lightly snoozing. Beyond simply adding some variety to your daily bar graphs, monitoring the depth of your slumber is also key to the success of the Smart Alarm. Instead of making a loud noise at a predetermined time, the Smart Alarm gently vibrates when you're in a light sleep, somewhere around the time you'd like to wake up (up to 30 minutes before you've actually set it). In theory this should make you feel less groggy in the morning.

Unfortunately, in practice, it was ineffective at best, and irritating, at worst. Over the course of several weeks, the alarm only succeeded in waking me up three times. The rest of the mornings I was either awake before the Up or slept through its vibrations.

The extension of the Smart Alarm is Power Nap. Press the button once, twice, then press it a third time and hold to tell the band you want to take a quick siesta. It then waits till you fall asleep then starts the timer, waiting for you to get roughly 26.5 minutes of shuteye, before rousing you during a light sleep cycle. My few experiments with this were rather unsuccessful, with the alarm once going off before I managed to get to sleep and another time failing to wake me up at all.

Ultimately the issue seems to be that the Up isn't actually very good at telling when you're asleep and when you're not. And the fact that you have to manually tell it when it's bedtime, unlike the Basis band, only exacerbates matters. One morning I forgot to take it out of sleep mode and the Smart Alarm went off 15 minutes after I got out of bed and was making a pot of coffee. Other days it was clear upon reviewing sleep data that the accelerometer inside just can't differentiate between laziness and actual sleep. Slothful Sundays that begin with a bed-bound TV session often translated into an extra bout of dozing in the Up app.

There's a third alert, though it has nothing to do with the sleep-monitoring functions. The Idle Alarm reminds you to get up and move about every so often to keep your body from slowly atrophying at your desk. The band can be set to vibrate at certain intervals if you don't meet a movement quota. You can also set the hours in which this is active, so that the Up doesn't wake you every 30 minutes while you're trying to sleep. We appreciated the reminders to move (multiple editors strapped one on and set it to 45-minute intervals during the hours of 8 AM to 7 PM), but rarely did it ever actually motivate us to get up from our desks. It made us acutely aware of how sedentary we were during the day, but failed to actually make us do anything about it.



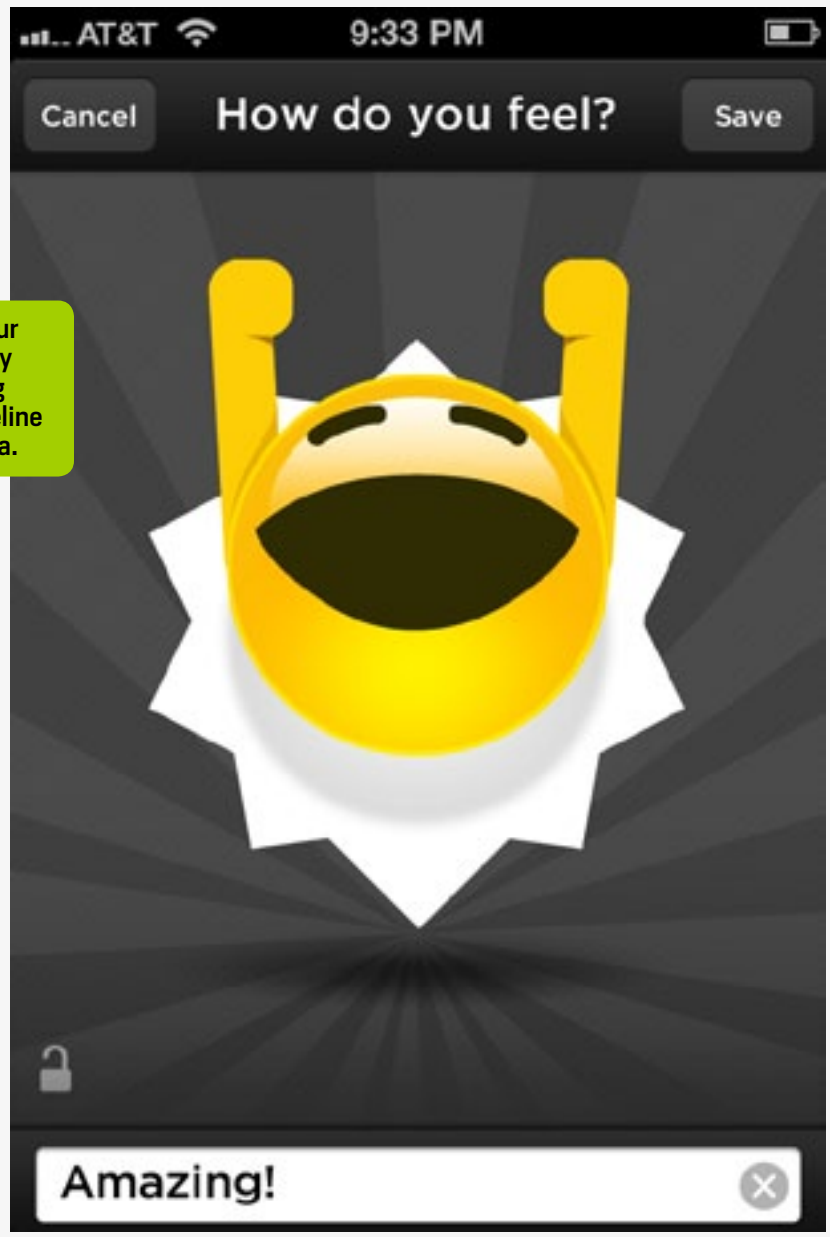
We found it wasn't too successful in waking us up all the time.

ACTIVITIES, MOOD AND INSIGHTS

The Up is very clearly targeted at those who wish to have a healthier lifestyle. And that term "healthy" is key. If you read through the various marketing materials you'll notice a few words that usually go hand in hand with "health" are missing — most notably "fitness" and "exercise." The Up isn't for seriously athletic people, and one look at its activity-tracking feature makes that painfully obvious. The band itself can only act as a stopwatch to time your more active moments — which you initiate by pressing the button once, then a second time and holding down until the green sun LED flashes and the bracelet vibrates. You mark the end of your activity by pressing and holding the button again. Next time you sync, an unknown activity will be added to your profile. If you're so inclined you could go in and specify the type of activity and the intensity level, which will give you a better estimate of your calories burned, but it still can't quite compare with something like a Garmin GPS combined with a heart rate monitor. In fact, it can't even come close to dedicated fitness-tracking services like Fitocracy or RunKeeper. Your activity choices are very limited — there are only a grand total of 18 options, two of which are "video games" and "other."

Mood tracking is another manually implemented feature that doesn't seem to add much for the data obsessed. Tap the smiley face icon on the home screen and you can set your status by sliding your finger up or down the screen. At the top is "amazing!" while at the bottom is "totally done," though you can customize the accompanying phrases for your avatar. Sure, you might notice you're in better mood when you sleep more or get more exercise, but overall it doesn't seem

Future updates may make Insights more useful, but for now it offers little beyond fortune cookie wisdom and basic math.



Track your moods by updating your Lifeline with data.

to add much depth — it's just one more thing to keep track of.

Sadly, what was billed as one Up's killer new features was also one its biggest disappointments. Jawbone describes Insights as a way to "discover hidden connections and patterns in your day-to-day activities." Instead it basically just spits out weekly recaps of how much you slept and walked along with generic, feel-good health advice like "staying active is a great way to beat the blues." Perhaps future updates will make Insights more useful, but for now it offers little beyond fortune cookie wisdom and some basic math.

WRAP-UP

One year ago, we thought the Up was done for, but Jawbone refused to simply roll over and give up. We've got to give the company credit for going back to the drawing board, redesigning the band and its companion app and addressing all of the most glaring problems with the product — most notably its tendency to stop working. This year's model is a success in terms of ruggedness and longevity. We're pretty sure we couldn't break this electronics-packed rubber band even if we wanted to and it can last well over a week on a single charge. So, if you were sold on the concept in 2011, but took issue with

The UP offers a low-key, minimal design for daily use.

its durability, then rest assured your concerns have been addressed.

On the software front, things are a little murkier. While the companion iOS app is certainly a significant upgrade, we still feel there's a lot of room for improvement. The design is slick, there are loads of new features and you can dig much deeper into the details. The added granularity and new visualizations are clearly a highlight, but too many other features feel half-baked. It seems like Jawbone took the complaints about the stripped-down nature of the Up app to heart, but may have overcompensated by becoming a jack-of-all-trades while mastering none. We will say this about the app: no longer does it seem like an afterthought. Instead we'd say it's the main attraction and the band seems like an accessory (an unfortunately mandatory one).

And, therein lies the problem. The Up band itself doesn't actually do much that you can't already do with your smartphone or a $20 pedometer. Heck, if you've got a phone running Jelly Bean, you've already got a pedometer. And, if you are in the market for a dedicated health-tracking gadget, the Fitbit One offers most of the same features for $30 cheaper in a slightly less convenient form factor. If Jawbone would let you use the app without purchasing the bracelet, it might have more success luring people in by hooking people on the platform before trying to sell them a piece of jewelry. At the end of the day the Up excels at encouraging good habits and a healthy lifestyle, but considering the competition we're not sure $130 is a compelling price. D

Terrence is too complicated and multi-faceted to be reduced to pithy one liners. He's also kind of a jerk.

BOTTOMLINE

JAWBONE UP (2012)

$130

PROS

- Improved durability
- Excellent battery life
- Feature-packed app

CONS

- Sleep tracking isn't accurate
- App still has rough edges
- "Insights" are as useful as a fortune cookie

BOTTOMLINE

Jawbone has addressed many of the issues that plagued the original UP, but $130 is a steep asking price for a stylish pedometer and mediocre health-tracking app.

REVIEW

ASUS ZENBOOK PRIME UX51Vz

The luxury-priced Zenbook Prime UX51Vz is a solid and stylish media powerhouse, but does it have the juice to take it to the top of the Ultrabook charts?

By Sarah Silbert

Windows 8 has ushered in an era of category-defying devices, with hybrid machines that bend, flip around, lie flat and otherwise contort flooding the market (and our offices). When virtually every Windows 8 product we've reviewed possesses acrobatic abilities, it's easy to forget regular ol' laptops are running Microsoft's new OS, too. One such machine is the $1,949 ASUS Zenbook UX51Vz (aka the U500), a 15-inch Ultrabook with the trappings of a multimedia powerhouse, including a quad-core Core i7 processor, NVIDIA GT 650M graphics and a 1080p

