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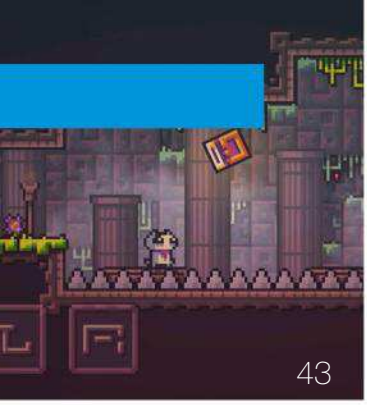

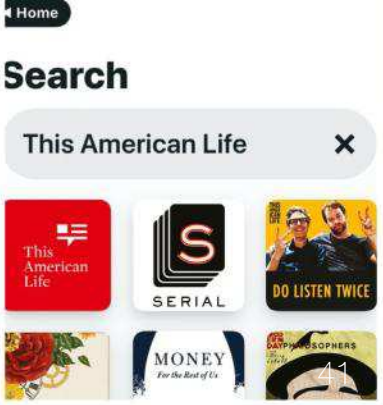

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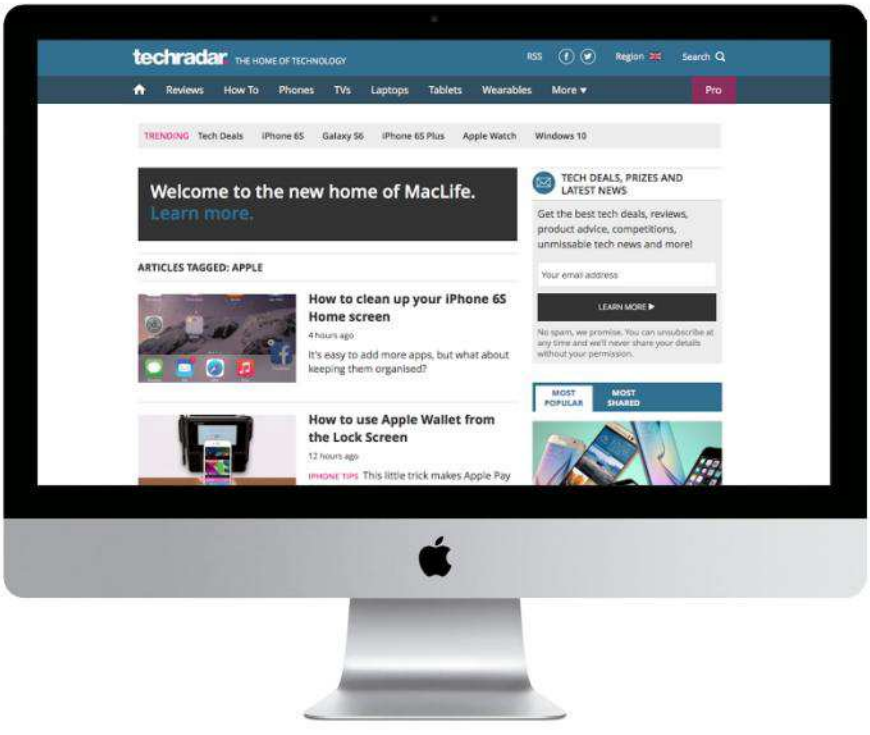

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A NEW WAY OF WORKING?

IT'S TOO EARLY TO TELL because at the time of writing this, our previous issue still isn't on sale, but I'm looking forward to reading your views on *Mac|Life* in our reader survey (p6). But I almost needn't wait, as the continued feedback I receive in our inbox has given me a pretty good insight ahead of the much-anticipated results.

It's interesting to note that a great deal of you are very outspoken about the use of iPads for, shall we say, more practical purposes. It seems the majority of you are using an iPad of some description (usually a Pro, I might add) alongside a MacBook. Many of you are impressed with what the iPad is capable of from a productivity standpoint, but nobody has yet felt the need to ditch their MacBook altogether because it's faster and easier to use when it comes to "getting things done."

There's been a lot of talk recently about the possibility of a new Apple device that bridges the gap between iOS and MacOS — a hybrid that is both portable and productive. Personally, I didn't like it when Microsoft did a similar thing in Windows 7. But whether you or I like it, or want it to happen, matters not, since Tim Cook recently stated, quite categorically, that iOS and MacOS will never be aligned, for fear of watering down the Mac and iPad platforms. So, don't hold your breath — no *really*, don't.

If you're convinced that using an iPad for work is the best idea ever, but you don't want to pay for an iPad Pro, then take a look at our definitive review of the all-new iPad (p50). If the idea of using an iPad for "grown-up" stuff makes you raise an eyebrow, then I'm guessing you're probably a Mac fan. If that's the case, might I suggest heading over to our guide on how to save money on your next Mac purchase (p30). Whether you prefer to use an iPad or a Mac for your core duties, there's one thing that unites us all: we want faster internet! This issue's main feature (p18) will show you how to make sure your home network is performing at its best, so you can make the most of whichever platform you're loyal to.

NICK ODANTZIS, Editor
Twitter: @maclife

>>>THE TEAM

Matt Smith
Art Editor
Matt's Macbook decided to sleep halfway through a huge render, and Matt wishes he could join it.

Rosie Hilder
Operations Editor
Rosie has been lusting over smart garden tech. Only one problem: she doesn't have a garden.

Matt Bolton
Contributor
Matt works for sister title *T3*, so his selection of tech in this month's Crave is cutting edge.

LETTER OF THE MONTH

We have several Apple TVs and we stream 100% of everything that we watch. I think the price to rent movies or shows is way too high. I have a RedBox nearby that I have considered spending a couple of bucks renting stuff from instead, but the convenience of streaming wins every time. Buying movies at $10.00 a piece doesn't seem to sting so much, so I tend to buy movies instead of renting them. With a cold snap that we recently had, I wanted to binge the whole *Death Wish* series with Charles Bronson. The rental price per movie was $3.99 and the purchase price was $4.99. In that case, it is a no brainer. But, when it is $7.00 to rent and $20.00 to buy, that does make you have to think about it. My wife will rent something half a dozen times — I am still trying to get her out of that expensive habit!

DAN MATNEY

We absolutely agree – when you can buy something, even if it's not a title you're sure you'll watch again, why would you not spend a few extra dollars to have it forever?

Changing your Apple ID

When I first created an Apple ID I used a Hotmail account as the email, which I have now closed. I want to change the email address to my iCloud account, and I know I can do this but what happens to all my purchases, wishlist, podcast subscriptions, and everything else associated with my iTunes account? Can I just change it and all will be okay?

ANTHONY M CASELNOVA

Changing the email address of the Apple ID associated with your account is really easy and won't affect any purchases you make as they will always be tied to this account, no matter what you change the email to. You can change your Apple ID quite easily too – to find out how to do it see the following: bit.ly/ml142appleid.

Bigger iPhone?

I have the iPhone 8 Plus and have been waiting for a bigger version of the iPhone X to come out. Will it ever arrive?

MICHAEL TIERNEY

The current rumors suggest that a new iPhone X with a bigger screen could well materialize when the new crop of cell phones appear this year. Check page 12 for more.

iPad versus Macbook

I have the first generation iPad Pro, and am very pleased with it. It is not a replacement for my Mac, but it is good for what it does, which is to make it possible for me to do a lot of my field work without having to unlimber my MacBook Pro (recently relegated to "riding shotgun" status since our new iPads have taken over the home office.) On the other hand, now that the MacBook Pro is free to roam, it may replace the iPad Pro for my "real computer" work.

KEVIN MURPHY

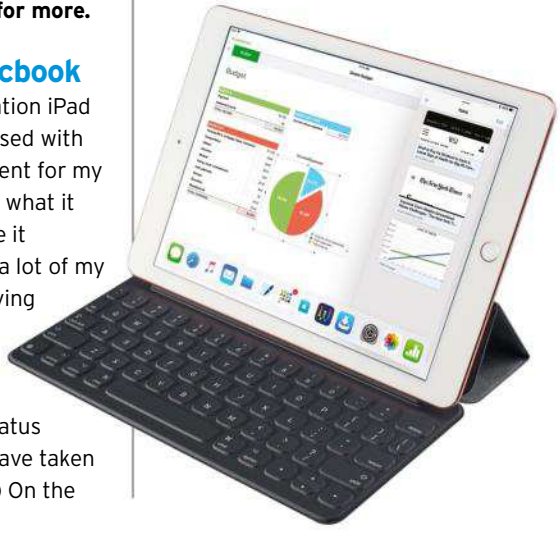
An iPad being able to replace a Macbook for real work is probably still a long way off, but the 12.9-inch iPad Pro does a convincing job.

HomePod hates music

I bought three when introduced and they worked great for the first two to three weeks. My wife and I went to our cottage for a week and when we came back all three HomePods started pausing and stopping music and generally acting a bit weird. Apparently, I am not alone – bit.ly/ml142homepod.

WILLIAM PILIPCHUK

We've encountered the same problem with our HomePod on occasion, but we just assumed it was something to do with our taste in music. Thanks for the heads up.



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NICK ODANTZIS, EDITOR

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START

FEED YOUR MIND. FEAST YOUR EYES.

Mobile economy thriving

How Apple is making money with Services

BY ALEX SUMMERSBY

APPLE IS A hardware company, right? Well, sure, but after buying MacBooks or iPhones, customers continue to spend money with Apple, making its Services business its next-biggest revenue stream after the iPhone. There's admittedly quite a gap — in Apple's Q1 2018 (everyone else's Q4 2017, ending December 31, 2017), iPhone sales brought in $61.6bn and Services $8.5bn — but this still makes the Services segment on its own the size of a Fortune 100 company.

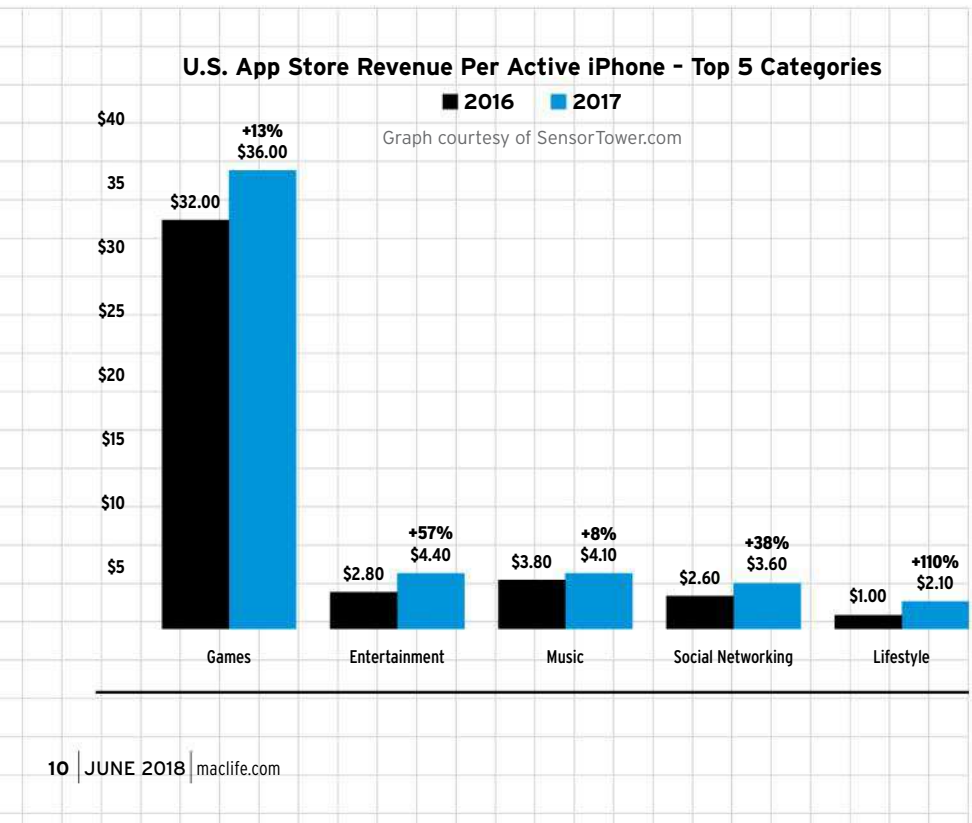
What is Apple's "Services"? It includes the App Store, Apple Music, iCloud, AppleCare, and Apple Pay.

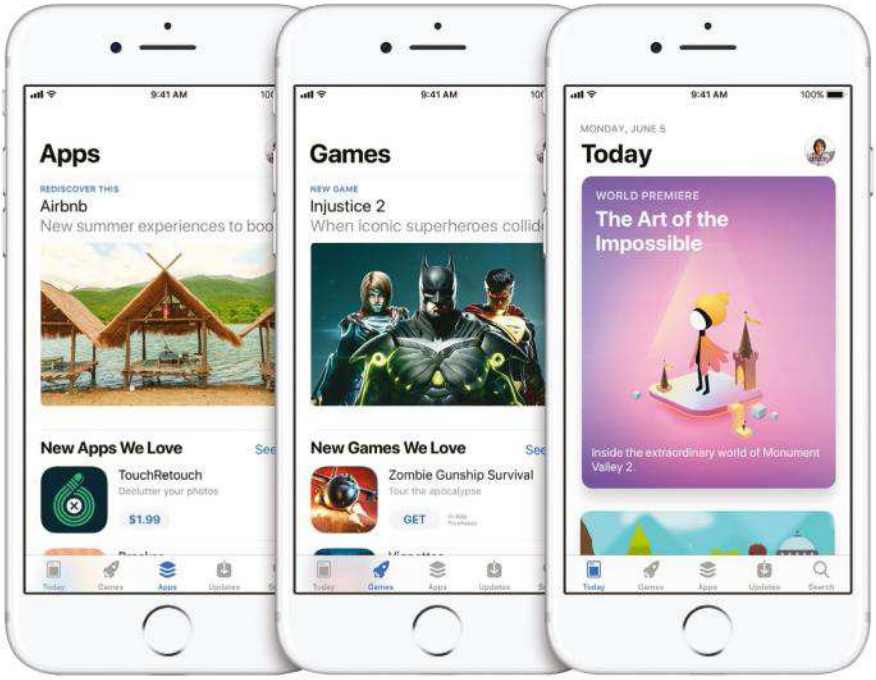
In February, Apple CEO Tim Cook said in Apple's Financial Conference Call that the quarter's Services revenue was up 18% over the previous year, "and we're on pace to achieve our goal of doubling our 2016 Services revenue by 2020." In addition, "The number of paid subscriptions across our Services offerings passed 240 million by the end of the December quarter. That's an increase of 30 million in the last 90 days alone, which is the largest quarterly growth ever."

As AppleInsider points out, Cook is unlikely to mean that Apple has "a quarter-billion subscribers to its own Services;" a large proportion of this number must be subscribers signed up through the App Store for games, services, and content feeds from which Apple gets a cut.

Despite commentators predicting that the app economy boom is over, the App Store is still doing strongly. Apple does not detail how much of its revenue comes from this stream, but according to data analyst Sensor Tower, US iPhone users spent an average of $58 per active iPhone in 2017 on premium apps, subs, and in-app purchases (but excluding online shopping and the like). This was a 23% increase, up from an estimated $47 in 2016, and significantly higher than Google Play's revenue per user of $38 in 2017.

Sensor Tower says mobile gaming represented the largest single category of spending on iPhone apps: Games and IAPs accounted for about $36 of the $58 spent per device, or 62%. Entertainment (including subscriptions to services such as HBO NOW, Hulu, and Netflix) was the next-largest category, at an average $4.40 spent in the App Store per active iPhone, a 57% rise over





Apple is aiming to grow paid-for Services, with its video content service in active development

2016. Music, including services such as Pandora and Spotify, was next ($4.10, up 8%), followed by Social Networking ($3.60, up 38%), which includes subscriptions to services such as LinkedIn and VoIP call credits in Skype. The biggest rise was in spending on Lifestyle apps, including dating apps such as Tinder and Bumble, which rose 110% to $2.10 per iPhone in 2017.

On average, the analysis found, users installed 45 apps per iPhone in 2017, four more than the previous year. Sensor Tower concluded that "in terms of downloads and revenue, US iPhone owners are installing and spending more than ever."

It is not clear whether Sensor Tower's Music category includes subscriptions to Apple Music itself, but the service hit 40 million subscribers at the beginning of April. It still has some way to go to catch Spotify, which has reported 71 million paying users, but at least one financial analyst is predicting that Apple Music will grow 40% per year for the next three years.

Indeed, another analyst, at Morgan Stanley, forecasts that "Services revenue growth will contribute more than 50% of Apple's total revenue growth over the next five years" while "The iPhone, which has contributed 86% of Apple's revenue growth over the past five years, will make up 22% of revenue growth in the next five."

This forecast assumes that iPhone sales and revenues will plateau, which remains to be seen. But it's true that Apple is aiming to grow paid-for Services even more, with its much-anticipated video content service in active development. Following Apple's purchase of Texture, an app that delivers unlimited access to 200 magazine titles for $9.99 a month, there's also been speculation that Apple News might be in line for a makeover into a subscription-based service integrating Texture, plus conceivably other media as well as magazines.

News in brief

Apple news in bite-size chunks

› iOS UPGRADE BRICKS iPHONE 8 SCREENS

The iOS 11.3 upgrade reportedly disabled the touch functionality in some iPhone 8 screens repaired by third parties. AppleInsider notes, however, that the problem can apparently be fixed "with a fairly routine DFU restore," it is unknown how widespread the issue was, and it remains "unclear if the glitch was intentional or accidental, or if a future software update will provide a fix." In early 2017, Apple revised its policy on repairs carried out by shops that are not Apple Authorized Repairers: These now will not automatically invalidate a device's warranty. So if yours is still under warranty or AppleCare, contact Apple Support for advice.

› TIM COOK SAYS APPLE WON'T MERGE MAC AND iPAD.

Apple has no intention of melding macOS and iOS, CEO Tim Cook told *The Sydney Morning Herald*. "We don't believe in sort of watering down one for the other. Both are incredible. One of the reasons that both of them are incredible is because we pushed them to do what they do well. And if you begin to merge the two... you begin to make trade-offs and compromises. So maybe the company would be more efficient at the end of the day. But that's not what it's about. ... It's about giving people things that they can then use to help them change the world or express their passion or express their creativity. So this merger thing that some folks are fixated on, I don't think that's what users want."

New iPhone models in the pipeline

Judging by the latest rumours, it's going to be all change in the display department

BY ALEX SUMMERSBY

APPLE DOES NOT disclose its future plans, but other sources suggest that new iPhone models are imminent. A regulatory filing with the Eurasian Economic Commission, required for companies wanting to market products in Russia that incorporate encryption, lists 11 new iPhone model numbers. Filings with the Commission have been a reliable indicator of new Apple products, lifting the curtain on AirPods, iPhone 7, new MacBook models, and the latest iPad, which was launched a month or so after being listed. On this record, it seems likely that the new iPhone models might be announced at WWDC in early June.

However, Apple's usual update cycle sees new iPhones released in the fall, so instead, commentators anticipate an update to the iPhone SE, which has not had a substantial revision since it was introduced in March 2016. Speculation is that the new SE model's specs will be in line with those of the iPhone 7, including the A10 Fusion chip, a significant step up from the A9 in the current SE. Nobody knows whether a new SE would still have a 4-inch screen, popular with users who want a more compact device, or grow to 4.7-inch like the iPhone 7 and 8. It is also unclear why there may be 11 distinct models — reports speculate about a range of new colors, but that would not require separate model numbers.

Rumors suggest that the updated iPhone SE will reach American consumers in the fall.

It is possible that the filing covers a whole new range of iPhones, which observers expect around September. KGI Securities analyst Ming-Chi Kuo, who has a good track record of forecasting Apple products, predicts a completely new three-model line:

- a second-generation version of the current flagship iPhone X, with the same 5.8-inch OLED display;
- an "iPhone X Plus" with a larger 6.5-inch OLED display;
- a new, more affordable 6.1-inch iPhone with an LCD display (so slightly larger than the 5.5-inch screen on the current iPhone 8 Plus).

All three are expected to have an edge-to-edge screen like the iPhone X, and Face ID — no more Home button or Touch ID sensor. It may also be that, instead of releasing a single "iPhone SE-2" model, Apple plans a wider range of models with a traditional Home button in addition to these three premium models.

SCREEN THRILLS

The iPhone X is the only current model with an OLED screen. This component is made by Samsung, and

In a break with tradition, Apple's next iPhone could include an OLED concave screen.

reports say Apple does not want to rely on supplies from a company that happens to be its main competitor in the smartphone market, especially if Apple plans more models with OLED screens. Some claim Apple has been exploring other sources, notably LG, but the *Wall Street Journal* reports LG has encountered manufacturing problems and can't deliver on time.

Down the line, Bloomberg reports, Apple will break the iPhone mold with a curved, gesture-controlled phone. The screen will be concave, gently curving inward from top to bottom (unlike Samsung's current curved phones, which curve down at the edges). Apple would use OLED displays, which can be curved in ways that LCD cannot. Bloomberg says gesture controls would make it possible to move a finger close to the screen (without actually touching it) to perform some tasks, but it says the technology will not be ready for at least another couple of years.

>THE SHIFT

As streaming services kill off traditional cable subscriptions, **DAVID CHARTIER** examines whether this shift is for the best

TRADITIONAL CABLE SUBS have steadily declined for a decade, while the sheer quantity, variety, and quality of internet streaming services has flourished. You could argue that consumers won — having escaped the shackling of cable bundles while gaining more choice and flexibility. In the coming years, though, we may have to reflect on an old adage: be careful what you wish for, you just might get it.

These days, we have no shortage of options for streaming just about anything we want. Newer companies like Netflix quickly gained dominance, while the old guard like HBO, Sony, and the broadcast channels can apparently learn new tricks. Apple and Amazon are now also streaming providers and even create new, original series.

We're in a golden age of movie and TV show accessibility. Many services offer a wealth of content at affordable prices.

However, I call this a golden age because we are slowly entering what comes next. While I don't think it's an asteroid or mass media extinction, these services are definitely evolving, and I don't think everyone will be happy.

The first sign of the Walled Garden Age is the race for exclusives. This tactic is as old as the biz itself, but competition has hockeysticked among streaming services in recent years. Apple and Amazon are directly hiring big Hollywood names, and Netflix alone will spend $8 billion in 2018 to produce (and acquire) over 700 original films and TV shows. Yeah, seven hundred. You'd better free up some more binging weekends.

The next sign is what I would call "old exclusives." Some of the larger studios have started pulling content from third parties like Netflix and Amazon. It happens with such frequency now that some websites have started regular coverage of "here's what to watch on Netflix before it disappears this month." Part of it is just licenses expiring, but Disney plans to pull all of its films from Netflix in 2019, then launch its own service.

All of this leads up to the third sign: The New Bundling. Some people are happy with Netflix (and maybe Spotify). But a large portion of the market will soon trade their singular cable subscription for juggling individual bills across Hulu, Sony, Disney, Netflix, and maybe even ESPN and a couple other channels for good measure.

In many ways, it's a win for consumer choice and flexibility; I don't know anyone who wants to go back to waiting for a film or TV episode to broadcast at a specific time on a specific channel. And yet, The Walled Garden Age might feel like a loss in other ways. But like the evolutionary ages before it, there is likely no going back.

>>> David Chartier is a content strategist and writer with vast experience analyzing the tech world. He runs the website *Finer Things in Tech* (finerthings.in) and hosts its podcast, The Finer Things In.

Apple already winning the next platform war?

How Apple is leading the way in healthcare

BY ALEX SUMMERSBY

A FEW MONTHS ago, in *Mac|Life* 139, we reported on technologies that make Apple Watch a key healthcare and diagnostic aid. New developments reinforce the trend, and business news website Quartz says "the next stage of the platform wars may be in health," with Apple ahead of the curve.

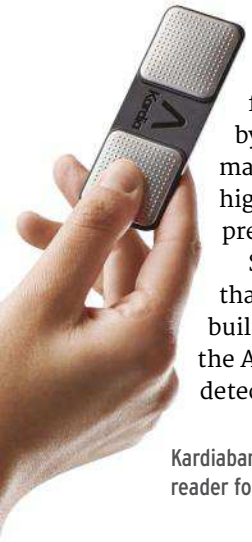
In February, Quartz reports, Apple was granted a patent for an AirPod-style charging case that can hold both your Watch and a number of "smart bands," each of which might be a specialized sensor in its own right. Apple also holds a separate patent for a modular Watch attachment containing sensors.

This raises the prospect of being able to choose from a range of sensors for different health needs, or even combine options to manage complex conditions. As Quartz notes, AliveCor already offers an accessory called Kardiaband — the first electrocardiogram reader for Apple Watch approved by the US FDA — which may also be able to detect high potassium levels present in the blood.

Separately, it turns out that the heart rate monitors built into wearables such as the Apple Watch and Fitbit can detect abnormal heart rhythms with 97% accuracy, according to a study by the team behind the Cardiogram app for Apple Watch in conjunction with researchers at the University of California, San Francisco.

"We think that only Apple can make medical surveillance bearable, much less cool," Quartz says. "The overall market for watches is likely smaller than phones but Apple's competitive advantages in design, technology, and data security could give it a significantly higher market share in watches."

Apple does not currently release details of Apple Watch sales. However, market research firm IDC estimates that Apple shipped 8 million Watches in the December quarter, beating its rival Fitbit. According to Fortune, Apple sold more watches in the quarter than Rolex, Omega, and Swatch combined. In April, Intel announced that it was disbanding its New Devices Group, its venture into wearables (including AR glasses), into which it had poured hundreds of millions of dollars in the search for new growth markets to complement its chip business. Apple will no doubt still face competition in the future, but it certainly seems to be leading the pack when it comes to smart wearables.



Kardiaband is the first electrocardiogram reader for Watch approved by the US FDA.

Business bites

Apple business news in brief

> iPHONE X SALES "POOR"?

Almost since the day it launched, commentators have been sniping at iPhone X, saying its sales have been disappointing. Far from it: In Apple's quarterly earnings statement, Apple CEO Tim Cook said "iPhone X surpassed our expectations and has been our top-selling iPhone every week since it shipped in November." A study by Counterpoint Research (cited by AppleInsider) says iPhone X alone accounted for 35% of the profits in the global smartphone market in the December quarter of 2017, despite shipping only in November. In total, Apple had eight out of the top ten smartphones in terms of profit share, grabbing 86% of global smartphone profits.

> HOMEPOD SALES "POOR"?

Okay, this one's a bit less clear-cut. Bloomberg says Apple has lowered its sales forecasts for HomePod and scaled back production. The smart speaker sold strongly at launch, taking 10% market share, but has since slipped to an estimated 4%. Amazon's Echo is by far the market leader. However, HomePod's high price means it still takes a big share of revenue – Slice Intelligence estimates 19% in February-March, compared to 8% for Google Home and 5% for Sonos. Smart speakers are the fastest growing consumer technology category, and Canalys predicts 56m will be sold in 2018. Strategy Analytics forecasts total HomePod sales of just 3.8m for the year, although analyst Gene Munster said he expects sales to pick up later in the year and forecasts a total of 7m sold in 2018.

Mac|Life

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CRAVE

THE GEAR WE'RE LUSTING AFTER

1 Philips Brilliance 492P8

philips.com
$TBC

>>> If you want the ultimate productivity setup, Philips has you covered here. This giant display has an ultra-ultra-wide design, with a ratio of 32:9. That means it's twice as wide as a standard 16:9 widescreen monitor, and comes in at a colossal 49 inches, which means it reaches 5K resolution across (specifically, it's 5120x1440). Get one of these curved beauties on your desk for effectively a dual-screen setup in a single neat package, with connections over DisplayPort, HDMI, USB-C and HDMI. It's due out later this year, and looks fantastic.

2 Apple Space Gray Magic accessories

apple.com
From $99

>>> The iMac Pro's super-cool Space Gray finish isn't unique to that machine (MacBooks already came in it), but it was the first Mac to include Space Gray accessories. Apple has now made them available to buy separately, so you can deck out a docked MacBook Pro with them, or just grab them because they're extremely cool. The downside is that they cost more than the silver version for some reason: the Magic Keyboard is $149, the Magic Trackpad 2 is $149, and the Magic Mouse 2 is $99 – all $20 more than the silver version.

3 Audeze Mobius

audeze.com
$399

>>> These are the first wireless headphones to use planar magnetic driver technology (which offers clearer and more controlled sound than the dynamic driver tech almost all other headphones use), but they're advanced in lots of other ways too. Built-in audio processing calibrates their sound for the shape of your head, and can create immersive 3D audio that emulates the open space of a room, rather than the closed-in feeling of headphones. They can be plugged in over USB-C too, as well as wireless and 3.5mm jack support.

4 Moment Anamorphic Lens

shopmoment.com
$150

>>> Take shooting video on your iPhone to the next level by adding movie-style perspective. Anamorphic lenses capture a wide view, but with the tight focus of a telephoto lens. They're key to the epic scale movies have, and let you grab dramatic horizontal lens flare. The image captured is so wide it actually needs correcting, but Moment's app will do that live while you're shooting. It's going to mean lots more amazing iPhone-based projects – Steven Soderbergh shot his film Unsane using an iPhone 7 and Moment lenses. This lens' Kickstarter finished successfully, for a June release date.

BUILD A BETTER NETWORK

How to get to grips with your network and make it perform better for you

WRITTEN BY NICK PEERS

THESE DAYS, YOUR network is put to much greater use than simply getting your Mac online to browse the web and check email. Inevitably, that means enduring a lot more disruption if something goes wrong with it — no more Netflix, tunes won't stream from Apple Music or Spotify, and you may be unable to access files on your networked storage until the problem is fixed.

But, how do you go about identifying the root cause of the problem, which could originate anywhere from your internet service provider to the location within your home that you've chosen to use your Mac, iPhone, iPad, Apple TV or some other kit?

Here you'll learn about diagnosing network interference, kit that can boost your network, ways to improve security, new things to do with your network, and more. Even if your network's running well right now, networking niggles can suddenly sneak up on you, so hold on to this guide to keep yourself connected.

TROUBLESHOOT YOUR SETUP

Problems getting on to the internet or your own network? Start here

YOUR NETWORK CAN be neatly divided into two zones: inside and outside. The outside refers to the wider internet, delivered to your home through your phone or cable connection, while the inside is where all your networked devices reside – whether they're connected using Wi-Fi or Ethernet cabling. Bridging the two is your modem-router, which does the hard work of managing the connections between devices.

When it comes to troubleshooting your network connection, therefore, you have three major points where problems tend to occur: your Mac or some other device, your router, or your internet connection.

THE SIMPLE STUFF

Begin by restarting your router or powering it off for a minute or so – this often clears up most problems, just like restarting your Mac can occasionally fix glitches. Speaking of which, restart that at the same time. Don't take this as a reason to regularly power off your router – it should normally be left on.

That will clear up some glitches, but not all. The guide opposite reveals how to use macOS's own networking tools to try to determine the problem and attempt a fix – as they tend to focus on your Mac, check whether your other devices are suffering a similar problem before focusing attention on your Mac.

If the problem appears to affect all your devices, then the next port of call is your router. If devices can see and connect with each other, but not the internet, then the issue may lie with a problem outside your home (and direct control). The second guide opposite reveals how to try to rectify this problem – if you don't have the means to connect to the internet another way – for example, using a hotspot feature on your cellphone – it's worth checking with your neighbors to see if their broadband connection is down and, if not, if they'll let you connect temporarily so you can continue to troubleshoot the problem.

Check your network speed

Worried your internet connection isn't up to speed? Install SpeedTest (for Mac, iOS and tvOS) from the App Store that will give your connection's upload and download speeds a thorough workout. It's worth carrying out this test at different times of the day.

