

FOUNDED MAY 1989
MEETINGS - SECOND
SATURDAY OF THE MONTH



FOCUS - HARDWARE & SECURITY

2020 CONSUMER ELECTRONIC SHOW

Our main presenters will be members Todd Peters and Fran Rabuck who will describe the best of the 2020 Consumer Electronic Show held in Las Vegas in January 2020. They will tell us about the breakthrough technologies for the next generation of innovations for the marketplace. CES has been providing the forum for innovators to introduce their hottest and newest tech gadgets for 50 years.

Todd R. Peters (upper photo) is a dynamic IT Leader with vast experience integrating IT security and emerging technologies. He is business focused with proven track record of "delivering the results". He is skilled at managing vendors and contracts, in particular cloud services.

Francis (Fran) Rabuck (lower photo) is a technology evangelist, explorer and trail blazer. He discovers trends, connects people, beta-tests things and then builds early prototypes of a mashup of ideas. He shares his findings in the classroom, workshops, presentations, articles and keynotes at a variety of international conferences. Fran is currently the Chief Strategy Officer for Agile Handover.



Meeting Canceled

MARCH LOCATION

WE WILL MEET AT LUDINGTON LIBRARY IN BRYN MAWR. IT'S AT THE CORNER OF LANCASTER AND BRYN MAWR AVENUES, NEAR THE BRYN MAWR TRAIN STATION. GO TO MLMUG.ORG FOR MAPS.

SOME WEBSITES

Netflix Secret Codes: How to Find and Watch Hidden Movies. Amazing what movies are available if you use these hidden codes. bit.ly/2lqgYnH.

The 4 Best Smartphone Tripods of 2020. If you think a tripod might be useful, this article's for you. bit.ly/2we7wRO.

How to Fix a Slow iPad. Lots of good idea for actions to take when you have the problem. And most don't take much time or expertise. bit.ly/39hOiJK.

Apps are selling your location data. The U.S. government is buying. It's impossible to avoid roping in U.S. citizens when information is requisitioned at a massive volume. So what can we do? wapo.st/2x61cMs.

How to set up and use Apple Pay. Great YouTube video explaining how to do it. bit.ly/38pzeZd. Using Apple Pay Cash, see cnet.co/2TBIFAA.

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MLMUG Journal is published monthly by the Main Line Macintosh Users Group and is available online. It is produced using Apple Pages with a Helvetica Neue font (Same as Yosemite).

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**Apple
User Group**

Membership Information

Membership dues are \$30 for individuals and \$40 for families. Memberships are based on your anniversary date, which is the month you joined. You will be e-mailed reminders when membership fee is due.

If you're just visiting to check us out, or if you've been visiting for some time, but haven't joined, consider these **BENEFITS OF MEMBERSHIP**:

- **Monthly meetings**, where you can learn, share, and meet everyone from working Mac professionals to new Mac users from all backgrounds.
- **Monthly newsletter**, which is full of interesting Mac news, tips, and information.
- Useful free items at the monthly **Raffles**.
- **Discounts**. Vendors offer special prices to User Group members.
- **Web Site** with 2-3 years of MLMUG newsletters, meeting information, a member directory, directions to our meetings, and much more! Our web site is www.mlmutg.org.
- **MLMUG Mailing List**, to post technical questions or comments to each other and the experts within the group.
- **Reviewers** keep items reviewed.

Are you ready to join? Please make a check payable to MLMUG and bring it to a monthly meeting or mail it to:

Treasurer, MLMUG

P.O. Box 1374

Southeastern, PA 19399

Typical Meeting Agenda

9:00 - 9:05: Call to order in main meeting room.

9:05 - 10:15: Q&A Panel - 3 or 4 expert members will answer your questions about anything relating to your Mac, iPad, iPhone, iWatch, and any attached peripherals.

Questions can relate to the most basic items, equipment issues, Apple's operating systems, and all applications, including applications for photo, video, audio, and print media.

Answers are amazingly helpful and often in depth, exploring the subject beyond the question.

10:15 - 10:30: Welcome and other business.

10:30 - 11:50: Main Presentation (by a member or guest)

11:50 - Noon: Raffles and silent auctions.

Come join some fellow MLMUG members for lunch after the meeting at a nearby restaurant.