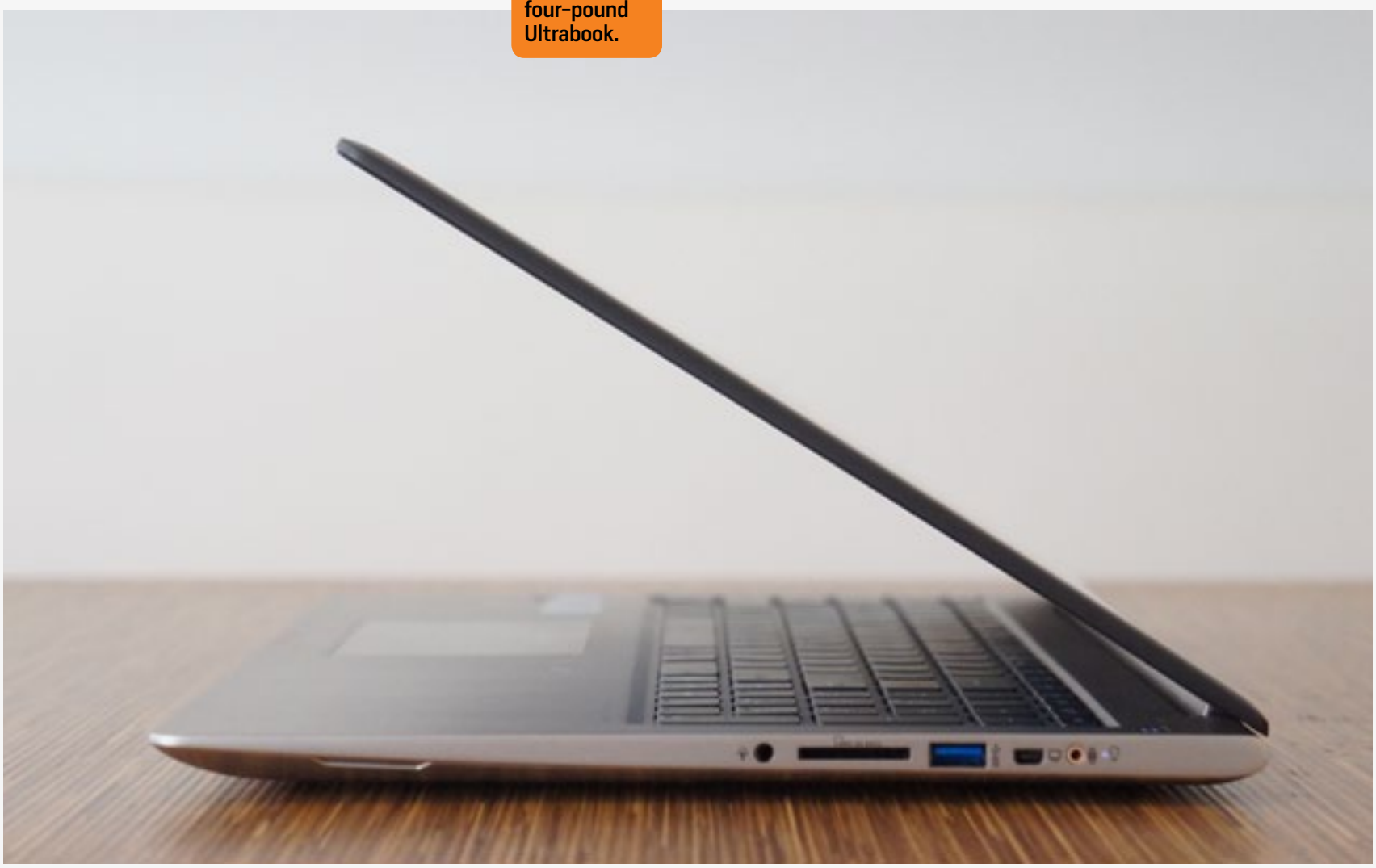
IPS display — and no gymnastic tricks up its sleeve. Another thing it doesn't have: a touchscreen, which is available on plenty of other Windows 8 notebooks, not to mention other upcoming Zenbook Prime models. Considering that (possibly glaring) omission, is the UX51Vz still an attractive option at this premium price point?

LOOK AND FEEL

ASUS' Zenbook line scores high in the looks department, and the UX51Vz sports the same signature spun-metal lid and all-metal chassis as its predecessors. Those features make for a classy, super-slim Ultrabook (as evidenced by the UX31A and the UX21A before it), and they still go a long ways toward making the UX51Vz's larger 15-inch size more palatable. It definitely doesn't feel as sleek as the 13-inch Zenbooks, but it's mighty attractive for a big rectangle. Still, that's not to say this notebook is a waif: weighing four pounds and measuring 0.99 inch at its thinnest, it can't compare to the 15-inch Samsung Series 9, which checks in at 3.5 pounds / 0.58 inch thick.

> In addition to good looks, the UX51Vz has the build quality of a high-end machine.

In addition to boasting good looks, the UX51Vz has the build quality of a



The UX51Vz is a powerful, semi-slim, four-pound Ultrabook.

high-end machine. It feels very sturdy in the hand — and very light for a four-pounder, we might add. The hinge exhibits no creakiness whatsoever, and the lid and bottom don't bend under pressure. Flip the laptop over and you'll notice that the brushed-metal motif carries over to the bottom. ASUS sealed off the underside, so you won't have easy access to the battery, SSD and so forth.

Typing on the island-style keyboard is a pleasant experience.

Time for the formal tour: on the left side of the UX51Vz you'll find the power jack, Ethernet port, HDMI and two USB 3.0 connections. The right side is home to the microSD card slot, another USB 3.0 port, mini-VGA and a connection for the tiny external subwoofer, which comes in the box. ASUS also bundles a mini-VGA-to-VGA dongle, along with a USB-to-micro-USB converter. Back on the deck, the speaker grille sits at the top of the keyboard. And at the front edge of the system, under the trackpad, you'll find four indicator lights (for hard drive, wireless, num lock and caps lock).

KEYBOARD AND TRACKPAD

Since the UX51Vz doesn't sport a touch-enabled display, the spotlight shines extra brightly on the keyboard and touchpad. As these are your only onboard options for interacting with Microsoft's touch-optimized OS, you'll want assurance that these are finely tooled instruments. We're happy to report the ergonomic outlook is good.

For one, the slightly recessed, island-style keyboard offers enough travel to make typing sentences a fluid experience — you won't stumble over individual letters due to shallow keys. When we gave a typing test a whirl, we achieved moderate typing speeds but very low error rates. Another highlight: the palm rest is huge, so your wrists won't dangle off the edge of the machine.

The touchpad is situated slightly off to the left side of the deck, and it's plenty roomy. We found it to be a noticeable improvement over other Zenbooks such as the UX31A. Windows 8

gestures like swiping in from the right to reveal the Charms Bar work reliably, though single-finger tracking is still a bit finicky. It's really an issue of having to apply more pressure than you might like to get the cursor under your control. And if you've played with any touch-enabled Windows 8 machines, your biggest problem will be overcoming the instinct to touch the display.

DISPLAY AND SOUND

With a 1080p resolution, the UX51Vz's 15.6-inch IPS display provides a great canvas for watching movies and browsing the web. The panel quality is especially noticeable when you view the Windows 8 Start Screen: tiles pop out in true, bright hues against the vibrant background. This is a colorful UI, and this screen does it justice. The matte finish and IPS technology lend the machine very wide viewing angles as well — you can tip the screen a ways forward before images start to wash out, and watching Netflix with friends shouldn't be an issue, as we had no problem viewing the action even at extreme off-angles.

Of course, we can't fully sum up this laptop's display without touching on what's conspicuously missing. The lack of a touchscreen — on a $1,949 machine, no less — is, well, curious. Yes, adding a touch display would add weight to the already-substantial machine, but given that Windows 8 sports such a finger-friendly interface, the UX51Vz might feel like an incomplete version of the W8 experience. We found ourselves tapping at the panel simply out of habit, but quickly adapted to the non-touch model — the comfortable, responsive keyboard and clickpad certainly make that omission easier to swallow. Then again, the UX51Vz isn't a convertible, so you won't be using it in tablet mode, which is when you're most likely to crave those touch features.

The 15-inch 1080p display is crisp and bright.

The UX51Vz's built-in stereo speakers pack Bang & Olufsen ICEPower Audio Technology, and they deliver loud — albeit slightly fuzzy — audio. Songs and videos play back with a moderate amount of bass, though audiophiles will note that sound could be crisper. To bolster the laptop's multimedia cred, however, ASUS includes an external SonicMaster subwoofer in the UX51Vz's box. Plug this in, and you'll be treated to audio that packs more oomph. The pe-

ripheral enhances both gaming and music-streaming sessions; we'd definitely recommend keeping it on hand.

PERFORMANCE AND BATTERY LIFE

We tested the UX51Vz with a quad-core 2.1GHz Core i7 processor, 8GB of RAM and a 256GB SSD made by SanDisk. Those cushy specs lend the system good performance numbers, most of which trounce the Windows 8 systems we've tested so far. In the disk benchmark ATTO, for example, the ultraportable turned in top read speeds of 908 MB/s and write times up to 567 MB/s. Those blazing I/O speeds are bested only by the Acer Aspire S7 among machines we've tested recently. The UX51Vz takes a breezy 12 seconds to cold-boot into Windows 8, and in general navigating the Start Screen and desktop feels fast and fluid.

ASUS bills the UX51Vz as a multimedia machine, and the laptop packs NVIDIA's GT 650M chip with 2GB of dedicated memory along with integrated Intel HD Graphics 4000. On the synthetic graphics tests 3DMark06 and 3DMark 11, it scored miles above systems with integrated graphics, and it also performed well when we played a few games via Steam. When we fired up titles like *Mafia II*, action looked fluid and frame rates hovered in the 40 to 60 fps range. That's a solid showing, though the fan is clearly burdened by the workload. Just a few minutes into the demo, the whirring started and the machine felt slightly warmer.

The machine packs an eight-cell 70WHr battery, and when we ran our battery test (looping a locally stored video on loop with display brightness set to 65 percent), it lasted five hours and 15 minutes. (ASUS rates the system for a slightly longer five hours and 38 minutes.) We've seen many, many Windows 8 devices with touchscreens turn in very short runtimes, and given that the UX51Vz doesn't pack a touch dis-

BENCHMARK	ASUS UX51Vz (2.1GHz Core i7-3612QM, NVIDIA GT 650M graphics)	ACER ASPIRE S7 (2.4GHz Core i7-3517U, Intel HD 4000)	LENOVO IDEAPAD YOGA 13 (1.7GHz Core i5-3317U, Intel HD 4000)	DELL XPS 12 (1.7GHz Core i5-3317U, Intel HD 4000)
PCMARK7	4877	**5011**	4422	4673
3DMARK06	**14267**	4918	4415	4520
3DMARK11	**E3809 / P2395 / X750**	E1035 / P620 / X208	E917 / P572	N/A
ATTO (TOP DISK SPEEDS)	908 MB/s (READS); 567 MB/s (WRITES)	**934 MB/s (READS); 686 MB/s (WRITES)**	278 MB/s (READS); 263 MB/s (WRITES)	516 MB/s (READS); 263 MB/s (WRITES)

BATTERY LIFE	
ASUS UX51VZ	5:15
SAMSUNG SERIES 9 (15-INCH, 2012)	7:29
LENOVO THINKPAD X230	7:19
SAMSUNG SERIES 9 (13-INCH, 2012)	7:02
MACBOOK AIR (13-INCH, 2012)	6:34 (OS X) / 4:28 (Windows)
DELL XPS 14	6:18
HP FOLIO 13	6;08
HP ENVY SLEEKBOOK 6Z	5:51
TOSHIBA PORTEGE Z835	5:49
SONY VAIO T13	5:39
LENOVO IDEAPAD YOGA 13	5:32 (OS X) / 4:12 (Windows)
MACBOOK AIR (13-INCH, 2011)	5:32 (OS X) / 4:12 (Windows)
DELL XPS 12	5:30
HP ENVY 14 SPECTRE	5:30
TOSHIBA SATELLITE U845W	5:13
TOSHIBA SATELLITE U845	5:12
ACER ASPIRE TIMELINE ULTRA M3	5:11
TOSHIBA SATELLITE U925T	5:10
LENOVO THINKPAD X1 CARBON	5:07
SAMSUNG SERIES 5 ULTRABOOK (14-INCH, 2012)	5:06
ACER ASPIRE TIMELINE ULTRA M5	5:05

play, we expected it to offer better longevity. Plus, this 15-incher could fit in a bigger battery.

SOFTWARE AND WARRANTY

The UX51Vz isn't immune to the bloatware epidemic that seems to affect most Windows machines, though ASUS exercised some restraint here. The pre-load mostly consists of Microsoft-branded utilities, such as the Fresh Paint drawing app, a 60-day Office trial, SkyDrive and Skype, plus a handful of ASUS' own applications. You'll find ASUS Install, a one-stop shop for installing drivers and programs — only for pre-selected apps like Cyberlink Power2Go, however. An ASUS calculator and a measurement conversion utility are also on board, and there's also ASUS Tutor for helping users master the new terrain of Windows 8.