You can also check your current local network speed by opening Network Utility (type its name in Spotlight) and switching to its Info tab. Select 'Ethernet (en0)' for your wired connection – the link speed should be 1Gbit/s; if not, check the cables and verify your router supports a fast Gigabit Ethernet connection. Select 'Wi-Fi (en1)' to check your wireless connection. A strong 2.4GHz signal should deliver at least 200Mbps, while a 5GHz one should deliver at least 350Mbps.

Also try the free HELIOS LanTest tool (bit.ly/heliostest) – you'll need the username and password shown on that page to get it, and to use System Preferences' Security & Privacy to allow the app to be installed.

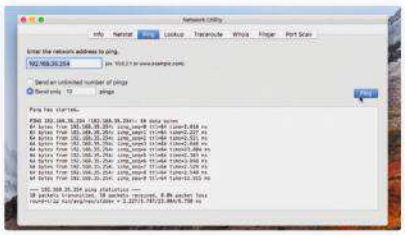
Speedtest can help you determine the actual speed you're getting from your internet connection.

HOW TO Diagnose connection issues

THE FIRST PLACE you should look to check your Mac's connection is System Preferences' Network pane. Select Ethernet or Wi-Fi, depending on which one you use. If the circle next to it is red (no connection) or yellow (not configured), the pane should provide info on the problem, such as a missing Internet Protocol (IP) address – the set of four numbers beginning '192.168.' that uniquely identify a device – or lack of an internet connection. If that's not enough to identify the issue, however, then use the following steps to make further checks.

1 Check your Wi-Fi

Hold Alt, click the Wi-Fi menu bar icon and choose Open Wireless Diagnostics. Click Continue to run a series of tests, then click each result for a description of what it has found.

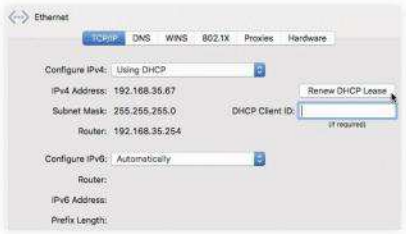


2 Run some tests

Use Spotlight (Cmd+Spacebar) to open Network Utility. In the app's Ping tab, type your router's IP address and click Ping. If the packets are all received, the issue isn't with your Mac.

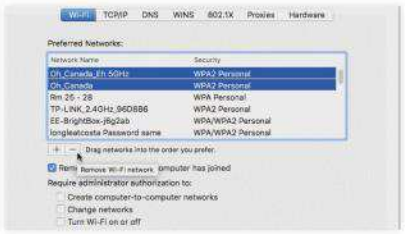
3 Verify IP settings

Go to System Preferences> Network. Select your connection type and see if an IP address has been assigned – if set manually, choose, TCP/IP. Try setting IPv4 to Using DHCP.



4 Renew the lease

Try renewing the lease of the IP address given by the router. If the issue persists, pick 'Using DHCP with manual address'; enter an unused one, leave the mask as is, and verify the address.



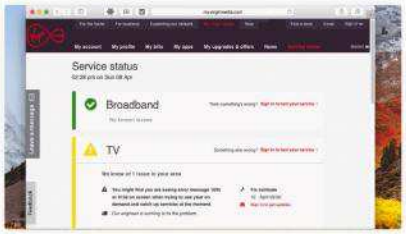
5 Forget your Wi-Fi

If you use Wi-Fi, click Advanced > Wi-Fi, select the misbehaving network in the list and click – (minus) to remove it. Click OK, Apply, then the Wi-Fi menu bar icon and connect from scratch.

HOW TO Troubleshoot router problems

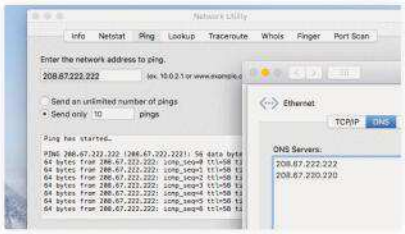
1 Log in to the router

Point your web browser at your router's IP address (see the TCP/IP tab in System Prefs > Network > Advanced), then check to see if the router's status page indicates an issue with your internet connection.



2 Ask your provider

If the connection is down but you can get online on your phone, check your service provider's status page for outage reports. Its support pages should give its required settings, plus contact details.



3 Resolve DNS issues

If your router has a connection but pages don't load, your provider's DNS server, which connects web addresses to servers, might be in trouble. Follow bit.ly/odnsma to see whether this free service fixes it.

IMPROVE YOUR

Bring your network bang up to date to boost its speed or range

ONCE UPON A time, you plugged your Mac in to a modem and that was your internet connection sorted. These days, your network consists of more than just a few computers and perhaps a printer; now there are your mobile devices, smart TVs, HomePod, Apple TV, Internet of Things (IoT) gadgets and other hardware besides to consider. If your network is struggling to cope with bandwidth demands or the places you need it to reach, now's the time to look for the right upgrade to suit your needs and your wallet.

New Wi-Fi router

› The 802.11ac Wi-Fi standard gives you faster wireless performance at greater range, covering more of your home. A new router may have other advantages – extra features, stronger security and so on. See what to look for on page 29.

Mesh network

› This tech is designed to extend Wi-Fi networks through larger homes. Asus has even launched its own mesh system (asus.com/uk/AiMesh) that works not just with brand new routers but its existing models, too.

INFRASTRUCTURE

Powerline adapters

› Extend your network over your electrical circuit. You'll need at least two (one goes near your router). Choose 1200AV or higher models to maximise performance, and passthrough models if you need to keep the wall socket free. Some models include Wi-Fi connectivity, too.

Network switch

› Enables you to add extra ports to your network for cabled devices. Ideally, use a switch with Gigabit ports for maximum performance. Managed switches have advanced features, such as link aggregation for combined throughput – useful on Macs that have multiple Ethernet ports.

Range extender

› This relays your Wi-Fi signal to a dead spot in your home. Prices start from around $15 for an 802.11n model that supports a transmission rate of 300Mbps, or save a little money by reusing an old router in bridge mode.

HOW YOUR NETWORK WORKS

Discover how your networked devices communicate with each other

HOW DOES DATA travel from one part of your network to another? The answer lies in the TCP/IP model. TCP (Transmission Control Protocol) is the method used by computers to connect over networks, while IP (Internet Protocol) is the way in which data is broken down into 'packets' of information and transferred.

Each packet is labelled in such a way as to make it clear where it's come from and what its destination is. When data is transferred, the TCP part of the process is responsible for ensuring that the data is checked for errors during transmission – if errors are found, the data is transferred again.

This model can be broken down into four basic layers: Application, Transport, Internet and Link – see the explanation opposite for a basic breakdown of what happens on each of those layers.

At the local network level, your devices are typically linked and managed through a single device – your router – in what's termed a Local Area Network (LAN). Devices are uniquely identified on your network by their IP address, which consists of four separate digits, each of which can be a number from 0 to 255. The first two refer to the network address and are almost always 192.168. The last two refer to the host address. Of these, the first number (the subnet) is shared between all networked devices, while the final number (host) is what uniquely identifies that device on the network. For example, your Mac might be assigned 192.168.0.2 and your iPhone might be 192.168.0.3.

One IP address on your network – often 192.168.0.1 or 192.168.0.254 – is reserved for your router, and this address is known as the 'gateway', through which all other devices communicate. You'll also see a reference to a subnet mask, which is usually 255.255.255.0, and can be safely ignored.

By default, IP addresses are handed out automatically by your router using a feature called DHCP (Dynamic Host Configuration Protocol), but you can set them manually for devices whose IP address needs to remain constant, though this is unusual in a home setting.

Enjoying what you've read so far?

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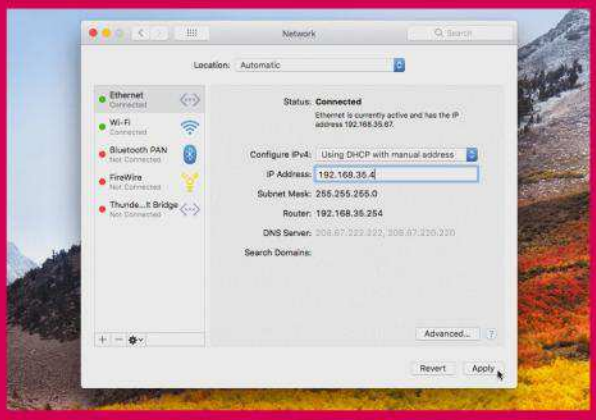
p36

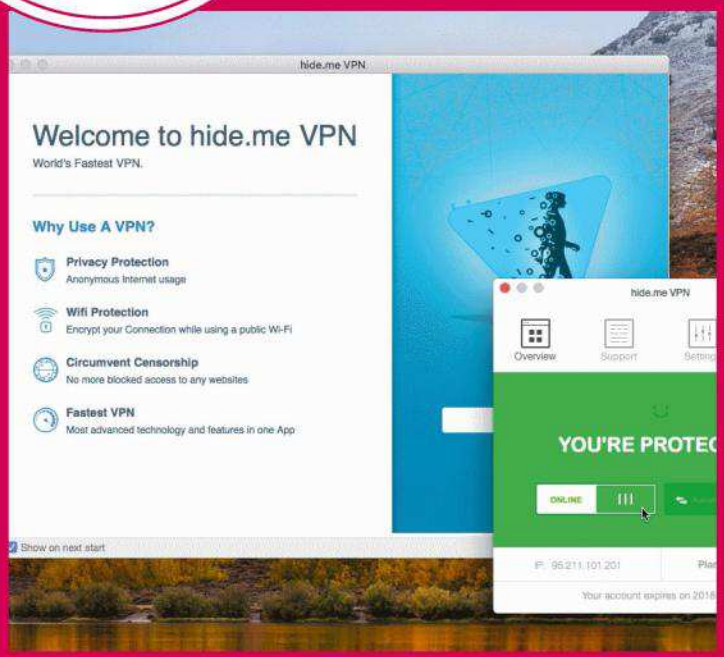


If you want to apply a static IP address to your Mac, select your connection method in System Preferences > Network, click Advanced, choose 'Using DHCP with manual address' and assign one that isn't already in use.

WIRELESS CONCERNS

Data transferred over wires is generally considered secure, but data sent wirelessly can be intercepted, which is why wireless networks support various forms of encryption, the most secure of which, currently, is WPA-PSK2.

One way to secure your internet connection on an insecure wireless network is to use a Virtual Private Network (VPN), which effectively creates an encrypted 'tunnel' through which data is sent and received.



Virtual Private Networks (VPNs) work by 'tunnelling' an encrypted connection through an unencrypted network, such as a public Wi-Fi spot.

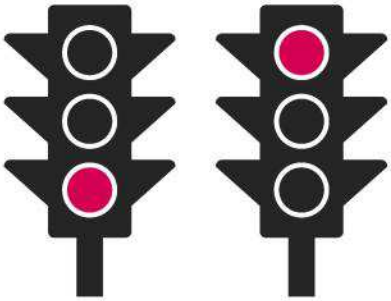
1. Application layer

This layer is split into three main elements: at the top of this layer is the software you're using to access the internet, such as a web browser. Next is the 'presentation' element, where data is translated into a format for sending – for example, if it's to be encrypted or compressed. Finally, the 'session' element determines the type of connection made – HTTP or HTTPS for the web, and SMTP for email, say.

UP STREAM
DOWN STREAM

2. Transport layer (TCP)

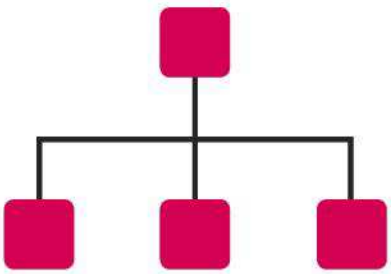
This manages how the data will be delivered by converting it into 'packets' for sending, then making sure they're safely delivered and reassembled at the other end in the correct order. It also works in reverse for packets which have been received by your computer.



UP STREAM
DOWN STREAM

3. Internet (or Network) layer

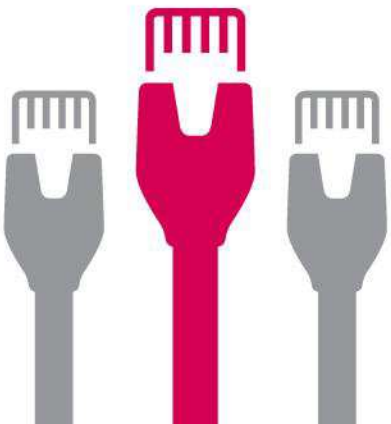
This is the layer that covers how the data will be addressed and then routed between devices. This means determining where the data is to be transmitted to on its route between your computer and its destination. It's also where the actual delivery of data occurs, using IP packet switching, as described earlier.



UP STREAM
DOWN STREAM

4. Link layer

The lowest layer, also known as the network access layer, is where error detection and correction take place as the data is packaged and transported. It's also where you'll find the physical hardware (typically Ethernet or Wi-Fi) that connects your device to your network and, ultimately, the internet.



Networking terms explained

802.11
The protocol for transmitting data wirelessly over different frequency bands, including 2.4GHz and 5GHz. The letter(s) after the number indicates a specific standard that determines the frequency, speed and range. The latest standard is 802.11ac.

DHCP (Dynamic Host Configuration Protocol)
A network management tool used by routers to automatically assign unique IP addresses to each device that's connected to a network.

DNS (Domain Name System)
A naming system which translates user-friendly domain names – such as apple.com – into their actual public IP address (17.178.96.59 in apple.com's case), making it easier for you to browse the web. A DNS server supplies this information, acting like a 'telephone book' for the internet.

IPv4 and IPv6
These are different versions of the Internet Protocol (IP) standard for routing internet traffic using IP addresses. IPv4 remains the most common, but IPv6 offers a greater pool of addresses and should eventually replace it.

Public IP address
The IP address that identifies a website or your own network to the internet. Your own public IP address is allocated to you by your internet service provider. Each device on your network is then allocated a private IP address by your router.

Noise
The amount of interference affecting your device's Wi-Fi signal due to range and other devices. The greater the noise, the more likely you'll suffer connection or performance problems.

NETWORK ISSUES

Five problems that commonly afflict home networks, discussed and solved

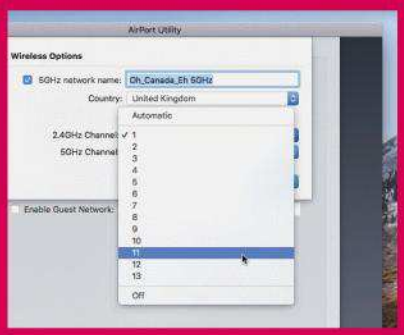
› Wi-Fi FREQUENCY

Fix congestion issues

These days, many wireless networks overlap due to their number and extended range, which can cause interference that manifests with poor performance and connection issues at shorter-than-expected ranges. Add in an ever-growing number of devices trying to share a single channel and you can see how problems can occur.

If you have an 802.11ac router that can broadcast on the 2.4GHz and 5GHz bands, which are divided into several narrower channels, try moving some devices onto the less crowded and congested 5GHz band, particularly those close to the router.

2.4GHz networks also transmit over several overlapping channels – 1 through to 14 in the US – and moving your network to a less crowded one can also have a marked impact on performance. Use Spotlight to find and open Wireless Diagnostics. In that tool, choose Window › Scan. Use the summary page to see which channel is recommended under 'Best 2.4GHz', then use your router's configuration utility to switch it to broadcast on this channel.



You can set Apple's routers to broadcast a separate 5GHz network in AirPort Utility.

› FIX APPLE TV STREAMING ISSUES

Media streaming issues can be traced to poor network performance, often linked to a weak Wi-Fi signal. If your Apple TV is located in a different room to your router, that's likely to be the problem. If the device is connecting using the 5GHz band, try switching it to the 2.4GHz band, which performs better at longer ranges. Failing that, either add a range extender to boost the signal to where your Apple TV is sited or invest in powerline adaptors, which allow you to connect your devices to your network using Ethernet cable, carrying the connection between rooms using your electrical circuit. Wired connections are typically faster and more stable than wireless ones.

If your router is nearby and you're convinced the signal should be strong enough, there may be congestion from other Wi-Fi networks – refer to the tip on the left to change the channel and fix this.

Your internet connection's speed will also affect streaming from outside your local network. 4K video requires a lot of bandwidth – Apple recommends 25Mbps; with too little, Apple TV may stream at a lower quality. However, we've found that you can force it to use 4K by turning off Quick Start in Settings › Apps › iTunes Movies and TV Shows.

› ACCESS SHARED FOLDERS ON A PC

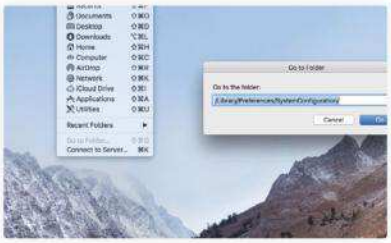
Accessing files from PCs (running Linux or Windows) ought to be straightforward, but sometimes the connection doesn't work in one or both directions. If you're struggling to connect your Mac to the shared folder on a PC, open System Preferences' Network pane on your Mac, select your connection, click Advanced › WINS, and select your Windows PC's workgroup if necessary.

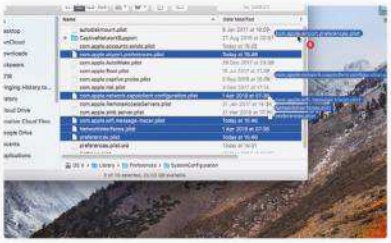
If your PC doesn't show up in Finder under Shared, press Cmd+K to open the 'Connect to Server' dialog. Type **smb://pcname** or **smb://192.168.x.y**, substituting your PC's name or IP address to see if you can connect to it manually. If asked for login details, use those you use to sign in to the PC; if you're using a Microsoft account to do that, omit the @email.com part.

If it's just one specific PC you can't connect to, check it's sharing at least one folder, and whether other computers can connect to it.

If your Mac cannot connect to one PC but others work fine, the problem lies with that specific PC.

HOW TO Completely reset Wi-Fi configuration





1 Find preferences

Turn off Wi-Fi. In Finder, go to /Library/Preferences/SystemConfiguration and select com.apple.airport.preferences.plist, com.apple.network.eapolclient.config, and NetworkInterfaces.plist.

2 Delete and restart

Also select com.apple.wifi.message-tracer.plist and preferences.plist. Drag all five files to a folder on the desktop. Restart the Mac, then switch Wi-Fi back on and see if your problem has been resolved.

› BACK UP YOUR CONNECTION

Working from home and suffering from a flaky internet connection that can't be upgraded? Investigate using a backup connection in the form of mobile broadband. First, check with your service provider that you're in a good signal area. Second, see if you're able to 'tether' your iPad or iPhone – Apple calls this Personal Hotspot (see bit.ly/prshtspt).

If not, consider investing in a backup 3G/4G modem; some routers allow these to be plugged in to their USB port to use as a backup-only connection when broadband is down.

Remember to limit your usage, as you'll have a fixed quota of data and bandwidth to play with – use it to warn others that you're experiencing an outage, or investigate the cause of the problem – and contact your ISP!

Check to see if your router supports a backup mobile broadband connection.

› CAN'T CONNECT IN THE KITCHEN

If your devices have trouble connecting in a specific room that isn't related to how far you are from the router, the likely culprit is network interference from other equipment, such as older cordless phones or even your microwave. This tends to affect the 2.4GHz band most – switching to the 5GHz network may help, though that band's shorter range may itself pose a problem.

If that doesn't work, consider updating your cordless phone to a newer DECT model (make sure it's DECT 6.0, which avoids interference with Wi-Fi). Otherwise, leave your kitchen while using the microwave. Test other wireless gadgets – radio-controlled cars, for example – and cheap wall chargers by switching them off. If your Wi-Fi signal improves, you've found the culprit.

Networking myths disspelled

Save energy by turning off your router

A modem-router is designed to be left on 24/7. Switching yours off may save a small amount of power, but when you switch it back on it will take time to renegotiate your download and upload speeds. Leave it on for fast, stable performance.

Hide your network's SSID

It's said disabling the broadcast of the SSID (the network's name) can help to secure your network, but network traffic can still be revealed with software that detects it.

Enable MAC address filtering

It also seems a good idea to restrict access to your network to known devices, identified by their MAC addresses. But hackers can easily scan for and 'spoof' them.

Free Wi-Fi hotspots are dangerous

Not true. The key thing is whether the hotspot has encryption applied and that it's WPA2-PSK. If it is, it's reasonably safe to use. However...

Encrypted Wi-Fi hotspots are safe

Not quite, given the KRACKS vulnerability (see the next page). When on public Wi-Fi, disable all services in System Prefs' Sharing pane before connecting, and use a Virtual Private Network (VPN) such as hide.me or TunnelBear to add an extra layer of encryption.

Avoid using any wireless hotspot that doesn't have a padlock at the right end of its row – it's too risky.

BEEF UP NETWORK SECURITY

Make sure your network is protected from outside threats

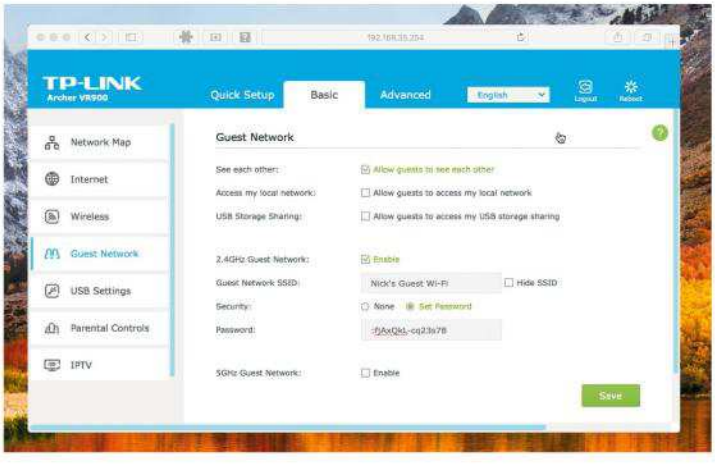
JUST HOW SECURE is your network? At the very least you should be protecting the Wi-Fi side of things with WPA2-PSK encryption. This is the latest Wi-Fi security measure, scrambling your data and protecting it using a pre-shared key (PSK), which is network speak for a password. But that only scratches the surface. Read on for other tips you should employ to close the door on hackers and other unwanted intruders.

UPDATE YOUR ROUTER

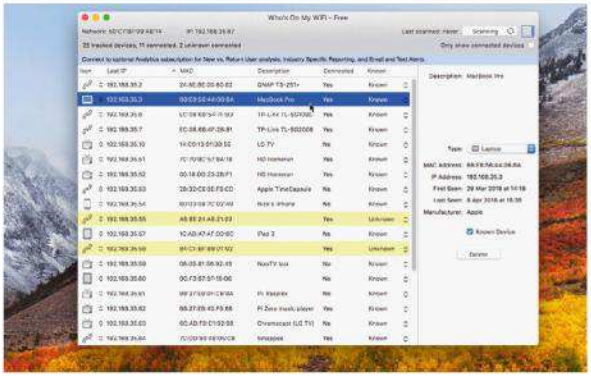
The recent discovery of the KRACK vulnerability has shaken Wi-Fi networking to its core. Familiarize yourself with what it is at krackattacks.com. Your first step should be to visit your router's homepage and see if a firmware update has been released that specifically addresses this problem – if you have an AirPort Express, Extreme or Time Capsule, use Spotlight to open AirPort Utility (or download the iOS version), which should prompt you with a firmware update – at least version 7.7.9 for 802.11ac models, or 7.6.9 for 802.11n.

You also need to update all your Wi-Fi devices. Apple has already patched OS X El Capitan, macOS Sierra and macOS High Sierra, and iOS 11.1. To find out more about Apple's security updates go to bit.ly/applesecupd.

Did you know your router might be open to access from the internet? First, sign in to its configuration utility in your web browser and, if you haven't already done so, change the default password to something more secure. Now go to whatismyip.com – see your public IPv4 address? Type this into your browser and see if this takes you to your router configuration login page. If it does, look for a 'remote access' option and disable it.



One way to tighten security is to give visitors limited access to your network by setting up a guest network. This provides people with access to the internet, but things like printers and storage are cordoned off.



Find out how many devices are connected to your network, whether over Wi-Fi or Ethernet, with an app like Who's On My WiFi.

WHO'S ON YOUR NETWORK?

Install Who Is On My WiFi (free, Mac App Store) or Fing for iPad and iPhone (free, bit.ly/fingios) to see a list of devices – wired or wireless – currently connected to your network. Label those you recognise by IP address and mark them as known, and investigate the unknown devices to verify they're legitimate. Keep checking back for new devices. If nothing else, it'll remind you how many connected devices you own!

Another way to protect yourself is to turn on your router's guest network, if it offers one. This gives guests internet access only. Be sure to protect it with WPA2-PSK and give the password to friends to use without exposing the rest of your network to them.

Check whether your router supports a feature called VLANs (or 'interface grouping'). This segregates your network by Ethernet port or Wi-Fi network, allowing you to set up isolated networks for specific devices. It can be complicated to action, and isn't on Apple routers or many others, so a guest network's often more suitable.

Another option is to close the virtual 'ports' that route data from apps and services between networked devices and to the internet. If your router has UPnP (Universal Plug and Play) turned on, apps can open the ports they want, which can be risky. Managing port forwarding by hand is complicated, but periodically check your router's admin tool to see which ports have been opened, removing any you don't recognise or no longer use. It's wise to cross-reference Apple's list of ports used by its software at bit.ly/aplpt.

5 THINGS to do with your network

THESE DAYS, YOU'RE missing a trick if you're only using your home network to browse the web, send an email and perhaps share a file or two. Networking has an ever-growing list of possibilities, and by choosing the right hardware you can save both money and space in your home, too.

Other network additions can help improve the quality of your life while making sharing that bit simpler and easier, while a feature that's built in to macOS makes it easy to access your computer from wherever you are.

Here you'll find five different ways in which you can make even better use of your network.

1 Central sharing

Shared folders on your Mac are only accessible while your computer's turned on. See if your router has a USB port that enables a hard drive to be shared so you can provide a resource that's always on and available to your family.

2 Network storage

NAS drives give you networked storage, and many can do more, such as run a media server or personal cloud. Get one with multiple bays so its capacity can grow. Both AirPort Extreme and Time Capsule allow USB expansion – see bit.ly/airdisk.

3 Share peripherals

Why buy printers for everyone when you can share one? If you don't have one with Wi-Fi, Ethernet or AirPrint, see if you can connect a USB printer to your router and share it through that. Apple's AirPort devices allow this – see bit.ly/apprint.

4 Serve your media

Copy your music, movies and other media to a central location, then set up iTunes as a server using Home Sharing (see bit.ly/hmshrng), or choose a third-party option with broader support, such as plex.tv, to stream over the internet.

5 Remote access

On a home-based Mac, turn on Back to My Mac in System Preferences' iCloud pane (see bit.ly/bck2mac) and you can connect securely over the internet from your MacBook to grab files and even remotely control your Mac at home.

> How to choose a new router

In the market for a new router? Start by making sure it supports 802.11ac for the latest wireless technologies, including faster connections at the same distance.

Check the router's AC rating. The higher the figure, the faster it is, but note the number is a combo of the maximum 2.4GHz and 5GHz Wi-Fi speeds, specified in Mbps – megabits per second. Detachable antennas can help you direct the signal to where reception is weak.

Look for a model with a built-in modem to reduce clutter. Make sure it's compatible with your internet connection – that means ADSL for regular broadband, VDSL for fiber-optic or DSL for cable.

Also, make sure it has sufficient Ethernet ports for your needs, and that they're Gigabit Ethernet if you need them to reliably handle 4K streaming. Finally, pick a model with USB ports for expansion options, such as sharing printers and hard drives over your network.

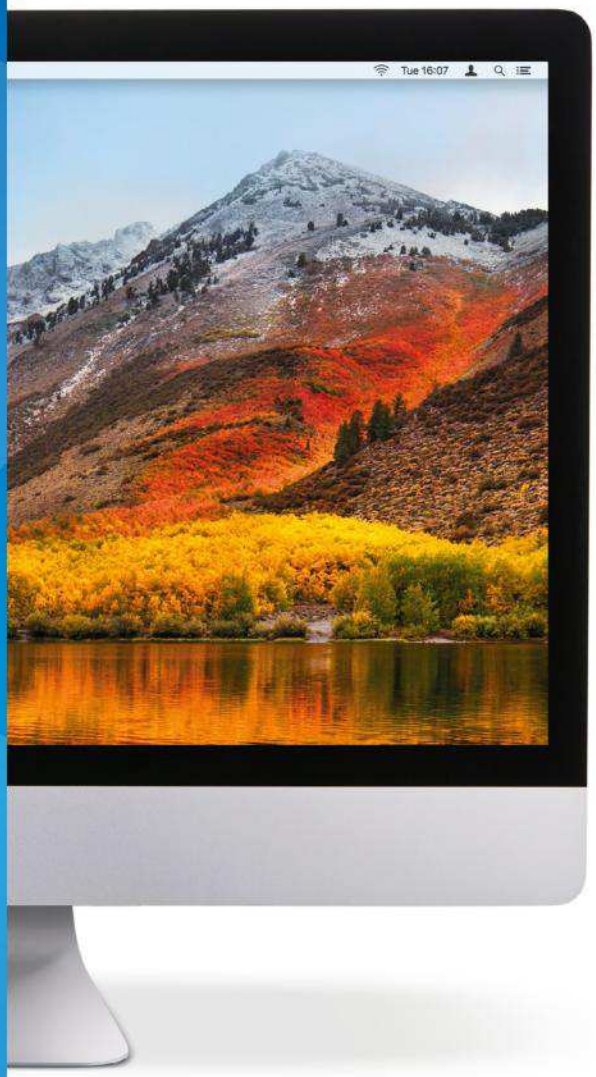
Check out
Our mesh routers group test p56

HOW TO

BUY YOUR NEXT MAC

FOR LE$$

Never pay full price for a Mac again with our economic yet comprehensive money-saving guide!



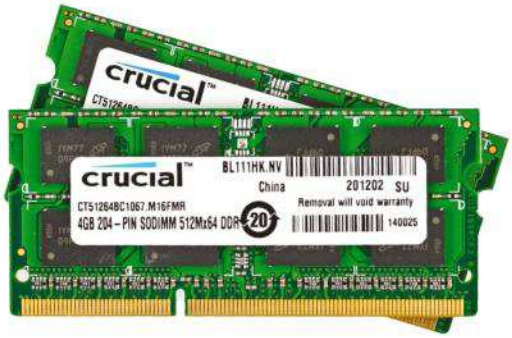
APPLE IS WELL known for really high prices on its computers — just take a look at the latest iMac Pro, which starts at a shade under $5000. While you certainly get a lot for your money, there's no doubting that buying a Mac requires a serious financial investment.

But there's no need to pay full price if you know where to look. There are plenty of clever tips and tricks that can save you a huge amount of money, so buying the Mac you always wanted becomes a much more palatable prospect.

From sales and specs to rights and resellers, over the next few pages we'll take you through all the ways you can save your dollars when buying a Mac. Read this and you'll never need to pay full price again.

Pick your specification

Knowing what you need is vital



Make sure you know what you intend to do with your Mac before you buy it. For example, do you need more than 8GB of memory?

THE TECH WORLD has a concept called "feature creep", where a product gains features until it becomes bloated and complicated. The same thing can happen when you buy a Mac.

KNOWLEDGE IS POWER

The key to avoiding this situation is ensuring you know exactly what you need before you start looking at Macs and get carried away. If you stick to that spec, you don't need to spend more than necessary.

For example, do you need that Intel Core i7 processor? It's a powerful processor, but unless you regularly engage in heavy-duty video or photo editing work, you can probably go without.

For processor clock speed and cores, if you mostly work with audio then fewer cores and a higher clock speed can be beneficial when it comes to latency. However, video export and compiling apps benefit from extra cores working in tandem, despite the typically lower clock speeds on offer.