MLMUG Email list

The Main Line Macintosh Users Group has its own email list, hosted at [Groups.io](https://groups.io). Compose your letter and email it to MLMUG@groups.io and your message will be sent to everyone on the mailing list. Contact Bob Barton (barton@bee.net) if you are a member and you are not on the list.

Please observe good email etiquette. If your message is humor or not Apple-related (off-topic), please include "Humor" or "OT" in the subject line. The [Groups.io](https://groups.io) Terms of Service are at groups.io/static/tos. Look for the section on "Conditions of Use"

The MLMUG list may be used to post Apple-related items for sale, but any solicitation of members through the list is forbidden without the written consent of a MLMUG officer. Violation of the [Groups.io](https://groups.io) terms of service or good email etiquette may result in removal from the list.

New Users SIG

You don't have to wait a whole month to get answers to your basic Mac questions! Get together with other members on the fourth Saturday (i.e., two weeks after each regular meeting) for the Startup Folder Lite.

Many new users have said that they can learn much more from face-to-face meetings than they do from manuals or other sources. That's what this meeting is all about. Go to www.mlmug.org/nusfl.html for details.



Bookmarks

By Mark Bazrod

USING THE KINDLE APP

The Kindle app has many unique features that make it the most versatile and simple Internet-based book acquisition and reading application. I think it's generally better than reading paper books.

With a Kindle or a Kindle app you can download and read more than 6 million eBooks, newspapers, magazines, blogs and other digital media using wireless networking.

One big advantage of the Kindle app is that it will automatically synchronize your Kindle app with all your devices. You can start on one device and continue on another device at the same place you left off.

You only need a Kindle or a device with an internet connection, an Amazon account, and a credit or debit card to pay for new content.

Getting Started

1. Download Kindle app - Go to the App Store for iPad or iPhone and Mac App Store for Mac. Use the search feature to find the Kindle app. Tap "Get" button.
2. Register the Kindle app with your Amazon account by entering your email address and Amazon password.

The very first time you open the Kindle app, you're prompted to log in with your Amazon.com username and password. You're then taken to your usual Home screen. Any items you previously purchased and downloaded for the Kindle are stored in the

Library area. Click that area, and then click the item you want to download to your device.

The Bottom Menu

The overall guide for the Kindle is the Bottom Menu - Home, Library, Current Book, Discover, and More. To go from one to another, tap the desired symbol at the bottom.

In Home, you see the various sections - From Your Library, Based On Your Reading, Most Read Non-Fiction Books On Amazon Charts, Trending This Month, More Like Your Recent Books, Recommended For You, Best Sellers in Kindle Store. You can see more of each category by tapping See All.

In Library, you see ALL your books or just the DOWNLOADED books.

In Discover, you see several items at the top being pushed - Recommended For You; Book Categories; Prime Reading; Newsstand (magazines); Best Of The Month (58 titles); and Amazon Charts - The week's Top 20 Most Sold (Fiction or Nonfiction) or Most Read Books (Fiction or Nonfiction). You can try most books with a free sample straight from the Kindle app.

In More, you see Join The Goodreads Community (see what your friends are reading and discover new books with many others); Reading insights (your stats); Audible Companions (audible books for Kindle books in your library); Sync, Settings (many, many with other), And Help (including how to switch from turning pages to continuous scrolling). Also available by tapping the page and tapping < at the top left of page.

Using The Kindle App

Turning pages is easy. You simply swipe the screen to turn the page.

You can't get new books in the Kindle app. You only can get samples in Discover or Library. It's due to Amazon's maddening license restrictions.

To get new books you need to go to amazon.com and select Kindle Store from drop down menu at the top. Now return to the Kindle app and you should see the new purchase in your library. (If not, tap Menu and then Sync to update the library.) However, Bob Barton informs me the Android version is different. It takes you directly to the Kindle Store so you can buy the selected book.

To get more than 2 million free books, search Amazon.co.uk for 'Free Kindle books'.

To close a book, tap the screen, tap the hamburger menu at the top, & tap Close Book. This gets you back to Library screen.

A lot more info - The Ultimate Guide To Using Kindle App For iPad and iPhone. bit.ly/39hX7Ug. Extensive, but very long.

I found negotiating around can be a bit confusing until you get used to the app.