CONFIGURATION OPTIONS AND THE COMPETITION

We tested the ASUS UX51Vz-DH71, packing a 2.1GHz Core i7-3612QM processor, 8GB of RAM, NVIDIA GT 650M graphics and a 256GB SSD. This configuration will set you back a hefty $1,949 — and, amazingly, that's the entry-level price. Big spenders can splash out even more for the $2,399 UX51Vz-XH71, which runs Windows 8 Professional and boasts dual 256GB SSDs. And before we open the playing field up to other companies, it's worth mentioning that ASUS offers other Zenbooks that sport touch-enabled displays. The

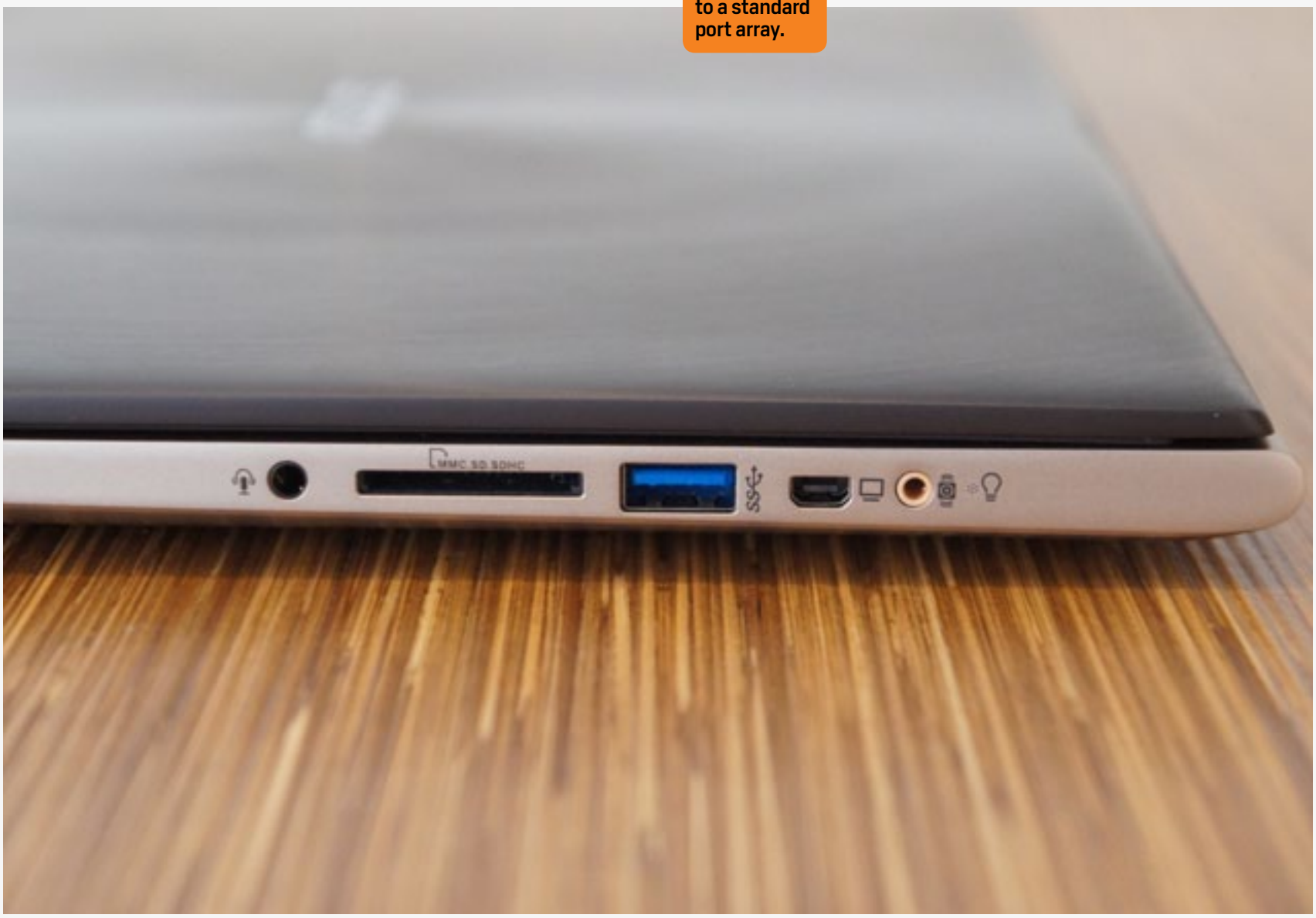
ASUS ZENBOOK PRIME UX51Vz

Given the lack of a touchscreen, we expected better longevity.

13-inch Zenbook Prime Touch will go on sale later this month, and a touch-enabled 15-incher will come later.

If 15 inches is your sweet spot, the Sony VAIO S Series 15 is another, similarly configured option. For $1,700, you get a 2.2GHz Core i7 CPU, 12GB of RAM (!), a 256GB SSD and NVIDIA GeForce GT 640M LE graphics. Like the UX51Vz, the E Series 15 sports an IPS display with a 1,920 x 1,080 (also non-touch) resolution, though this system weighs a heavier 4.42 pounds and is thick enough to include an optical drive. There's also HP's 15-inch Spectre XT TouchSmart which, yes, sports a 1080p IPS touchscreen. A price tag of $1,569 affords you a Core i7 CPU, a 128GB SSD and full versions of Adobe Photoshop Elements and Premiere Elements. The trade-off here, though, is integrated Intel HD Graphics 4000 rather than the NVIDIA chips found in ASUS' and Sony's systems.

And if you don't bat an eye at the UX-51Vz's price tag, you might consider the 15-inch Apple MacBook Pro with Retina display. It offers



A subwoofer output is located next to a standard port array.

a 2.3GHz Core i7 CPU, a 256GB SSD and discrete NVIDIA graphics for $2,199. Its advantages are a brilliant panel and superior battery life — though the lack of Windows 8 will no doubt be a dealbreaker for some.

The UX51Vz laptop sports the iconic ASUS spun-metal lid.

WRAP-UP

Is the UX51Vz a worthwhile purchase? Could be: it packs high-performing internals into a sleek package and offers a comfortable keyboard, to boot. But few though the cons may be, they could be reason enough to justify passing this system up. The machine verges on cost-prohibitive, especially considering the battery life isn't great and there's no touchscreen for interacting with Windows 8. If those shortcomings don't deter you, though, the UX51Vz is easily the most powerful Ultrabook you can get. D

Sarah is Reviews Editor, a wannabe tap dancer and a closet film critic.

BOTTOMLINE

ASUS ZENBOOK PRIME UX51Vz

$1,949+

PROS

- 1080p IPS display offers good viewing angles
- Sleek design, comfortable keyboard
- Excellent performance

CONS

- Underwhelming battery life
- Expensive

BOTTOMLINE

The Zenbook Prime UX51Vz is easily the most powerful Ultrabook available, but underwhelming battery life — and a sky-high price tag — temper our enthusiasm somewhat.

REVIEW

APPLE iMAC (2012)

The mission to slim down the desktop has been accomplished. So is skinnier better for Apple's iMac refresh?
By Dana Wollman

Better, faster, stronger. The new iMac claims to be better in all the ways you'd expect a refreshed product to be better: it steps up to Ivy Bridge, and packs NVIDIA Kepler chips for stronger graphics performance. It sports an improved display that cuts down on glare by 75 percent.

But *thinner*? For the first time in the product's history, the iMac is missing a built-in optical drive, which allows it to measure just 5mm thick around the edges. We can't say we've been waiting for a desktop quite that skinny, but if the new iMac delivers substantive improvements

over the last-gen model, we won't begrudge Apple a little eye candy. So, does the iMac do more than just sit pretty? Are the performance and display as good as we've been led to believe? In a word, yes. Here's why.

LOOK AND FEEL

For the past few years, our iMac reviews have been rather perfunctory. Until this fall, when Apple finally announced fresh models, the design remained the same for several years running. Even now, we're tempted to gloss over the hardware section: from the front, this looks more or less like the last-generation iMac. Same aluminum build, including that metal chin with the glossy black Apple logo in the center. The stand in the back is basically the same, with a circular pass-through for the power cable. (As it happens, the stand is slightly more compact than it had been, but that means little in terms of space savings since the screen sizes are the same as they always were.) Both the 21- and 27-inch machines are significantly lighter, too, but you'll only notice that when you're taking yours out of the box.

No, if you want to appreciate the difference in design, you'll have to tear yourself away from that fully laminated screen and roll your desk chair off to the side. Now that the iMacs don't have built-in optical drives, they measure 5mm thick around the edges,

The new iMac slims down to 5mm thin around the edges.

about the thickness of four credit cards. Aside from nixing the DVD drive, of course, Apple was able to achieve that thin shape by adopting a process called friction-stir welding, a manufacturing technique commonly used in the aviation industry. Naturally, as you can see, the backside isn't that thin throughout; it puffs out in the center where the processor, GPU, RAM and all that fun stuff lives. Even so, it's dramatically, almost comically skinnier than last year's model. Up to a 40 percent reduction in volume, to be exact, depending on which one you get.

All told, the new design is eye-catching, and will probably earn you bragging rights the next time you give someone a tour of the home office. But how often are you going to be staring at your computer edge-on? And how many stares can a desktop draw if you never take it out in public? As you'll see, we ultimately recommend the iMac for several reasons — namely, speed, display quality and graphics might. Thinness counts, too, but it feels more like a nice bonus than anything else.

With one notable exception, the selection of openings is identical on both the 21- and 27-inch model. The ports (all located on the back side toward the right) include an Ethernet jack, two Thunderbolt connections and four USB 3.0 sockets. There's also an SDXC reader and a 3.5mm headphone jack, located closest to the edge. The power button is also on the back side, but over on the left-hand side. Up front, tucked into the front bezel, is a FaceTime camera, capable of recording 720p video. Hidden nearby are dual microphones, along with an ambient light sensor allowing the screen to automatically adjust the brightness depending on the surrounding lighting conditions.

The one difference is that the memory slots are user-accessible on the 27-inch model, but not on the 21-inch one. To open up the door on the backside, unplug the machine, remove the power cable from the back of the computer and then use a pen or a safety pin to press a button that causes the door to open. To be

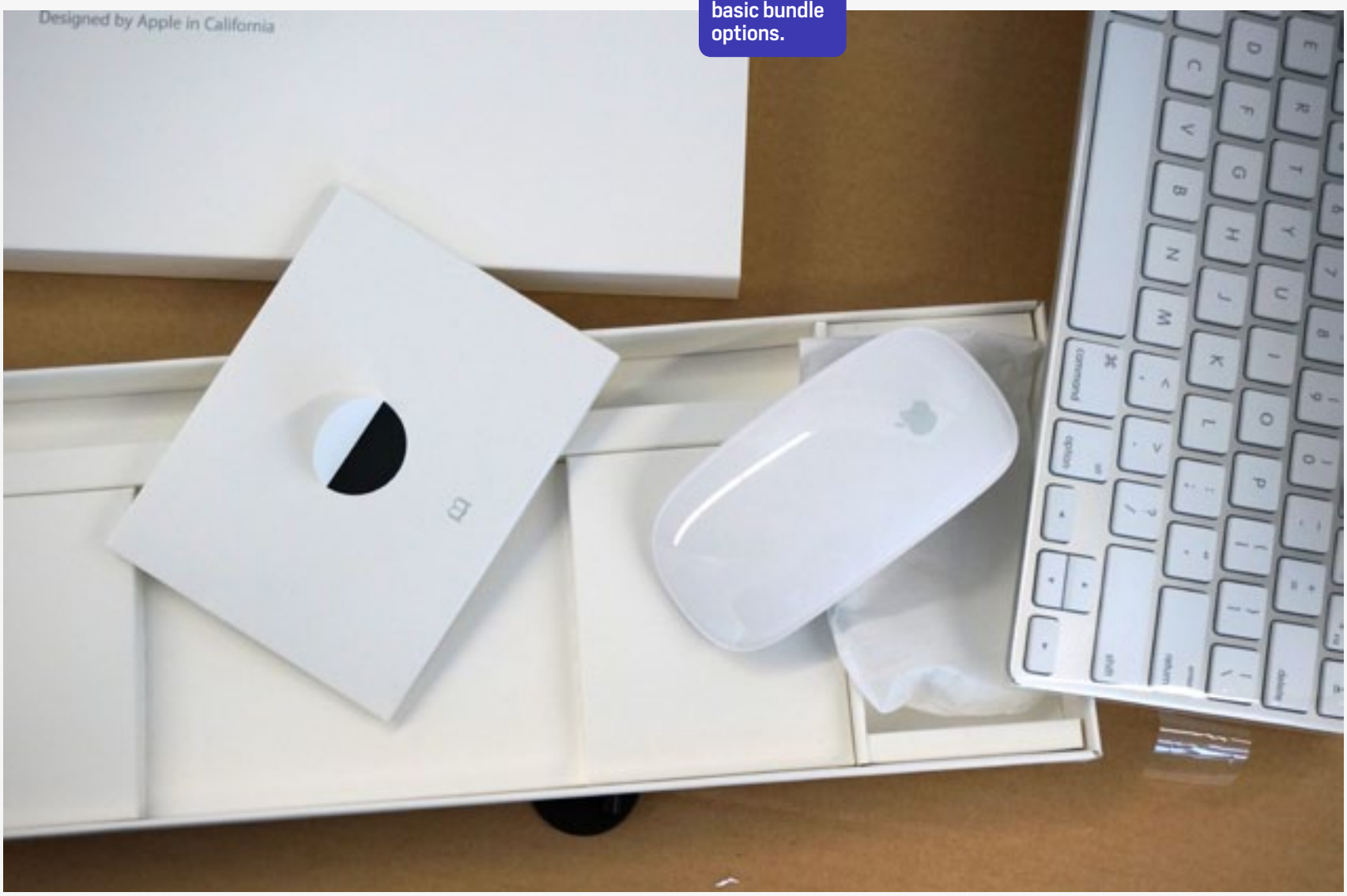
It may be thinner, but the iMac still has plenty of ports in back.

clear, though, this applies to the RAM only; the storage drive is inaccessible regardless of which model you choose.