Apple offers a variety of storage options, from normal hard drives to faster Fusion Drives to super-speedy SSDs. Work out how much space (and speed) you need, but remember that you can expand it with an external drive down the line.

Similarly, only get as much memory as you need. For many ordinary tasks, 8GB is plenty. If you use your Mac more intensively, you might need 16GB.

If you intend to use an external 4K or 5K display, make sure your Mac is powerful enough to run it. The support section on Apple's website has a page outlining requirements (**bitly.com/4K5Kreqs**).

Bear in mind that most Macs' components can't be changed — or not easily — after purchase, so you need to consider future uses for your Mac at that time. Thunderbolt 3 raises the possibility of external graphics cards, but Apple hasn't yet finalized how that will work, and we can't say for certain which models it's relevant to just yet.

› What extras will you need?

Docks and adaptors to expand your options

Apple captured headlines when it introduced its USB-C MacBook back in 2015. With just one port, it meant you could use one peripheral at a time, or none with the charger plugged in.

If you've got a single-port MacBook, an expansion hub can make a massive difference. Apple sells a Belkin USB-C hub with four USB-A ports for $69.95, and there are many similar options.

Apple has migrated many Macs to USB-C. So, if you use USB-A accessories, your new Mac might not have ports to connect them. The iMac still has four USB-A ports, but we can't say what'll happen with the future Mac Pro and Mac mini. The MacBook and MacBook Pro have no USB-A ports.

While individual adaptors (such as USB-A to USB-C, allowing you to hook up your older peripherals) are great for portability, a larger dock is often more practical, especially if you don't move around much.

If you're still running older tech such as FireWire hard drives, it's worth investing in newer kit with modern connections, rather than buying lots of adaptors for it – especially storage that might be near the end of its life.

Adaptors are good if you need portability, otherwise consider a hub or dock.

Buy from Apple

Getting a Mac from Apple doesn't have to be costly

WHEN IT COMES to buying a Mac directly from Apple, there are several ways to save some money. Before you hand over your hard-earned cash, there are a few places you should check first.

One is the clearance section on Apple's website, which offers slightly older Macs (such as those from 2015 and 2016) for a lower price. If you don't mind not having the latest and greatest Mac available, this is a great place to get a deal (see page 34 for more).

Separately, there's also a section offering second-hand Apple products that have been refurbished by the company, also sold at a discount. While these are not unused, brand-new Macs (unlike clearance items), they have still been tested and certified by Apple, so you know they're in a good condition. Every Mac sold this way comes with a one-year warranty.

However, the items in both the clearance and refurbished sections tend to go quickly. If you're interested in buying this type of Mac, it might be an idea to set the appropriate place as your web browser's homepage. Then you can quickly check for discounted Macs every time you go online, so there's less chance of missing out.

While the cost of buying a Mac directly from Apple with a single sizable payment can seem daunting, Apple offers a way of making it more affordable. Instead of buying the Mac outright, you can spread the cost over six, 12, or 18 monthly instalments, interest free (if you pay it back within the promotion period), with Barclaycard Visa. If you don't pay the balance within this timeframe or you're late with a payment, interest will be charged to your account from the purchase date. The APR is 15.49%, 21.49%, or 28.49% variable, depending on how good your credit is, so it's worth taking advantage of the interest-free option.

Education & employee purchase plans

Use your workplace benefits to get money off a Mac

Apple offers a number of ways to save money on its products through your place of work or study. If you're a student or teacher, for example, you can save up to $200 on a new Mac through the Apple Store for Education. Apple is pretty relaxed about eligibility for this deal, so as long as you have a student ID you're good to go; sign up to Unidays (myunidays.com) and use the email address you received when you enrolled. Similarly, teachers just need an ID card, payslip or other ID to prove their credentials.

MAKING WORK PAY

Many larger workplaces are signed up to Apple's Employee Purchase Programme (EPP), which offers discounts of varying levels on many first- and third-party products. This is available online and in retail stores.

You can buy a limited number of discounted Macs, iPads, iPhones and iPods each calendar year, for yourself or friends and family. Check the terms and conditions shown when you first sign in to your company's special EPP web address to confirm these limits.

If you're a student or work in academia, you can get money off in the Apple Store for Education website.

Buy from a reseller

Get extra savings on a Mac from third-party retailers

WHILE APPLE OFFERS discounts from time to time, you'll often get more money off from third-party resellers. But before you get started, it's a good idea to buy from an authorized reseller or service provider; that way, you're buying from Apple-approved companies. Moreover, any repairs at an Authorized Service Provider are done using genuine parts by people trained by Apple.

Many of these resellers offer deep discounts around Black Friday, so if you're not in a huge hurry it's a good idea to wait until then. But it's not necessary to save your shopping to one time of the year — B&H Photo offers excellent discounts on Apple products, such as $200 off the price of a top-of-the-range Macbook Pro 15-inch with Touch Bar. That's as good as the education discount.

If you don't mind buying kit that isn't brand-new, some shops sell ex-display units. Make sure you read the product description and, if possible, check out the unit before buying so you know exactly what condition it will be in. It's a good idea to test things like battery cycle count to make sure no parts are worn out. You also need to be fast if you see any ex-display units on sale — naturally, they're usually limited in supply, so if you've already decided what sort of Mac you want and you see it on sale, go for it while you can.

CHEAP DEALS

On the other hand, if you want to buy a brand-new Mac but don't mind if it isn't the latest model, the best time to buy is just after new models come out. At that time, many resellers will reduce their prices in order to shift old stock and free up space for newer Macs. As a result, you can pick up a bargain for yourself. Check out page 35 for more information on this.

If you want to buy from a reseller, consider how that might affect your support and AppleCare options. Make sure you keep your receipt and AppleCare Proof of Coverage (if that applies), as Apple might ask to see them if you need it to service your Mac. Many resellers offer their own support services in addition to those from Apple.

If you aren't sure where your nearest authorized reseller is, head over to **locate.apple.com**, select a service and enter your details. You can look up numerous resellers, service providers, training centres, and consultants, all approved and authorized by Apple.

Protect your purchase

Your consumer rights and insurance options

Apple provides its own insurance policy in the form of AppleCare. It covers your Mac for one year of hardware repair from Apple or from an authorized technician, and up to 90 days of unlimited complimentary software support and technical assistance by phone.

To enhance the level of support over and above what you receive with AppleCare, you can purchase AppleCare+, which increases your coverage to three years and adds up to two incidents of accidental damage (which you don't get with the standard policy). You also get 24/7 priority access to phone or chat support, so you can solve any problems quickly. AppleCare+ for Mac costs between $99 and $379 (based on the model you choose), and can be bought within 60 days of purchase.

When you buy a Mac through Apple, you have up to 14 days from date of purchase to return a product for any reason (provided you didn't cause a problem), so it's best to have the extra protection afforded by AppleCare+.

If you're the sort of person who spills their coffee over their Mac, get AppleCare+.

Do you need the latest?

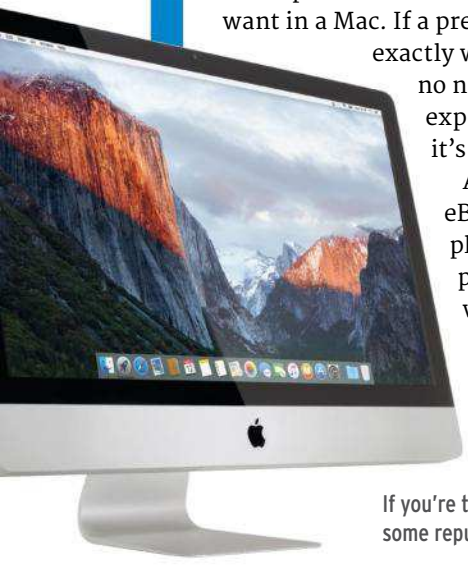
Save a bunch of money by purchasing an older Mac

APPLE IS THE master of bringing out new products, with each launch hotly anticipated. But if you can resist the urge to buy the latest shiny computer, you can save yourself a load of money.

A lot of resellers will drop the price of previous-generation Macs when new ones go on sale. If you don't mind a less up-to-date model, this is an option to consider. As we mentioned on page 31, it's important to make sure you know what you want in a Mac. If a previous-generation Mac does exactly what you need it to, there's no need to go for a more expensive model just because it's newer.

Auction websites such as eBay are a particularly good place to look for deals. Lots of people sell their old Macs when newer models get released, and you can take advantage of that and snag a bargain. If you're lucky, you may even find someone selling a Mac for far below its value to get any money they can to put towards their own upgrade.

There may be another way to save money on a slightly older Mac a little closer to home: check to see if your work intranet has a page where your colleagues can list items for sale. You never know, someone might be selling a Mac for a good price.



If you're thinking of buying a second-hand Mac, some reputable retailers offer a warranty.

SECOND-HAND STEALS

You might also be able to find a good deal on a second-hand Mac in shops like Mac of all trades (**macofalltrades.com**). A very capable mid-2014 15-inch MacBook Pro (Retina) will set you back $1279; $700 cheaper than a current entry-level model. As well as that, some of these shops offer warranties on Macs. Mac of all trades, for example, has a 90-day warranty with Macs, which covers hardware faults (excluding consumable parts, like batteries), but you won't be covered against software issues. Mac of all trades will try to repair it; if that's not possible, it will give you a replacement Mac or a store credit. You can also extend the standard 90-day warranty with one or two years, which can be purchased at any point during the 90-day period.

Smaller second-hand stores might have older Macs in stock, but check if they offer a warranty.

Raise money from your old Mac

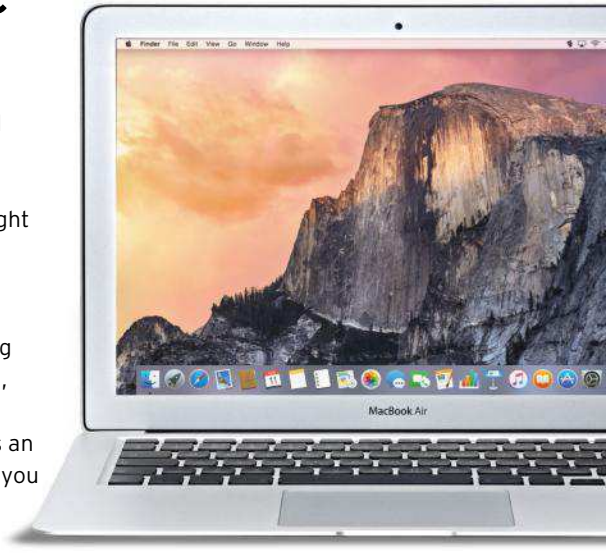
Sell your unneeded tech to raise some cash

If you want to raise some extra cash to put towards the purchase of a new Mac, you should consider selling your old computer. Apple offers a trade-in scheme (**www.apple.com/mac/trade-up**) and will give you money to recycle your old Mac, but the prices it offers are not always the best available.

If you want to get an idea of how much your Mac is worth, use a website called **mac2sell.net**. Its prices are often a little on the generous side admittedly, but it can be useful to see how much you might be able to sell your model for, when the time comes.

Perhaps the best way to get an accurate sense of how much you might raise is by checking other listings on eBay. Watch auctions of the same model as the one you want to sell, as that shows what people are willing to pay (rather than Buy it Now items, which often don't sell at all).

However you sell your old Mac, it's an excellent way to reduce the amount you need to save up.



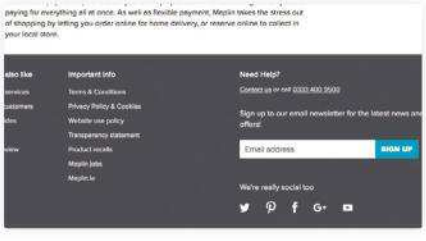
Buying a second-hand Mac

You have some rights, but exercise caution

The rights you get when you buy second-hand goods really depend on whether you bought from a store or an individual. Buying from a retailer gives you more protection, but you'll need to check the specifics as this can differ with each retailer. If an item is faulty or not as described (the retailer must highlight any defects before you buy), an implied warranty may give you the right to return the item. Any Mac sold by a retailer must be of "satisfactory quality." Superficial scratches probably won't entitle you to a refund, but major damage should.

If you buy from a private individual, your rights are more limited. The Mac must still be as described. So, if it's described as new, it can't be second-hand; if it was described as an "Apple laptop," it can't be another brand. The seller isn't obligated to disclose faults, though they can't misrepresent what they're selling.

Four ways to get a better deal



1 Shop around

You should never just buy your Mac from the first shop you find. Shop around, use price comparison websites like **nextag.com**, and browse money saving sites to help you pick up some useful tips on getting the best deal.

2 Newsletters

There's nothing worse than finding out about a fantastic deal after it's ended. Make sure you don't miss out: sign up to retailers' newsletters. They'll email you when they launch a sale or cut Mac prices, so you can take action.

3 Loyalty points

Signing up for a loyalty program is a no-brainer – it's free, and if you shop regularly enough you rack up points quickly. With the Best Buy rewards program, you can put points toward a new Mac for a lot less.

4 TechRadar deals

Our sister website TechRadar features a price comparison tool at the bottom of Mac reviews, and regularly features round-ups of the best Mac deals. It also occasionally gets exclusive money-off deals, so keep checking back.

Checklist

☑ Know what you need

Do you need powerful parts, or will a simpler Mac do the job? Research, read reviews and make an informed decision before you overspend.

☑ Be patiently active

If you're not in a hurry, wait until the big sales, for the very best deals. At the same time, if you see a top deal or a clearance Mac, make sure to move quickly!

☑ Shop around

Don't buy a Mac without seeing what others are charging. If you do find a seller that has a great warranty but high prices, then see if they will agree to price match.

☑ Try before you buy

If you're buying a second-hand Mac, view it in person if possible. Before you make a commitment, check its battery cycle count and other indications of overall health.

☑ Protect yourself

Protect your costly Mac with a warranty or insurance policy. If the prices on two Macs are similar, then buy your new Mac from the retailer with the best warranty.

☑ Know your rights

The rights you get when you buy a Mac depend whether it's second-hand and whether you bought it from a retailer or an individual. Read up on what you're entitled to in order to avoid any nasty surprises.

Mac|Life

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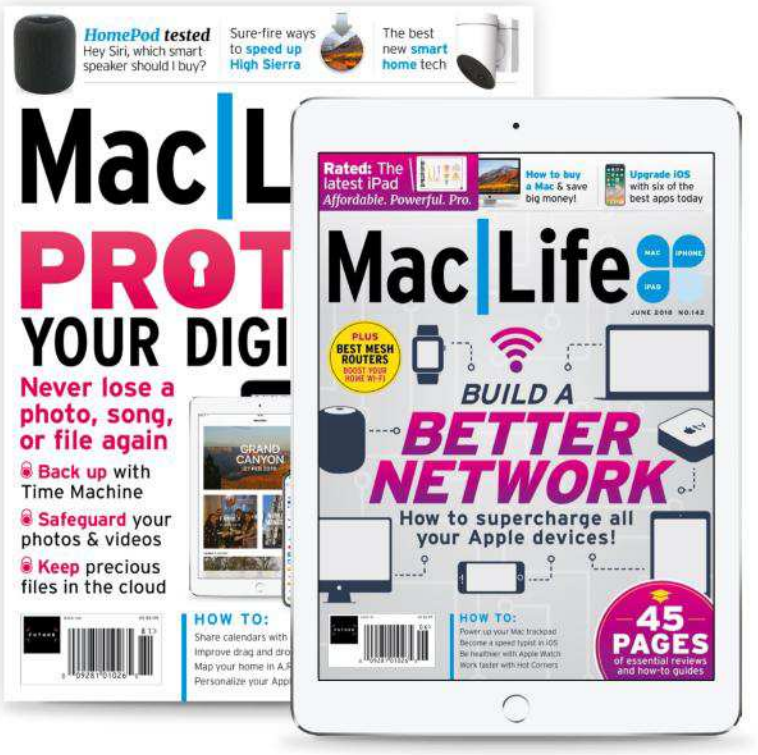

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APP LIFE

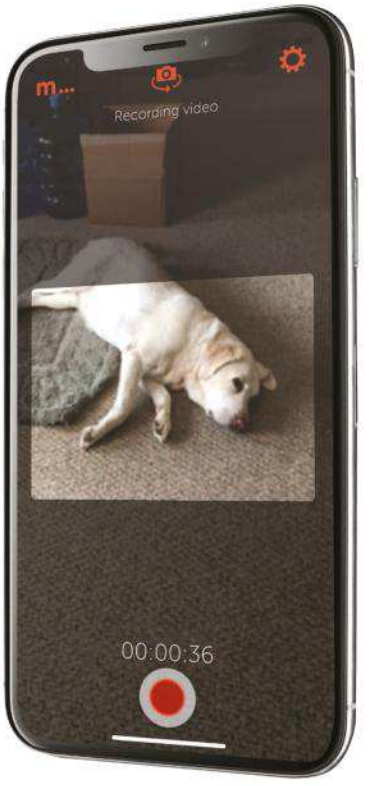
THIS MONTH'S MOST INTERESTING iPHONE & iPAD APPS

Manything

Free home security with old iOS devices

Free (IAPs) **From** Manything Systems Ltd, manything.com

Made for iPhone, iPad **Needs** iOS 8.0 or later



The downside of buying new iPhones and iPads is that it's easy to accumulate older devices — especially if you don't trade them in or gift to friends or family members. Fortunately, app developers have come up with some clever ways to repurpose damaged or unwanted hardware.

One such app is Manything — the name is a mash-up of "monitor anything" — which transforms spare devices into home security cameras. As long as your devices run iOS 8.0 or later and have a working camera, you're in business. (The app can be used on older devices running iOS 6 or iOS 7, but only if you install on a newer device first.)

Getting started is a snap: Register for an account from the first device (this can only be done within the app), then choose whether that hardware will be used as a Viewer or Camera. Repeat the process by installing the app on a second device and logging in with the

APP TIPS

Make the most of Manything

Avoid receiving false alerts from Manything's motion detection by blocking out unwanted areas in a room.

Toggle on Stills Mode to have Manything capture in time lapse mode using intervals of three seconds to 24 hours.

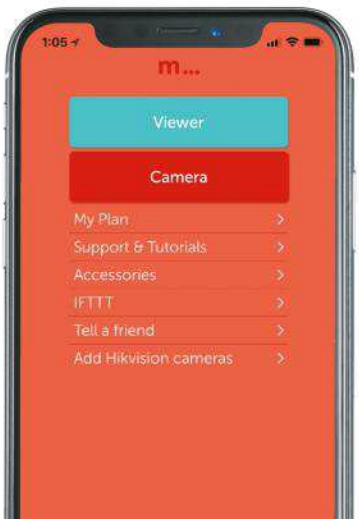
Manything defaults to a live stream that doesn't look great, so adjust Wi-Fi and cellular video quality for best results.

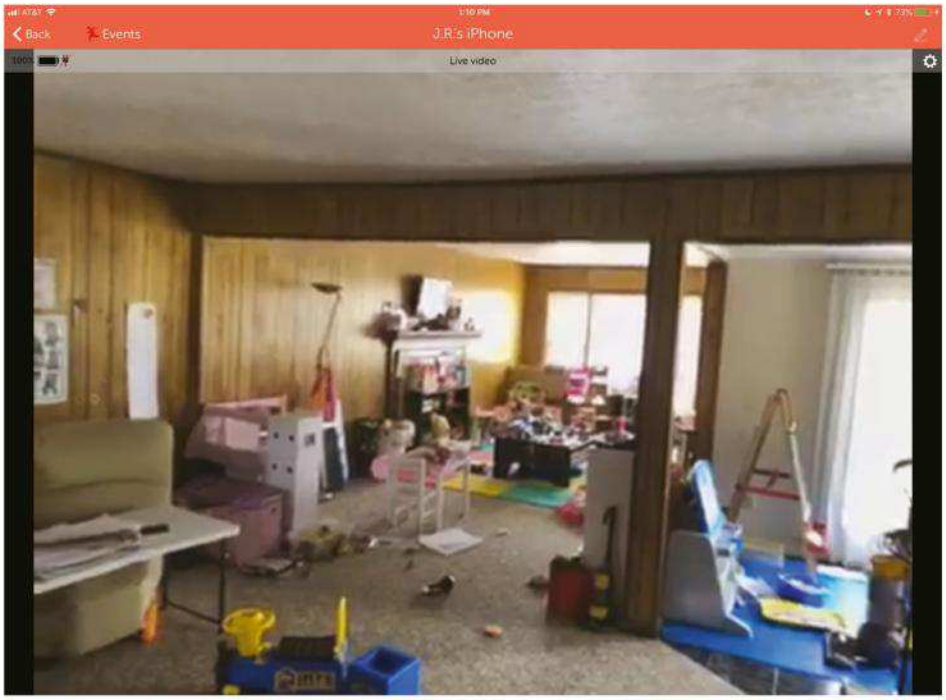
same credentials. Then you're ready to tap the red button on the Camera device, and a few seconds later the live stream appears on the Viewer device.

The app is free but limited to live streaming from a single camera. That's enough for infrequent use or for parents with a newborn child, for example, but subscription plans (available direct or via iTunes) add cloud recording starting at $3.99 per month, or up to five cameras for $25.99 a month; note that there's no free trial for cloud recording.

We were impressed by the breadth of Manything's capabilities. Standalone security camera systems are equipped with features like motion or sound detection and alerts, and these are available here as well. You can adjust video streaming quality, with separate options for Wi-Fi and cellular. (You definitely should, because the default Fair setting doesn't look so great.)

Detection offers 10 levels of sensitivity with the option to set up specific zones to monitor, while alerts can be sent via push notification, email, or both. In our tests, motion detection worked most reliably when set to four or five, which triggered fewer false alerts.





One device is a camera, while other "Viewer" devices log in to monitor what's going on at home.

The only real limitation is that the app tends to be a battery hog — after all, iOS devices weren't made for constant use, while security hardware is designed with this in mind. Manything shows a warning whenever the Camera is started while on battery, and conveniently displays current device battery level while monitoring. Mounting a camera is also more of an issue with a smartphone or tablet, especially for outdoor use; the developers offer a variety of compatible accessories on their website, including a free printable stand or sun shield.

Manything cameras can be monitored from multiple Viewer devices at the same time, including web browsers. It's worth noting that live stream sessions are saved to your account for up to 30 days even without a subscription, which could be a privacy concern for some users.

THE BOTTOM LINE. Not ideal for everyone, but an easy way to build a full-featured security camera system on the cheap.
J.R. BOOKWALTER

MANYTHING

- ✚ Full-featured security system
- ✚ Repurpose old iOS devices
- ✖ No free cloud recording trial
- ✖ Battery intensive app

GREAT

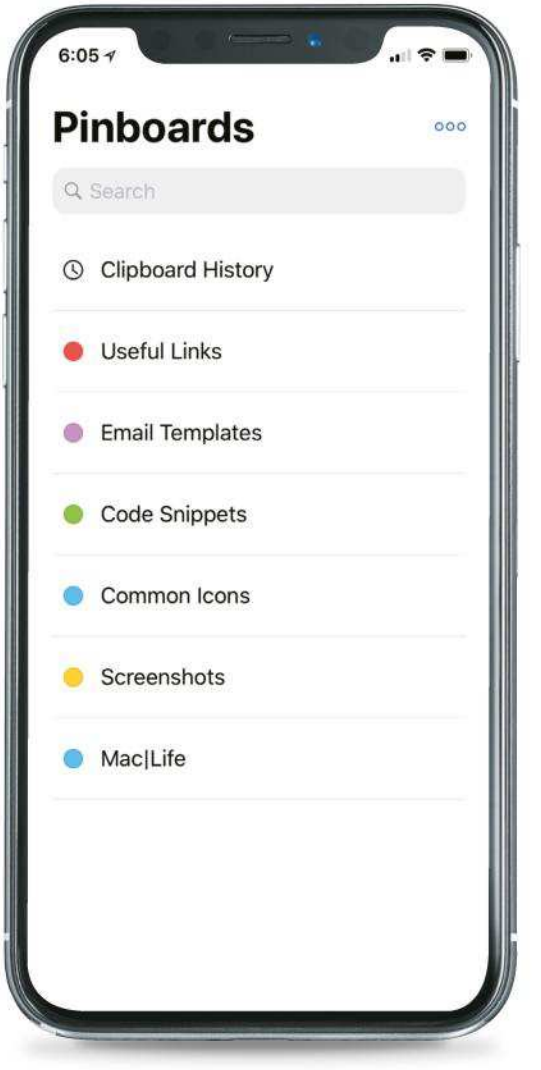
You'll no longer have to wonder if your dog is tearing up the furniture while you're away from home with Manything.

Paste 2

Simple clippings management now on iOS

Free (IAPs) **From** Dmitry Obukhov, pasteapp.me

Made for iPhone, iPad **Needs** iOS 10.0 or later



Apple's Clipboard seamlessly copies and pastes between Mac and iOS, but the current implementation falls short. Instead of simple one-time data transfer, a true clipboard manager would enable saving and organizing frequently used clippings.

After making a splash on the Mac three years ago, Paste 2 has arrived for iOS, giving power users exactly what they've craved all along. This free mobile app uses iCloud to sync text, images, links, files, or other content saved with Paste for Mac 2.3 or later — and vice versa — organizing clippings into folders called Pinboards.

You can rearrange, delete, rename, or share snippets, but there's no way to directly add new content into the Paste iOS app — this must be done from other apps like Safari or Mail via the sharing extension.

If you want to sync or add Pinboards on iPad, you'll have to pay for an upgrade.

The process is as straightforward as it sounds, and a share sheet prompts you to give the clipping a unique name and file it in an existing Pinboard.

Like the desktop version, Paste 2 for iOS features a similarly sparse, clean user interface. Clipboard History consolidates everything into a single searchable Pinboard, and the developer includes a second Pinboard for Useful Links with website and support contact information. It's a snap to add new Pinboards, each tagged with a color of your choice, but this can only be done from the main app, not via the sharing extension.

Tapping the three-dot menu button in the upper right corner enables you to manage Pinboards or app settings. There are only three toggle switches for the latter, which enable or disable copy on app activation, copy on widget activation, and iCloud sync. The second option pastes the current clipboard contents whenever you switch to the Paste widget, which can be easily expanded to display the last seven history items.

Paste 2 for iOS also includes native support for iPad, with one caveat: Adding or syncing Pinboards on a tablet requires a one-time $4.99 in-app purchase for what the developer calls a "Pro" upgrade. It's hard to complain given the core app is free to begin with, but the decision to effectively handicap only the iPad version is disappointing.

THE BOTTOM LINE. Nice Mac companion, but iPad users must pay.
J.R. BOOKWALTER

PASTE 2

- ✚ Pin snippets as favorites
- ✚ iCloud sync with Mac version
- ✖ iPad sync requires paid upgrade
- ✖ No clip editing or dark mode

GOOD

‘Sodes

Minimalist podcast streamer

$2.99 **From** Nice Boy, jaredsinclair.com

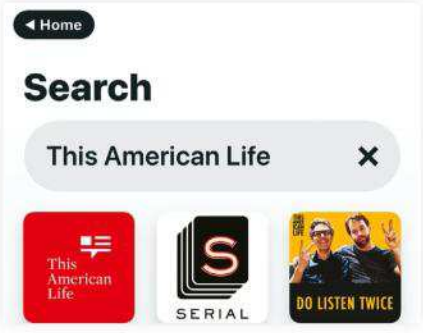
Made for iPhone, iPad **Needs** iOS 11 or later

Simplicity is a laudable goal in life. It speaks of focus and clarity, and of not letting outside clutter get in the way of what you’re trying to do.

‘Sodes is simple, almost minimalist in its pursuit of podcast purity, describing itself as a “casual, cozy way to listen to the occasional podcast.” There’s an overall similarity to Apple Music thanks to the white background and friendly buttons, but ‘Sodes has its own aesthetic that works well in foregrounding the important things – the podcasts.

The app only subscribes to and streams podcasts, there’s no downloading capability, so you need to be happy about it potentially burning through your data allowance, or be always aware of your nearest Wi-Fi hotspot. Search for a podcast by name or URL, add it to your favorites and stream individual episodes. It’s kept simple, as are the controls, with just play, pause and skip in either direction (15 seconds by default, which can be changed in Settings). Those with 3D Touch (iPhone 6s or later) can press to reset progress in an episode, or mark it as finished.

Episodes you’ve listened to vanish from lists. New episodes of casts you’ve subscribed to are clearly marked as Unplayed, while the In Progress section houses those you’re halfway through.



The interface is so friendly it might as well say ‘Don’t Panic’ when it opens.

‘Sodes is a clean, intuitive way of podcast management. It’s just a shame about the lack of downloading, even if it would add complication to the interface.

THE BOTTOM LINE. A well-made, sleek podcast streamer. **IAN EVENDEN**

GOOD

Things 3

Productivity app gets a makeover

$9.99 **From** Cultured Code, culturedcode.com

Made for iPhone, Apple Watch **Needs** iOS 10 or later

Things 3 sports a fresh new modern look. The refreshed interface isn’t the only addition to Things, however. There’s a long list of new features. Perhaps the most important is the addition of time-based reminders. You’ve always been able to schedule tasks, but you can now specify a time to be reminded to do them as well. And it supports both natural language and Siri.

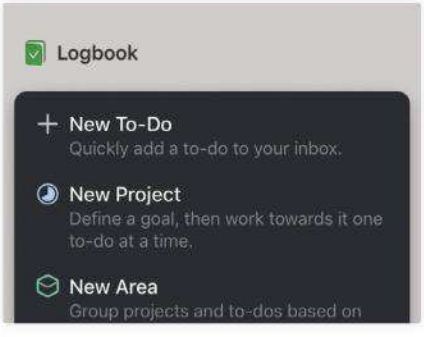
Other additions include an Upcoming list, rather than just Next; category headings; and checklists.

A new “Magic +” button enables you to create items precisely where you want them in a list, add them straight to your inbox from anywhere, or create headings.

You can also select and edit multiple tasks simultaneously, and re-order tasks by dragging them up and down the list.

Version 3.4 adds the ability to link to tasks to jump to them quickly from within Things, or to link from other apps, allowing for automated workflows.

As with previous versions, Things 3 syncs with iPad and Mac using Things Cloud, which now has a new Fastlane mode for time-based reminders. Bear in mind that if you want to sync with an iPad, you’ll have to buy that version ($19.99); the Mac version costs $49.99.



The Magic + button is the gateway to creating new tasks, projects, or groups of projects.

In use, Things is remarkably intuitive. It rewards a few minutes tapping and swiping with an array of intelligent pop ups and options. It’s a pleasure to use, which wasn’t always the case previously.

THE BOTTOM LINE. A step forward for Things. Great new features justify the relatively high price. **KENNY HEMPHILL**

GREAT

The Slig guard will shoot Abe on sight, so they must be dealt with immediately.

Abe's Oddysee: New 'n' Tasty

Everyone wants to eat you

$7.99 **From** Oddworld Inhabitants Inc, oddworld.com

Made for iPhone, iPad **Needs** iOS 8.0 or later

An iOS port of the PlayStation 4 update of the 1997 PlayStation original Abe's Oddysee, New 'n' Tasty is the third Oddworld game to appear on the App Store despite being canonically the first in the series. It was always one of the best, too.

Abe is a Mudokon, a green slave creature who mops floors at the splendidly named Rupture Farms, owned by Molluck the Glukkon. Far from being a farm, it's a meat processing plant that drives species to extinction through gluttony. When Abe discovers that his species is the next to go into the grinder, he organizes a mass escape, summoning portals.

Abe's ability to interact with the environment is his single greatest weapon, especially early on in the game.