Organize Your Books

Over time, your ebook library can grow into an unruly, unmanageable mess. Just keeping the books you've already read separated from those you haven't can prove challenging.

Collections to the rescue. This is the Kindle app's version of folders, a simple way to catalog books in your library. For example, you might create one collection called "Read" and another called "Unread." Now, whenever you buy a new book, you immediately add it to the latter collection. When you're done, you move it to the former.

To create a new collection, start at the Library screen. Tap the Menu icon followed by Collections. Now tap the plus sign in the upper-right corner, assign a name to your collection and tap Create. Now tap the covers of any items you want to add.

Books can be assigned to multiple collections; nothing is actually being moved into folders. It's similar to tagging.

Go Beyond Paper

You can customize your text size, font type, text alignment, background color and continuous scrolling or not. Tap on the page of book you are reading, tap on the Aa menu at the top, and choose what you want.

Look up words you don't know and characters and places you can't remember. Look up with the built-in dictionary, X-Ray, Wikipedia lookup, instant translations, and search within your book. Tap and hold a word to view its definition, or use the Google and Wikipedia links to get more information.

Track your reading progress by tapping near the bottom. See what percent of the book you've read, pages read, and total pages. Bookmark places you want to revisit, make highlights, and take notes int your book. Tap on the current page, tap the letter icon at the top to open My Notebook to see all your bookmarks, highlights and notes.

When you're reading a book, the Kindle app will automatically sync where you left off, so you can start reading on one device and pick up where you left off on another.

Some Extras

Kindle Unlimited - For \$10 a month, you can join Kindle Unlimited and have unlimited reading and listening to over 1 million books, thousands of audiobooks, and current magazines. A 30-day free trial is available.

Amazon Prime - Amazon Prime members have access to over 1,000 books, magazines, comics, and more. Each month they get free magazines and one of a dozen yet-to-be-released books.

February 8, 2020 Meeting Minutes

By Mark Bazrod, Secretary

Maria Arguello, our President, opened the MLMUG meeting at about 9:15 AM at the Ludington Library in Bryn Mawr. There were about 25 attendees.

Q & A Panel - Bob Barton, Nick Iacona, Mike Inskip, and Adam Rice. (And thanks to the Panel for reviewing the draft of the Minutes and correcting it.)

Q. Maria A. asked about experience with recent OS updates.

A. Two members had installed recent updates to Mojave and Catalina. Neither had any problems. You should always install security updates as soon as possible for the latest protection.

Q. Mark B. asked the panel to explain long file names of perhaps 40 characters, just letters and numbers, which he had found when using CleanMyMac.

A. They primarily come from caches for information on web sites you have visited, attachments to emails, and also simply by using the Mac itself. For example, for Safari, go to `~/Library/Caches/com.apple.safari/` and in a subfolder you may see cache files (including the long files) from Safari (depending on which version of macOS you are using). Developers sometimes use long file names so malware will be less likely to locate the files. Most of these files are small, but some were more than 1 GB according to Mark.

You can no longer go into the browser and set the size of the cache. It's easy to remove cached files - use Onyx, a free maintenance utility. Caches have images from webpages and some other data. History files are small and really not worth deleting. Cookies are also small, but individual ones can be deleted if you prefer. Normally, don't be concerned with caches, cookies and history.

For Safari, go to *Safari Preferences > Privacy > Manage Website Data* to see sites which have stored cache, cookies and other items. You can remove the data from all or selected sites.

If you hold down the shift key with the refresh button near the top, you will a complete refresh of the webpage.

If you clear your caches on one device, you may close caches on other devices if Safari Syncing within a user's Apple ID iCloud account's settings is enabled on multiple devices. Some open pages may disappear.

Q. Linda M. asked what are the pros and cons of VPNs (virtual private networks).

A. They were originally for large organizations so you could securely connect from home. Now it's also for security and privacy. But if you use a VPN, you better trust the VPN provider. That at least means they have been in business for some time and charge a subscription fee. Don't go for a new provider who is trying to get customers by offering free service. Go to krebsssecurity.com to see reviews of VPN providers. Also, you can go to thatoneprivacysite.net and look at Simple VPN Comparison for a detailed guide to Choosing A VPN or charts comparing VPN services.