KEYBOARD, MOUSE AND MAGIC TRACKPAD

Just as the overall design hasn't changed much, neither have the included peripherals. As ever, the Bluetooth keyboard is a compact little thing, fairly small considering it was built to live on a desk (one big enough to accommodate a 21- or 27-inch computer, at that). In fact, the keys take up about as much space as on the 15-inch MacBook Pro, and the spacing between the buttons is similar, too. The only reason it might have been bigger, then, would have been to accommodate a numpad, which you'll not find here.

In general, typing feels very similar to typing on a MacBook, which is to say the keys offer a decent amount of travel, and all of the major buttons (Delete, Enter, etc.) are easy to find by feel. Typing is also comfortable thanks to the battery door on the underside of the device, which gives the keyboard a slight wedge shape. All in all, it's an easy typing experience with a very small learning curve. If we could have Apple change one thing, though, it would be to coat the keys with the same soft-touch finish it uses on its laptop keyboards. The plastic buttons here are a bit scratch-



The Magic Mouse is one of the basic bundle options.

ier, not that it's likely to interfere with the typing experience in any way.

If you wanted, you could configure your iMac so that it came with both a Magic Mouse and a Magic Trackpad in the box. By default, though, you get a choice between one or the other. (The regular Apple Mouse is also an option.) Far be it for us to tell you what to do, but if it were us shopping, we'd either choose the trackpad, or pay $69 extra so that we could have both. Part of it's that the trackpad works flawlessly, but it's also that the Magic Mouse is too narrow and too flat to fit comfortably in the hand. To be fair, the entire top of the mouse is one big multi-touch surface, capable of pinch-to-zoom, two-finger scrolling and all the gestures that serve as shortcuts in OS X. All of that would be awkward to pull off on a truly ergonomic mouse with a curvier shape. Still, if you've ever seen Microsoft's Touch Mouse, you know mice like this don't need to be *that* flat — not unless clean aesthetics are a priority, anyway.

Fortunately, the mouse performs well on a variety of surfaces, including wood and metal. It also works reliably as, well, a mouse. Simple cursor navigation is a breeze, as are more complex gestures. We had no problem scrolling through pages using two fingers, or scrolling to the side with two fingers to swipe between pages. Zooming also works smoothly — pinch-to-zoom, the obvious method, feels controlled, though when we had the option (like in Google Maps) we used a two-finger scroll to zoom instead.

The Magic Trackpad, to those of you who haven't seen one before, is basically an overgrown version of the glass touchpad Apple uses on all its laptops. Meaning, it offers a smooth, low-friction surface with very precise tracking. As you'd expect, it supports all the same gestures as the Magic Mouse, though it also does things the Magic Mouse can't. To put it as simply as possible, the Magic Mouse only supports single- and two-finger gestures, while the Magic Trackpad also allows for three- and four-finger ones. These include: pinching your index finger and three fingers to either expose the desktop or the Launchpad; swiping down with three fingers for App Expose; swiping up with three fingers for Mission Control; and swiping left or right with three fingers to move between full-screen apps. We'll admit having an external trackpad instead of a mouse can take some getting used to, even if you're normally glued to the touchpad on your laptop. Still, once you get comfy, you might appreciate the bigger surface area, and also the wider range of gestures. Your wrist might thank you too.

DISPLAY AND SOUND

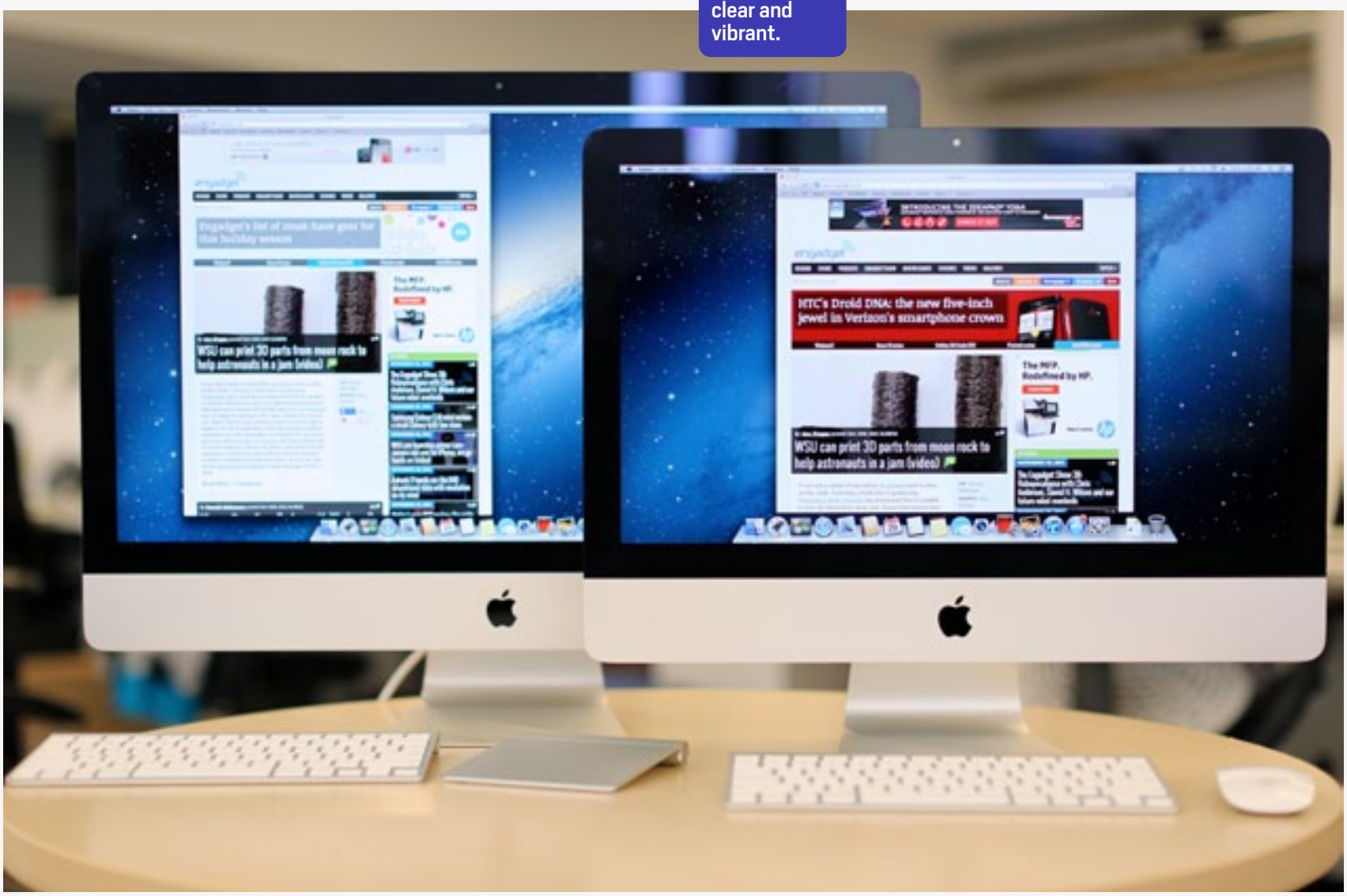
If you're thinking of buying the new iMac, this is your single best reason to take the plunge. That and, well, the screaming performance. Though the screens have the same resolution as the

This is your single best reason to take the plunge.

last generation (1,920 x 1,080 for the 21-inch model and 2,560 x 1,440 for the 27-incher), they promise 75 percent less glare, thanks to a full lamination manufacturing process that eliminates the gap between the LCD and the glass. In principle, it's not unlike the optical bonding technique used in the Surface, iPhone 5 and other devices; we've just never seen it done on a screen quite this large. Additionally, Apple used a process called plasma deposition to apply an anti-reflective coating at an atomic level, instead of just blanketing the screen with the stuff. The goal there was to reduce reflections on that glass layer without dulling the quality of the colors coming from underneath.

We'd say it was a success. Even with the screens turned off, the new iMac is noticeably less reflective than last year's model. Turn the two systems on, though, and the difference just speaks for itself. In our unboxing, we already described the display as a wall of color, and that still feels like the most apt description. There really are very few reflections standing in between you and those vibrant tones. True, you'd never mistake

The reduced-glare displays are bright, clear and vibrant.



this for a matte display (there's still a little glare, as you can see in some of our product shots), but it's still a huge improvement over last year's model, not to mention competing all-in-ones. In fact, with the brightness turned up far enough, you'll struggle to even make out your own reflection. As you can imagine, the screen is easily viewable from off-angles, too, which should come in handy the next time it's movie night and there's not enough room for everyone to have a front row seat. You can also adjust the screen angle by tilting it forward and back, but given the lack of glare, we rarely felt the need to.

Once you stop gawking at those rich colors, you'll notice the impressive level of detail. The truth is, even when it comes to mundane tasks like web browsing, having a 1080p or 2,560 x 1,440 display makes everything feel just a bit crisper, a bit tidier. It wasn't until we started playing games and viewing photos, though, that we truly appreciated all those pixels. What can we say? It's a fantastic spec, especially if you're stepping up from a lower-res system. Still, we can't help but feel that the resolution is of secondary importance compared to the new screen technologies used here; after all, last year's models had the same resolution and still didn't look this nice.

The neat thing about the iMac's speaker setup is that unless someone gave you a tour of the system, you might not know exactly where the sound was coming from. Had you asked us back when we knew nothing about it, we would've guessed the sound came from somewhere around back. In fact, though, the speaker chambers are located on either side of the display, with the sound firing down from the bottom edge of the screen. Considering the audio is aimed down, then, instead of toward the user, the soundstage is actually quite wide — wide enough that maybe, just maybe you'll be willing to set aside your headphones the next time you launch into a gaming marathon. The quality itself is rich — forceful, even — with only a hint of distortion at higher volumes (not that I pushed it past the median level when it was just me working by myself). Suffice to say, you probably don't *need* an external pair of speakers here; as is, we felt like we were rediscovering favorite songs, in that we were able to make out details that would have gotten drowned out on a lesser system.

PERFORMANCE

As you'd expect from a desktop that's getting refreshed in late 2012, the new iMac steps up to Intel Ivy Bridge processors, along with NVIDIA Kepler GPUs. For the purposes of this review, we tested two units (one in each size, natch). This included a 21-inch system with a 3.1GHz Core i7 CPU, 16GB of RAM and a 512MB NVIDIA GeForce GT 650M GPU, and a 27-inch machine with a 3.4GHz Core i7 processor, 8GB of RAM and a 2GB GeForce GTX 680MX.

Refreshed silicon doesn't tell the whole story.

Were you to buy these yourself, they'd cost $2,149 and $2,599, respectively.