As a 2D puzzle-platformer, New 'n' Tasty benefits from the imagination that's gone into its darkly comic setting. Abe is weak, so avoiding guards or pulling levers to make them fall through floors allow him to progress. The Mudokons will follow him, even if this means being led into electric barriers or blown into chunks on landmines. It's a game full of charm and personality.

The problem is the controls. Abe's Oddysee was designed with Sony's eight-button, twin-stick DualShock controller in mind, and the move to a platform with no buttons has inevitably led to compromise. There are both on-screen taps and swipes and virtual buttons, the latter clustered around the right thumb position just perfectly to obscure enemies entering the screen from that side.

It's a flaw compounded by the fact the magnifying glass icon doesn't seem to do anything. Increasing the buttons' size would make it easier to hit them accurately with a thumb, but would do nothing to alleviate the memory test that is using them. And while most movements are carried out with a gesture, a simple jump forward uses a button.

It's awkward things like this that take something away from an otherwise excellent game. If you've got an MFI controller, then you're in luck, because there's full support, but iPhone gamers may struggle.

THE BOTTOM LINE. A great puzzle gamer, but the controls infuriate. **IAN EVENDEN**

ABE'S ODDYSEE: NEW 'N' TASTY

- ✚ Imaginative world
- ✚ Charismatic characters
- ✚ Looks great
- ✖ Poor control layout

GREAT

Reed ^_^

A punishing old-school platformer

$1.99 **From** Crescent Moon Games, crescentmoongames.com

Made for iPhone, iPad **Needs** iOS 8 or later

First of all, apologies for the dark images: Reed's dark, pixelated aesthetic is great in motion and terrible in screenshots. Reed really is as pixelated as it looks, though, and that made it a tough play on the iPad Pro: what's cute on an iPhone feels like too much of a close-up on a big screen.

This is a platformer of the old-school, if you went to a particularly sadistic school. You play the eponymous Reed, created by an ancient supercomputer to try and save the world by collecting crucial components. To do that you need to face ever more complex puzzles and ever more dangerous traps armed with nothing but a double-jump.

It's murderously fast and murderous in general: a moment's pause to decide on your next step usually involves the ground you're standing on giving way to a bunch of spikes. The left-right controls are perhaps a little too keen: we typically found ourselves either not moving fast enough because of terrified half-taps or accidentally sending Reed scooting into the nearest death-trap because we pressed for a millisecond too long.

Controls aside, it's perfectly pitched: difficult enough to require multiple goes at the same puzzle, but not quite fist-gnawingly frustrating enough for you to put your iPhone in peril of being hurled across the room or train carriage. It's maddening, but in a "just one more go and THEN I'll rage-quit," kind of way.

Collecting cubes should be easy, but there are lethal traps everywhere.

THE BOTTOM LINE. Pitched just the right side of annoying, Reed's a punishing platformer. **CARRIE MARSHALL**

GREAT

Town Musicians of Bremen

Great art, not so great app

$0.99 **From** Albert Frischmann Consulting, frischmann.biz/bremer/en/home

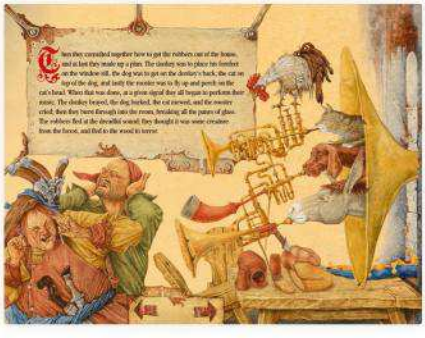
Made for iPad **Needs** iPad, iOS 9 or later

I really wanted my children to love this, because it's a work of art — or rather, lots of works of art. Lev Kaplan's beautiful illustrations, more than 1,000 hours in the making, are brought to life with the help of professional voiceovers, 800 animations and more than 120 sounds. But neither my four-year-old nor my 10-year-old liked it. My son prodded the interactive bits then demanded YouTube Kids; his big sister admired the artistry, for seven minutes. "It's pretty," she said. "But it's pretty boring."

The problem isn't the app, or the artistry, and it's not that my kids are philistines either. It's the delivery. Grimm's version of the famous fairy tale, a story that dates back to the twelfth century, is presented reverently. That's rather plodding for a generation raised on Nosy Crow and Toca Boca.

The translation is clunky too, with basic errors and a tendency to translate literally. "I am going to Bremen to become town musician," one character declares; later, the same character describes a table with "robbers sitting at it and making themselves a good time."

It reminded me of interactive CD-ROMs from the days of Macromedia Director, where previously static titles would be rendered magically interactive with the addition of a few things you could click on to make them jiggle. That approach feels even more dated than the ancient fairy tale it's trying to illuminate.



It's a shame that the story doesn't live up to the extraordinary artwork.

THE BOTTOM LINE. The artwork is beautiful but the app has been lost in translation. **CARRIE MARSHALL**

WEAK

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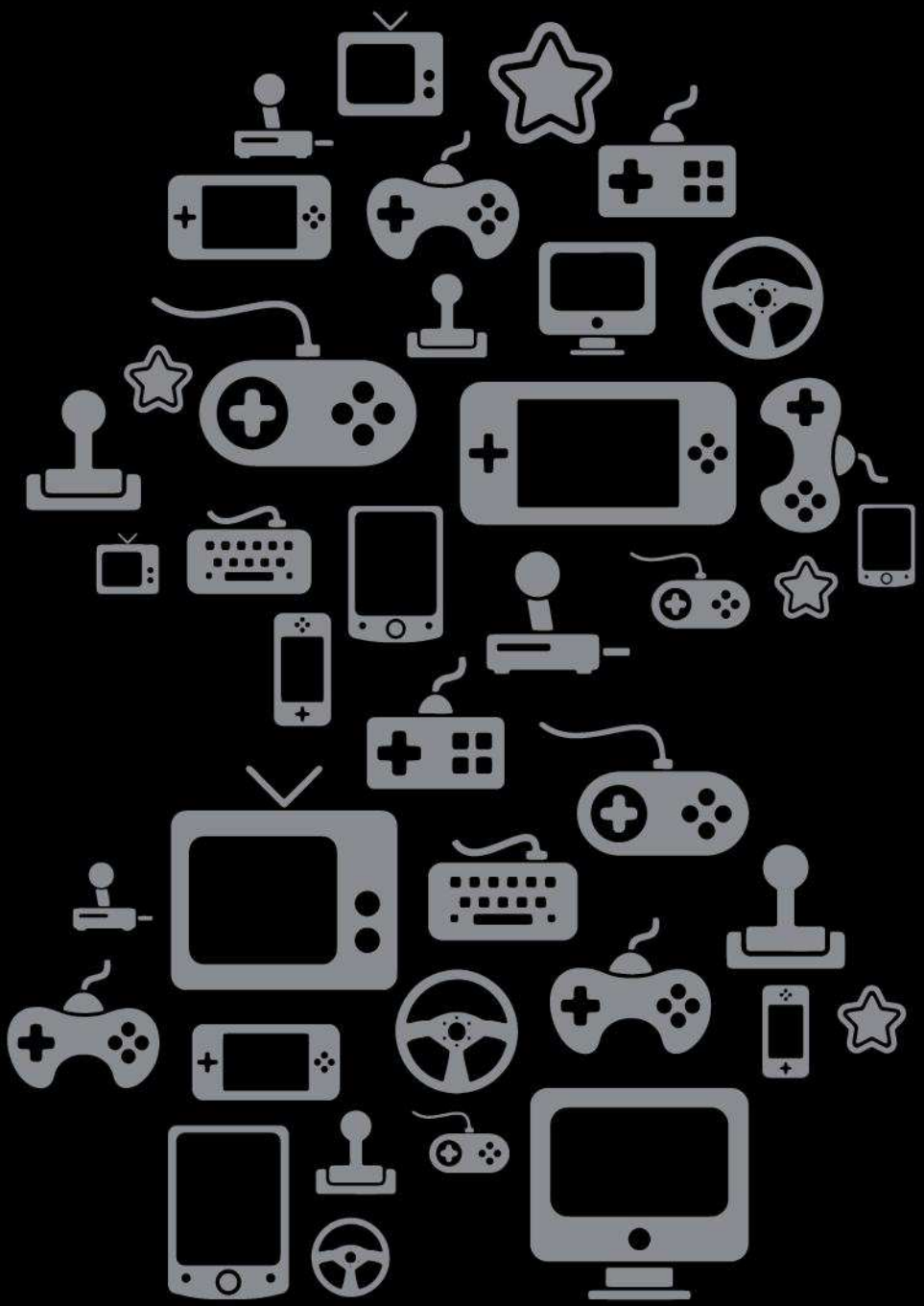


www.gamesradar.com

The Sims mobile

A pocket-sized life

Free (IAPs) **From** Electronic Arts, ea.com

Made for iPhone, iPad **Needs** iOS 9 or later

The Sims Mobile is not the first mobile Sims game. That honor went to The Sims FreePlay, a freemium game that came out seven years ago. The Sims Mobile is freemium as well, but in a much more enjoyable way than its predecessor.

The Sims Mobile is a focused experience, doing away with complete freedom of choice in favour of "stories" — small chapters of life based on your career, relationship, and hobbies, with rewards for completing each stage. Perhaps you'll be a doctor, trying to figure out the mysterious Llama Flu, or an aspiring foodie learning the cooking ropes. Each one is accompanied by charmingly quirky writing, as well as unique and funny interactions, and rewards that range from money, to experience points, to gaining new clothing.

There are, like in any freemium game, multiple currencies, and it is with these that you buy everything: clothes, furniture, even new Sims. Without paying for a single piece of content, you can slowly earn enough to buy that new oven you've had an eye on, and with careful, attentive playing (which can be achieved by turning on push notifications) you can end up raking in the Simoleons in no time.

The Sims Mobile is incredibly well-made, with custom animations and objects that are impressively detailed for such a small screen. Your Sim will heave a sigh when they fail, sweep their paramour off their feet, and stir a souffle mix with such panache that it's hard not to see those little people on-screen as real life humans that you can control.

It's a simplified version of the PC game, for sure, but that's not necessarily a bad thing — it's well-suited to the mobile platform.

THE BOTTOM LINE. Not the full Sims experience, but a streamlined pocket version.

KATE GRAY

Everything is done through "stories," which are completed with daily tasks and hangouts.

SIMS

- ✚ Beautiful animations and art
- ✚ Genuinely funny writing
- ✚ Fun even without paying
- ✖ Not as much personality as The Sims

GREAT

ROUNDUP

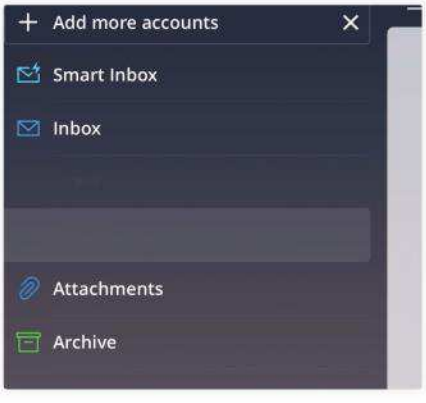
6 alternatives to stock Apple apps

The best replacements for native iOS apps

Every iOS device comes with several built-in Apple apps, but that doesn't mean that these are necessarily the best options on offer. Some of the third-party alternatives available on the App Store are definitely worth checking out and may be more suited to your needs than the standard Apple applications.

Here we've rounded up six of our favorite replacements for Apple's Mail, Calendar, Photos, Camera, Notes, and News apps. Best of all, four out of six of our suggestions are free, and the other two cost under $6, so there's really no reason not to download them and have a play.

TIM HARDWICK



SPARK EMAIL CLIENT

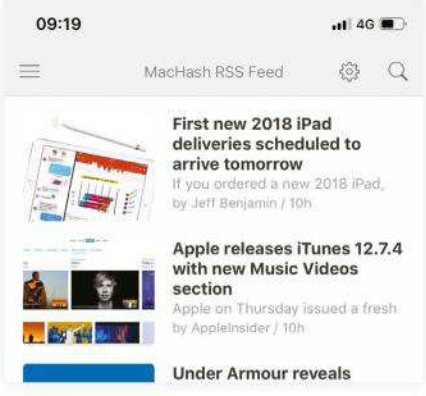
Free **Made for** iPhone, iPad

Spark is a great solution if you have multiple email accounts you want to access from your iPhone. Its smart inbox can sort incoming emails across your connected accounts into helpful categories, enabling you to filter notifications and newsletters from your personal messages. Thanks to its customizable swipe gestures, cloud storage, and email scheduling, you won't miss Apple Mail anytime soon.

FANTASTICAL 2

$4.99 **Made for** iPhone, iPad

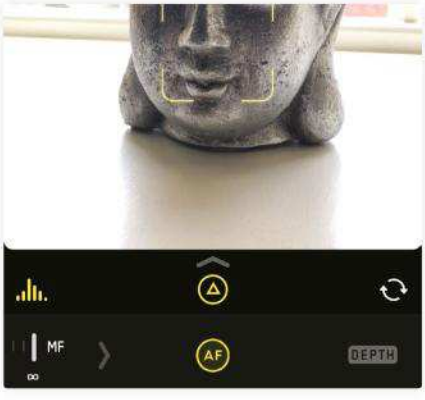
Fantastical makes adding events and reminders to your calendar a breeze, thanks to its natural language recognition. But its best innovation by far is the DayTicker, which lets you view upcoming events and reminders in a list that scrolls vertically as you swipe across the calendar strip above. If you prefer to see your schedule the old-fashioned way, a pull down on the strip makes it turn into a convenient month calendar.



FEEDLY

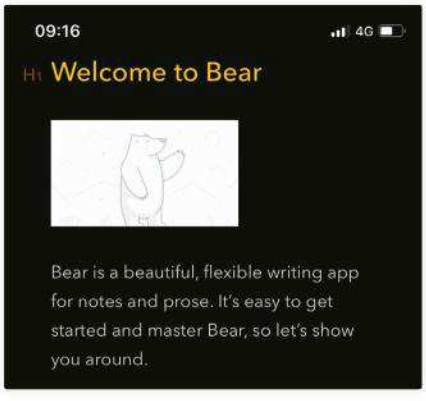
Free **Made for** iPhone, iPad

Feedly isn't new, but it remains one of the best news aggregators out there, and certainly gives Apple News a run for its money. It allows you to subscribe to news feeds, organize them into folders, mark content for later reading, share posts across social media, and tag articles for future access. Not only that, Feedly's Boards feature makes it really easy to track and organize stories about particular topics and interests.



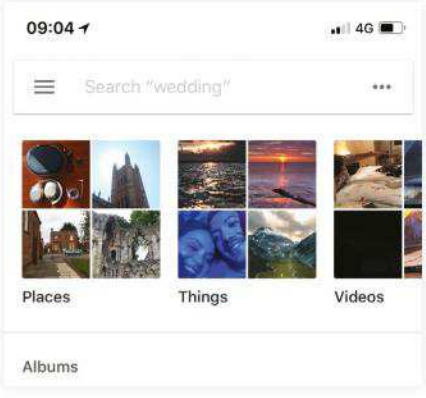
HALIDE CAMERA
$5.99 Made for iPhone, iPad

So much thought has gone into this camera app, which has been beautifully redesigned for iPhone X. The interface is packed with intuitive shooting tools that are optimized for one-handed operation, while innovative swipe gestures adjust exposure. It even packs a Portrait mode with built-in tools for adjusting depth information. Other features include quick review of your latest shots, and newer iPhones with iOS 11.3 can shoot in Raw.



BEAR NOTES
Free (IAPs) Made for iPhone, iPad

This plain text writing app's simple UI hides a plethora of tools for crafting short notes or in-depth essays. Bear's innovative use of hashtags mean you can organize your notes into themes or projects, while cross-note links let you reference other notes and build a body of work. With word counts and reading times on hand, not to mention an advanced markup editor, Bear blows Apple Notes out of the water.



GOOGLE PHOTOS!
Free Made for iPhone, iPad

If you take lots of photos on your device, sooner or later you'll hit a storage limit. You could always pay for an iCloud subscription, or you could try backing up your snaps to Google Photos, which offers unlimited and free cloud storage. The app also uses advanced artificial intelligence to suggest photo collections to share, and includes a neat Photos Assistant that generates collages, animations, and movies from your library.

WATCH

APPS AND GUIDES TO GET MORE FROM YOUR WATCH

Sleep++

Easy, convenient sleep tracking

Free **From** Cross Forward Consulting, david-smith.org

Made For iPhone, iPad, Apple Watch **Needs** iOS 11.0 or later

With Apple's recent acquisition of sleep monitor maker Beddit, it seems like only a matter of time before this kind of technology winds up built into Apple Watch. But you won't have to wait that long, because there's a free app that gets the job done today.

Sleep++ uses Apple Watch's motion and health monitoring capabilities to measure the quality of your sleep, recording data to your Health account. The result is a clear understanding of how much restful sleep you're getting each night, how long you were restless or awake, and when you had the best sleep.

Best of all, with the latest 3.0 app update, the process is entirely automatic. All you have to do is wear your Apple Watch to sleep, and Sleep++ will have a full report ready for you to view the next morning. This is a big improvement over the previous method, which required Apple Watch owners to manually start and stop sleep tracking.

Aside from the minor inconvenience of adjusting your schedule so there's enough battery life left at the end of the day to keep it running overnight, the app works remarkably well. We got in the habit of sticking our first-gen Watch on the charger a couple of hours before bedtime, and by morning it still had over 80 per cent battery remaining.

There is, however, one minor disappointment — data from automatically recorded nights are only viewable on iPhone. By contrast, if you manually start and stop each session from your Apple Watch, the watchOS app displays this data right from your wrist as well.

THE BOTTOM LINE. It's hard to imagine Apple's future built-in sleep tracking being easier than this — go to bed with your Watch on, there is no step two. **J.R. BOOKWALTER**

SLEEP++

- ✚ Automatic sleep tracker
- ✚ Minimal battery impact
- ✖ Manual recording for watchOS display
- ✖ Charging schedule disruption

GREAT

WATCH TIP

Workout goals shortcut

In watchOS 4, there's a new way to select exercise goals. Open Workout, tap the three-dot menu button for a desired card, then choose a goal based on Calories, Distance, or Time; or, tap Open to jump straight into a workout.

SoundMeter X

Discover if your sound levels measure up

Free/Pro from $0.99 monthly **From** Faber Acoustical, faberacoustical.com

Made For iPhone, iPad, Apple Watch **Needs** iOS 10.0 or later

With SoundMeter X, you can turn your cell into a portable sound level meter.

The free version supports time exponential weighted sound levels, Lp, with flat frequency weighting and fast time weighting (LpAF). That's plenty for most users, but a subscription adds a raft of additional features including data logging, Leq and Lx sound levels, and support for up to eight channels.

On Apple Watch, SoundMeter X acts as a remote control for sound levels, so you can tap play to see your chosen meter update in real time. There's only one view available with the free version, but you can view or control octave, recorder, signal generator, and dose options with a Pro subscription.

Sadly, the watchOS app doesn't actually use the Watch's mic – sound level measurements can only be taken from the iPhone mic or compatible external audio device.

THE BOTTOM LINE. A useful tool for engineers/musicians, but the free version is limited. **J.R. BOOKWALTER**

GOOD

Weav Run: #1 Running Music

Keep in step with the beat

Free **From** Weav Music, weav.io

Made For iPhone, Apple Watch **Needs** iOS 10.0 or later

Music is essential to most runners, but sometimes it can be hard to keep in step as the tempo changes between songs. Weav Run is dedicated to resolving this first-world problem.

This app uses motion-triggered technology to seamlessly change the tempo of a song between 100 and 240 steps per minute, which has been proven to decrease fatigue and pain while running. Weav Run works on a treadmill as well as it does outdoors on the street or sidewalk, and hooks into popular services like Nike+ Run Club, Strava, Runtastic, and more.

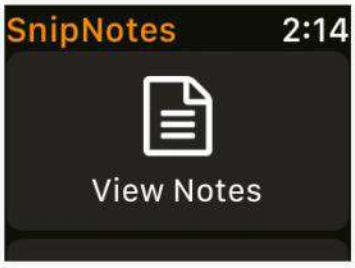
Your Watch becomes a remote control for the Weav Run iPhone app, offering comprehensive control over the most important Weav Run features, so you can choose to have the app detect your running tempo automatically or select a fixed tempo. This means you can have your iPhone strapped to your arm or in a pocket and still take charge from your wrist.

THE BOTTOM LINE. A well-executed app. And it's free! **J.R. BOOKWALTER**

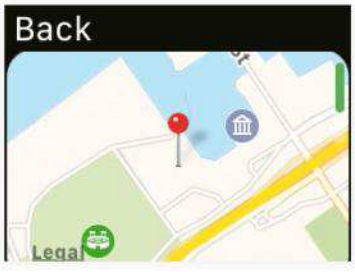
GREAT

HOW TO

Manage Notes in SnipNotes



1 **BETTER NOTES**
Apple Notes are missing from watchOS, but SnipNotes is the next best thing – you can even browse clipped images or save a location right on your Watch.



2 **REMEMBER WHERE**
To save your current location, open SnipNotes and swipe left. Tap Save Location and the address, map, and GPS coordinates are saved as a note.

3 **QUICK FIND**
Pull up previously saved notes quickly by tapping the Search Notes button. Then choose the dictation or scribble method to input the text you're looking for.

REVIEWS

TOUGH TESTING, TRUSTED RATINGS

9.7-inch iPad

An excellent mid-range tablet

From $329 **From** Apple, apple.com

Features 9.7-inch, 2048x1536-pixel Retina display, A10 Fusion chip with M10 coprocessor, 32GB or 128GB storage, Wi-Fi only or Wi-Fi + mobile connectivity

Last year, Apple introduced its most affordable 9.7-inch iPad to date – the $329 fifth generation. It had no bells and absolutely no whistles – its case even copied 2013's iPad Air, rather than the thinner look of the 10.5-inch and 12.9-inch iPad Pro. But that didn't matter, because it had a great price, was reliable, had a nice Retina display, and was as fast as you needed. For a family tablet, full of games and apps that make good use of a large screen, it was ideal.

A year later, that model is still more than good enough for that job, so we didn't think it would be updated so soon – but here we are.

The new model now works with Apple's Pencil stylus, and features an A10 Fusion chip (as seen in the iPhone 7), rather than the A9 processor (found in the iPhone 6s). That's it. This new iPad, like its predecessor, starts at a tidy $329 for a 32GB Wi-Fi model.

It means that, if you already have last year's model and are wondering whether to upgrade, the answer is: not really. But if you've got an older iPad or are looking for your first one, you should probably consider it. Let's find out why.

PIXEL PINCH

Perhaps the most important part of any tablet is its screen, and though this one's 2048x1536-pixel display is far from cutting edge, it's really good. It's definitely the biggest area of difference from the iPad Pro, though. It lacks the Pro's wide color gamut – a bit of a shame if you have an iPhone 7 or later, which can take photos in that color space. It isn't the end of the world, though, since the screen is still bright and colorful.

You also don't get HDR support, unlike on the iPad Pro. Again, we prefer to have this for watching movies, but it doesn't have as much impact on small screens as on a TV, so it feels like a reasonable trade-off at this price.

The pixels don't feel as close to the surface as the iPad Pro's either, but again, this is the difference between mid-range and premium. That's the gist – even aside from size, the Pro's screen is that much more luxe across the board in ways that justify its extra cost, but the one found here is definitely good enough.

That said, there is one missing feature of the screen we're frustrated about: the lack of TrueTone, Apple's technology that adjusts the screen's color temperature to match the ambient lighting of your surroundings, so that white on the screen looks like a sheet of paper would in the same light. TrueTone makes an iPad so much more pleasant to use, especially if you're using it before bed, and if you've ever used it,

iPad
14:42
62%
FaceTime
Calendar
Wednesday
11
Photos
Camera
Contacts
Clock
Maps
Home
Notes
Reminders
News
Settings
iTunes Store
iBooks
Apple Store
iPad

› New iPad

9.7-inch Retina display 2,048 x 1,536 pixels, 264ppi
32 or 128GB
A10 Fusion chip
TouchID
Apple Pencil support
Rear: 8-megapixel, f/2.4 aperture
Front: 1.2-megapixel, f/2.2 aperture
1080p video (1920x1080 pixels)
60Hz refresh rate
2 speakers (stereo in portrait orientation only)
Up to 10-hour battery life
Wi-Fi model: 32GB $329 128GB $429
Wi-Fi+Cellular model: 32GB $459 128GB $559

› iPad Pro

10.5-inch Retina display 2,224 x 1,668 pixels, 264ppi
64, 256 or 512GB
A10X Fusion chip
TouchID
Apple Pencil support
Rear: 12-megapixel, f/1.8 aperture
Front: 7-megapixel, f/2.2 aperture
4K video (3840x2160 pixels)
Variable refresh rate (up to 120Hz)
4 speakers (stereo in either orientation)
Up to 10-hour battery life
Wi-Fi model: 64GB $649 256GB $799 512GB $999
Wi-Fi+Cellular model: 64GB $779 256GB $929 512GB $1,129

switching to a device that lacks it feels like a big step backwards. With this tablet being aimed more at families (and especially kids), we feel that a feature that helps to alleviate eye strain, especially around bedtime, would be a really valuable addition.

Apple Pencil support works well. When you're writing notes, this iPad feels responsive, accurate, and slick. Inevitably, iPad Pro has it slightly beat, thanks to its screen refreshing at up to 120 times per second, compared to 60 here. So, sketching with fast movements reveals a tiny bit of lag in the lines appearing on the screen, whereas it seems instantaneous on second-gen iPad Pros. It'll only annoy if you're planning to do high-level art – if that's your bag, you should look at a Pro anyway.

PERFORMANCE

Performance and responsiveness everywhere else are also great. The A10 Fusion chip isn't quite as powerful as iPad Pro's A10X, but we had no speed issues in web browsing, editing docs, gaming, or GarageBand and iMovie.

Multitasking features of iOS are well supported, so you can have apps side by side, or have one floating for quick access, without any slowdown. The 9.7-inch screen doesn't make for a dual-app productivity powerhouse, but we found it fine for researching in Safari on one side and writing in a document on the other, for example.

Battery life is solid, due to a big capacity and a phone-level processor. Apple claims 10 hours, as usual for iPads, which is fairly conservative in light use

APPLE PENCIL SUPPORT WORKS WELL; FOR TAKING NOTES, IT FEELS RESPONSIVE AND ACCURATE

with the screen lower than full brightness. Conversely, a long game of Civilization VI will mean a much shorter life. On standby, a couple of per cent is lost each day, so there's rarely the frustration of it being dead when you are wanting to watch YouTube.

Speaking of video, while the iPad is fine overall, its speakers are a bit underwhelming, and they work in stereo only in portrait orientation. Though clear enough, there's a disappointing lack of oomph; another trade-off at this price.

The front and rear cameras are unchanged from the last model, meaning that they're fine. They work well enough for FaceTime, pick up surfaces nice and clearly in augmented reality apps, and image quality is decent. They're nowhere near as good as what you'll find in the latest phones, but they do the job.

The $329 model's 32GB of storage is also solid. If you'll primarily use the iPad to watch video and browse the web, and perhaps play a few games, then that amount of storage should be plenty. However, if you're likely to fill it with photos and your own videos, then $429 for 128GB of storage is a pretty reasonable upgrade cost.

THE BOTTOM LINE. Apple Pencil adds to the cost, and there's room for improvement, but this is still the best mid-range tablet. **MATT BOLTON**

9.7-INCH IPAD

⊕ Great performance
⊕ Supports Apple Pencil
⊖ No TrueTone display
⊖ Speaker setup
GREAT ■■■■□

CB CREATIVE BLOQ

“Digital design is like painting, except the paint never dries.

NEVILLE BRODY

The number one destination for
graphic design news, views, and how-tos

creativebloq.com

Lifeprint 3x4.5 Hyperphoto Printer

Makes photo prints come to life, thanks to a little AR

$149.99 **From** Lifeprint, lifeprintphotos.com

Needs iOS 9.0 or later

The Lifeprint concept is an intriguing one. Rather than just wirelessly print photos from your iPhone, Lifeprint enables you to bring them to life. To do that, choose a live photo, video, GIF or other animated format and print it; then fire up the Lifeprint app and hold your phone's camera over the printed image. As if by magic, it plays the live photo or video within the frame of the print.

It's a clever idea, but whether it's more than a novelty is another matter.

Lifeprint has another feature that takes it beyond being just a curio, however. Friends who both have Lifeprint printers can send photos to each other and print them on their own machines. In fact, Lifeprint has its own social sharing service where, if you choose to, you can share images publicly. When you share a photo and your friend launches the Lifeprint app, the image appears in their print queue inbox. When they print it and hold their phone over it, it comes to life.

The Lifeprint printer was easy to set up and connect to Bluetooth and Wi-Fi, once we had downloaded the app. Choosing a Live Photo to print was more difficult; our first attempts resulted in an error message saying Lifeprint couldn't access them. When we did an image that would print, it got stuck between the print queue and the printer. The next attempt worked, and after a couple of minutes we had our print.

The result looked like an old Polaroid — colors were washed out and detail lacking. Subsequent prints were the same. However, the point of the print is the way the app brings it to life, and that it did in some style.

THE BOTTOM LINE. Lifeprint's printer is easy to use and the in-app results are impressive, the prints less so. **KENNY HEMPHILL**

LIFEPRINT 3X4.5 HYPERPHOTO

- ✚ Print photos remotely via the internet
- ✚ Small and compact
- ✚ Impressive use of AR
- ✖ Poor print quality

GOOD

MacFamilyTree

Genealogy on the Mac is now slicker than ever

$59.99 **From** Synium Software GmbH, syniumsoftware.com

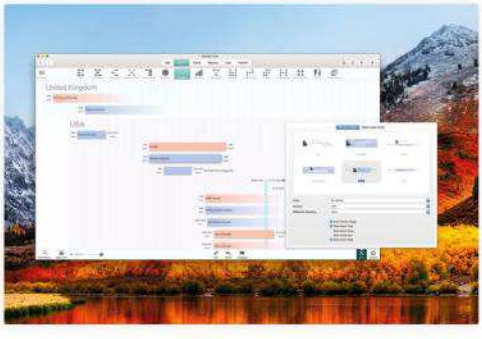
Needs OS X 10.10 or later

When it comes to Mac genealogy solutions, nobody does it better than Synium. As evidence, we submit the latest release of MacFamilyTree 8, which has added so many new features over the last two years that the developer could have easily christened it 9.0 and charged accordingly for a whole new version.

Thankfully, Synium chose to roll out all of this goodness in a cascade of free updates culminating with 8.3, which dramatically improves performance, especially while working with the Interactive Tree. This is our favorite way to edit a family tree and the adoption of Metal 2 support allows for smoother animation and improved text rendering.

Interactive Tree benefits from other improvements, notably the ability to hide the sidebar for viewing across the entire window width. Generation separator options make it easier than ever to see who's related at a glance, while new Camera settings offer control over lighting and shadows. At last, users can even print this graphically rich overview of their family tree in hardcopy form.

While Interactive Tree benefits the most, visuals have been improved across the board without losing the application's look and feel. Bloodline and indirect relationship paths including adoptions have been added as display options, along with six Timeline styles that offer a fresh look at tree data in a single mouse click. Other new features include duplicate detection and merging two different GEDCOM or MacFamilyTree databases with full control over the results.



With a free update to MacFamilyTree 8.3, six built-in styles make it easy to change your Timeline's look.

Interactive Tree mode now offers more ways to customize lighting and shadows.

All this slickness comes at a price — you'll need a recent Mac, capable of running macOS 10.13 High Sierra or later. If you own an older Mac, you'll be left stranded on the previous version.

Likewise, macOS 10.12 Sierra or later is required for CloudTree support, which allows real-time collaboration with an unlimited number of family members and devices. This sharing method is more robust than the former iCloud Drive sync, although that option remains.