ISPs can monitor internet use and there aren't any regulations about what they can do. So some users use VPNs so that ISPs can't monitor their use.

Maria A. said she has used hide.me for VPN service since 2012. It costs only \$10 per month and has great tech support. Proton is known for its encrypted email product and provides excellent VPN services. \$40-\$80 year is reasonable. If services are free, they are supported by ads or something behind the scenes to monetize the service.

Q. and A. The Onyx free app is excellent for maintenance. You can tailor what you want Onyx to do. However, Mac OSs have

gotten much better at self-maintenance so some suggest that the average user only needs to use Onyx if there is a problem.

A. (No Q.) Uninstall Flash player! It's easy. Too much malware comes thru it. Go to helpx.adobe.com/flash-player/kb/uninstall-flash-player-mac-os.html.

Xfinity streaming requires flash. It's safer to use the Chrome browser than Safari or Firefox when you need to use Flash Player because it is automatically updated with the browser and sandboxed so it's more secure.

Main Presentation - Safe-Driving Cars by Mark Bazrod

Self-driving cars are here, many more are coming, and the only question is how soon they will be 50% of cars sold.

There have been a few deaths, there will be some more, but some deaths didn't stop the development of airplanes, cars or helicopters.

Self-driving cars are being developed because many humans are not great drivers (40,000+ annual U.S. deaths, 1.6 million+ annual international deaths, human error causes nearly 95% of crashes) and it's a great moneymaking opportunity.

The first truly hands-off, self-driving car may be here by 2022 and fully autonomous cars without steering wheels or gas and brake pedals may be here by 2027 - 2032. But car companies were and are too optimistic so we'll see.

A self-driving car is basically a computer with an engine and wheels. It is a vehicle that is capable of sensing its environment and moving with little or no human input. Self-driving cars contain many sensors to perceive their surroundings, such as cameras, radar, Lidar, sonar, GPS, and odometry and inertial measurement units.

Self-driving cars depend on machine learning AI. The world is too complex for programmed rules. Cars must learn from experience

and figure out how to navigate on their own. But in Singapore, the system was confused by guy crossing street in chicken suit.

The Society of Automotive Engineers in 2014 defined 6 levels of self-driving.

Level 0 cars rely on the driver to drive: accelerate, steer, and brake. They may have features that warn the driver to take corrective action.

Level 1 cars have some small speed or steering tasks. Where Level 0 features just warned, Level 1 cars act.

Level 2 cars, at the least, handle steering, as well as automatic throttle control and braking. They might also change lanes automatically when requested, or abort a lane change if another car moves into the blind spot. But a Level 2 car cannot handle many common conditions such as a car just ahead changing into your lane, sharp curves, or hard braking by the car ahead.

For Levels 0, 1 and 2, the human driver monitors the driving environment. For levels 3, 4 and 5, it's the automated driving system which does it.

Level 3 is real automation, but with conditions. The system will control the car in many situations. The car will return control to the driver if the autonomous system fails or if it encounters a situation it can't handle.

Level 4 cars are almost completely autonomous. The driver doesn't need to interact with the car while it drives itself. If something goes wrong, the car will automatically slow down, pull off the road if possible, engage the four-way flashers, and call for help if it has onboard telematics.

A Level 4 might not be able to navigate unmapped areas or venture into storms that block machine vision and obscure pavement markings. But most of the time the driver is a passenger in a Level 4 car.

Level 5 cars are autonomous under all circumstances. They can go anywhere it's possible to drive a car. They will operate in snow and ice and on roads with worn-out pavement markings.

Driver controls on a Level 5 car would be unlikely, since it's meant to be autonomous all the time. The front seat might face the back seat.

The History. The first truly automated car was developed in **1977** in Japan. Carnegie Mellon University's car drove 2,848 miles across America in **1995**, 98% of it autonomously.

In October 2018, Waymo stated that its test vehicles had traveled in automated mode for over 10 million miles, increasing by about a million miles per month.

In 2019 1Q, about 7% of new US cars were self-driving. That's 200,000 cars, 3 times over 2018. Most were Toyota & Nissan.

Many companies are working on self-driving cars. Tesla and Waymo (Google) are the leaders. Google started in 2009. Others include Toyota, Nissan, Volvo, Ford, Cadillac Audi, BMW, Mercedes, Jaguar, Apple, IBM, Intel and more than 50 companies are building AI-based software for self-driving cars.