Predictably, they do well. Very, very well. Starting with raw benchmark scores, the 21.5-inch version we tested notched an average Geekbench score of 12,577, while our 27-inch review unit scored 13,045. The 27-inch iMac we reviewed last year scored just 8,465, but our ability to compare results is limited since that was a Core i5 unit, and not the sort of specially configured system we tested this year. Our two test machines also scored well in Xbench, managing 531.91 and 560.44, respectively. (To put that in context, the new Mac mini got 454 in the same test, which is a good showing in and of itself.)

Still, that refreshed silicon doesn't tell the whole story. That performance jump, we suspect, mostly comes from Apple's FusionDrive, which combines a 5,400RPM hard drive and an SSD into one volume — similar to the setup you'll find in high-end gaming rigs. (Note: you need to configure the iMac with this feature, as it doesn't come standard.) It's a significant change, especially since as recently as last year even the most tricked-out iMacs still had spinning hard drives (7,200RPM ones, mind you, but spinning hard drives nonetheless). Here, you get a 128GB disk, and it's not just there for caching, or speeding up boot times. The difference between this and other so-called hybrid storage solutions is that by default, FusionDrive stores most everything on that SSD, including the OS and applications. (Media files might live on the HDD, since you're not as likely to open them every day.) For the most part, then, the SSD will be your primary mode of storage; it's not until you run out of space that the machine really starts off-loading content onto the slower of the two drives.

And yes, it's fast, especially compared to the HDDs in last year's models. Using the Blackmagic disk benchmark, we recorded average read speeds of 409.64 MB/s and average writes of 320.14 MB/s. We should say, too, that although we varied the stress load, simulating transfers between 1GB and 5GB, the performance remained pretty consistent. For instance, in the 1GB test, which tends to yield higher numbers than the 5GB one, our average read and write rates were only slightly higher: 412.73 MB/s and 321.93 MB/s, respectively. We also didn't see that significant a gap between our high and low numbers; read speeds, for instance, never dipped below the 390s, but also never rose about the 420s. The numbers also stayed even from one machine to the other: our two systems delivered nearly identical numbers across many rounds of testing.

What does that mean in practice?

For starters, very little waiting. The system cold-boots in just 16 seconds. Chrome and Firefox take less than a second to open; Skype takes less than two while iPhoto, a more intensive app, takes just under three. Graphics-wise, we had no problem playing *Crusader Kings II* and *Half-Life 2* at the max resolution (1080p), even on one of the lesser-specced 21-inch models.

SOFTWARE AND WARRANTY

By now, all Apple computers ship with OS X 10.8 Mountain Lion, and that of course includes these here iMacs. You can find our detailed review on our site if you're intensely curious about all the new features, but here's the tl;dr version: deeper iCloud integration, built-in sharing to Facebook and other social networks and a new, Growl-inspired notification center.

As ever, Apple's standard warranty includes one year of eligible hardware repairs and 90 days of free phone support. The AppleCare extended warranty ($169 for iMacs) extends your coverage to three years of service, along with three years of phone support.

CONFIGURATION OPTIONS

Let's start with the smaller of the two machines, the 21.5-inch model. That guy starts at $1,299 with a quad-core 2.7GHz Core i5 processor, 8GB of RAM, a 1TB (5,400RPM) hard drive and an NVIDIA GeForce GT 640M GPU with 512MB of dedicated video memory. For $1,499, you get a faster 2.9GHz quad-core Core i5 processor with a slightly better GT 650M GPU (also with 512MB of memory). Even at that higher price, you still get 1TB of storage and eight gigs of RAM. In both cases, too, you can upgrade to 16GB of RAM, which adds $200 to the cost. However, if you choose the $1,499 model, you get some upgrade options that simply aren't available on the $1,299 one — namely, a 3.1GHz quad-core Core i7 processor ($200) or a FusionDrive ($250).

Now for the 27-inch model. It starts at $1,799, and packs the same 1.9GHz Core i5 processor used in the higher-end 21-inch model. At that entry-level price, it comes with 8GB of RAM, a 1TB (7,200RPM) drive and an NVIDIA GeForce GTX 660M GPU with 512MB of video memory. Here, too, there's a more tricked-out model, and that costs $1,999. For the money, you get a 3.2GHz quad-core Core i5 processor and an NVIDIA GeForce GTX 675MX GPU with a full gigabyte of memory. That configuration also comes with 8GB of RAM and a 1TB hard drive spinning at 7,200RPM.

Now, if you had the budget to upgrade even further you could, but once again you'd have to start with the higher-end configuration to get all the options. For example, you can order the 27-inch version with a 3.4GHz Core i7 processor ($200) and a 2GB GeForce GTX 680MX GPU ($150), but you'd have to select the $1,999 model. Re-

There's been a 40 percent reduction in volume since the last iMac.

gardless of whether you choose the high-end version or the base model, though, you can configure the 27-incher with up to 32GB of RAM ($600). You can also expand the storage beyond 1TB, even if you start with the entry-level configuration. In addition to the 1TB FusionDrive we mentioned ($250), you can order a FusionDrive with 3TB of space. That'll cost you $400. If you're content to just use an HDD, you can choose a 3TB, 7,200RPM disk, which adds $150 to the price. Proud member of the 1 percent? May as well get a 768GB SSD — a $1,300 add-on.

THE COMPETITION

Shifting our attention to all those new Windows 8 machines hitting the market, the iMac's most obvious competitor is none other than the HP Spectre

One, which takes numerous design cues from Apple, right down to the Magic Trackpad-style touchpad and eerily familiar keyboard. Aesthetics aside, the Spectre One makes for a neat comparison, given that it, too, is missing an optical drive, and is fairly skinny for an all-in-one desktop. What's more, this is one of just a few Windows 8 all-in-ones that *doesn't* have a touchscreen, so the user experience here might be a little more similar to the iMac's than on other Windows desktops.

In terms of specs and features, it has a 23.6-inch, 1080p screen, putting it somewhere in between the two iMacs, size-wise. Still, with a starting price of $1,300, it's much more poised to compete with Apple's 21-inch desktop, which goes for $1,299 and up. For $1,300, you get the same 2.9GHz quad-core Core i5 processor used in the $1,499 iMac, though the other specs are actually inferior to what you'd get in the lowest-end iMac. Here, you get 6GB of RAM, not eight, and the GPU is an NVIDIA GeForce GT 610M (albeit, with 1GB of video memory). This, too, starts with a 1TB 5,400RPM drive, except, of course, you can't pair it with a large SSD; just 16GB of flash memory to be used for caching. Aside from the standard CPU, the only area where the Spectre One possibly wins on specs is that it has NFC. Even then, though, we're not sure even HP has a clear vision of how you'll use this feature in your day-to-day routine.

Right now, at least, there isn't a single Windows 8 all-in-one with a display as nice as this.

We'd also be remiss if we didn't mention the Dell XPS 27, which matches the 27-inch iMac's 2,560 x 1,440 resolution. It's also tough to ignore its $1,400 starting price, which makes it $400 less than the lowest-end 27-inch iMac. There are a few things to keep in mind, though. For starters, the specs are slightly weaker than what you'd get on the 27-inch iMac, which makes sense, given the lower starting price. Secondly, this has a built-in optical drive and optional touchscreen, in case you think you'll miss those features on the iMac. Third, and perhaps most importantly, it comes standard with integrated graphics, and the highest-end option is the GT 640M, which Apple only installs on its lowest-end 21-inch iMac. So, the graphics power really isn't comparable, and even if you were willing to settle for the 640M, you'd have to pay upwards of $2,100. Basically, then, if you're looking for a super-high-res screen on the cheap, this is it. But if it's ultimate processing power you're after, the iMac is the better value.

Of course, there are plenty of other Windows 8 all-in-ones out there, but few offer such high-end specs and,

more importantly, many of them are touch-based. That opens up a philosophical debate that goes far beyond Mac versus PC. It's about touch versus the mouse and keyboard (or mouse and Magic Trackpad, as it were). If you're dead-set on touch, you're probably not seriously considering the iMac. And if you are thinking of a touchscreen machine, you'll have to accept the fact that right now, at least, there isn't a single Windows 8 all-in-one with a display as nice as this.

Wrapping things up back on the Mac side, you can get the benefits of FusionDrive with the budget-friendly Mac mini, which costs as little as $850 if you order it with that kind of drive. Still, you'll be stuck with integrated graphics, less RAM and less potential storage. It performs well, as we found in our review, but there's no use pretending it's in the same performance class as the iMac.

WRAP-UP

The newest iMac is a great product, and despite Apple's reputation for making pricey things, it's actually a great value, too. Even as other computer makers catch up in terms of screen resolution and industrial design, the iMac stands out with a stunning display that really does cut down on screen glare. As for FusionDrive, it's exceedingly rare to find a consumer

Design has always been a top priority over at Apple HQ.

system that uses an HDD for storage and an SSD for system stuff. That's a clear step up from typical hybrid drives, which use a much smaller amount of flash memory, mainly for caching and improving start-up times. And while Apple doesn't always win on specs, it makes a tempting offer here: you get beefier graphics than on competing systems, which should help creative professionals, amateur photographers and casual gamers alike.

We highly recommend the iMac to all the above groups, though unless you're a pro or just *have* to have that extra screen real estate, the $1,799 price might deter you from choosing the 27-inch model. Even so, the 21-incher is a powerful machine in its own right, and is priced low enough that we can see folks picking one up to use in the home office, or as a shared family machine.

If anything, the biggest drawback is that with this redesign Apple doesn't have a single consumer desktop with a built-in optical drive. To be honest, we're not sure how many people still depend on these, but we suggest you think long and hard about whether you need to play back DVDs — and if you'd be willing to do it with an external SuperDrive. What's more, the iMac forgoes a touchscreen in favor of the Magic Trackpad, which means if you'd like the versatility of a touch-friendly system, you'll have to start cross-shopping Windows 8 machines, with the understanding that none of the ones available today have this nice a display. If DVD drives and touchscreens mean little to you, though, the iMac remains the best all-in-one on the market. D

Zach Honig contributed to this review.

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BOTTOMLINE

APPLE iMAC (2012)

$1,299+

PROS

- Stunning, low-glare display
- Fast performance
- Slim design
- Robust audio

CONS

- No optical drive

BOTTOMLINE

The iMac remains the best all-in-one on the market, with a gorgeous, low-glare display, fast speeds, strong audio and robust graphics performance.

OUR AUGMENTED SELVES

THE PROMISE OF WEARABLE COMPUTING

By Donald Melanson and Michael Gorman

It's been an interesting year for Google's most famous side project. After emerging from the company's suitably mysterious X Lab in April, Glass appeared across the roundtable from Charlie Rose, gave conference attendees a skydiver's-eye view at Google I/O, strutted down the catwalk at New York Fashion Week and shared the stage with California Governor Jerry Brown as he signed a bill into law allowing self-driving cars on the state's roads.

DAVID PAUL MORRIS/BLOOMBERG VIA GETTY IMAGES

Yet there's still more that we don't know about Google Glass than we know about it, despite its status as the highest-profile attempt at making wearable computing the next big thing. Public demonstrations of the tech have so far only hinted at its full potential. The promise of Glass echoes that of wearable computing in general, a promise that's remained largely unfulfilled despite decades of research driven by everyone from the military to DIYers.

That's not to say those years haven't been eventful; the very definition of wearable computing has changed during that time. Most recently, it's become intertwined with the idea of augmented reality. It's a relatively new term, but in the broadest sense it's something that goes back decades — even centuries. Eyeglasses and sunglasses restore or enhance our vision, electricity and the light bulb free us from a dependence upon daylight, and the automobile and other means of transportation have expanded the space we consider home, to name just a few examples. But the wearable technologies of today, and those promised for the future, are augmentations of a different sort: not just augmentations of ourselves and our surroundings, but of existing technologies.

THE KEY ELEMENTS

Today, wearable computing is largely considered to be an evolution of the smartphone, which is close to being a "wearable" technology itself. But the real history of wearable computing as we know it goes back quite a bit further — well before the first cellphones, let alone the first smartphones. In those early devices, bulky and obtrusive as they were, we could see the key roots of the modern

WEARABLE COMPUTING PROMISES TO EXTEND THAT **ALWAYS-ON CONNECTION** EVEN FURTHER AND, POTENTIALLY, CHANGE THE NATURE OF WHAT IT MEANS TO BE "CONNECTED."

wearable computer: the PC and the camera.