THE BOTTOM LINE. Feature-rich updates that are worth the money, made even better because they are free.

J.R. BOOKWALTER

MACFAMILYTREE

- Awesome free updates
- New Camera options
- Metal 2 support
- Limited export options

EXCELLENT

MESH NETWORKS

GROUP TEST

We put five mesh networks to the test. Discover which one best suits your home...

BY ALEX COX

THERE'S NO question about it: mesh networks are hot right now. It's not just marketing hype – though their manufacturers no doubt love that they can charge a little more for home networking hardware. It's a real change in the way networking operates that makes a massive difference to coverage and speed.

Mesh networking is a fairly simple concept. Rather than relying on a central router, which can be difficult to extend, mesh uses individual nodes, each of which shares a signal with the others through what's called a backhaul channel. Add a new node to your mesh network, and it simply joins that behind-the-scenes channel – as long as one of your nodes is close enough to talk to it, your network can go further. If you have Ethernet strung through your home, you'll often be able to use that as a backhaul, enabling faster communication and freeing up radio space for more traffic.

Above the backhaul channel, typically, comes a collection of cutting-edge Wi-Fi radios. Each member node of a mesh network looks after its own little area of space – your Mac, your phone, and your other devices simply and seamlessly connect to the node that has the highest signal strength from wherever they are.

There are some downsides, however. A standalone router doesn't need to do between-device intercommunication, so you'll suffer slightly more lag with a mesh. You'll need to plug in a number of devices around your home, marginally upping your power bill and tying up sockets. And the initial cost is quite high as you're essentially purchasing a bunch of routers at once – although the difference isn't always that extreme.

Things to consider...

What you need to know before getting started

1 HOME SIZE

Do you really need a mesh network? If you're living in reasonably close quarters, the answer is probably no. Mesh networks are best suited to larger homes, or those built of particularly dense materials that cause Wi-Fi dead spots.

2 HOW MANY NODES?

If your Wi-Fi does need the range extension that mesh offers, how many nodes will you require? Check the specs of the mesh network you're looking at – there'll generally be a suggested range per node – and compare it to your home's dimensions.

3 CURRENT KIT

If your router is currently working fine, don't jump on the mesh bandwagon if you're looking for speed; while mesh networks are efficient, you won't find a big speed boost unless you're currently struggling along on an outdated version of Wi-Fi.

4 AVAILABLE SOCKETS

Your nodes will each need powering, so they must be placed close to a power outlet. This isn't a huge deal, since nodes are generally pretty flexible about where you place them, but they'll need good communication with other nodes wherever they go.

5 CHEAPER OPTIONS

Throwing everything away and replacing your kit with a mesh network will certainly offer up results, but a Wi-Fi extender, or some cheap Powerline adaptors, may be all you need to quash those dead spots. Think carefully before investing.

How we tested

To make the test fair, given the differing number of nodes included with each system, we set up two nodes of each in matching positions, in a three-storey house with known signal dead spots. One node was then moved close to the front of the house to measure signal distance outdoors, and signal strength was tested from predefined points. Each node was set up and configured using its respective iOS app.

▲ HIGHER...

UBIQUITI AMPLIFI

amplifi.com

$349.99

Not much tops the Orbi Pro's price. Ubiquiti's AmpliFi system, which includes a router and two socket-mounted nodes (with adjustable antennas), comes pretty close though at $350.

▼ ...OR LOWER?

NETGEAR WN3000RP

netgear.com

$39.99

Netgear's socket-mounted extender isn't mesh, and it's not the fastest with its single 802.11n radio, but it's only $40 and will cover an awkward dead spot.

› Test 1 Getting connected

How hard is it to hook up?

The set-up process is something mesh does well, in general. None of the products tested here are particularly difficult to connect. Some are more involved than others, but the contrast between them isn't exactly huge. Linksys' Velop, for example, is one of the slickest we've seen – you just have to plug it in, open the app, and it's all hooked up in a couple of minutes.

On the other hand, Google's initial process can take a while, but adding additional nodes is fuss-free. The TP-Link Deco, Netgear Orbi, and Zyxel Multy X use Bluetooth to create that initial connection, which simplifies things, though not every initial connection was as trouble-free as it could have been in our testing. The Multy X, in particular, put up a fight, taking an hour of playing with and resetting before it finally acquiesced, despite its straightforward instructions and seemingly basic installation method.

GOOGLE WIFI	LINKSYS VELOP	NETGEAR ORBI PRO	TP-LINK DECO M5	ZYXEL MULTY X
■■■■□	■■■■■	■■■■□	■■■■□	■■■□□

› Test 2 Power rating

The quest for a super signal

Power, in mesh, is a little relative – when you're distributing the load, you don't really need a lot of individual muscle. So while the AC1200 radios in the Google WiFi mesh setup might appear to be "weak" when compared to the AC3000 combos of the Zyxel Multy X and Netgear Orbi Pro nodes, there's not really a huge speed difference, even when you're loading up the network with a couple of bulky 4K streams. Google's programming and load balancing are top-notch, but the power dip translates into a slight lack of reach.

The Zyxel Multy X's nine-antenna, dedicated backhaul setup gives this particular mesh network impeccable performance and reach, while the Linksys Velop absolutely flies when talking to the wireless card of a modern Mac. Even the TP-Link Deco, a shred less strong in terms of pure numbers, is certainly powerful enough.

GOOGLE WIFI	LINKSYS VELOP	NETGEAR ORBI PRO	TP-LINK DECO M5	ZYXEL MULTY X
■■■■□	■■■■■	■■■■■	■■■■□	■■■■■

› Test 3 Complexity

Simple Wi-Fi or something more?

It's worth noting that everyone does the mesh network thing a little differently. Netgear's Orbi system, for example, has a specific node that simply manages the task of routing, and it also has a compliment of satellite nodes that communicate with that.

The rest of the mesh networks here can attach any node to your existing modem – but you'll lose access to the Ethernet connections you might already have hooked up to your current router, which might necessitate a little reorganization of your network, particularly if you're currently running a smart hub or a network printer.

Realistically, though, no mesh network currently available today is going to be particularly complex. It's a much smoother ride than when you're trying to extend a network with traditional Wi-Fi repeaters, that's for certain, but it pays to know what's different.

GOOGLE WIFI	LINKSYS VELOP	NETGEAR ORBI PRO	TP-LINK DECO M5	ZYXEL MULTY X
■■■■■	■■■■□	■■■■■	■■■■□	■■■■□

› Test 4 Security and app

Because control is important

Mesh is generally app-controlled, and that gives you access to more than just a few statistics. TP-Link's Deco app gives you an extra layer of network-wide antivirus protection, which may provide some peace of mind, and parental controls are a common feature on everything but the Orbi Pro – though bear in mind that it's slightly more business-minded than the standard Orbi, which features "Circle with Disney" parental controls, so you can at least get a little deeper with your network traffic control.

TP-Link's effort is a little more confusing than the others, whereas Zyxel's well-designed app gives good access to its security features. Google and Linksys shine in this department with a pair of excellent apps. Neither provides a huge amount of depth or control, but for fire-and-forget mesh, they're comprehensive enough.

GOOGLE WIFI	LINKSYS VELOP	NETGEAR ORBI PRO	TP-LINK DECO M5	ZYXEL MULTY X
■■■■□	■■■■□	■■■■■	■■■□□	■■■■□

THE WINNER

Linksys Velop

Apple's favorite is an easy-to-use and super-fast system

LINKSYS' VELOP is, as far as we're concerned, the top home mesh network on the market today – it's no wonder Apple has started selling it through its own storefront. The individual nodes are elegant and don't take up too much surface space, the setup process is flawless, and the app, despite offering relatively few controls, is perfect for what Velop aims to achieve: utter simplicity. It also manages to top the rest of the networks on offer, bar the business-class Orbi Pro, in terms of range and power, coping with whatever we could throw at it.

That's not to say Velop is without its flaws. Its relative lack of Ethernet ports could be a curse if you'd rather keep your smart home bridges in one place, although a cheap Ethernet hub would solve that problem in a flash. While we love the look of the individual nodes, many of its rivals manage to be less conspicuous. There are also cheaper mesh networks and, as our final scores below show, there's surprisingly little to be lost by investing less.

How do they compare?

THE SPECS	GOOGLE WIFI	LINKSYS VELOP	NETGEAR ORBI PRO	TP-LINK DECO M5	ZYXEL MULTY X
PRICE	$258.99	$449.99	$293.58	$299.99	$299.99
PACKAGED NODES	3	3	2	3	2
RADIO	AC1200	AC3000	AC3000	AC1300	AC3000
ANTENNAS	2x2 MU-MIMO	2x2 MU-MIMO	3x3 MU-MIMO	4x4 MU-MIMO	4x4+1 MU-MIMO
ETHERNET PORTS	2 per node	2 per node	4 per node	2 per node	3 per node, plus modem
DIMENSIONS	4.17 x 4.17 x 2.7 in	9.3 x 3.1 x 7.3 in	3.1 x 6.7 x 8 in	4.72 x 4.72 x 1.34 in	2.03 x 7.01 x 9.29 in
GETTING CONNECTED	■■■■□	■■■■■	■■■■□	■■■■□	■■■□□
POWER RATING	■■■■□	■■■■■	■■■■■	■■■■□	■■■■■
COMPLEXITY	■■■■■	■■■■□	■■■■■	■■■■□	■■■■□
SECURITY & APP	■■■■□	■■■■□	■■■■■	■■■□□	■■■■□
OVERALL	■■■■½	■■■■■	■■■■■	■■■■½	■■■■½

Note: The final verdict scores reflect the overall opinion of a product and are not necessarily an average of the criteria listed in the table.

Moleskine's notebooks are, of course, brilliant – but only Moleskine+ Paper Tablets are compatible with Pen+.

Moleskine Pen+ Ellipse

A writing experience like no other

$179 **From** Moleskine, moleskine.com

Needs iOS 8.1 or later

When is a pen not a pen? When it's a Pen+. This is a pen which sees what you're writing, and where you're writing it, and beams it to your iPhone as you scribble.

The Pen+ Ellipse is Moleskine's refined version of the original Pen+, slightly slimmed down and more matte, with pressure sensitivity built in. It has a rather short replaceable cartridge, with much of the body reserved for its 300 mA battery.

The Pen+ writes exceptionally well — you can sketch anywhere with it, but to actually use the interactive features you need one of Moleskine's special notebooks, which include a microscopic and barely visible dot pattern, read by the tiny sensor integrated next to the nib of the pen. That pattern is so unique that the Moleskine Notes app knows exactly where you've written, down to the location on the page of the notebook.

With the app open, you can write and record audio at the same time, and later play back the audio and see your notes appear as you wrote them. If your phone's away, the Pen+ stores a fair amount of writing, uploading it to the app automatically.

You can then edit the notes: add color, scribble your own digital-only notes on top and export them as a PDF, a PNG, or vector graphic image in SVG format. If your handwriting's any good, the app will transcribe it.

It's not perfect. The instructions in the app have been, "interestingly" translated into English. It's also pricey. But it works so well that you'll find ways to justify using it.

THE BOTTOM LINE. An effective if pricey sketching tool. **ALEX COX**

MOLESKINE PEN+ ELLIPSE

- ✚ Instant replication
- ✚ Neat editing tools
- ▬ Not cheap
- ▬ Notebooks are extra

GREAT ■■■■□

Kingston Bolt Duo

Storage expansion for the snap-happy

From $89.99 **From** Kingston, kingston.com

Needs iOS 9 or later, Lightning port

This USB drive is available in capacities up to 128GB, and sports a Lightning connector at one end and USB 3.1 at the other. It acts as storage expansion, allowing you to copy files to it from your iOS device, record directly to it from your device's camera, or view pictures and videos already stored on it through its companion app. You can also copy media files from your Mac or PC for viewing on your iPad or iPhone, as long as you copy them into an existing folder. You can't transfer from the drive to your internal storage.

The app is minimal but works well, despite becoming unresponsive if placed in the background, and annoyingly repeatedly asking for permission to access the drive.

A gigabyte of photos takes just over two and a half minutes to copy onto the drive via Lightning and the interface is fast enough to view a 1080p movie. Copying a single 1GB movie file onto the drive over USB 3.1 takes around one and a half minutes.

Bolt looks good and gets the job done. It's a good buy for anyone busting out of their limited internal storage.

THE BOTTOM LINE. It looks good and works well, despite occasional app freezes. **IAN EVENDEN**

KINGSTON BOLT DUO

- ⊕ 128GB is a lot of photos
- ⊕ Great aluminum looks
- ⊕ Minimal app works OK
- ⊖ ...but occasionally freezes

GREAT

LXORY Dual Wireless Charging Pad

Juice up your iPhone faster

$33.90 **From** LXORY, lxory.com

Made for iPhone X, iPhone 8, or other Qi-compatible smartphone

Apple took forever to embrace wireless charging, but it didn't take nearly as long for accessory makers to hop on the iPhone bandwagon, hence this Dual Wireless Charging Pad from LXORY.

Available in white or black, this eight-inch wide, 0.4-inch thin pad is made to simultaneously charge a pair of iPhone 8 and/or iPhone X handsets, or other Qi-ready devices. The hardware also has a USB-A output on the back for charging a third wired device at the same time.

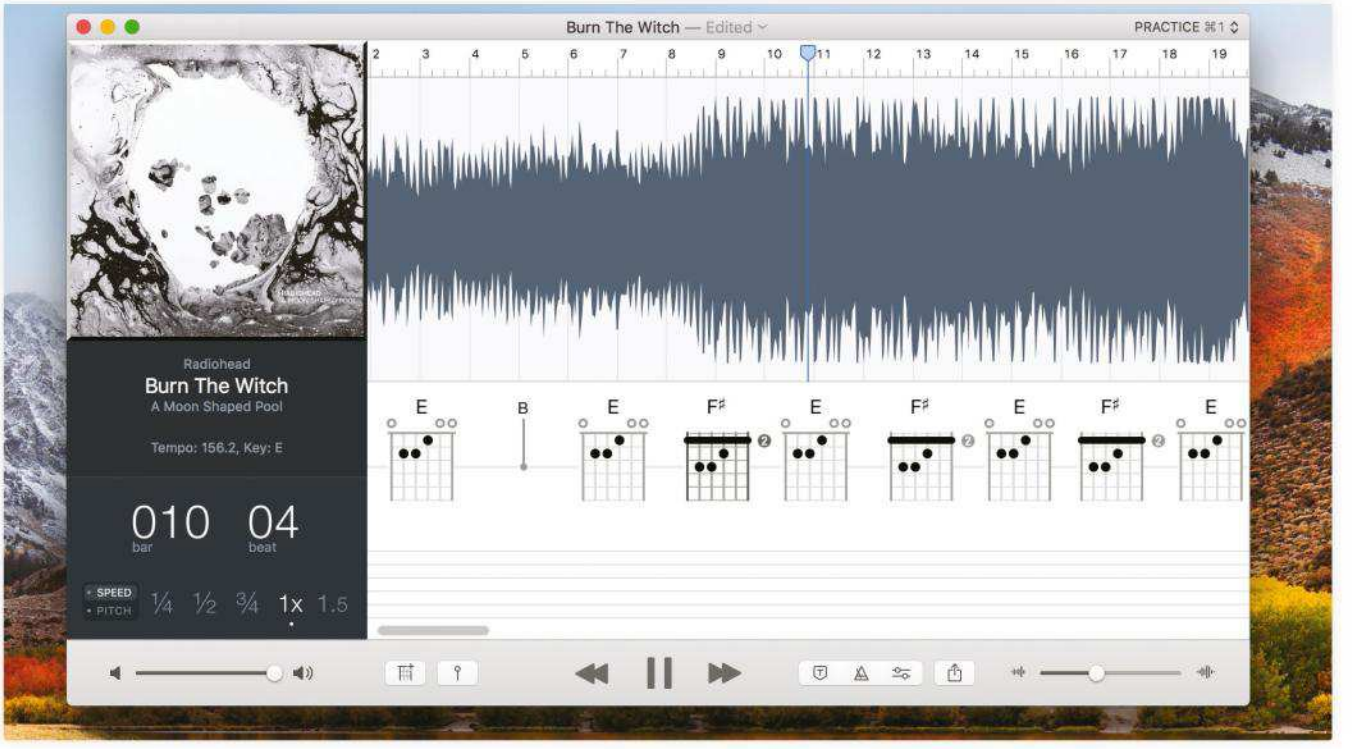
Together with the stylish design and an affordable price, this three-in-one approach offers an unbeatable combination for wireless iPhone owners. The pad is identical to the company's previous model, with one noteworthy change: 9W output on both charging pads, compared to only 5V before. That means a fully depleted iPhone 8 can be topped off in just over four hours using the included USB-C cable. Lightning and micro-USB inputs are also built-in for 5V charging through the dual pads alone.

THE BOTTOM LINE. Versatile three-in-one wireless charging, now even faster. **J.R. BOOKWALTER**

LXORY DUAL WIRELESS CHARGING PAD

- ⊕ 9W wireless charging
- ⊕ Dual charging pads
- ⊕ Stylish, compact design
- ⊖ Slower than wired

EXCELLENT



Capo's ability is almost uncanny, detecting the key and individual chords.

Capo

Learn any song the easy way

$49.99 **From** Supermegaultragroovy, supermegaultragroovy.com

Needs macOS X 10.11 or later

Performing other people's music is one of life's joys whether you're doing it to learn how to play an instrument, or singing *I Will Survive* in a karaoke bar. Working out what other people are actually playing isn't always simple, unless you have Capo.

Capo analyzes your chosen music to work out how to play it and presents the appropriate chord diagrams, and it gets the right chords most of the time. When it gets the odd one wrong, you can correct it and store that correction alongside the other chord information.

There are limits to what Capo can handle. MP3s and other major audio file formats are fine but streaming isn't, not least because recording them is copyright infringement.

Capo worked flawlessly not just with clear acoustic music but with filthy electronic rock and layered prog, even your own creations. And once you've identified the chords you can mess around with them. You can loop sections, and speed up or slow down the music to make it easier to play along, and change the pitch if you wish.

Although Capo is mainly about learning guitar chords, it isn't exclusively so. The pitch changing means you can work in the right keys for other instruments. You can even extract instrument solos or isolate vocals, or mute the solo or vocal. You can also extract audio and export it as MIDI for use in GarageBand or other audio software.

There are two downsides. First, the price: fifty bucks feels like a lot. Second, previous versions have been known to crash. The latest version is stable but it's wise to try the trial version before you commit your cash.

THE BOTTOM LINE. A useful app, even if it lacks streaming support. **CARRIE MARSHALL**

CAPO

- ✚ Superb detection
- ✚ Vocal/solo isolation
- ✚ Pitch shifting
- ✖ Audio files only

GREAT

Pawbo+

Interactive cat hassling, anywhere

$199 **From** Pawbo, pawbo.com

Features 720p video, laser dot, mic **Needs** iOS 8.0 or later

Some things exist, and do exactly what they're supposed to do, but make you question the very nature of technological advancement. Take the Pawbo+, a combination webcam, treat dispenser, two-way intercom and laser pointer, which allows you to remotely interact with your pets.

The unit connects easily to Wi-Fi, and through that to an app, putting that red laser dot, photos and video recording, control of the motorized treat wheel, and a microphone at your fingertips. You can see what your pets are doing from afar, then baffle them by talking to or half-blinding them.

It's purrfect (sorry) if you or your pet have any separation anxiety, as long as your furry friends are both bothered by the Pawbo+ and small enough that they won't destroy it; in testing on three cats, two were more interested in the ticking of the laser motor, and the other got stuck in with her claws after realizing it smelled of kibble.

THE BOTTOM LINE. Cute, though its value might not match its price. **ALEX COX**

PAWBO+

- ✚ Wide-angle lens
- ✚ Quick, easy setup
- ✚ Packed with features
- ➖ So-so video quality

GREAT

Penclic Mini Keyboard KB3

A keyboard for everything

$99.99 **From** Penclic, penclic.se

Made for macOS, iOS
Features Bluetooth connection / USB port

Any mini keyboard worth its salt is going to elicit comparisons to Apple's Magic Keyboard, and the KB3 stands up well. It's slightly bigger, and shares almost the same layout, with the Eject button replaced by a Delete key and Fn switching places with Ctrl. Whether its particular take on scissor keyswitches appeals as much as Apple's is another matter. There's less of a pop to the action here, and the keys have a slightly rougher surface. The actuation distance is also lower – right at the bottom of the key's travel, in fact – leading to a frustrating amount of missed keypresses.

The KB3's real joy lies in its versatility. It can run wired as a straight USB keyboard, or via Bluetooth, with profiles built in to use its function keys on macOS, iOS and other platforms. Switching between devices is quick and painless, and the KB3 is compact and sturdy, too.

THE BOTTOM LINE. A perfectly practical keyboard for both iOS and macOS. **ALEX COX**

PENCLIC MINI KEYBOARD KB3

- ✚ Small and light
- ✚ Versatile key layout
- ✚ Good battery life
- ➖ Not the best keyswitches

GREAT

Road Tripper

A multi-stop route planner with limited appeal

Free (IAPs) **From** ZurApps Research Inc., zurapps.com

Needs OS X 10.12 or later

You can add a description or photo of a place, but a premium subscription is required if you want to print or share a route.

Apple Maps has come a long way when it comes to providing accurate turn-by-turn directions — but only for a single destination at a time. Map out a road trip with multiple stops along the way, and you'll discover that the Mac navigation app isn't up to the task.

Road Tripper tries to bridge this gap by applying a new coat of paint over the existing Apple Maps API — one designed expressly for organizing trips involving two or more stops. It's an idea that's been attempted many times before with mixed results.

Sadly, the same is true here — Road Tripper's interface lacks refinement and is clunky when performing even the most basic tasks. It's easy to search for destinations, and Yelp-powered results turned up everything we input including local mom-and-pop eateries, but the process of adding new stops isn't as intuitive as it should be.

Although places along your designated route appear as color-coded pins, clicking Get Route to view an entire trip only shows the resulting course in a single color out of nine available choices; the only way to make sense of your travel is by confirming the order of stops along the way in the places sidebar. Road Tripper results can be calculated for car or walking, but there's also a 'My Speed' option, which estimates your travel time based on methods like bicycle, scooter, motorcycle, or even helicopter. It's a neat idea but largely conjecture, since you have to move a slider based on how slow or fast you think you might travel.

Things take a turn for the worse when it comes to sharing trips with others. You can't do it at all with the free version — sharing is one of several features locked behind a premium subscription, starting at $4.99 per month. To be fair, the first trial month is free, but even at a discounted annual price of $29.99, we didn't find the app road-worthy enough to justify such an investment. (There's also a $99.99 Pro version for those who shun subscriptions altogether.) The free version is also limited to a single trip with up to 20 stops, which seems like a particularly cruel restriction considering you can't export that trip without paying for it in the first place.

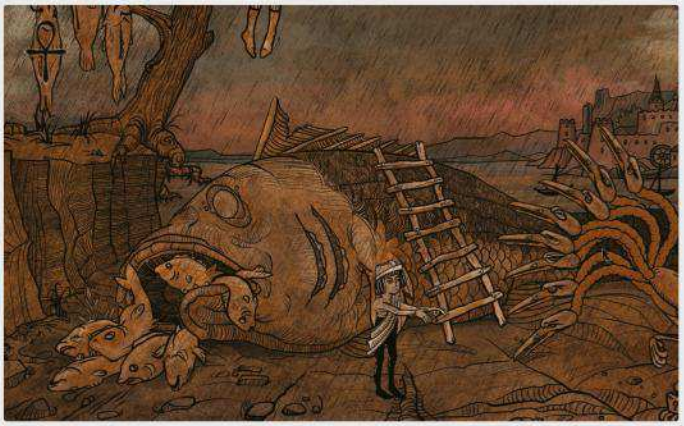
THE BOTTOM LINE. Gets the job done, but the clunky interface keeps this Mac app parked in the garage. **J.R. BOOKWALTER**

ROAD TRIPPER

- ✚ Road trip organizer
- ✚ Add multiple stops
- ✖ Unintuitive interface
- ✖ Limited free version

OKAY

It's easy to map multiple stops in Road Tripper but making sense of the route, not so much.



Apocalipsis

Variety-packed macabre puzzling

$6.99 **From** Punch Punk Games, punch-punk.com

Needs OS X 10.8 or later

Sometimes things are bleak. And they don't get much bleaker than Apocalipsis' combination of a 15th Century woodcut aesthetic with a black-as-night storyline. At its core, it's a selection of one-button, point-and-click, combine-the-object puzzles, which range in difficulty from the very easy to the cryptically obtuse.

Virtually every one of those puzzles is smothered in bleak and fantastical imagery – you begin, for example, by firing up a ritual via a handy pentagram, and quickly progress to pulling the code-covered tongues from torture victims or hacking off a corpse's arm to feed a sea monster – but Apocalipsis is consistent when it comes to giving out clues. Basically, it doesn't: it's up you to find solutions, and apply lateral thinking to riddles that often don't make sense.

The puzzles are varied and creative, but they're also interspersed with awkward action sequences which, due to the simplified controls, are more frustrating than enjoyable. Apocalipsis isn't a bad game, but you may not want to finish it twice to see both of its endings.

THE BOTTOM LINE. Apocalipsis is dark, disjointed, and inconsistent, but absolutely worth your time. **ALEX COX**

APOCALIPSIS

- ✚ Ultra-atmospheric setting
- ✚ Some clever puzzles
- ✖ Some not-so-clever puzzles
- ✖ Awkward animations

SOLID

Photolemur

AI takes on photo editing

$34.99 **From** Photolemur, photolemur.com

Needs OS X 10.11 or later

"Simplicity is the ultimate sophistication," goes the saying, so how about this: a photo editor which uses artificial intelligence (AI) to make your photos look their best.

The interface is simple – a small window onto which you drop one or more images. After a few moments (Photolemur carries on processing in the background if you import a batch) you're presented with an almost non-negotiable result – you can drag a vertical slider across your image to preview your shot before and after, while a slider lets you vary the strength of the changes.

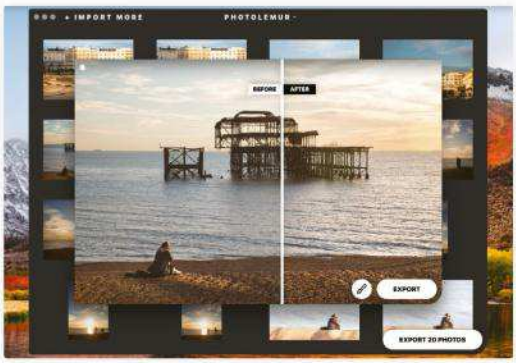
On fundamentally sound RAW files, Photolemur showed a light touch. Slightly brighter highlights, gently increased saturation and a touch more clarity all produced nice-looking, ready-to-print images. Even on ropier images, there's a marked improvement. Purists will prefer apps with more fine-grained control, of course, but if you don't mind technology taking the wheel, Photolemur's results are easily up to snuff.

THE BOTTOM LINE. Photolemur will definitely improve your images. **DAVE STEVENSON**

PHOTOLEMUR

- ✚ Quality, understated results
- ✚ Batch processing
- ✚ Quick performance
- ✖ Little for tweak-happy editors to get excited about

GREAT



You can specify the exact color of each Snugs tip, from Red Metallic to Pastel Pink Glitter.

Snugs True Wireless

The ultimate headphones for wire haters?

From $376.95 **From** Snugs Earphones, snugs.com

Features Bluetooth 4.2, sweatproof Liquipel Nano Technology, power pack storage (500mAh)

True wireless headphones differentiate themselves from 'regular' wireless ones due to their total lack of wires. As such, you're untethered while you listen to music.

The Snugs True Wireless headphones take this fairly new technology one step further by offering its signature custom-fit tips allied to a pair of true wireless Jabees Beebuds headphones (Snugs doesn't make its own) so they fit perfectly in your ear.

Custom-fit tips are neat because there's no sound leakage in use, so audio quality is much improved, and you get the benefit of natural sound suppression; Snugs boast a reduction of -30DB, which is impressive.

We've used Snugs' custom fit tips in the past and have always been impressed with whatever headphone they were paired with, but how do they fare in the Beebuds alliance? In terms of audio, they're loud, but muffled, and lack liveliness. The Snugs tips do their best to carry the Beebuds, but there's a limit to how much you can do with a $50 pair of totally wireless headphones. Matched to a superior headphone, such as the B&O E8, the setup would really shine. Of course, you can buy the Snugs tips separately ($219) and then add your own, if you like.

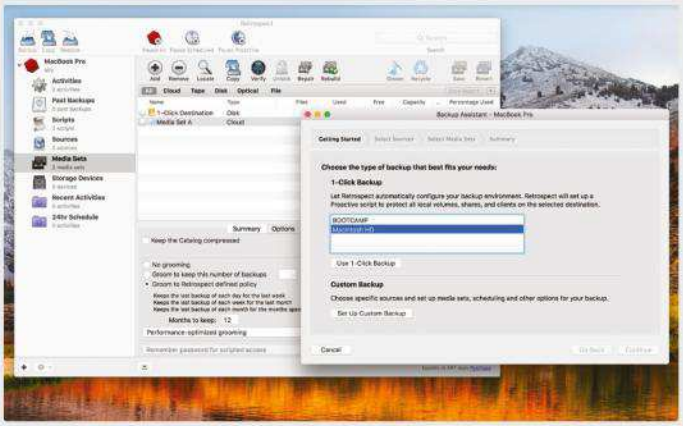
Operating the Snugs is easy thanks to a single button on each unit offering complete control using different combinations of presses. The included case has a 600mAh battery built in, which makes charging simple — click them in place, and off you go. A full charge takes less than an hour and you'll get around 4 hours of playback time.

THE BOTTOM LINE. They have the potential to be great but the Beebuds hold the Snugs back; we'd buy the tips separately and spec better quality headphones. **EMILY MINA**

SNUGS TRUE WIRELESS

- ⊕ Amazing fit
- ⊕ Noise cancelling
- ⊖ Average sound
- ⊖ Very expensive

SOLID ■■■□□



Retrospect Solo 15

Back up your Mac to more places

$49 **From** Retrospect, retrospect.com

Needs OS X 10.6 or later

The release of Retrospect 15, which can back up your Mac to directly attached drives, networked storage, and cloud services, includes a new edition. As the "Solo" in its name suggests, it's the one to pick if you have just one Mac to back up and want something better than Time Machine.

It uses the same interface as other versions, including the useful summary page, which confirms recent activity, how much data has been backed up, estimates the space you'll need this week and month, and more. Backup options are comprehensive, including two levels of file verification, password-protected encryption, and catalogs you can search even when the corresponding media is unavailable.

A highlight of this (and Retrospect 15 in general) is email protection to back up the contents of IMAP-connected email accounts to local or other cloud storage.

There's a wealth of help online, though getting familiar to know you've set things up correct is inevitably more time consuming than with alternatives designed for consumers.

THE BOTTOM LINE. Retrospect Solo 15 is a powerful and great tool if you're self-employed and can invest time in researching its many features. **ALAN STONEBRIDGE**

RETROSPECT SOLO

- ✚ Comprehensive backup options
- ✚ Works with many cloud storage services
- ✚ Email account backups to local/cloud storage
- ✖ Daunting for home use

EXCELLENT

Tayasui sketches

Stylish art app on iOS

Free (IAPs) **From** Tayasui, tayasui.com

Needs iOS 9.0 or later

Tayasui Sketches is an app for drawing or painting on iOS. On the iPad, it has a clean, minimal user interface. On the iPhone, it's pared down even further. It reminded us of Paper by Fiftythree, but in fact Sketches is a lot more flexible.