Tesla cars have 8 cameras providing 360 degrees of visibility around the car at up to 750 feet; 12 ultrasonic sensors; a forward-facing radar can see through heavy rain, fog, dust and even the car ahead; and a high speed computer on a neural network.

Tesla says new Tesla cars have the hardware needed for full self-driving in almost all circumstances. The system is designed to be able to conduct short and long distance trips with no action required by the person in the driver's seat.

As new self-driving capabilities are introduced, the Tesla is continuously upgraded through over-the-air software updates.

A Tesla 3 self-drove LA to New York in 50 hours in January 2018. It spent only \$100 in charging. Tesla sold 368,00 cars in 2019, more than in the prior 2 years combined.

Waymo (a subsidiary of Google) cars perform much better than any other self-driving system, but have many fewer miles driven in the real world than Tesla and other self-driving car makers. Waymo tests its software to simulate thousands of scenarios to probe the car's capability. Its simulated world has logged 1,000 times more miles than actual cars. Waymo in December 2018 launched a limited 24-hour taxi service in Phoenix. Often no driver! tcrn.ch/2tqN6UC.

Testing. Testing cars is done in closed tracks, on public roads, and in computer simulations.

Technologically, we are 85% to 90% of the way to perfecting hardware, guidance systems, and software needed for Level 5 cars. But the final steps will not be easy.

Are we using customer drivers as test subjects? Tesla is rolling out self-driving features to its cars incrementally, saying "It would be morally wrong to withhold functionalities that improve safety". Waymo is conservative, saying self-driving cars shouldn't be sold until human action isn't required at all. Other companies fall somewhere in the middle.

Tesla collects more than 5.5 million miles of data per day. For comparison, Waymo has the next most data with about 10 million miles driven in its lifetime, i.e., in 2 days, Tesla acquires more data from its cars than Waymo has in its lifetime.

Legislation. As of late 2019, about 43 states and DC have laws or executive orders regarding self-driving cars; Congress is still trying to pass legislation; and at least the UK, France, Switzerland, Hungary, and Singapore allow testing on public roads.

Incidents. Unfortunately, fatalities with self-driving software will always occur, just as with human drivers. The most common accident involving self-driving cars is getting hit from the rear.

The first fatal crash of a Tesla with Autopilot occurred in China in 2016. For Tesla cars, the crash rate dropped by 40% after Autopilot was installed. As of early 2016, Google test cars had been involved in 14 collisions, of which other drivers were at fault 13 times and the car's software caused a crash 1 time.

Technological obstacles. AI is not yet able to function properly in chaotic inner-city or developing country environments, e.g., India or Vietnam; a car's computer could be compromised; bugs and flaws in complex software systems; susceptibility of the car's sensing and navigation systems to different types of weather; avoidance of large animals requires recognition and tracking; and competition for the radio spectrum needed for the cars' communication.

Sensor Technology. What combination of sensors creates the best balance of capability, complexity, and cost? Radar can calculate speed and distance, but can't distinguish between a living thing or a rock, or whether a traffic light is red or green. Lidar creates a 3D map and gives the car depth perception, but it can cost as much as \$7,500 per car and it can be easily fooled by rain and snow.

Mapping. GPS systems can pinpoint locations of phones and cars to within 2 meters roughly 95% of the time. That's not good enough to let the car drive on its own.

Software. Either program in every possible eventuality (impossible) or teach a vehicle to learn and think for itself (machine learning).

More obstacles. Government over or under regulation, uncertainty about future regulation, whether one federal or 50 state regulation, and consistent international regulation; Resistance by individuals to losing control; safety concerns; human and self-driving cars sharing the roads for a long time; the

available computer talent pool has not grown with demand; structure and pricing of insurance; hype by the self-driving industry; and cars have to determine the intentions of pedestrians, bicyclists, animals, and other self-driving vehicles.

Potential advantages. Elimination of 90% of all U.S. auto accidents; improved mobility for the young, the elderly, and people with disabilities; reduced labor costs; and elimination of driving while distracted, texting, or intoxicated,

Disadvantages. Loss of driving-related jobs in trucking, taxis, public transit, crash repair shops, and the insurance industry; more loss of privacy; terrorist attacks (self-driving cars could be loaded with explosives and used as bombs).