The influence of the computer, and the personal computer in particular, is difficult to overstate. As researcher and game designer Ian Bogost articulated particularly well in a recent essay on Alan Turing for *The Atlantic*, the computer is not a device designed for a specific task, but a device designed to simulate other devices, or "just a particular kind of machine that works by pretending to be another machine." The more advanced and capable computers become, the more devices they are able to simulate and, ultimately, replace.

That's become clearer than ever with the advent of the personal computer, which in recent decades has drawn people away from the television, the radio, the calculator and countless other devices. More recently, we've seen that shift again with smartphones and tablets pulling people away from PCs, telephones, cameras and video game consoles. In each case, the new technology replacing the old has taken on a more central role in people's lives. Whereas the personal computer became a hub in the home, the smartphone has become a source of ever-present connectivity and a near-constant accessory. Wearable computing promises to extend that always-on connection even further and, potentially, change the nature of what it means to be "connected."

Just as important is that other key device: the camera. As portability and an always-available (or mostly available) internet connection separated the smartphone from the personal computer, a constantly active camera is one of the key factors that distinguishes many of today's wearable computers from the smartphone. That wasn't always immediately evident, as many early wearable computing efforts were focused on specific tasks. Indeed, the device widely considered to be the first wearable computer, conceived in 1955 and ultimately tested in 1961 by Edward Thorp, was designed to give its wearer the upper hand at roulette. It was certainly wearable — built into a shoe and controlled by a toe tap, with an earphone providing musical tones for output — and it did perform a basic computing task (timing both the roulette ball and wheel), but general purpose it was not. As we

AN ABRIDGED TIMELINE OF WEARABLE COMPUTING

IN THE BEGINNING

11TH AND 12TH CENTURY: Humans begin wearing eyeglasses and sunglasses, the first wearable "augmentations."

moved into the era of the PC, though, we soon saw new notions of the wearable computer, and clear indications that the camera would be its killer app.

Without a camera, a wearable computer is just that: a computer you can wear. It's more portable, always accessible and opens up new possibilities of its own, but it isn't *that* far removed from the traditional notion of a PC. It has a screen, an input device or two and applications for a variety of tasks. With a camera, a wearable computer doesn't just become a device able to capture pictures and record video; it becomes able to constantly monitor its surroundings (something further aided by GPS and various sensors). That makes a name like "Glass" all the more appropriate. The screen in front of your eye is less of a "screen" than a clear view of your environment with an overlay on top of it; a new way to look at things, rather than something new to look *at*.

1665: Scientist Robert Hooke suggests humans should artificially augment all of their senses.

WEARABLES TAKE SHAPE

The importance of the camera to wearable computing is nowhere more evident than in the work of Steve Mann, an MIT alum and key pioneer in the field. Mann built his first wearable device — a backpack-mounted computer with a camera viewfinder attached to a helmet — in 1981, and he hasn't let up since. While that device stretched the definition of "wearable," Mann would continually adapt his systems over the years, shrinking them down and making them less cumbersome with each variation.

Those systems included the many variations of what he dubbed the WearComp, which helped establish the archetypal image of the wearable computer: a small computer, generally worn on the hip, a portable input device and a wearable display. It also, of course, had a camera, which, by the mid-1990s, Mann was using to broadcast live video to the web. Later, he would miniaturize the display even further with his EyeTap device, which looks remarkably like Google's Glass — albeit with decidedly more of a DIY flavor. These days, Mann is venturing into cyborg territory, with a display he claims is now "permanently attached" and doesn't come off his skull

PHOTOGRAPH COURTESY OF HULTON ARCHIVE/GETTY IMAGES

without “special tools.” That detail became something of an issue when employees at a McDonald’s in France tried to pull the system off of him earlier this year — an event that brought more attention to wearable computing than just about anything outside of Google Glass recently. Beyond that, Mann’s also been using what he calls a mind mesh, or brain-computer interface, and is involved with a company called InteraXon working on thought-controlled computing.

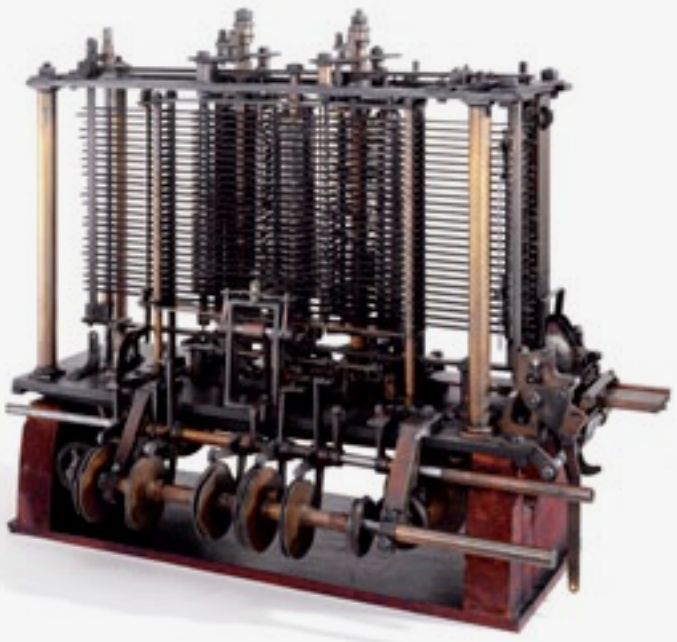
That same progression toward something more wearable than luggable (minus the more cyborg-minded efforts) can also be seen in the work of Thad Starner, a contemporary of Mann’s at MIT, who has also been donning his own devices for decades now. Those were first based on the Hip-PC design from Doug Platt — essentially a homebuilt 286 computer worn, more or less, on the hip. The devices also made use of Reflection Technology’s Private Eye head-mounted display (a popular option among early enthusiasts), along with a Twiddler one-handed keyboard for input.

Starner’s broader approach to wearable computing has been quite a bit different than Mann’s over the years, though, initially aiming to provide something closer to a personal assistant than a computer designed to interact with one’s surroundings. His work has provided augmentations of sorts, however, including the Remembrance Agent, which he developed with Bradley Rhodes. That device constantly monitored what the user was doing and provided a list of relevant documents — effectively augmenting human memory, in the words of Starner. Mann explored this type of augmentation in his book written with Hal Niedzviecki, *Cyborg: Digital Destiny and Human Possibility in the Age of the Wearable Computer*, noting a shift from “smart things” to “smart people.”

In that respect, both Mann and Starner (and others in the field) also owe a debt to Douglas Engelbart, who not only invented the chorded keyboard used in many early wearable computers, but wrote the landmark paper *Augmenting Human Intellect*. In it, Engelbart draws on the work of Vanne-

THE COMPUTER AGE

1837: Charles Babbage devises the Analytical Engine, the first proposal for a general-purpose mechanical computer.



PHOTOGRAPH COURTESY OF SSPL VIA GETTY IMAGES

var Bush and his pre-hypertext idea of a "memex" system to explore new ways we can augment our thinking.

Much of Mann and Starner's other contributions also boil down to the simple idea that a wearable computer should be worn all (or most) of the time. That's an idea now echoed by Google, and one that will ultimately need to be broadly accepted for wearable computing to have anywhere near the success of smartphones or tablets. It's one that Google clearly thinks is possible, and a notion extended by Mann, who suggests in *Cyborg* that "one day we will all feel naked without our wearable computer." That can already be said for many people and their smartphones. Incidentally, Starner has since gone on to work on Glass at Google, while Mann continues to focus on his own efforts serving as a tenured professor at the University of Toronto.

Naturally, not all pioneering work in wearable computing has been done in the academic world. Indeed, DARPA has been exploring the technology since the 1990s and, along with industrial use, military applications have proven to be among the most practical applications of wearable computing in the pre-consumer era.

In most instances, these go back to the devices designed for specific tasks, but they also provide clear examples of AR as we understand it today. Initiatives like the US Army's Land Warrior program offered up many of the archetypal elements of wearable computing, including a heads-up display that offered maps, thermal vision and an improved targeting system to soldiers. That program was canceled in 2007, but the equipment went on to see some use in Iraq. Similar "future soldier" efforts continue in the US and a number of other countries around the world.

1936: Alan Turing describes the Turing Machine, a theoretical computing device key to the development of modern computers.

On a different front, there's another technology developed concurrently with wearable computing that was also once promised to be the next big thing: virtual reality. While the two are closely linked in some ways (both offer wearable displays and input devices), they are completely removed in others, with VR focusing more on an inward view of the digital world versus an outward projection. Still, VR is hardly a relic of the recent past. Earlier this

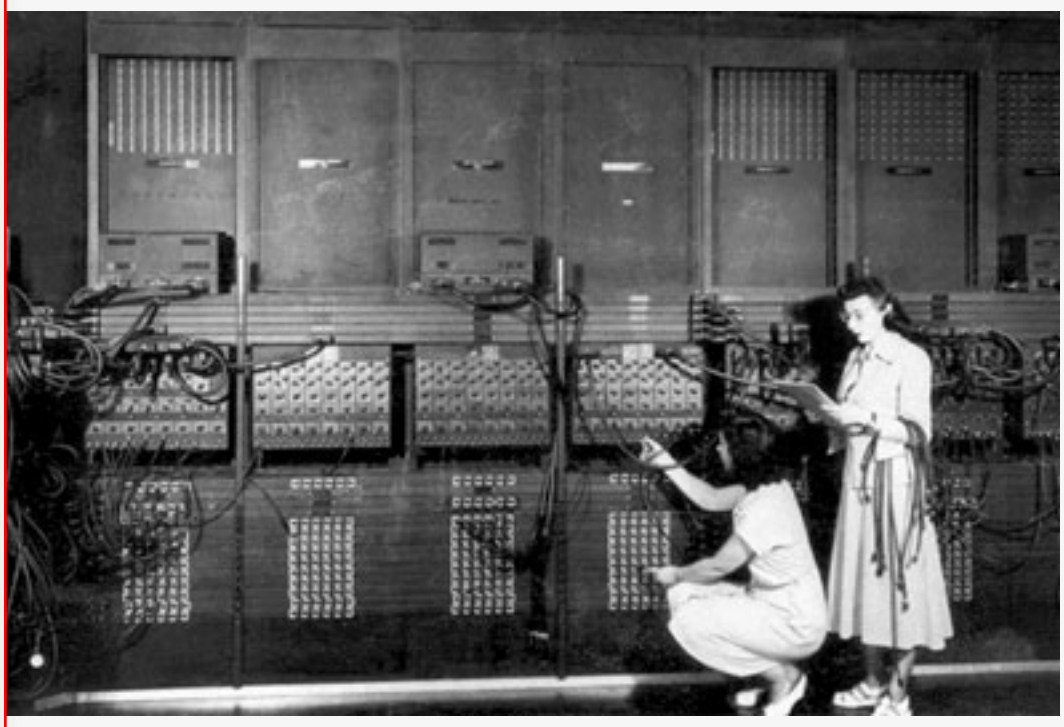
year, the Oculus Rift — a relatively low-cost wearable display with motion-tracking capabilities — reignited buzz with a successful Kickstarter project, offering hope of a new future for the technology in gaming.

Valve's Michael Abrash also sees a continued place for virtual reality in the near-term as a sort of stopgap technology until full-fledged AR becomes feasible, explaining in a recent blog post that "interaction with the real world and especially with other people is why AR is the right target in the long run." He added, however, that it "makes sense to do VR now, and push it forward as quickly as possible, but at the same time to continue research into the problems unique to AR, with an eye to tilting more and more toward AR over time as it matures."

Of course, many of the most popular images of wearable computing come not from the real world, but from science fiction. For many, their first image of a head-mounted display and AR came from movies like *The Terminator* and *RoboCop*, both of which offered a cyborg's perspective, with continually updated information laid on top of their field of vision. The 1980s and '90s also gave us the cyberpunk futures provided by the likes of William Gibson and Neal Stephenson, which featured a different sort of cyborg: one who was augmented, but still mostly human.