Used with a finger or eraser stylus, Sketches adds variation and smoothing to create stylish strokes. For finer control, a $5.99 Pro IAP supports Apple Pencil and a range of third-party styluses, such as Adonit's Pixel. The upgrade also adds layers, pattern fills, and a color mixer.

Brushes aren't fully editable as in Procreate, but you can alter size and opacity. The default settings are beautifully judged, from the satisfyingly scratchy pen to watercolors that mix together until you "dry" them.

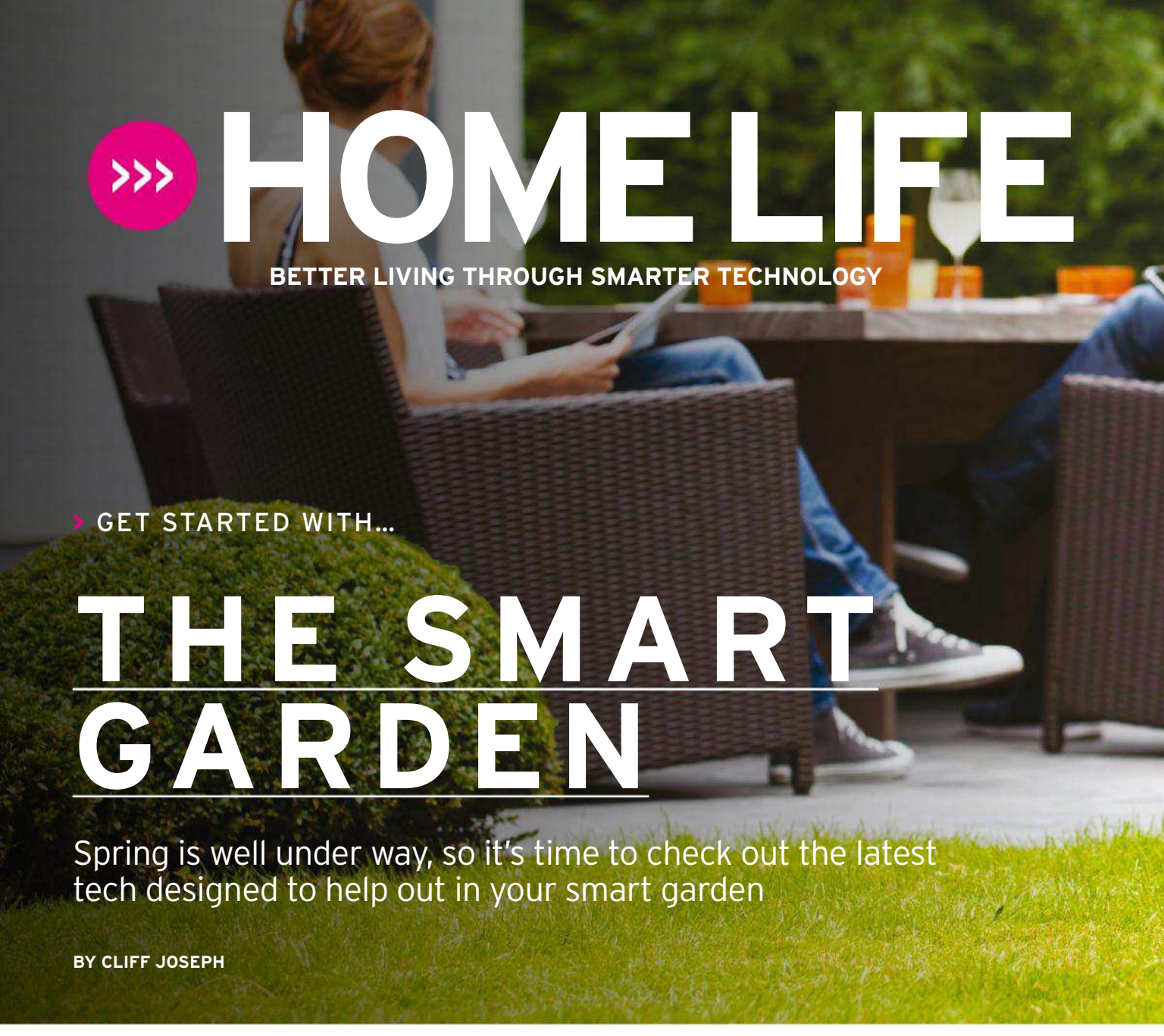
There's room for improvement: layer blending modes are few, you don't get tone or color adjustments, and the canvas is fixed at screen resolution – but Retina devices provide enough pixels for most purposes.

THE BOTTOM LINE. Brush editing is limited, but overall Sketches excels. **ADAM BANKS**

TAYASUI SKETCHES

- ✚ Easy to get started
- ✚ Gorgeous presets
- ✚ Wide support for styluses
- ✖ Fixed resolution and brush types

EXCELLENT



HOME LIFE

BETTER LIVING THROUGH SMARTER TECHNOLOGY

› GET STARTED WITH...

THE SMART GARDEN

Spring is well under way, so it's time to check out the latest tech designed to help out in your smart garden

BY CLIFF JOSEPH

After the winter, your garden is probably feeling a little under the weather, so it'll take some extra care and attention to restore it to its former glory.

A good starting point for any smart garden is a soil sensor that can measure details such as temperature and moisture, and send notifications to your mobile device to let you know when your plants need attention.

There are a number of soil sensors available in the US. Edyn's Wi-Fi garden sensor costs around $70, and tracks light, temperature, soil nutrition, humidity, and moisture. It can also suggest plants that match your garden's climate and conditions. PlantLink costs around $60 and claims to have plant-specific algorithims. Similar products are available online if you (ahem) dig about. The Xiaomi and Flower Care 2 smart soil sensors are both around $30.

While a plant sensor is a great way to dip your foot in the water of smart gardening, the most effective way of managing your garden's needs from afar is by using a smart sprinkler system. Luckily, there are plenty of options available to suit your needs. Rachio offers a stand out option with its third generation system — the Rachio 3 Smart Water System. Included in the bundle is a smart sprinkler

Sit back and relax while your lawn is mowed by one of Robomow's mowers.

controller and wireless flow meter with leak detection, and the Rachio app enables you to control and monitor watering from your iPhone or iPad. It works with most existing sprinkler systems and with Weather Intellgience Plus, the Rachio 3 automatically adjusts for the changing conditions, so you don't need to constantly monitor what's going on outside. Rachio is also compatible with most smart platforms, such as SmartThings or Nest, and supports most smart speakers, such as Amazon Echo or Google Assistant (though no word on HomeKit compatibility – sorry HomePod folks), so you can command Rachio to do your bidding with your voice alone.

Prices for the Rachio 3 depend on whether you want the flow meter included — without this it's $229.99 for the 8-zone version, or you can step up to the 16-zone controller (allowing you to control the watering needs of twice as many areas of your garden, if you so desire) for total lawn domination. In either case, you'll have to add on $100 to this price to get the wireless flow meter included.

THE MOST EFFECTIVE WAY OF MANAGING YOUR GARDEN FROM AFAR IS WITH A SMART SPRINKLER

iFacts...

WHAT ABOUT APPS?

There are dozens of gardening apps available, with one of the top rated being GardenTags. This is a social media app for gardeners, where you can share information or ask for advice from thousands of other gardeners, or use in-app purchases to get personalized advice from professionals such as TV gardener Michael Perry.

IS IT SAFE?

You don't have to worry too much about accidents with a smart sprinkler, but robot lawnmowers can potentially be dangerous. Check what safety precautions are built in, such as sensors that can spot a person nearby, or a child lock that can prevent a mower being activated by accident.

Robomow has recently launched a couple of more affordable models of mower.

Rachio isn't the only company out there that has the smart garden watering market locked down, Orbit specializes in a variety of smart timers, including the B-hyve Sprinkler Timer ($105.95) and the B-hyve Hose Faucet Timer ($69.95), both of which offer auto-adjustment of watering thanks to Smart WeatherSense, along with watering control from your smartphone, plus Alexa voice control.

ROBO CROP

As for mowing the lawn, there are smart options that can help here, too — even if they are a bit pricey. A number of companies sell robot mowers that can zoom around the garden and trim the lawn all by themselves, while you put your feet up and supervise with the aid of a nice, cool beverage. These robo mowers have been pretty expensive in the past, generally starting at around $1,000 and going beyond the $2,000 mark for high-end models designed for large gardens or land.

The leading company in this field is Robomow, which recently launched a couple of more affordable models for smaller gardens. The RX12 costs $599 and is "smart" in the sense that it has built-in sensors that enable it to detect

> Summer Lights

Use smart lighting to highlight your hard work

When the work outdoors is done, you can relax and unwind in your own personal oasis. To set the mood, Philips has launched a number of new smart lights in its Hue range, which all work with Apple's HomeKit (with the aid of the Hue Bridge, approx $50). The multi-colored Calla ($129.99) bollard light can be used to illuminate paths. And you can dot the Lily spotlights ($279.99 for three) around your garden for some dramatic lighting to highlight your eye-catching flower beds. There are also three wall luminaries – Inara, Lucca, and Ludare – on offer (from $49.99). The new Hue lights will be available in July.

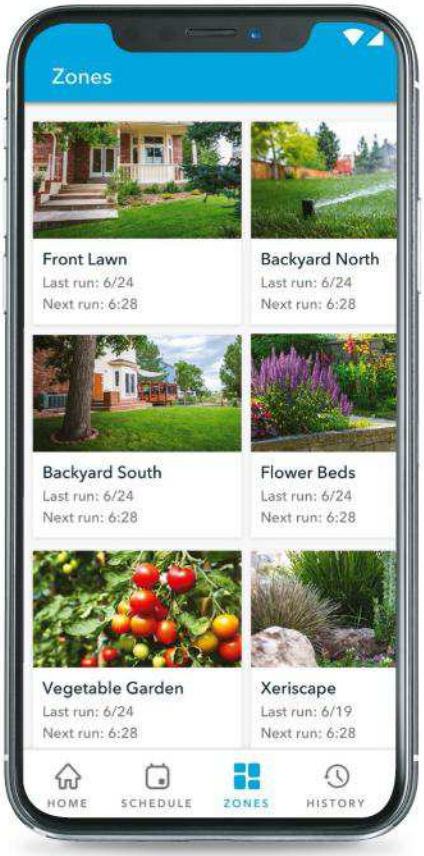
The Rachio 3 Smart Water System includes a smart sprinkler controller and flow meter.

the edge of the lawn and to navigate around obstacles while trimming it.

If you want more control via an iOS app, then you'll need to step up to $999 for the RC304 model, which can be programmed with a mowing schedule and can split your garden into a series of zones for individual attention. There's also a remote control feature that lets you "drive" the mower from the comfort of your chair or swing in the yard.

Bosch also makes a range of robotic mowers, but they are a little more expensive, starting at $1,008 for the auto-navigating Indego 350, or $1,154 for the app-controlled 350 Connect model.

If you have a particularly large garden to tend to, then you're going to need to make a significant investment. Husqvarna offers its Automower 450X robo lawn mower, which has a 1.3 acre capacity, which should be sufficient for most folks with a sizable garden space, allowing you to concentrate on sorting the multitude of weeds that have appeared during the Spring.



Rachio enables you to control the different areas of your garden from your iPhone or iPad.

WHAT ABOUT SECURITY?

› Most security cameras are designed for indoor use, but there are a number of outdoor cameras that can be used to keep an eye on your garden, too. Netatmo's Presence ($299.99) cleverly combines a powerful floodlight with a concealed security camera, while Netgear's Arlo Pro 2 Smart Security System is more expensive ($479.99) but includes two weather-proof cameras for indoor and outdoor use, and a powerful siren to scare off intruders.

WHAT ABOUT THE WEATHER?

› To keep an eye on the unpredictable weather while you're away, you could invest in a sensor, such as Netamo's Weather Station ($149.99). This device monitors temperature, humidity, and barometric pressure so that you can schedule watering and other tasks using remote control.

FIVE OF THE BEST

The best tech for your smart garden!

1

RACHIO 3 SMART WATERING SYSTEM
From $229.99
rachio.com

This comprehensive kit includes a smart sensor controller and a wireless flow sensor. It's perfect for upgrading existing sprinkler systems, offering automatic garden watering of up to 16 zones, smart weather detection and compatibility with a variety of smart home platforms.

2

B-HYVE HOSE FAUCET
$69.95
bhyve.orbitonline.com

An affordable option for controlling your sprinkler or watering system. Just attach the valve to your faucet, and the hub to your router and you can control it from anywhere. You can also create schedules to automate watering, and the smart weather detection adjusts the level of watering accordingly.

3

NETGEAR ARLO PRO 2
From $479.99
arlo.com

It's a little pricey, but this two-camera security kit is ideal for use in the garden. The cameras are rated IP65 weatherproof for outdoor use, and battery-powered so that you can move them around easily. There's a siren to scare intruders – and a HomeKit update on the way.

4

PHILIPS HUE LILY
$280
meethue.com

This pack of three multicolor spotlights can be placed in and around your flowerbeds to create a really eye-catching display – all controllable using HomeKit and Siri voice commands. You'll need to buy the Hue Bridge (approximately $50) to be able to use Hue lights in a HomeKit setup.

5

ROBOMOW RX12
$599
robomow.com

Robotic mowers are expensive, but Robomow's latest models finally come in way below the $1,000 mark, with the app-controlled RX12 coming in at around $600. This app-controlled mower has a two-hour rechargeable battery, is recommended for lawns up to 1/20 acre, and features a child lock.

>SMART HOME LIVING

NICK ODANTZIS loves the garden, with or without tech

THERE'S A funny thing that occurs at this time of the year. In the middle of Spring, when the weather is starting to get its warm and sunny hat on, the world outside starts calling my name. And it's saying: "It's a nice day, get outside, put down that cell you've been playing with and stop worrying about all that smart home stuff you've filled your house with!" Suddenly, everything I've worked hard on improving on the inside of my home over the last six months — whether it's making my heating easy to control from a smart thermostat or asking Siri on my HomePod to turn on all the lights as soon as I get in from work in the evening — becomes less interesting. And, well, just less relevant really.

The winter is hard on the soul, more so for those of us with SATD (Seasonal Affective Tech Disorder), so smart home gadgets help to fill that cold and dark void, with the promise of a better quality of life, with light and warmth to keep us happy.
But once the weather gets nicer, just step outside, enjoy the heat of the sun on your face and crack open a can of that light and hoppy craft beer that you've been saving for the right occasion. You don't need any of those gadgets, or do you? If this month's Home Life feature is anything to go by, then once the smart home season comes to an end, the smart garden season begins.

While you might think that the garden is the last place you'd want to be messing with gadgets, I've found there is a place for them — within reason. Honestly, I still get a bit of a kick from mowing the lawn the good ol' fashioned way because, heck, it feels pretty damn good to do so.

But then I don't have an especially big garden to tend to. What I do have a lot of is plants, and when it gets really warm in the middle of summer, I'd rather be drinking more of those ice cold brewskis than spending an hour each evening watering my garden with a regular hose. So, I'm all for a smart sprinkling system that takes out the hard work that I don't actually enjoy. That's the thing with the smart garden, as it is with the smart home — when a gadget takes away the need to do something that I don't actually enjoy doing, or makes a task easier to do, then I'm all for it. When it's there just for the sake of it? I'll pass. That said, we're all different, and one person's idea of fun is another's idea of hell. So go ahead, outfit your garden with gadgets if that's your thing. If not, life is still pretty good.

Winter gadgets take a back seat in summer

APPLE TV

THE LATEST tvOS APPS AND THE HOTTEST HARDWARE

There are a variety of different fireplace options to enjoy, including Aspen, Alps, Christmas, and Vermont.

Magic Fireplace

White-hot 4K HDR

$0.99

The holidays may be over, but those who enjoy cozying up to a virtual fire at the push of a Siri Remote touchpad will find everything they could possibly want in Magic Fireplace. Version 2.0 completely overhauls the experience by adding 24 scenes shot in 4K 10-bit HDR for a sharper, more realistic picture on your Apple TV 4K.

Owners of older models also have plenty to enjoy, with a total of 40 fireplaces in 1080p HD. Magic Fireplace is no one-trick pony — viewers can choose from a variety of locales including Alps, Big Bear, Christmas, Vermont, and even a gas-powered fireplace for extra authenticity.

Each toasty scene has been professionally captured and mastered, and there's a variety of options to control looping, relative volume for the sound effects, the ability to mix with music, a handy on-screen clock, and five filters to keep things from getting boring. This app is a must-have for cozy evenings in! **J.R. BOOKWALTER**

Evoland 2

Spacetime continuum disorder

$6.99

Mixing references to classical games with an epic adventure spanning the very history of video games themselves, Evoland 2 promises "a slight case of spacetime continuum disorder" as gameplay switches between traditional 2D role-playing or fighting to 3D shooter and even trading card game, a mashup that blends genres in a whole new way.

At its core, Evoland 2 is a role-playing adventure game, but despite obvious influences from classics like Zelda or Final Fantasy, it winds up feeling like a unique experience. You'll need to commit some time getting started — but once it gets going, this game plays like a greatest hits montage of past favorites, a mish-mash that actually works in its favor.

One thing's for sure: Players won't have time to be bored, because the gameplay hops through time with increasing frequency. That has the unwanted effect of throwing off the pace at times. Not surprisingly, a game controller is required to play Evoland 2 — the Siri Remote just won't cut it for this kind of fun. **J.R. BOOKWALTER**

It takes a while for the gameplay in Evoland 2 to build, but once you get going, you'll discover it's a delightful mish-mash of classic games.

Stingrays Live

Watch 'em swim, in silence

Free

California Academy of Sciences recently shared its aquatic life with the world courtesy of several live streaming apps, the latest of which brings viewers face-to-face with an order of batoid known as myliobatiformes. Stingrays Live provides a high-definition webcam stream showing cownose and honeycomb rays circling a mangrove lagoon in search of their next meal.

Tune in every Tuesday and Thursday at 1:30PM PST to see scientists serving dinner for the rays or hop over to the alternate Reef View for a change of scenery, or to get up close and personal with other members of stingray tanks.

Watch stingrays find food, or tune in at feeding time for guaranteed action.

We can't get enough of this kind of app – it makes for a great visual backdrop when playing music or working out. We'd love to see an audio option, because stingrays aren't as cool in absolute silence. **J.R. BOOKWALTER**

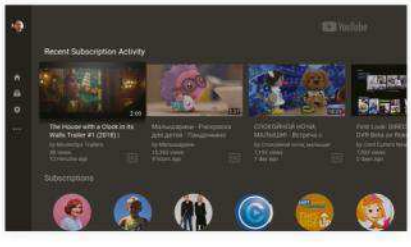
YouTube

Small changes, big improvement

Free

My kids love watching YouTube videos, but the Apple TV experience always felt like a second-class one. As if generally laggy performance wasn't enough, subscriptions were displayed in a long, seemingly endless horizontal list. To top it off, there wasn't even a progress bar to indicate which videos were already viewed or in progress. We wound up using Roku instead.

Mercifully, all of these issues have been resolved as of version 2.01.04 for fourth and fifth-generation Apple TV models. Content in the Subscriptions tab now appears in a grid layout like it used to, controls are more responsive,



The user interface of YouTube's Apple TV app is now massively improved.

video scrubbing once again works great with the Siri Remote touchpad, the search keyboard works better with third-party remotes, and you can now see which videos have been watched. Goodbye Roku! **J.R. BOOKWALTER**

HOME THEATER

Make the most of home entertainment

SONY XBR-65X900F

$2199.99 • SONY.COM

The new models for 2018 have started shipping, and Sony's 65-inch with direct LED lighting and local dimming offers some serious bang for the mid-range buck. Picture quality for both SDR and HDR content is fantastic, but the value is somewhat hampered yet again by the inclusion of Android TV and a love-it-or-leave-it overall design.

BEAR MOTION CASE

$6.99 • AMAZON.COM

Rather than complain about how svelte Siri Remote is, why not pick up this rugged, inexpensive silicone shock resistant case instead? Available in four colors (black, blue, green, or red), you'll not only protect the back and sides but also make it harder for the remote to slip out of kids' hands while playing games.

ASK

TECH SUPPORT & TECHSPLANATIONS

Email Mac|Life at **ask@maclife.com**

Hot topics right now

Make sure you check out these important support articles on Apple's website to better understand the latest features.

MACOS 10.13.3 UPDATE ISSUES SOLVED

Learn about the latest update to MacOS 10.13.3 which addresses various issues, and find out how you can get the update at bit.ly/ml142ask1

32-BIT COMPATIBILITY IN MACOS 10.13.4

Apple is making the transition to 64-bit apps as of MacOS 10.13.4. To find out how this affects you and your Mac apps, and what you can do to make sure you can continue using your favorite apps, go to bit.ly/ml142ask2

GREEN PIXELS IN ITUNES VIDEO CONTENT

If you're incurring green pixelation when you watch videos bought from iTunes, even if you've installed to the latest version of MacOS, find out what to do at bit.ly/ml142ask3

Issues with an old disk image

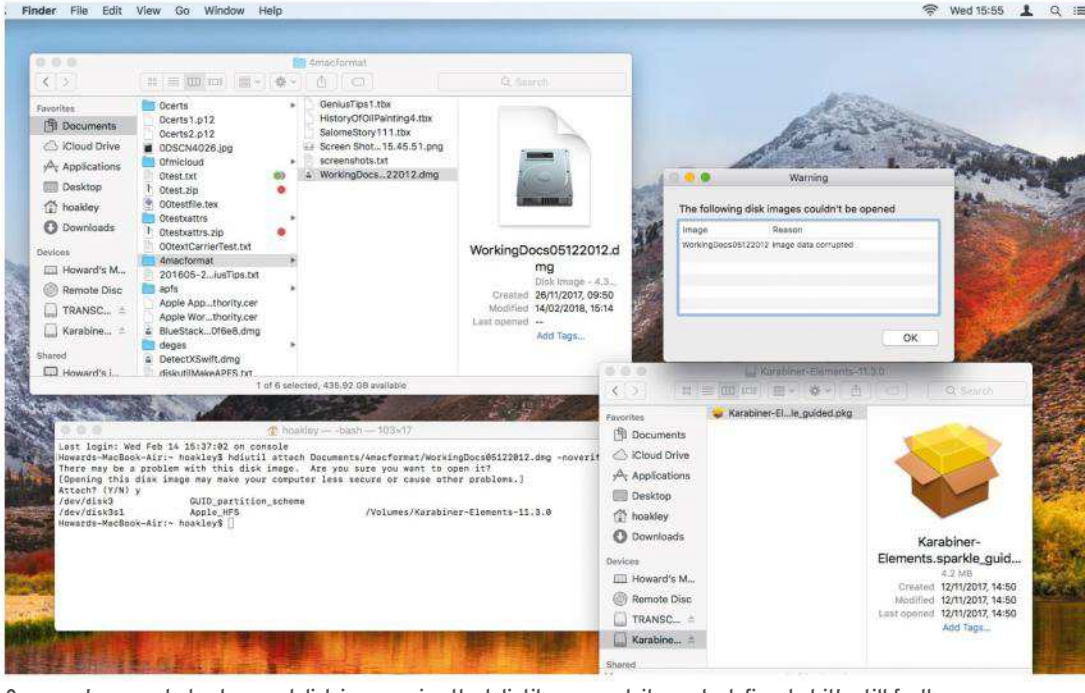
How can I mount an old, but important, disk image that's been reported as having an invalid checksum?

Read-only or compressed disk images are checked by macOS when you try to mount them. When they're created, a checksum of their entire contents is saved in the file, and that's compared against their current checksum. If those differ, macOS reports this error and refuses to mount them.

If you can't access another undamaged copy of the disk image (from a backup, say), the only way around this is using the command line in Terminal. As the image is likely to be damaged, this can cause problems, and in the worst case could cause a kernel panic. So save all open work and close non-essential apps. You need to be confident that the disk image isn't malicious in any way.

Open Terminal, type a command of the following form and then press backspace: **hdiutil attach filename.dmg -noverify** where filename.dmg is the name of the disk image file – you can simply drag it from Finder onto Terminal's window at that point in the command to substitute the complete path and filename. If successful, you'll see a list of the partitions that have been mounted.

When macOS discovers a checksum issue, it writes an extended attribute of a type whose name starts with com.apple.metadata: kMDLabel_. Sometimes, you might need to delete that using the command tool xattr, or the free utility xattred, although removing it won't enable you to mount the disk image.



Once you've mounted a damaged disk image using the hdiutil command, it may look fine, but it's still faulty.

> Viewing Reading List articles offline

I have set Safari on my iPad to save web pages for offline viewing, but I almost always can't view Readling List articles when not connected to Wi-Fi. Is this a bug?

Yes, and it has been alleviated – though not entirely fixed – since iOS 11.2.5. You can help Safari cope better by manually saving pages to its Reading List, rather than relying on it doing so automatically. In Settings > Safari, turn off Automatically Save Offline. After doing that, when you want to make sure a page is available for offline viewing, first save it to Reading List, then open the list, swipe left on that item and then tap Save Offline.

When Safari makes a page available for offline reading, it saves the page and linked content to a cache. The tricky decision for any service of this nature is how deep to follow those links. Currently, browsers for iOS go shallow, and at best will only save that page and its linked content, such as its style sheet and images.

Firefox's similar feature doesn't appear to cache any content at present, and so fails to load pages from its reading list when the iOS device is in Airplane mode.

Some of the more specialist apps, such as Offline Pages (codiumlabs.com/ios/offline-pages/), including its pro version, do rather better than Safari, but they still don't go any further than one link deep.

If you want more reliable offline reading, you'd be better off using Offline Pages, or updating iOS and adding important pages manually to Safari's Reading List. Even then, you'll trip over its limitations at times.

Although Offline Pages caches content linked directly to a page, it doesn't go any deeper, and can still fail to load.

Quick-fire questions & answers

HOW DO I CONNECT WATCH AND iPHONE AFTER UPDATING TO iOS 11.2.5?

Try shutting down both devices and then turning both on again. If that doesn't work, unpair them following Apple's instructions at bit.ly/unpairwatch. For best results, start the pairing process on your Watch. When the devices are once again paired, restore the Watch's contents from its most recent backup. Note that the process can take a while.

WHY DON'T iPHONE NOTIFICATIONS APPEAR ONSCREEN WHEN MY iPHONE IS LOCKED?

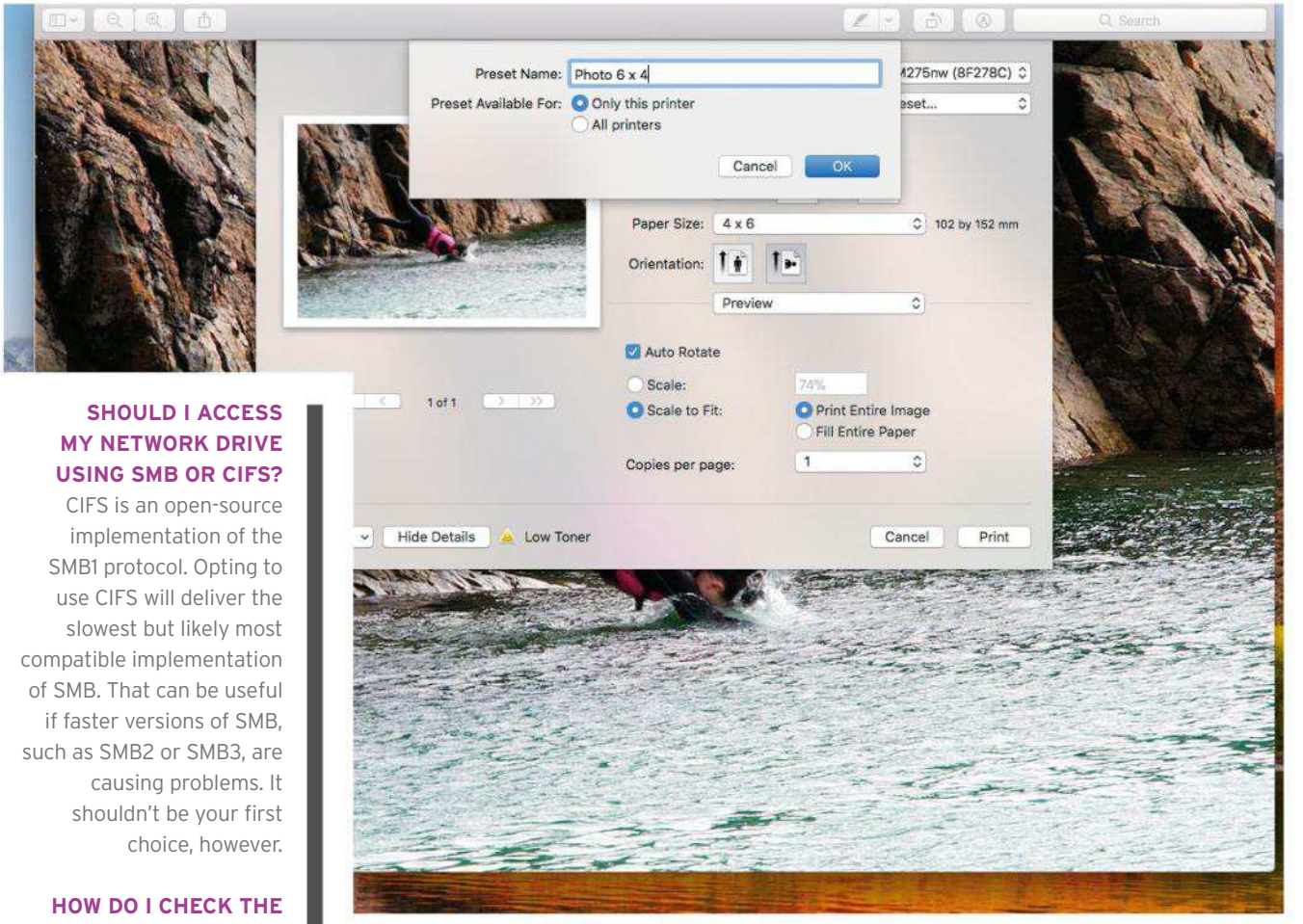
This can get changed during an iOS update, or simply by mistake. To restore notification previews, go to Settings > Notifications. At the top of the page, tap Show Previews and choose Always. You can also choose whether notifications are silenced when your iPhone is locked – go to Settings > Do Not Disturb > Silence and choose either Always or While iPhone is locked.

SHOULD I ACCESS MY NETWORK DRIVE USING SMB OR CIFS?

CIFS is an open-source implementation of the SMB1 protocol. Opting to use CIFS will deliver the slowest but likely most compatible implementation of SMB. That can be useful if faster versions of SMB, such as SMB2 or SMB3, are causing problems. It shouldn't be your first choice, however.

HOW DO I CHECK THE SMART STATUS OF MY EXTERNAL SSD?

macOS still doesn't support monitoring SMART status for USB drives, although it does for most connected using Thunderbolt. Try installing the SAT SMART Driver from bit.ly/github_smart; since it's a kernel extension, in High Sierra you'll need to approve it in the Security & Privacy pane after installation.



To get the best out of high-quality print modes, set up scaling and other options, then save them as a preset.

> Photo prints are wrongly scaled

My iMac is running macOS 10.13.3 and the latest printer software, but Preview and Photos only print a third of each image to 6x4in photo paper on my HP Deskjet 3520. All other printing is fine. How can I print these photos properly?

High Sierra's drivers might need a little assistance in setting them up for high-quality print modes. It's best to do this using a custom print setting.

Open an example image in Preview, and then choose File > Print. If you only see a simple dialog, click on the Show Details button to expand it fully. Ensure you have the correct paper size and orientation set at the top and then, in the pop-up menu halfway down, choose Preview to reveal the app's controls for scaling its output to the page.

You should be able to leave Scale to Fit selected, but might need to switch from Print Entire Image to Fill Entire Paper. If those don't do the trick, switch to using the Scale option and, because the image is being printed too large, try reducing the adjacent percentage.