Public opinion. Men feel less anxiety towards self-driving cars, whereas women show the exact opposite.

Ethical issues. What action should the car take in an unavoidable crash - kill its own passengers or nearby pedestrians? See [The Moral Machine Experiment](#). How could these be translated into software code? The practical difficulties may present as much of a challenge as the theoretical abstractions.

Liability issues. The car manufacturers responsible for those crashes that occur due to a technical malfunction or misconstruction? Those using or owning the vehicle since they know the risks involved in using such a vehicle? Software companies and engineers that programmed the AI code?

Conclusions.

The number of accidents and deaths will start dropping as self-driving cars are sold in greater numbers.

Most of the hardware technological problems have been solved.

Many cars today have some self-driving car features, like automatic braking.

Cars with Level 2 features are now available.

Cars with Level 3 or 4 features may will be available within 2 or 3 years.

Cars with Level 5 are at least 5 to 10 years away.

Most cars will be in developed countries. China is a large unknown.

Concerns about the safety of self-driving cars will probably limit growth, possibly to a large degree.

How cars will handle difficult ethical situations is a major conceptual and practical problem and could easily limit growth.

Legal and insurance issues don't seem that important.

Customer drivers will continue to be used as test subjects.

**SPEAKER ROSTER FOR
MLMUG'S 2020 MEETINGS**

January 11`	Bob Barton - 3D Printing
February 8	Mark Bazrod - Self-Driving Cars
March 14	Todd Peters & Fran Rabuck - 2020 CES (Consumer Electronics Show)
April 11	Bob Barton - Free Office Suites
May 9	Ira Cooperman - The U.S. Intel Community & America's Security
June 9	Picnic
July	Recess - Summer
August	Recess - Summer
September 12	TBA
October 10	TBA
November 14	Bob "Dr. Mac" LeVitus - TBA
December 12	Pot Luck Brunch, Members' Show & Tell, & Election of Officers

SOME SPEAKER ROSTER DETAILS

January 11 - Bob Barton - Long time MLMUG member, presenter, Newer Users SIG Co-Chair, & Webmaster

February 8 - Mark Bazrod - Long time MLMUG member, presenter, and Newsletter Editor.

March 14 - Fran Rabuck - Technology/Strategy Research Analyst, Visionary Communicator and Futurist

Todd Peters - IT Leader with vast experience integrating IT security and emerging technologies.

April 11 - Bob Barton - Long time MLMUG member, presenter, Newer Users SIG Co-Chair, & Webmaster

May 9 - Ira Cooperman - Lecturer, intelligence analyst, Air Force veteran, newspaperman, and teacher.

June 13 - Picnic - Valley Creek Park, Route 29, East Whiteland

September 12 - .TBA

October 10 - TBA

November 14 - Bob "Dr. Mac" LeVitus - a leading expert Apple products and software. Has written or co-written more than 85 popular computer books. Known for his trademark humorous style and unerring ability to translate "techie" jargon into usable and fun advice for regular folks.

December 12 - Pot Luck Buffet, Member's Show and Tell, and Election of Officers for 2021 - An opportunity to enjoy friends, and good food, A "Show and Tell" session will allow members 5, 10, or 15

Tom Nelson posted the following article to lifewire.com on November 12, 2019. bit.ly/30QtYL8 .© About, Inc. He is a consultant and writer providing Macintosh training, advice, and support. He has written hundreds of articles, tutorials, and product reviews.

What You Should Know Before You Buy an iMac

Is an iMac the right computer for you?

By Tom Nelson

The [Apple iMac](#) is a superb desktop computer that combines the power of the seventh-generation Intel i5 or i7 [core processor](#) with your choice of a 21.5-inch or 27-inch display, plus a large helping of Apple's [well-deserved reputation for style](#). The result is a gorgeous, all-in-one desktop Mac that has been setting industry trends since its debut in 1998.

Every [all-in-one computer](#) requires at least a few tradeoffs. Before you decide that an iMac would look stunning on your desk, let's take a closer look at some of the tradeoffs and see whether an iMac is a good fit for your needs.