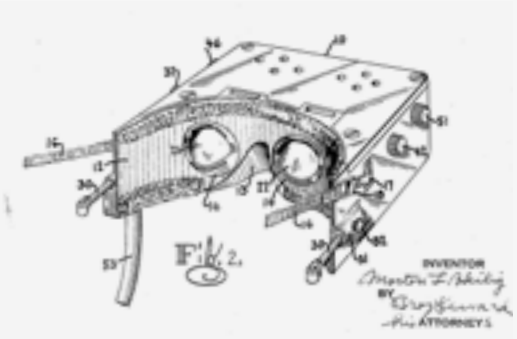
1946: ENIAC, the first general-purpose electronic computer, is announced.

Wearable computing continues to be a recurring theme in science fiction today. Eran May-raz and Daniel Lazo's short film *Sight* garnered a fair amount of attention earlier this year with its vision of a hyper-augmented future replete with computers that have receded into nothing more than a pair of contact lenses (something not quite as far-fetched as it sounds). That trend also naturally extends to video games, with titles like *Deus Ex: Human Revolution* bringing cyberpunk-style visions of augmented humans back to the fore.



PHOTOGRAPH COURTESY OF APIC/GETTY IMAGE

1960: Morton Heilig patents the Telesphere Mask, a head-mounted television display.



1966: Edward Thorp and Claude Shannon unveil the first "wearable computer," a device used to predict behavior of roulette wheels.

1968: Ivan Sutherland creates the first computer-linked head-mounted display at MIT.

1969: ARPANET goes live and the age of the internet begins.

THE GOOGLE FACTOR

It was another short video, but not (quite) a science fiction one, that brought wearable computing more attention than ever earlier this year. Google officially unveiled Project Glass with its "One Day" video, showing not the gear itself, but instead what the wearer sees: everything from simple reminders to directions to video calls that all appear to simply float in the user's field of vision. It admittedly showed far more than what its prototypes are capable of, but according to Google, it's not *too far* from what we'll eventually see. The gear itself also seems to be fairly impressive, even in its current state: self-contained, comparatively discreet and able to capture (relatively) high-quality still images and video.

In addition to Starner, the project has drawn a number of experts in the field to the secretive X Lab, including current project lead Babak Parviz, who previously worked on contact lens displays. By all accounts, though, it's Google co-founder Sergey Brin who is the driving force behind the effort — as evidenced by his enthusiasm for the project during the big Glass demonstration / stunt at Google I/O. Brin also seems to have thought about some of the broader implications of wearable computing — talking at length, for instance, about the ways it could lead to some genuinely new types of photography. It could be another instance of a new medium shaping the message.

For all their similarities, though, there are some marked differences between Google's Glass and Steve Mann's wearable computing efforts. That's perhaps most evident in the ways they promise to let the wearer interact with their surroundings. Whereas Google is pursuing an approach that "doesn't come between you and the physical world," as Parviz said in a *Wired* interview, Mann sees wearable computers as offering something closer to a "mediated reality" — one that allows wearers to tailor their environment to suit themselves; even blocking ads and billboards in real life, just as an ad blocker filters ads on the web. Mann himself calls this type of mediation "Personal Imaging," and says in *Cyborg* that it will be "one of the most far-reaching and important aspects of the coming wearable cybernetics revolution."

SUTHERLAND: PHOTOGRAPH COURTESY OF EVANS & SUTHERLAND;
ARPANET (IMP): PHOTOGRAPH COURTESY OF WIKIMEDIA/FASTLIZARD4


COOPER

1973: The first cell-phone is demonstrated by Motorola's Martin Cooper.

1975: Steven Sasson creates the first digital camera at Kodak.

1975: Pulsar introduces the first calculator watch.

1977: The Commodore PET, Apple II and TRS-80 usher in the personal computer era.

1979: Sony releases its first Walkman.

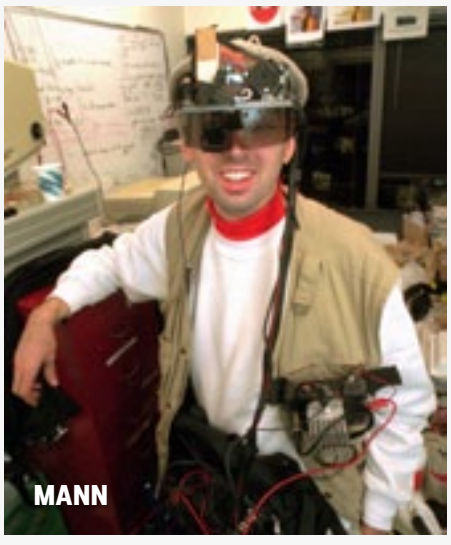
Despite those different approaches, though, both efforts represent a shift away from the traditional notion of computing in one key respect. As Starner explained in an interview with *Technology Review* earlier this year, one of the key things he's hoping to do with Glass is "make mobile systems that help the user pay more attention to the real world as opposed to retreating from it." That inevitably raises a number of other questions about how the technology will change our lives. Will we wonder what we're missing if we venture into a new place without our wearable computer?

Of course, while all the attention it has garnered may cause some to suspect otherwise, Google is far from the only company that has been experimenting with wearable computing. Xybernaut and Via Inc. were two early providers of ready-made wearable computers in the 1990s. They saw some limited success in the industrial and enterprise markets but little from their efforts to reach a broader consumer audience. They did bring some all-too-rare media attention to wearable computers, though, providing an alternative to the DIY route for those interested in dabbling in the field. Xybernaut would ultimately fall far from its status as a leader in a then-small industry, however, by drawing fraud charges from the SEC in 2005 and filing for bankruptcy shortly thereafter.

More recently, companies like Motorola and Kopin have continued to focus on industrial-minded applications for wearable computing (still one of the more viable markets), and countless others have sold or attempted to sell standalone wearable displays over the years, albeit with little success. Google will also have some competition when it gets around to releasing Glass — Vuzix is promising to release its own set of Android-based "Smart Glasses" in mid-2013, and earlier this year Olympus announced a heads-up display designed to be paired with a smartphone.

COOPER: PHOTOGRAPH COURTESY OF AP PHOTO/ERIC RISBERG; SASSON DIGITAL CAMERA: PHOTOGRAPH COURTESY OF KODAK; PULSAR CALCULATOR WATCH: PHOTOGRAPH BY MALCOLM CLARKE/GETTY IMAGES

1981: Steve Mann begins his wearable research with a backpack computer designed to control photographic equipment.



MANN

BRIDGING THE GAP: TOWARDS A WEARABLE FUTURE

Wearable computing may end up being the next big thing, but it still isn't just one thing. Much of what is actually now winding up in consumers' hands, are devices that are not full-fledged computers, but things like smart watches and fitness monitors, which offer portions of the functionality promised by the wearables of the future. Such products also come in less obtrusive and more fashionable form factors, resulting in broader consumer appeal than the sci-fi inspired heads-up displays and cybernetics developed by the likes of Google, Mann and Starner.

Take the Pebble Smartwatch, for example — a Kickstarter success story and a consumer product-in-progress keenly anticipated by its nearly 69,000 backers and the tech industry alike. Pebble functions as a watch, fitness computer and media player, but can also be seen as a sort of smartphone satellite that serves as your phone's secondary screen by providing notifications and remote control capabilities. Pebble works as a standalone device, but reaches its full potential when paired with an iPhone or Android handset.

Additionally, there's another subset that's more apparel than computer and is entirely dependent upon coupling with external devices. Adidas miCoach and Nike+ technology are two examples that

1984: Psion introduces the first personal digital assistant, or PDA.

1984: Seiko releases its first "wrist computer" watches, which included portable keyboards.

1989: Reflection Technology begins selling its Private Eye head-mounted display.

WEARABLE COMPUTING MAY END UP BEING **THE NEXT BIG THING**, BUT IT STILL ISN'T JUST ONE THING.

SONY WALKMAN: PHOTOGRAPH BY ROCKHEIM; MANN: PHOTOGRAPH COURTESY OF AP PHOTO/CHARLES KRUPA; SEIKO WATCH: PHOTOGRAPH COURTESY OF SEIKO

1990: Xybernaut, a leading provider of commercial wearable computers, is founded.

1991: Doug Platt introduces his 286-based Hip-PC, the basis for a number of early wearable efforts.

1991: CMU researchers develop the VuMan wearable computer.

ALEX PENTLAND, STEVE MANN, THAD STARNER AND REHMI POST

1993: Thad Starner begins continuous use of a wearable computer, develops his Remembrance Agent augmented memory software.

1994: The US Army launches the Land Warrior program to create military wearable computers.

1994: Steve Mann transmits images from his head-mounted camera to the web.

1994: IBM introduces the Simon personal communicator, the first smartphone.

WARWICK

1998: Kevin Warwick begins Project Cyborg by implanting an RFID chip in his arm.

1999: Casio introduces the first GPS-equipped watch.

have established a significant user base with sensor-laden garments and shoes. For now, the technology tracks fitness information like heart rate, distance traveled and elevation gained during workouts using sensors woven into the fabric and a small external pod packed with an accelerometer, GPS, magnetometer and gyroscope.

Despite their consumer acceptance, the systems are still in their infancy and in the process of being fine-tuned both in terms of hardware design and how the gathered data is used. Making the technology even more wearable is one big part of that. Simon Drabble, director of Adidas miCoach, said the goal is to reach a point where there's "no longer a consideration of 'Am I putting on wearable technology or am I just putting on a normal piece of clothing or footwear?'" In other words, the key, as he sees it, is for people to don wearable technology without giving it a second thought.

That's a goal shared by companies like Massachusetts-based mc10, which is focused on making devices more comfortable to wear. It's developed what it calls "conformal electronics," which are thin, flexible integrated circuits that can stretch and twist. This has enabled the creation of a biometric sensor — in a stretchy sticker form factor — with the potential to read vital signs, sense concussions, monitor seizures and more.

David Icke, CEO and founder of mc10, sees these confor-

STARNER AND COLLEAGUES: PHOTOGRAPH BY PAM BERRY/THE BOSTON GLOBE VIA GETTY IMAGES; SIMON: PHOTOGRAPH COURTESY OF WIKIMEDIA/BCOS47

NICK HAYEK JR., MISCHA BARTON AND BILL GATES

2004: The first smart watches linked to Microsoft's SPOT network are released.

mal electronics as a necessary part of the future. His company's Biostamp is the size of a Band-Aid, but is thin enough to be hardly noticed by its wearer. He said that today "most people are working with rigid, boxy sensors, and that's not ideal for high adoption or compliance. If you really want to make it ubiquitous, if you just have a sticker you can apply and forget, that's where you want to go." Using the same flexible circuit technology as that Biostamp, mc10 is also developing flexible micro solar cells to help address one of the greatest limitations of current mobile technology: power, or more accurately, not having enough of it.

Saving power has become a major focus for portable device designers, and it's largely the effort to increase silicon efficiency that's allowed both the simultaneous expansion of screen resolution and the slimming of chassis to occur in parallel. In contrast, rechargeable batteries have improved at a far slower rate. Brooks Kincaid, an ex-Googler turned co-founder of Imprint Energy, is out to change that. Imprint's developing a new battery technology that's both robust and flexible enough to be used in wearable ways. The company's a couple years away from a commercial product, but said its zinc-based chemistry will allow for higher energy density and cheaper production than the lithium polymer cells that power most present-day gadgets. What's more, these flexible batteries are printable and non-volatile — so they're stable sans packaging — which opens up a host of potential battery form factors.

2009: Fitbit ushers in a new wave of wearable, life-monitoring devices.

"Thinness and flexibility are key issues for any wearable device," Kincaid told us, and Imprint's tech is being crafted with the importance of such characteristics in mind. "If we can create batteries that are thin, dynamically flexible and

customizable to different shapes and sizes, then we'll be able to provide device manufacturers more design freedom."

The freedom afforded by the flexible technologies promised by mc10, Imprint and others will be critical moving forward, according to Jennifer Darmour, a designer with the Artefact Group, who has worked with the likes of Microsoft, HTC and Google. She echoed the same view held by Drabble: the key to unlocking a broader market is to fully integrate the technology with our clothing, as opposed to merely attaching devices to ourselves and what we wear.