To save these settings, choose "Save Current Settings as Preset" from the Presets pop-up menu at the top of the sheet. Then you can easily use them the next time you want to print 6x4in photos.

Specialist photo and image apps like Affinity Photo ($49.99, Mac App Store) provide more extensive and reliable printing options, which you should find more suitable if you print many of your photos in this way.

Updated driver causes crashes

I recently updated support for my Canon Pixma PRO-1 printer. Following that, when printing a photo at high quality, the printer software crashed and the printer was unresponsive. I can't understand much of the crash report's contents, but it refers to EXC_BAD_ACCESS (SIGSEGV). How can I fix it?

That generic error message usually indicates that the printer software is broken. After an update, it shows that failed, either because the update didn't install properly, or because there's a bug in the new version.

The first thing to do is to check that your Pixma PRO-1 printer's firmware is v2.000 or later; if not, update it using Canon's Printer Update Utility. Then uninstall it from the Printers & Scanners pane.

Choose between installing version 16.20.0.0 of the printer driver from Canon, or leaving macOS to install its latest release. Normally you're better off relying on macOS, but for this model you may find the Canon-supplied driver supports higher quality output.

If that still doesn't work properly, install the previous driver if you happen to have a copy to hand. If you don't, check with Canon, which should still be able to supply it.

CAN I USE HOMEPOD TO PLAY AUDIO FROM MY MAC?

If they're on the same Wi-Fi network, you can do this with AirPlay. Open the Sound pane in System Preferences; select HomePod to use in the Output tab's list of AirPlay devices. iTunes offers its own AirPlay controls.

WHICH FORMAT SHOULD I USE FOR A USB MEMORY STICK?

USB flash storage is usually formatted as ExFAT, making it usable on most computers. There is no reason you shouldn't reformat as Mac OS Extended if you're only going to use it with Macs; High Sierra can format some drives as APFS, but this won't be backwardly-compatible with older versions of macOS.

Thunderbolt drive and High Sierra

If I upgrade to High Sierra, will my iMac still be compatible with my Promise Pegasus R4 RAID, which contains my backups?

Yes, provided that you're running current versions of the drive's software, and that you update the drive's firmware.

Before upgrading to High Sierra, visit the Promise support page at promise.com/Support/downloadcenter. Select Legacy products, then model details. Download the Pegasus Series Utility for Mac and the Pegasus Series Driver for Mac, and install them.

It's worth installing the driver, which is a kernel extension, before upgrading to High Sierra, since that version of the operating system handles third-party extensions differently.

With the new Pegasus Utility installed, you should be able to upgrade its firmware from within the app. If you have issues, download the firmware from the support page and install it using the Firmware Update command from the utility's Admin menu, as detailed at bit.ly/firmprompeg.

Once your RAID drive is up to date, proceed with the High Sierra upgrade. When complete, it should be safe to leave Time Machine backups on, provided you don't restart your iMac in Sierra. Doing so can wipe out the database Time Machine uses to decide what to back up.

If you have a Thunderbolt RAID array and you're thinking of upgrading your operating system, visit the manufacturer's website and download the latest support software for your drive.

Syncing folders to a backup

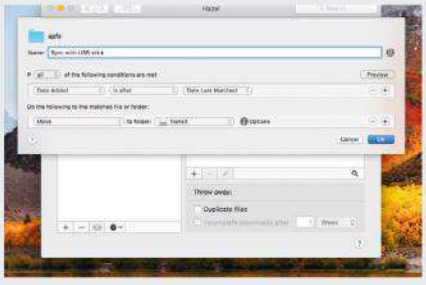
I used to sync key documents to a thumb drive, as an off-site backup. The app I used has now died, and I'm running High Sierra. Is there a better way to do this?

There are no less than three ways, depending on whether you enjoy writing AppleScript or shell scripts, or prefer to use a simple pane in System Preferences.

AppleScript supports Folder Actions, scripts that run whenever something changes in a folder, such as adding a document to it. They're now more awkward to use, as you need to make the Script menu visible, which is done in Script Editor's General prefs. (Script Editor is part of macOS, and located in /Applications/Utilities.) You'll need to write your own script to copy files from the watched folder to your thumb drive.

You can do the same in a shell script using the fswatch command (bit.ly/fswatch). Although powerful, these are not the simplest option.

Perhaps best for most of our readers is Hazel (about $30, noodlesoft.com). In its System Preferences pane you can set folders to be watched, then define actions which run when conditions are met – but without the need to write more complex scripts. For example, it would be very simple to copy files added to a specific folder to your flash drive. Hazel does a great deal more beyond this, and can be used to automate workflows that are usually manual affairs.



Building folder actions in Hazel requires no scripting or programming, although it can run scripts you've written if you wish.

HOW CAN I CHECK THAT AN APP IS PROPERLY SIGNED?

Download and install What's Your Sign? (free, bit.ly/objseewhatsign). This utility adds a "Signing Info" command to Finder's contextual menu. Ctrl-click the app you want to check, choose that command, and you'll see info about the developer's signature and its certificate authorities.

HOW CAN I CHECK I'M RUNNING THE LATEST JAVA?

If you have Java 9 installed, which is the current major version, there'll be a Java icon in System Preferences. Click it and a separate window will open. Go to that window's Update tab to see the version that's installed and if updates are available. Or, type java --version in Terminal to see version details there.

I can't read Apple's free iBooks

I recently added Apple's free iOS user guides for iPhone and iPad to the iBooks collection on my Mac. When I try to open either, I'm told that a different Apple ID was used to buy them, which isn't the case, and they work fine on my iPhone. How can I read them on my Mac?

Restart your Mac, and open the iCloud pane. Sign out, wait a few seconds and then sign in again. Also try removing the books from your Mac and then redownloading them.

If those don't help, open Settings on your iPhone. At the top of the first page, tap your name. You'll see all your current Macs and iOS devices listed. Tap your Mac there and check its details – in particular that it's a trusted device.

If that looks fine, shut down your Mac, wait 20 seconds, and start it up in safe mode (see bit.ly/macsafemd). That clears a lot of caches and could help eliminate any misunderstandings over your account and the Mac's authorizations. Then restart your Mac normally and try again.

If this problem only occurred after a macOS system update was installed, that could be the cause. In this case, you need to download the latest Combo updater for your current version of macOS (go to support.apple.com and search for "combo update" and your installed version number) and install that, as it can sometimes fix such strange problems.

Another trick is to repair your home folder's permissions – see bit.ly/repperms. At the end of all that, if you have no joy, call Apple support, as only it can fix problems that might lie server-side with the store.

iBooks should open books downloaded by your Apple ID, if that Mac is signed in to the correct account and trusted.

Is there an easier way to edit property list files than Xcode?

› There are several, including high-end XML or text editors like BBEdit. One of the most friendly lightweight property list editors is PLIST Editor ($3.99, Mac App Store). It's considerably less frustrating to use than the tool found in Xcode.

What's the best application for drawing complex timelines?

› Try Aeon Timeline 2 ($49.99, Mac App Store). It incorporates a database into which you can put an almost unlimited number of events. You can then filter those you want to display in the timeline, making it ideal for all kinds of projects.

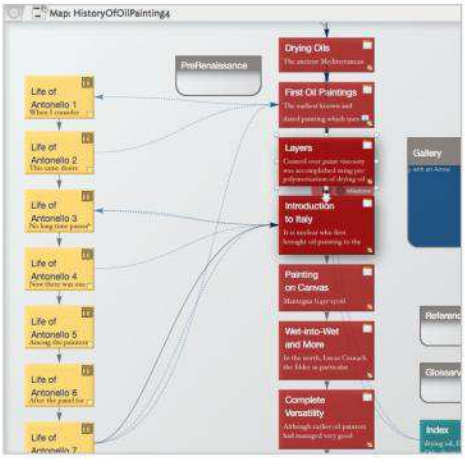
› Finding an affordable database

I build databases using FileMaker Pro 13, and recently created one for club quizzes. Since that version is getting old – and isn't supported on High Sierra – is there an affordable replacement that I can use instead?

Upgrade pricing for FileMaker Pro starts with version 14, so you'd have to pay full price (currently $329) to stick with it. In any case, for this task it would be overkill. FileMaker used to sell a simpler, more affordable app called Bento, but unfortunately it was killed off four years ago.

If you really want a database, a close alternative is Ninox ($34.99, Mac App Store). To check it out before buying, download the trial version from ninoxdb.de/en.

Consider other tasks you might want to use this for. If they're based on structured text and images, then look at a downloadable demo of Tinderbox from eastgate.com. Billed as a tool for notes, it goes far beyond, and is ideal for storing structured information and ideas. A single licence costs $249.



Tinderbox lets you structure your notes in hierarchies, and using sophisticated links. These notes also form a timeline.

Treemaps are invaluable for a quick overview of different types of note; we even use them to manage Genius Tips.

Essential support articles

Our advice may refer to the following features; check out the support articles linked below for full instructions.

macOS RECOVERY

The Recovery system contains tools to help you look up info online when macOS won't start, and to repair or reinstall the system. Learn more at bit.ly/mlrecovery

SAFE MODE

When you start your Mac in Safe mode, macOS performs extra checks and stops certain third-party software from running. See how to use it at bit.ly/mlsafemode

RESET SMC & NVRAM

These features handle low-level functions and store key settings for your Mac, respectively. Resetting them can fix various issues described at bit.ly/mlresetsmc **and** bit.ly/mlresetnvram

HARDWARE ISSUES

Your Mac includes tools that check for certain hardware issues without going to a Genius Bar. For Macs introduced in June 2013 or later, see bit.ly/mldiag**, otherwise see** bit.ly/mlahwt

SHARE WITH US!

EMAIL: letters@maclife.com
FACEBOOK: facebook.com/maclife **TWITTER:** twitter.com/maclife

Power up your Mac's trackpad

Enhance your trackpad with BetterTouchTool

REQUIRES
OS X 10.10 or later, BetterTouchTool

YOU WILL LEARN
How to use a third-party tool to add new capabilities to your Mac's trackpad

IT WILL TAKE
30 minutes

YOUR TRACKPAD RECOGNIZES far more gestures than Apple provides access to in System Preferences' Trackpad pane. But BetterTouchTool can unleash the full power of the Multi-Touch surface.

The app enables you to choose from additional gestures and assign actions to them. Treat the examples we give here as a starting point and experiment with ideas of your own. (In Manage Presets, export a backup of your BetterTouchTool settings, then reimport them later — a great way to reuse them on a second Mac.)

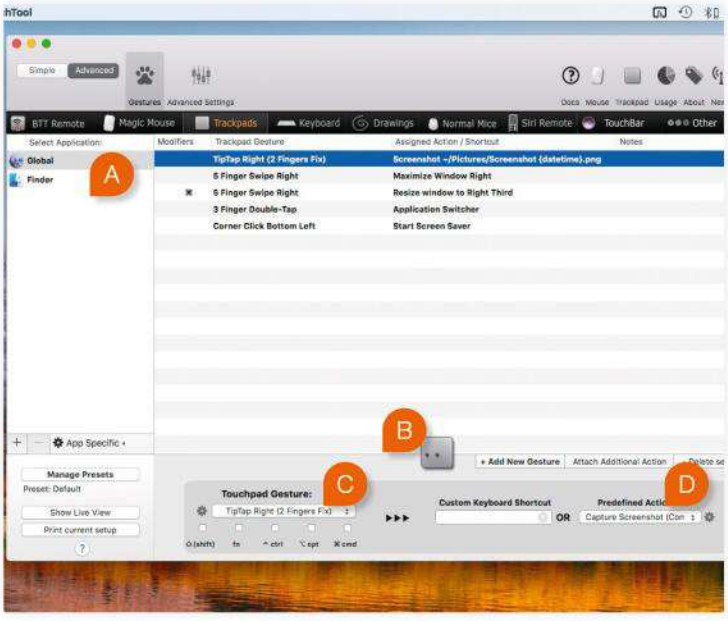
BetterTouchTool also offers more nuanced general trackpad controls. In the app's toolbar, click the Advanced button and then Trackpad. You'll see a range of options for fine-tuning how your trackpad works. If things go a bit weird, you can click Reset All Settings.

You can install a free 45-day trial of it from **folivora.ai** — after that, a two-year license costs $6.50; a lifetime one is $20. Open the app, click the icon it adds to the menu bar, choose Preferences, then click on the Trackpads tab below the toolbar. Let's get started! **CRAIG GRANNELL**

QUICK LOOK Find your way around BetterTouchTool

A
RULE TARGETING
Our tutorial uses "Global" rules, but you can specify an app and define gestures and actions to work in it alone.

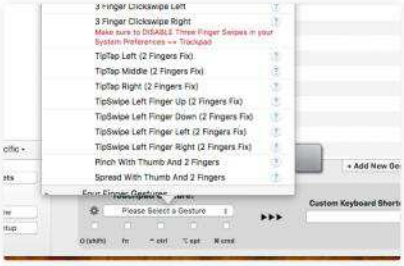
B
GESTURE HELP
If you find that you need a reminder of how a gesture works, you can click it in the list and watch this animated guide.



C
GESTURES MENU
The Touchpad Gesture menu is where you choose the gesture you want to trigger your action.

D
ACTIONS MENU
Use the Predefined Action menu to choose the action you want your gesture to invoke.

HOW TO Enhance your trackpad's behaviors

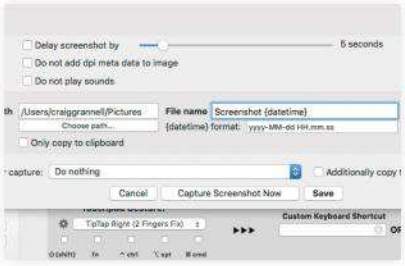


1 Pick a gesture

First define a gesture to take a screenshot – which you can't do in System Preferences' Trackpad pane. Click Add New Gesture. In the pop-up, pick TipTap Right from the Three Finger Gestures category.

2 Choose an action

From the Predefined Action pop-up, under Screenshots, pick Capture Screenshot (Configurable). Click Capture Whole Screen(s), and if you wish, tidy the file name and adjust its save destination.

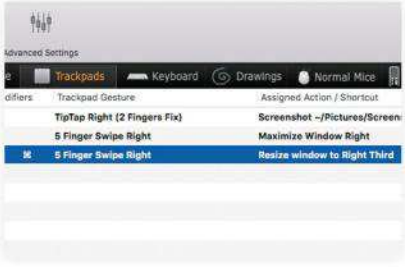


3 TipTap screenshots

Click Save to confirm. Now you can try out your gesture. Rest two fingers on the trackpad and then tap with a third to their right. A screenshot should be saved to the location you specified during step 2.

4 Move a window

We'll now create a gesture to snap a window to half the screen. Use 5 Finger Swipe Right (find it in Five And More Finger Gestures); set the action to Maximize Window Right from the Windows Resize & Move group.



5 Duplicate a rule

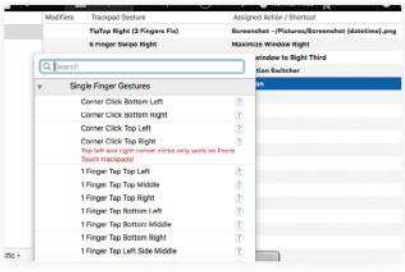
Select step 4's gesture. Copy (Cmd+C) and paste it (Cmd+V). You can now select/edit the duplicate. Below the Touchpad Gesture pop-up, check Cmd. In the Predefined Action pop-up, pick Resize window to Right Third.

6 Test your gestures

Open a Finder window. Perform a five-finger rightwards swipe and the window will resize to fill the right half of the screen – or the right third if Cmd is held. Think about ways to expand on these shortcuts to suit how you work.

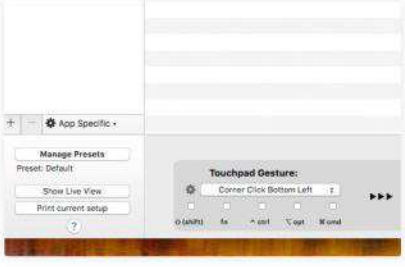
7 Switch apps

Use a gesture to bring up macOS' app switcher solely using your trackpad. Set up a gesture that uses 3 Finger Double Tap to invoke the Application Switcher action (from the OS X Functionality category).



8 Use corner clicks

You can use Hot Corners to activate your screensaver, but it's quicker to click your trackpad. To set this up, in a new gesture, select Corner Click Bottom Left from the Single Finger Gestures category.



9 Avoid accidents

In the OS X Functionality group, pick Start Screen Saver. To avoid triggering in error, check one of the modifier key boxes, such as Cmd. If you have a Force Touch trackpad, you could consider a Force Click gesture.

Boost your Apple ID's security

Learn how to set up and use two-factor authentication

REQUIRES
A Mac running OS X 10.11 or later and/or a device running iOS 9 or later

YOU WILL LEARN
How to set up and use two-factor authentication

IT WILL TAKE
30 minutes

INTRODUCED WITH IOS 9 and El Capitan, two-factor authentication (2FA) is a security feature in iCloud. It's an evolution of two-step verification, which we'll refer to as 2SV.

The latter pushes a security code to a device using either SMS or Apple's Find My iPhone system; 2FA pushes a notification to "trusted devices" linked to your account. This tells you that someone has requested a verification code and shows you a map of the location where the request was made.

You can subsequently reject the attempt to access your account, or allow it and have the code sent to the trusted device which you're using.

In addition to at least one trusted device, you'll also have to register at least one trusted phone number. Apple encourages you to register more than one, such as your home phone — rather than the iPhone that you've connected to your iCloud account.

As well as having Apple send you a code, you can manually generate one yourself from one of your trusted devices.

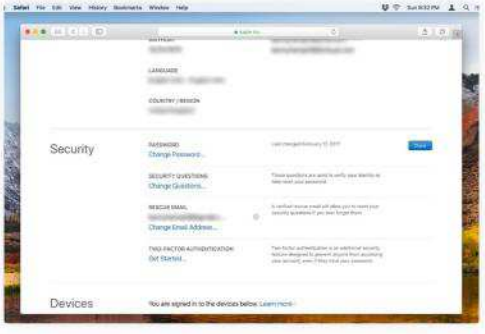
KENNY HEMPHILL

TWO-FACTOR AUTHENTICATION IS AN EVOLUTION OF TWO-STEP VERIFICATION

HOW TO Use two-factor authentication

1 On a Mac (no 2SV)

Go to the iCloud pane in System Preferences. Click Account Details, then click Turn on Two-Factor Authentication. If you created your Apple ID in iOS 10.3 or macOS 10.12.4 or later, this feature will already be on.



2 On a Mac (with 2SV)

In Safari, go to appleid.apple.com and sign in. Click Edit in the Security section and click Turn off Two-Step verification. Create new security questions and type in your date of birth. Now follow step 1 to turn on 2FA.

GENIUS TIP

On systems that don't support entering a 2FA code, just sign in as normal and the code will be sent to your trusted devices. Append the code to the end of your Apple ID's password in the password box.

3 On iOS 10.3 or later

In Settings, tap your name at the top of the first page, then Password & Security. Tap Turn on Two-Factor Authentication and then Continue. Two-factor authentication will now be turned on for your iCloud account and supported devices.

4 On iOS 10.2 or earlier

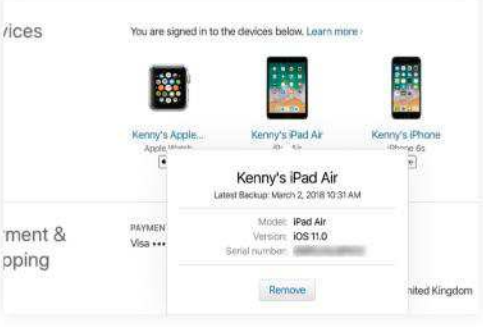
In Settings > iCloud, tap your Apple ID followed by Password & Security. Tap turn on Two-Factor Authentication followed by Continue. You may be asked to answer your Apple ID security questions to proceed further with this.

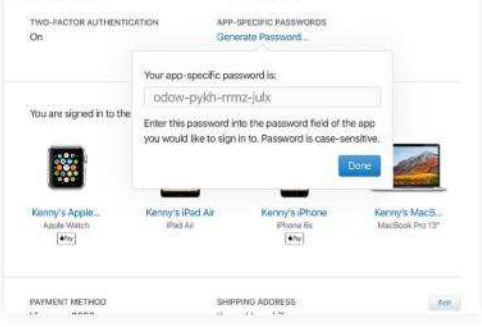
5 Add your cell number

On the next page, choose your country then type in the number of the cell you want to use. Choose either text message or phone call to receive the verification code. When you get the code, type it into the boxes on screen.

6 Update your number

In Password & Security settings, tap Edit. Tap the minus to remove a number, or Add a Trusted Phone Number to add one. Verify using text message or an automated phone call, then enter the code you receive.





7 Manage trusted devices

Sign in to appleid.apple.com; enter the verification code when you receive it. Scroll to your devices. To remove one, click on it, then Remove, then Confirm. New devices are added here when you sign in to iCloud on them.

8 App-specific passwords

App-specific passwords allow third-party apps to access your iCloud data. Next to Security at appleid.apple.com, click Generate Password. Follow the steps and type the result in place of your usual password in the app.

GENIUS TIP

With 2FA, you receive an alert showing the location of a device that tries to sign in to your iCloud account. The location may not be accurate, but use good sense; if it appears when you haven't tried signing in somewhere, click/tap Don't Allow.

GENIUS TIP

If someone gains access to your account/device and turns on 2FA without permission, click Turn Off Two-Factor Authentication at the bottom of the confirmation email you receive from Apple. The link is valid for two weeks.

Use Hot Corners

Activate features by moving the pointer to corners of the screen

REQUIRES
macOS

YOU WILL LEARN
How to activate functions simply by moving the pointer

IT WILL TAKE
5 minutes

YOU MIGHT HAVE heard of the Hot Corners feature in macOS (we mentioned it on page 83), but are you actually using it? Hot Corners enables you to perform a multitude of functions simply by moving your pointer to one of the corners of the desktop.

The Hot Corners feature is pretty well hidden in System Preferences, but once you know where to look, you'll find out just how easy it is to activate.

JO MEMBERY

Hot Corners can save you time in activating features such as the screen saver, Launchpad, and Mission Control.

QUICK LOOK Key features

A

DESKTOP

If you're someone who keeps files on your desktop, the ability to move windows out of the way to reach them in an instant will save you laboriously closing them or moving things around.

B

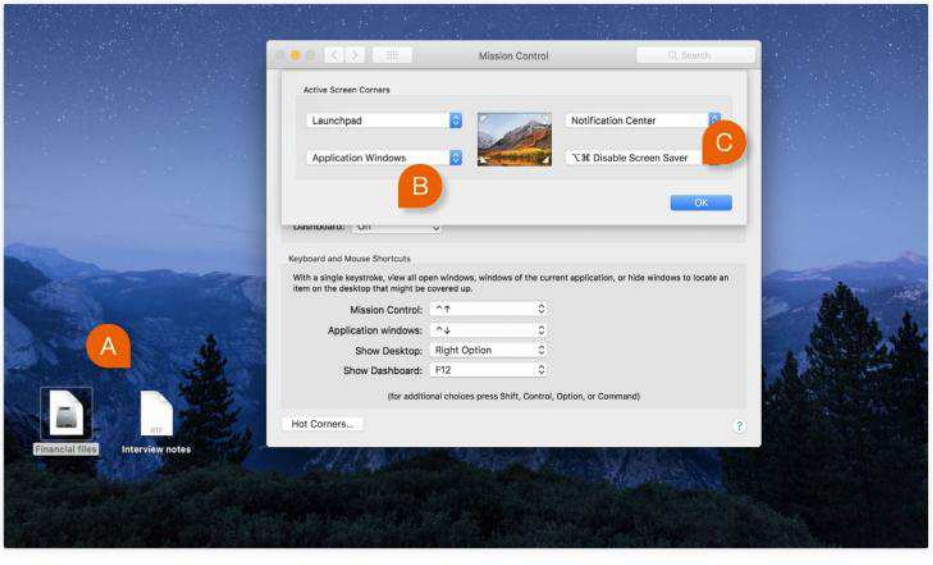
APPLICATION WINDOWS

The Application Windows action shows you a Mission Control-like view of all open windows from just the app you're currently using. This is great if you're working on multiple Numbers spreadsheets, say!

C

DISABLE SCREEN SAVER

Doing a presentation that focuses on one slide for a long time, or streaming a film/watching a video? Avoid awkward moments by using the Disable Screen Saver action to ensure your screen doesn't go to sleep.



Add instant security

If you're worried about prying eyes glancing at your Mac's screen, even when you've used a Hot Corner to put it to sleep without clicking anything, make sure you make this change in System Preferences' Security & Privacy pane. Put a check next to "Require password" and then choose Immediately from the adjacent pop-up menu. This ensures nobody can access your account after you move away from your desk.

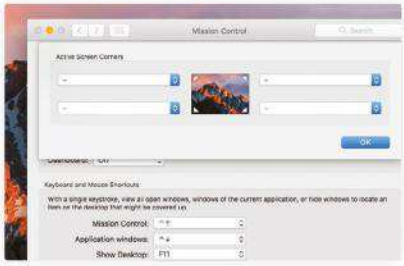
Notification Center

This feature contains a plethora of information about what needs your attention and what you've got coming up. Set up a Hot Corner to get at that info without having to click its menu bar icon.

HOW TO Activate and use Hot Corners

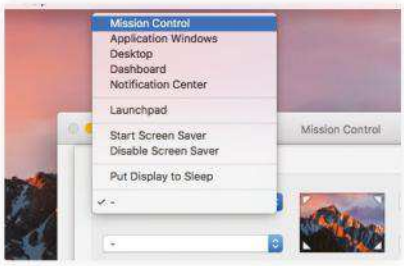
1 Find Hot Corners

As with most system tweaks in macOS, this one requires opening System Preferences. Once you're there, click Mission Control and you'll see a button for Hot Corners.



2 Four corners

Click that button. In the panel that opens, the four corners of the desktop are represented as pop-up menus. Click one to see all the actions you can assign to that corner.



3 Your options

Handy system shortcuts include showing Mission Control, Launchpad, or the current app's windows. You can also start your screensaver, or alternatively put the display to sleep.

4 Activate actions

You only have four corners to play with, of course, so experiment with the line-up of actions. Pick actions from as many of the menus as you want. Click OK when done.

5 Test them out

Any action you've assigned is activated automatically when the pointer reaches the corresponding corner, saving you remembering menu item locations or keyboard shortcuts.

6 Disable a corner

Hot Corners are very useful if you need to use a non-Apple keyboard or mouse. If you want to remove one's action, though, set its corresponding pop-up menu back to the – (dash) item.

PREVENT SLIP-UPS

While using your Mac, you might find yourself accidentally triggering the Hot Corner actions you've assigned. This is frustrating, particularly as it's easy to forget you have Hot Corners activated. Thankfully, there is a workaround that uses one or more modifier keys. This means you have to hold down one or more of several special keys before you're able to trigger a Hot Corner's assigned action. Without those keys held down, nothing will be triggered. The following two steps will explain how to set this up.

1 A secret option

Adding a modifier key to a shortcut is an easily overlooked feature. In the Hot Corners panel, hold down one or more modifier keys – (Cmd, Opt, Shift, Ctrl) when choosing an action from the pop-up menus.

2 Add a modifier

The symbols for the keys you're holding will be prefixed on the actions. Keep them held and choose an action. If you hold Cmd, say, when you move the pointer to the corner, you'll need to hold that key to trigger the action.

Mix different video resolutions

Shoot and combine HD and 4K footage in the same iMovie project

REQUIRES
A Mac with iMovie 10.1 or later, iPhone running iOS 9 or later (iPhone 6 or later needed for shooting in 4K)

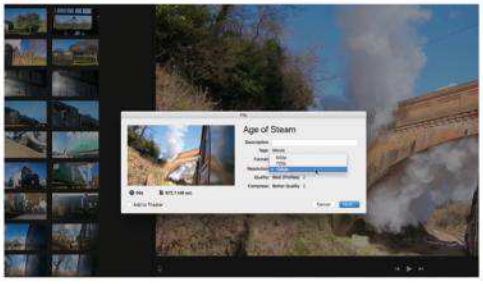
YOU WILL LEARN
How to shoot multiple resolutions and combine them in the same timeline

IT WILL TAKE
15 minutes

YOUR IPHONE, AND gadgets such as the GoPro Hero 6 Black camera, can record video footage at different resolutions and frame rates. The iPhone's default video recording resolution is 1080p HD at 30 frames per second (fps). This footage looks excellent on TV and YouTube.

However, you might want to drop the resolution to 720p HD, to save storage space, for example. This smaller HD resolution will still look okay when viewed on social media, but may look fuzzy when combined with higher resolution files in an iMovie project.

You can also record slow-motion (slo-mo) clips on your iPhone using the 720p HD resolution. This is worth doing to benefit from a higher frame rate of 240fps, which ensures smoother motion in a slo-mo sequence than you'd get by simply slowing down a standard 30fps clip, or even the highest quality 1080p option of 120fps. Slo-mo clips enable you to portray an event or action in a visually artistic or poetic way, without jarring jumps between frames.



Different resolutions can be combined in iMovie. Make sure you set the final resolution when editing's done.

Shooting 4K gives you footage with a very high resolution. When you use a 4K clip in a 1080p HD iMovie project, you can crop it to zoom in without creating fuzzy-looking pixels. You can also add Ken Burns zoom and pan effects.

In this walkthrough, we'll talk you through how to shoot a range of differently sized clips and then combine the different resolutions into a consistent 1080p HD project. **GEORGE CAIRNS**

GENIUS TIP

To check the resolution of your imported clips, Ctrl-click on the iMovie Library file (in your Movies folder) and choose Show Package Contents. In the folder named after your event, open the Original Media folder, select a file, then press Cmd+I for info.

HOW TO Combine different resolutions

1 Choose a resolution

On your iOS device, go to Settings > Camera > Record Video. The default 1080p HD at 30fps balances high-quality footage without filling up your cell. 1080p HD at 60fps creates larger files, but with smoother-looking motion.

2 Compose your clip

Use a tripod, such as the Manfrotto Pixi mini with a phone clamp (pictured). As well as producing stable footage, a tripod will help you check how the image is composed. This can lead to more professional-looking clips.

3 Capture some clips

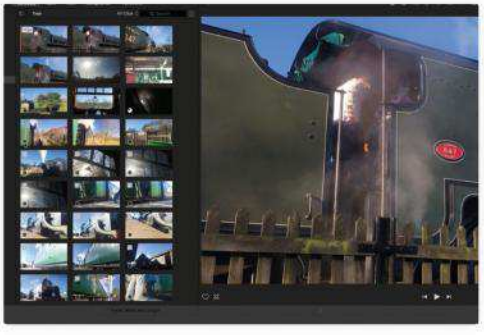
Feel free to change the resolution when capturing different subjects. A 4K size will suit wide shots, as you can zoom into specific subjects while preserving quality. Drop to 720p HD if you run short of storage space.

4 Slow motion settings

To capture moving subjects – for example, billowing steam – in a creative way, go to Settings > Camera > Record Slo-mo. 720p HD at 240fps will capture a very smooth and slow version of any fast-moving subject.

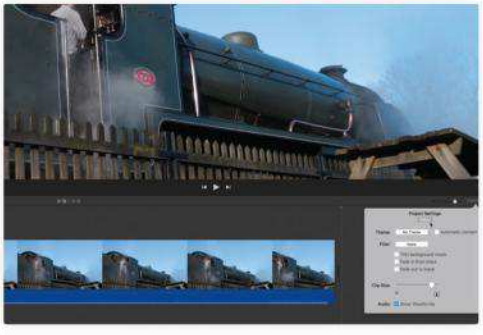
5 Import clips

In iMovie on your Mac, click iMovie Library; choose File > New Event and name the event. Connect your iPhone to your Mac using its USB cable. Go to File > Import Media, browse to your iPhone, then choose Import All.



6 Create a new movie

The clips will be imported from the iPhone. Slo-mo clips are indicated by a circular icon (at the top left of their thumbnails). Click Projects (top left), then Create New and choose Movie. A new timeline will appear.



7 Set project size

The clips in your event will be of various resolutions. Drag a 1080p HD video from the Media Browser into the timeline. Afterwards, click Settings (under the Viewer) to confirm the project is 1080p – see Genius Tip, top right.

8 Add clips

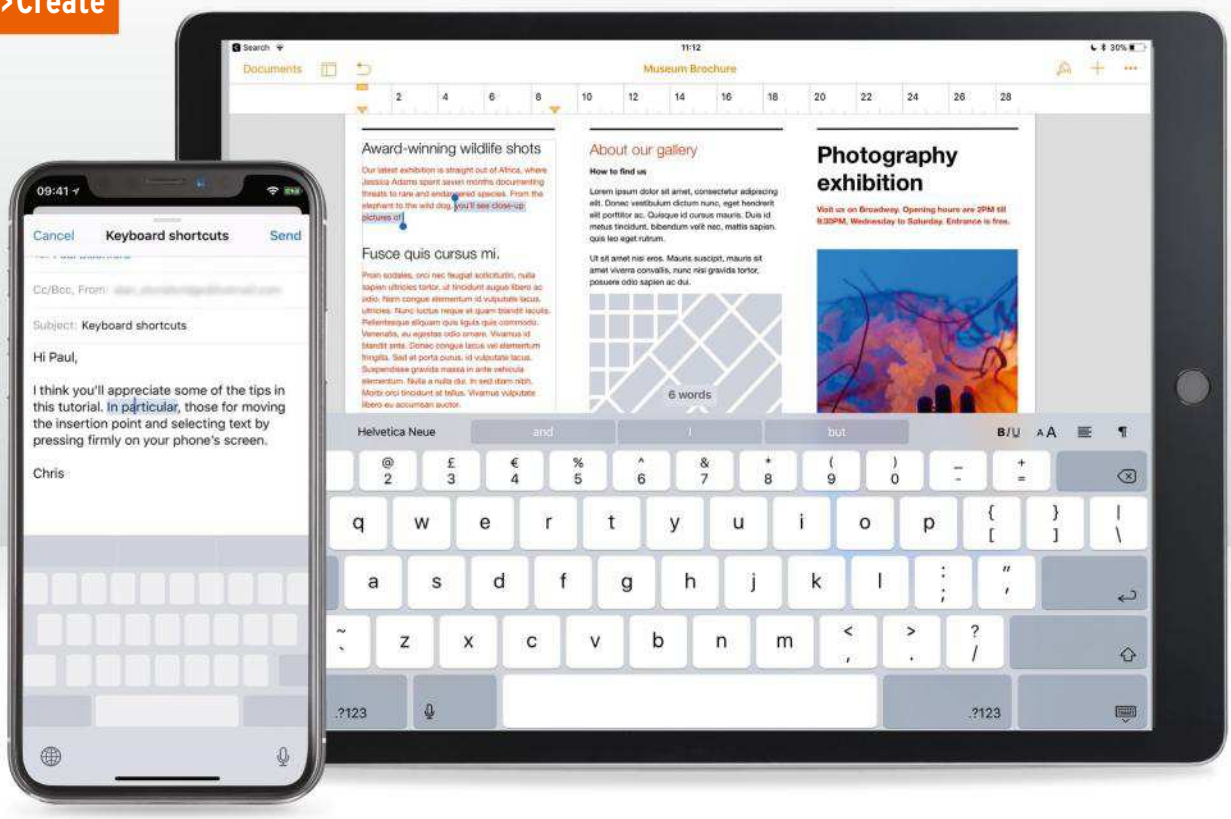
Clips you add to the timeline will be scaled to 1080p. 720p slo-mo clips might look a little soft due to them being upscaled to 1080p. 4K clips will look sharp, even if you zoom into them manually or apply the Ken Burns effect.

GENIUS TIP

Note that the first clip you add to a timeline sets the resolution of the entire project. So, if you want to work in 4K, make sure you add a 4K clip to the timeline first.

GENIUS TIP

To make imported slo-mo clips automatically play back in slow motion once you add them to the timeline, go to iMovie > Preferences and check the box by the Slo-Mo clips label.



Uncover iOS' hidden speed-typing

The productivity-boosting tricks concealed under your keyboard

REQUIRES
An iOS 11 device (some features work on older versions)

YOU WILL LEARN
How to type faster with iOS's built-in keyboard shortcuts

IT WILL TAKE
25 minutes

YOU MIGHT THINK that to get any serious typing done on an iPhone or iPad you need to use an external keyboard. While it's true that you can do that — over Bluetooth, using a Smart Keyboard, or using Apple's Lightning to USB adapter — if you learn the tips and tricks Apple has baked into the on-screen keyboard, everything from a tweet to the next great novel is well within your fingertips.

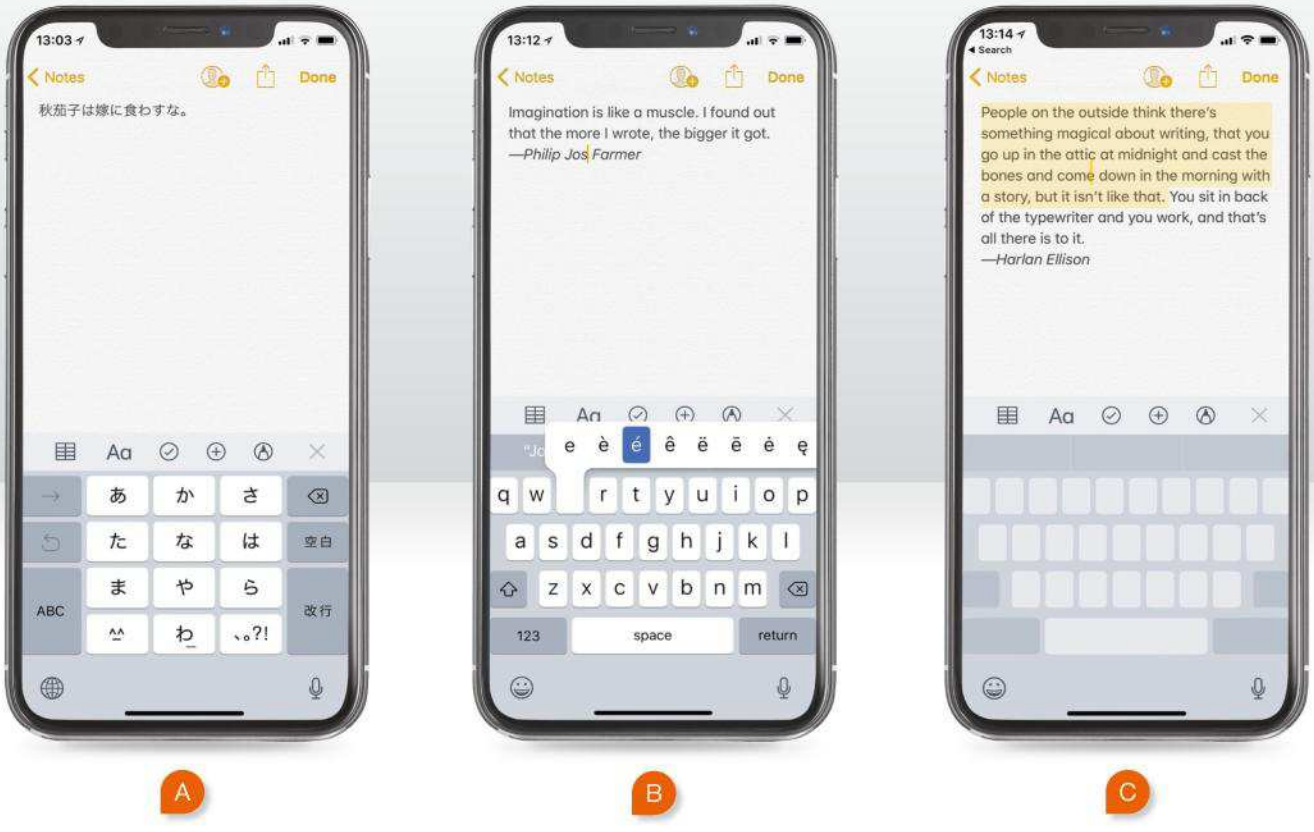
You can set up several keyboards in iOS, for example for typing in different languages; adding other keyboards in Settings > General > Keyboard > Keyboards doesn't just change the layout of the keys to match conventions in that country (AZERTY rather than QWERTY in France, for example), or even the input method entirely, but it changes the autocorrect dictionary, too. (Here's a really hidden feature: you can override the keyboard layout change — to retain the benefits of the autocorrect change without the confusion of letters moving around — by tapping the name of the keyboard you've added in this list.)

- **Image A:** To switch between the keyboards you add (in the order you set them in Settings > General > Keyboard > Keyboards), tap the globe icon at the bottom left of the keyboard. If you only have one main keyboard installed, this will instead be a smiley face, as it toggles to the emoji keyboard.

EMOJI AND SPECIAL CHARACTERS

So long as you have the Predictive bar turned on, though, it can act like emoji search, and you don't even have to switch to that keyboard; type "fries," say, and the last option in the predictive bar is the fries emoji. Tap it to replace the word with the emoji. (Even this is localized; if you type "chips" in the UK English keyboard, you get the same emoji.)

You might be used to tapping "123" to switch to the layout with numbers, but if



you only need to type a single character from this keyboard, drag your finger from the "123" to the desired number key — the keyboard will temporarily switch layout in between — then release to get back to the usual keyboard.

If you're on any iPad except the 12.9-inch, you also see secondary characters on the keys (when using optimized apps); just flick down on the key to type them.

- **Image B:** Hold a finger on a key to see alternate characters, and voilà – you can type "voilà!" You can also hold the $ sign, to get other currency symbols, or on the period when entering a web address in Safari to see other domains, such as .org.

MOVE THE INSERTION POINT

The traditional way to move the insertion point, or caret, around on iOS is to hold a finger on the text you were writing, and then use the magnifying glass pop-up to get it into the right place. That's a little awkward and prone to error around the edges of the screen, and there is a better way on iPad, and iPhones with 3D Touch (available on iPhone 6s or later).

On an iPad, you can slide two fingers around the keyboard to move the caret. Once you've moved it, lift your two fingers, set them down again, wait a beat, then move; you'll then be selecting text. On an iPhone with 3D Touch, press on the keyboard with one finger to switch to this mode, then slide your finger around.

On iPhones with 3D Touch, you have extra options for text selection, though they take some trial and error to learn. Once you've pressed firmly on the screen to move the caret, you can reposition the caret over a word and then press even harder to select just that word. That bit's easy enough, but with practise you can also double-press to select the whole sentence at once, or triple-press to select the whole paragraph.

- **Image C:** You can combine the two-finger and 3D Touch shortcuts with dragging. Let's say you have a three-sentence paragraph and want to copy only the first two sentences; press firmly to start moving the caret, position it anywhere over the first sentence, double-press to select that sentence, then drag to

GENIUS TIP

Made a mistake? You needn't reach for the Undo button to roll back your text; just shake your device, provided Settings > General > Accessibility > Shake to Undo is switched on.

GENIUS TIP

If you use multiple email addresses, text replacements can work out quicker for typing them than relying on the keyboard's QuickType suggestions bar. For example, you might use @icl to type your iCloud address, @gma for Gmail, and @lst for an alias you use for newsletters and other mailing lists.

the second, which will be selected in its entirety — though the paragraph's final sentence will be left out.

In either scenario, you can grab the little handles that appear at each end of your selected text to fine-tune what you're picking up, if necessary, and you can also tap either of these handles to bring up the options bar, with cut, copy, paste, and other options, if they aren't already visible.

CAPITALS AND SPECIAL CHARACTERS

Let's go back to something easier: switching to capital letters. This can be as simple as tapping Shift to switch only the very next character you type to uppercase, or double-tapping it to turn on Caps Lock. Note that you can use the same slide technique we mentioned for the "123" keyboard switch; slide from the Shift key to a letter and it will be capitalized without the need to dismiss the caps keyboard afterwards. iOS will try to be helpful in capitalizing new sentences, but if you don't like this, you can turn off Auto-Capitalization in Settings > General > Keyboard. Here there's also a toggle for the period shortcut, which enables you to double-tap the space bar to get a period, a space, and the next letter capitalized.

We mentioned holding a finger on some keys to get accented forms and alternative characters. On some iPads running iOS 11, keys may display a second character. Rather than using Shift or holding on the key, flick upwards from the key to type the second character more quickly. (Settings > General > Keyboards > Enable Key Flicks must be switched on.)

In iOS' Accessibility settings are helpful options to alter the sensitivity of the keyboard and 3D Touch.

Splitting the keyboard makes typing easier when holding your iPad, at least on smaller models.

KEYBOARD SIZE AND POSITION

There are a couple of things you can do to change the size and position of the keyboard.

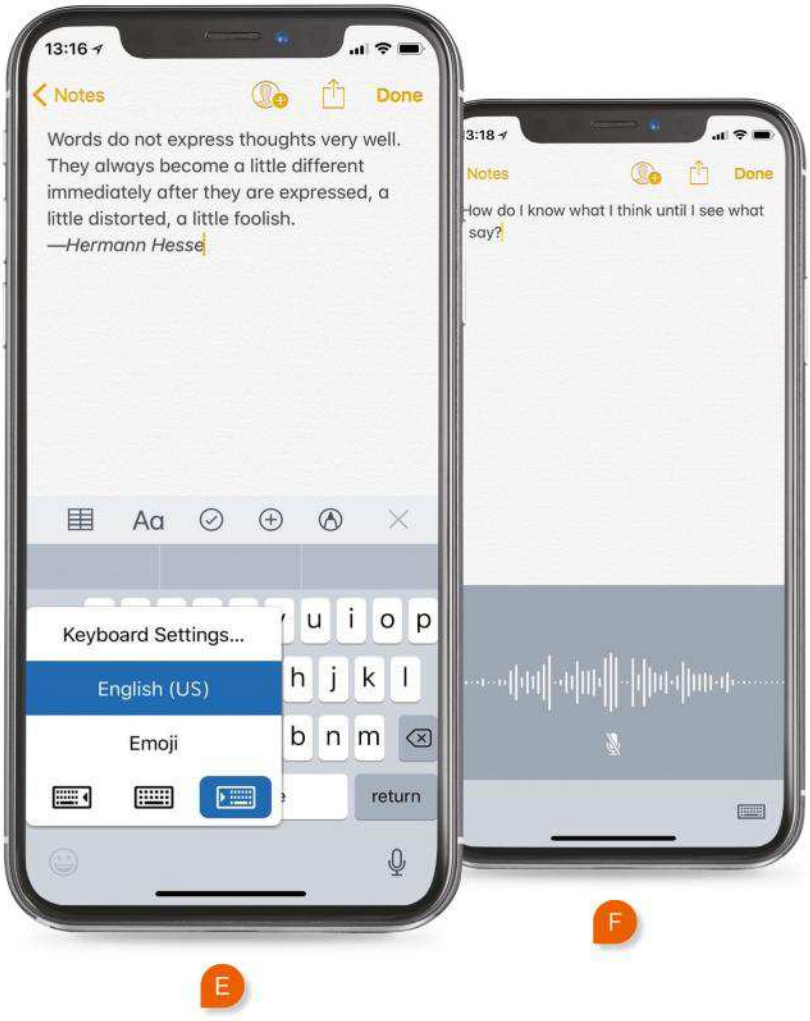
- **Image D:** On an iPad, either drag the left and right of the keyboard apart with your fingers, or hold a finger on the keyboard icon (bottom right) and tap Split in the menu that appears; this separates the keyboard at the sides of the screen so it's easier to type with your thumbs when holding your iPad. Adjust the keyboard's vertical position by dragging the icon at its bottom right. Drag all the way to the bottom to return to a single, large keyboard.
- **Image E:** On an iPhone running iOS 11, except for the 5s and SE, you can make the keyboard easier to use one-handed by holding on the emoji/globe icon (bottom left) and choosing to shunt the keyboard over to the left or right side of the screen. The keys become narrower, like on pre-iPhone 6 devices, but are easier to reach with your thumb.

Don't feel this has to be a permanent decision; it makes sense to toggle it when you're trying to type while walking, say, even moving from right to left as you swap hands, but then switching back to the full-width keyboard once you get where you're going. To do this, tap the large arrow next to the keyboard.

SPEED UP YOUR TYPING

iOS provides some very helpful ways to speed up what you type. Text replacement is a great one, with three common applications. First, to replace clusters of characters with short phrases (such as typing "omw" being replaced with "On my way!"), and even "correcting" weird iOS autocorrections. Second, to "type" characters that would otherwise require laborious searching/copying/pasting — to have "cprt" become ©, say.

The third major use is to type phrases or longer passages of text that you write often. For example, you might type "reply7" and have iOS replace that with paragraphs of text that are your standard response to a question you're frequently asked by email. Or, if you often search



Apple Support articles in Safari, set up a shortcut to replace "#spt" with "site:support.apple.com" so that you only get Google search results from that part of Apple's site. Set up text replacements in Settings > General > Keyboard > Text Replacement on iOS, or in Apple Menu > System Prefs Keyboard > Text on a Mac. Whichever device you do this on, your text replacements will sync to other devices signed in to the same iCloud account.

SAY YOUR WORDS

- **Image F:** Don't forget about dictation, which you'll find at the bottom of Settings > General > Keyboards. It works for English even when your device is offline, and though you might feel weird doing it in a shared office or classroom, it's highly accurate — and usually much faster than typing. You can even dictate punctuation and issue "commands," such as "period" and "new line." **CHRISTOPHER PHIN**

GENIUS TIP

If you find 3D Touch's sensitivity a little "off," adjust it to require a lighter or firmer press in Settings > General > Accessibilty > 3D Touch.

Master GarageBand's Alchemy synth

Create an energetic electronic bass line using an arpeggiator

REQUIRES
An iOS 11 device, GarageBand 2.3 or later

YOU WILL LEARN
How to use the Alchemy synth and arpeggiator

IT WILL TAKE
15 minutes

GARAGEBAND ALWAYS HAD a wide range of sounds, but the Alchemy synth's arrival has been transformative for Apple's music-making app. Camel Audio's Alchemy had long been regarded as one of the finest digital synths, and Apple's acquisition of it in 2015 was widely regarded as a wise move.

As expected, Apple quickly welded Alchemy to Logic Pro. What wasn't expected is that Apple squeezed its flagship synth into GarageBand for iOS, too. Sure, it's cut-down in terms of interface, but you still get plenty of dials and pads to experiment with.

In this tutorial, we'll continue making a ringtone (which we started in April's issue of *Mac|Life*, #140). You'll use Alchemy and GarageBand's arpeggiator to construct a bass line. The arpeggiator keeps things in time, so this will help to underpin your work.

Before we begin, we'll share two tips. First, be mindful of the bass sounds you use — too complex or effects-laden and they'll muddy a mix, especially for a ringtone. Secondly, if you've not followed previous installments of this GarageBand series, you might find Alchemy alone is enough for a minimal, old-school ringtone. If not, lay down a Drummer track before you start the walkthrough.

CRAIG GRANNELL

QUICK LOOK Sound manipulation with Alchemy

A TRANSFORM PAD
This touch surface enables you to manipulate the currently selected sound – even when playing live.

B SNAPSHOTS
The pad is divided into eight snapshots, each of which is effectively a distinct and unique preset.

C FRAMING BOX
The framing box is like a mixer. Drag it between snapshots and it combines them into something new.

D GYRO CONTROL
Use the gyro control to move the framing box by tilting your iOS device. You wouldn't do that with your Mac!

HOW TO Use Alchemy to record some bass

1 Choose instrument

Add a track to a song; tap Alchemy Synth in the Keyboard panel. Tap the default instrument (above the touch surface), pick Plucky Synth Bass, then Done. Set the keyboard behavior to Glissando and the octave to 0.

2 Set up keyboard

Tap the Keyboard button (above the keys, third from the right); select a size you're comfortable with. Turn off Velocity. Ensure you can see keys A2 to G3. If not, set the keyboard behavior to Scroll, drag, then change it back.

3 Play some notes

Tap/hold some notes to get a feel for the keyboard controls and the instrument. Experiment with dragging the framing box as you play to hear how it can dramatically change the feel and tone of the selected instrument.

4 Turn on arpeggiator

Tap Arpeggiator (second from right) and turn on Run. You can adjust the arpeggiator's note order, range and octave range. Hold down a key. Notice the sound alternate between that note and one an octave higher.

5 Set octave range

With the key still held down, tap the up arrow next to Octave Range, so it's set to 3. The arpeggiator will play across three octaves, which sounds a bit more interesting. Now it's time to get recording...

6 Record your bass

We'll use a progression that works with the world instruments used last issue (issue 141). Tap the red record button and then hold notes as follows: E3 (beat 1); C3 (3); A2 (4); G3 (5); F3 (7); D3 (8); A2 (8.5).

7 Make adjustments

If you find it tricky to get the timing of the changes right, tap the Settings menu (the spanner, top right) and adjust the tempo. Remember you can re-record your bass line as many times as you like until you're happy.

8 Experiment further

As Alchemy is a MIDI instrument, it records note data rather than rendered audio. This means you can play your recording and then change how it sounds by adjusting dials, pads, or using a new instrument.

9 Transpose notes

Tap the Track Settings button (three slider icon, top left). In Track Settings > Transposition, adjust the octave to make your bass higher or lower. Go up a level. Under Output, tap solo to listen back to your bass track.

Stay safe with Apple Watch

Keep a watchful eye on your health and safety with Apple's wearable

REQUIRES
An Apple Watch, an iPhone

YOU WILL LEARN
How to use and set up the emergency and heart-rate features on your Apple Watch

IT WILL TAKE
5 minutes

HAVING A COMPUTER strapped to your body at all times isn't just useful for making sure you don't miss alerts and easily setting timers when you're cooking. The Watch can really come through for you if there's an emergency.

The Emergency SOS feature is built in to watchOS, and we'll show you how easy it is to trigger a call to the emergency services when you need them. For most Watch models, your phone will need to be within range of your Watch, because your phone is what actually makes the call — however, you don't need to actually touch your phone. If you have a Watch Series 3 with 4G built in, you don't need your phone nearby, because the Watch can make the emergency call directly, even if you don't actually have a call plan for it.

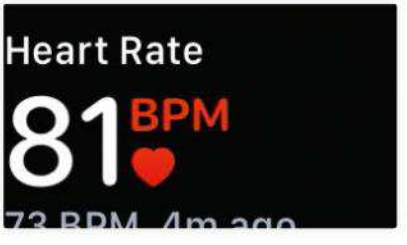
That's not the only way the Watch could help you in an emergency, though. If you set up some essential medical information in the Health app, emergency workers can access it from your Watch, which could be vital if you're unconscious. You can enter your allergies, blood type, medications, and more. We'll also show you how to set those details.

Of course, apart from being a communication device, the Watch is also a health monitor, so it may be able to help keep you healthy in more direct ways. Its heart rate monitor can keep a constant eye on your ticker (if you have a Watch Series 1 or later, it can keep track of your heart rate during rest or walking passively; on the first-generation Watch, it tracks your heart rate during a Workout, or when you open the Heart Rate app).

The heart rate monitor is accurate enough to potentially detect heart conditions, though it won't do that on its own! What it will do is warn you if things look iffy. You can set Watch to warn you if your heart rate is creeping worryingly high even though you're not exerting yourself. There are cases where people have used these warnings as a prompt to see their doctors, and been diagnosed with heart conditions as a result. Your Apple Watch really could save your life!

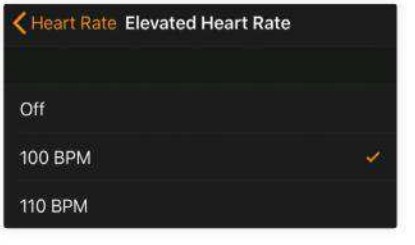
MATT BOLTON

HOW TO Keep an eye on your heart



1 Get a reading

Get a heart rate reading by opening the Heart Rate app on your Watch, and letting it do its thing! Or, you can add a complication that includes the latest reading to some watch faces. (Watch Series 1 or later.)



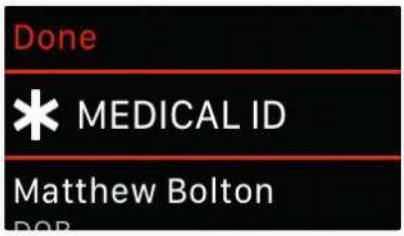
2 Heart warnings

On Watch Series 1 or later, go to the Watch app on your iPhone and tap Heart Rate. Here, tell your Watch to notify you if your heart rate goes above a certain level during a period of inactivity, which can be a bad sign.

3 Try Cardiogram

The free Cardiogram app from the App Store can use your Watch's heart rate data to give you useful info. Open the app on iPhone to see graphs of your activity, and see how your data compares to the average.

HOW TO Use the Medical ID feature



1 Set up iPhone

On your iPhone, open the Health app. Tap Medical ID in the bottom bar, then Edit at the top right. You can now enter useful information such as your age, blood type, and weight, and select emergency contacts.

2 Show when locked

At the top of the Medical ID editing screen, make sure "Show when locked" is turned on. This means someone who finds your phone can tap Emergency to see your details. This capability is also available on Watch.

3 Set up Watch

Press and hold the side button on your Watch (the long one). If you have set up your Medical ID, a slider labelled as such will be shown. Someone can slide it to access your medical info on your Watch's screen.

HOW TO Use Emergency SOS

1 How to use it

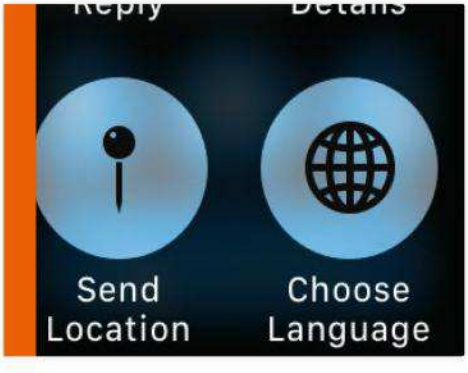
Press and hold the side button on your Watch. A screen with an Emergency SOS slider will appear – slide it to call local emergency services. On your iPhone, press the Sleep/Wake button five times for Emergency SOS.

2 Hold to Auto Call

In the Watch app, go to General › Emergency SOS. Make sure Hold to Auto Call is turned on; this means if you hold down the side button on your Watch, it will automatically start the emergency call – no sliding needed.

3 Notify contacts

When using Emergency SOS, once the call to the emergency services is done, your Watch will send all of your emergency contacts a text message saying you're in trouble, with your location attached.



› SHARING YOUR LOCATION

Let people keep track of you when you're at risk ›

Emergency SOS shares your location, but that's only after the authorities have been called. What if you're walking home late, or are worried a situation is going sideways, and want to make sure people know where you are? You can share your location in Messages on your Watch – in a conversation, press firmly on the screen, then tap Share Location. A more serious option is Wearsafe (requires in-app purchases, bit.ly/wearsafe) – you can press a button to instantly share your location and audio of what's going on with a network of trusted contacts.

RANDOM APPLE MEMORY

Intel transition

Adam Banks remembers when Apple swapped its own processors for industry-standard Intel chips

© Image courtesy of Apple

ON 6 JUNE 2005, Steve Jobs announced to the Worldwide Developers Conference (WWDC) that the Mac was abandoning the PowerPC processor line that Apple had been manufacturing in partnership with IBM and switching to the rival Intel chips used in Windows PCs. Amid much-discussed delays to the PowerPC 970, aka G5, the move wasn't entirely unexpected. But the decision came out of the blue, with Jobs revealing Mac OS X had secretly been tested on both platforms for years.

Despite the fractious relationship between Apple and IBM, PowerPC had given the Mac a new lease of life. In 1997, an Apple TV commercial showed Intel's Pentium II lumbering along on the back of a snail, contrasting its reputation as "the fastest chip in the world" with the PowerPC G3 – "up to twice as fast." In 1999, Apple hailed the Power Macintosh G4 as "the first personal computer classified as a weapon by the US Government." The claim, referring to a threshold for technology exports set 20 years earlier, was cheeky, but true.

So giving up on the G5 looked like snatching defeat from the jaws of victory. "I don't know that Apple's market share can survive another architecture shift," worried Insight 64 analyst Nathan Brookwood, echoing the views of many. In fact, the following decade saw Mac shipments grow steadily, while the PC market declined.

Whether sticking with PowerPC would have been better or worse, we'll never know. But a year later Jobs was able to report, again during WWDC, that the transition – aided by the introduction of "universal binaries," allowing developers to release apps that worked on both old and new machines – was "the best and smoothest in the whole history of the industry." This time, the analysts agreed.

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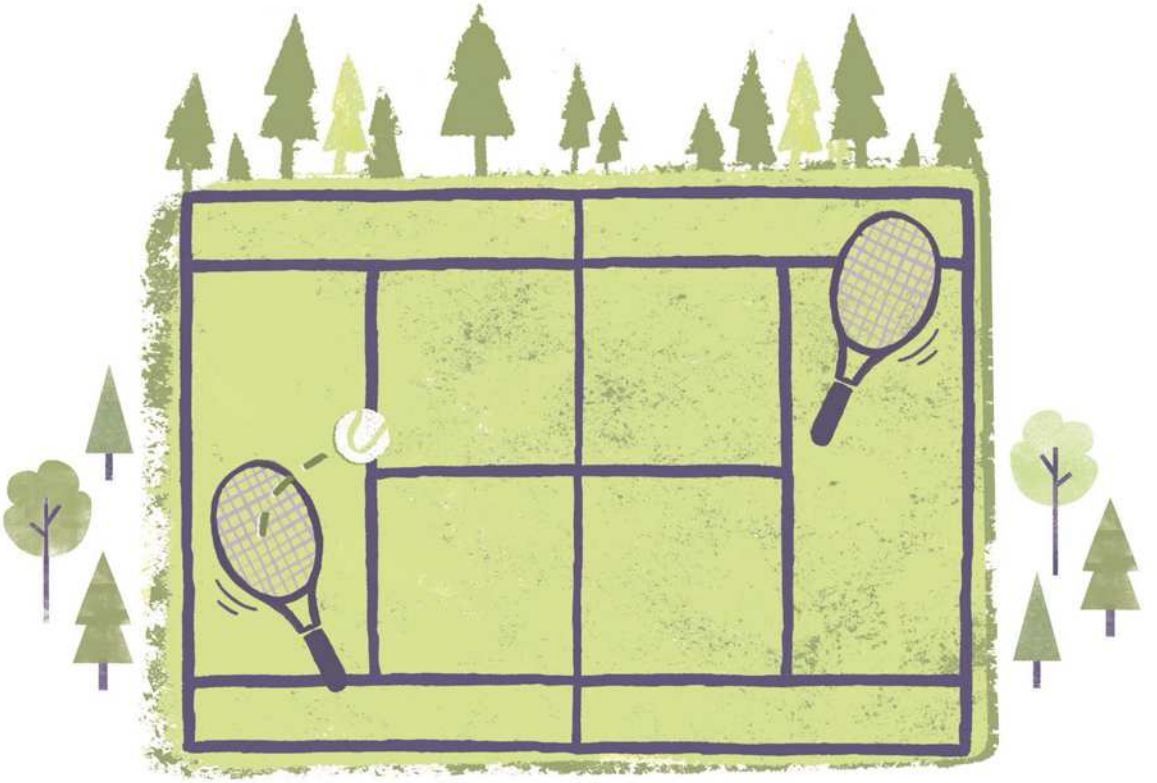

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