"If you're asking me to wear it, it's gotta look good," she said. "Nobody wants to wear a bunch of technology bolted on their bodies."

She and Drabble are hardly alone in this belief. "Smart clothing" has become a considerably broader field in recent years, with the introduction of everything from a Microsoft Research-designed dress that displays tweets to more practical applications like The North Face's jackets with inbuilt PMP controls and the aforementioned sports apparel replete with sensors. Of course, wearable technology doesn't always necessarily mean "wearable computing," as new advances have also made new types of materials possible. That's something even William Gibson recently pondered in a recent piece on the future of fashion for *The Wall Street Journal*:

2012: Google reveals its major wearable computing project, Glass.

BRIN AND DIANE VON FURSTENBERG

"The real future of clothing, of course, belongs to unsettling, change-driving new technologies. To nano-beaded fabrics that clean and re-groom themselves as they hang in your closet. To relatively weightless materials, packable as silk, cool or cozy as required. To the function-based repurposing of natural-wonder materials, like silk and cashmere. To the

realm of performance materials, technical fabrics, many of which are currently produced in Switzerland — and are as expensive per yard as decent Italian leather. This sort of innovation feels like part of the actual future that's arrived slightly early, the opposite of futuristic."

WHAT'S NEXT

For many, a future filled with more wearable devices is inevitable. They will be part of a wider world of connected devices that "permeates our cities, our dwellings, our objects, our clothing and eventually our bodies," as Joseph Paradiso of the MIT Media Lab put it. Some, like Google's Parviz, are especially optimistic about that pace of change — he told *Wired* earlier this year it's his expectation that "in three to five years it will actually look unusual and awkward when we view someone holding an object in their hand and looking down at it. Wearable computing will become the norm." Still, others are considerably more skeptical.

If there is a consensus on one thing it's that, as Brin has said, the technology simply needs to "get out of the way" for it to become widely accepted. If it is to move forward, the wearable technology of the future will be comfortable, fashionable and unobtrusive, and provide us with valuable data about ourselves and the world around us in useful, easy-to-understand ways. It will also, undoubtedly, raise new issues of privacy, and new fears that we are becoming too dependent upon and too consumed with our technology.

But even Google Glass is still in the future, and it remains to be seen if it or a future device will bring wearable computing close to the level of acceptance that smartphones and tablets have achieved in the past decade. Glass has already helped the cause in one key respect, though: it's gotten more people talking and excited about using a wearable computer than ever before, and that's no small feat for a technology that has largely been confined to experimental research, battlefields and science fiction. D

BRIN AND FURSTENBURG: PHOTOGRAPH COURTESY OF AP PHOTO/SETH WENIG

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VISUALIZED

FACING DOWN THE WINTRY WIND

On a cold day we have our hats, earmuffs and scarves to help keep the chill off exposed bits of skin, but if we want to keep the wind from nipping at our noses, the solutions can have us looking like mummies or cat burglars. There may be *some* innovations, however, that have passed un-noticed, such as this transparent conical face shield seen in Canada, circa 1939, which alleviates the winter wind and aims to give you more face time.

PHOTOGRAPH COURTESY OF NATIONAAL ARCHIEF/SPAARNESTAD PHOTO/
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ERIC MIGICOVSKY

The brains behind the PEBBLE smartwatch confesses his love for the Galaxy Nexus and recalls his Apple Newton eMate.

What gadget do you depend on most?
My Galaxy Nexus. Always there for me! I love being able to quickly jump between apps like calendar, maps and Chrome. We travel a ton and mainly keep in touch using Google Talk and email.

Which do you look back upon most fondly?
Apple Newton eMate. My first real portable computer. I would carry it to school, hook it up to a StyleWriter printer, fiddle with PCMCIA modem cards.

Apple Newton eMate. My first real portable computer. I would carry it to school, hook it up to a StyleWriter printer, fiddle with PCMCIA modem cards.

Which company does the most to push the industry?
At the moment? I'd probably say Google. It is constantly upping the game in terms of connecting information sources on the web to my daily life. Google Now is in its infancy, but I can definitely see how Google Glass will evolve to use a lot of the widgets that are being built for Now.

What is your operating system of choice?
Previously Ubuntu, currently using OS X.

What are your favorite gadget names?
Big fan of Newton. The "What is Newton?" television advertisements were awesome. I think it was really cool that Apple picked up the ad style again with iPad.

What are your least favorite?
I think iPaq was a pretty bad name. Also not a fan of the RIM naming scheme. Blackberry Bold 9950 doesn't do it for me.

Which app do you depend on most?
Google Maps transit and biking directions.

What traits do you most deplore in a smartphone?
Battery life that isn't long enough for a day of work. It's funny that the feature I use constantly on my Galaxy Nexus (swappable batteries) is also one that I deplore.

Which do you most admire?
Customizability. Thinness. Long battery life.

What is your idea of the perfect device?
I think a screen that could fold out to suit your activity (small screen for normal smartphone usage, folds out to tablet for browsing) would be pretty great.

What is your earliest gadget memory?
My uncle, a plumber, carried around a gigantic mobile phone /

briefcase in the ‘80s.

What technological advancement do you most admire?
I think what Jeff Hawkins and the Palm team did was amazing. They single-handedly created a new method for interacting with computers. Palm formed the basis for handheld computing that underlies all smartphones.

Which do you most despise?
I think the whole internet appliance deal around the end of the ‘90s had such a large opportunity... but totally squandered it.

What fault are you most tolerant of in a gadget?
Dents and scratches on the device, even gashes on the screen. I don’t really mind banging up my devices (as long as they don’t break) because I feel it’s a sign that they’re being used constantly and earning their keep. Plus, each dent usually has a great story to go along with it.

Which are you most intolerant of?
Lag. I hate how Android seems to hang at inopportune moments. I really wish I could figure out which apps are causing that, and delete them so hard.

When has your smartphone been of the most help?
Traveling. I can’t imagine traveling without Google Maps transit instructions. Incredibly helpful all around the world.

What device do you covet most?
I coveted a MakerBot Replicator for a while but we just got one in the office!

If you could change one thing about your phone what would it be?
Slightly longer battery life (but I’m okay with two extra charged batteries in my bag). Other than that, the Galaxy Nexus is practically perfect.

What does being connected mean to you?
It means always being able to text or email my friends, jot down a note into Asana if I get a brain wave or never be bored when waiting for a train.

When are you least likely to reply to an email?
While I’m sleeping, hiking or having dinner.

When did you last disconnect?
Went for a five-day hike through Kings Canyon last fall. Being completely off grid for a few days felt great. It was a good opportunity to let my mind think without interruption. D

IN REAL LIFE is an ongoing feature where we talk about the gadgets, apps and toys we're using in real life.

EPSON STYLUS PHOTO R1800 PRINTER

Babbel iPad Spanish Learning Book

Nokia Lumia 920

Sure, not everyone has a need for a 13 x 19 photo printer. But, when you're proofing a 40-page style guide for a client, you tend to want easy access to the outputs. In order to cut production costs in grad school, I invested $500 in the Epson Stylus Photo R1800, which is capable of borderless prints and can print 13 inches wide by however long I'd like, thanks to paper roll attachments. Like many printers these days, it can also print directly onto CDs so long as you can spare a solid 12 hours of drying time. As you might imagine, anything under Super B / A3 sizing is fair game, with printing all the way to the edge there as well.

I picked up this monster back in '06, and leaned on it pretty hard for a good three years. Since then, it's become strictly a proofing machine since I'm no longer producing class projects on a regular basis (thankfully). On occasion, though, I'll press it to do some heavy lifting on holiday cards and such — no more than two or three times a year. In the beginning it provided amazing print quality at a level that was sometimes better than the local print shops, which would completely gouge me for the same work.

Now that the R1800 has some years behind it, the wear and tear are beginning to show. Almost every time I use it I have to clean the print heads and nozzles to avoid streaks. While this doesn't take a huge amount of time, it does consume a large amount of ink. At the height of my grad school years I was switching out cartridges once a quarter. Now, I'm doing so a few extra times a year. While I've had a good run with this hoss, it's just about come to an end now that the price has dropped on similar printers, and now that WiFi is a standard option. — *Billy Steele*

BABBEL iPAD SPANISH LEARNING BOOK

Epson Stylus Photo RI800 Printer

Nokia Lumia 920

I've felt for some time now that tablets could well be the catalyst for the next major revolution in education. The internet itself just feels like a far superior tool for teaching than just about any book, and a world where children are given access to it at an early age is one I look forward to living in. Recently, my wife and I tried a new Spanish language learning tool from Babbel. To date, the $8.99 guide, which runs some 77 pages, is the company's only one on the iPad. But if you're looking for the basics, it's a fantastic option.

The book itself is extraordinarily well thought-out, with lessons that are both easy and enjoyable to cruise through. You'll also find accompanying material on the web and on iPhone, and these tools have speech recognition so you can practice your pronunciation and get a real time score on your vocabulary. In fact, the only major gripe we had was that the book eventually ends. It's a perfect layout for future titles, and I can only hope that the company expands the series for those looking to tackle more advanced lessons. Perhaps even a subscription model would work, and it'd still be far cheaper than Rosetta Stone. — *Darren Murph*

NOKIA LUMIA 920

Epson Stylus Photo RI800 Printer

Babbel iPad Spanish Learning Book

The Lumia 920 can be a resolutely pragmatic phone. It acknowledges that life doesn't always happen in warm, brightly lit spaces. With that in mind, I used it as my main phone for a few weeks to see whether a handful of truly unique hardware extras, and the leap to Windows Phone 8, make it a more viable device for anyone trying to call, chat and navigate through a cold season than its predecessors like the Lumia 900.

Hardware-wise? Nokia's design mostly comes up aces. It's thick and heavy, to be sure, but that high-sensitivity touchscreen is incredibly handy in chilly weather. It's entirely possible to take a call or post a tweet with winter gloves on. The wireless charging is equally welcome if you happen to have a Qi-friendly pad. And the camera is superb. Autofocus sharpness quirks are a real issue without a software fix, but the Lumia 920 can take photos in low light that would leave an iPhone 5 struggling. About the only day-to-day hardware quirk is a somewhat slippery design.

And yet, software remains a mixed bag. WP8's customizable home screen and fast IE 10 browser go a long way towards legitimizing the Lumia 920 as a heavy-duty smartphone. It's actually *liberating* compared to WP7's fixed tile sizes and years-old web code. However, there are still some missing key apps. It's not just top-50 apps like Instagram; it's peripheral- and region-specific software that's either absent or has a close-but-not-quite equivalent. The lack of a notification center, combined with an interface that periodically overwhelms function with form only compounds problems if it's vital that you spot and deal with an emergency in minutes.

The Lumia 920 consequently feels somewhat like a 900 redux. It's still a handset for those who are either new to smartphones or aren't deeply invested in any one ecosystem, at least in its current state. Provided the apps you need are there and detailed notifications aren't matters of life and death, you can comfortably say you're using a high-end device.

— *Jon Fingas*

The week that was in 140 characters or less.

Mobile Photo Melange, Top Optics and the Holy Slate

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@IanIsGravy
All this time “reinventing”, and the new BlackBerry looks like yet another iPhone clone

@alexia
He who controls the mobile photos, controls the universe.

@beijingdou

Dayum. Oppo Find 5 has 13MP camera, hardware-based HDR and 120FPS video.

@Trixxy

Pope uses an iPad. What an iLamb… of God.

@rjcc
It’s not news, and it’s not new news, that Apple has tested TV designs for years.

THE STRIP | BY BOX BROWN

PIGEON PHOTOGRAPHY

In 1907, Julius Neubronner, apothecary and carrier pigeon hobbyist, was struck with an idea to trace the paths of his avian couriers after one bird arrived home four weeks later than expected. He designed a lightweight, time-delayed, miniature camera which could be fastened to his birds using a harness. The resulting photos were displayed at photographic exhibitions across Germany and even sold as postcards, but the aerial reconnaissance potential for the military was undeniable. However, after initial positive tests, these feathered-photographers were swiftly rendered obsolete as mechanized aviation was rapidly perfected.

MODERN EQUIVALENT:
Parrot AR.Drone 2.0

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Chairman & CEO	Tim Armstrong