Expandability or the Lack Thereof

The iMac's design limits the [types of expansion](#) that end users can perform, but that's not necessarily a bad thing. This design decision allowed Apple to devise a great-looking, compact machine that has all the features many individuals will ever need.

The iMac was created for individuals who spend most of their time working with computer software, and little or no time tweaking hardware. This is an important distinction, particularly if you enjoy fiddling with hardware more than you realize. But if you just want to get the work done (and have a little fun), the iMac can deliver.

Expandable RAM

The iMac may not be particularly flexible when it comes to user-configurable hardware, but depending on the model, the iMac can have no user-accessible [RAM](#) slots, two user-accessible RAM slots, or four user-accessible RAM slots.

The recent versions of the 21.5-inch iMac dropped user-accessible RAM slots in favor of either internal slots that would require complete disassembly of the iMac to change RAM, a very difficult task, or RAM that is directly soldered to the iMac's motherboard. If you're considering the 21.5-inch iMac, you may want to order the computer with more RAM than the standard configuration since you won't be able to upgrade the RAM at a later date, at least not easily in most cases.

The 27-inch iMac, regardless of the model, still has four user-accessible RAM slots, allowing you to expand the RAM yourself. Apple even provides detailed instructions on how to [access the RAM slots and install new RAM modules](#).

And no, you're not stuck buying RAM from Apple; you can buy RAM from many different third-party suppliers. Just make sure the RAM you purchase meets the iMac's RAM specifications.

If you're considering purchasing a new 27-inch iMac, consider buying the iMac configured with just the minimum RAM, and then [upgrading the RAM yourself](#). You can save a nice chunk of change this way, which can leave you some cash for buying apps or peripherals you may need.

The 27-inch iMac Pro is the newest model of the iMac, released in December 2017. The iMac Pro boasts impressive specifications including up to 18 processors cores, RAM upgradable to a ridiculous 128GB, a Radeon Pro Vega designated (up to 16GB) [video card](#), and a choice of a 1TB, 2TB, or 4TB [solid-state drive](#). The iMac Pro does not have any RAM access panels, but with the base model coming with 32GB; and the intended users of the iMac Pro usually knowing their usage before [shopping for a new computer](#), there isn't much need for it.

Display: Size and Type

The iMac is available in two display sizes, and displays in two different resolutions. Before we take a look at [Retina](#) or standard displays, let's start with the question of size.

It's often said that bigger is better. When it comes to iMac displays, at least, this is certainly true. Available in 21.5-inch and 27-inch versions, both iMac displays perform well, using [IPS](#) LCD panels with LED backlighting. This combination provides a wide viewing angle, a large contrast range, and very good color fidelity.

The only possible downside to the iMac's display is that it's only offered in a glossy configuration; no matte display option is available. The glossy display produces deeper blacks and more vibrant colors, but at the possible cost of glare.

Thankfully, new iMacs, especially those using the Retina display, come equipped with an anti-glare coating that really helps keep glare at bay.

Display: Retina or Standard?

Apple currently offers the iMac with two display types for each size. The 21.5-inch iMac comes with either a standard 21.5-inch display using 1920x1080 resolution, or a [21.5-inch Retina 4K display](#) with a 4096x2304 resolution.

The 27-inch iMac is only available with a 27-inch Retina 5K display using a 5120x2880 resolution. Early versions of the 27-inch iMac also had a standard display available at 2560x1440 resolution, but all recent models make use of the higher resolution Retina 5K display.

Apple defines Retina displays as having a high enough pixel density that a person is unable to see individual pixels at a normal viewing distance. So, what is a normal viewing distance? When Apple unveiled the first Retina display, Steve Jobs said a normal viewing distance was about 12-inches. Of course, he was referring to the iPhone 4. It's hard to imagine trying to work at a

12-inch distance from a 27-inch iMac. The average working distance from a 27-inch iMac is more along the lines of 22 inches or more. At that distance, you can't see individual pixels, resulting in one of the best-looking displays you've ever seen.

Besides the pixel density, Apple has gone to great effort to ensure the Retina displays have a wide color gamut, meeting or exceeding the DCI-P3 [gamut range](#). If you worry about color space, then the iMac's Retina display is an excellent choice. It may not match high-end color monitors, but remember, when you buy an iMac, you're getting a Mac computer and a display for less than the cost of some 5K monitors by themselves.

Storage: Bigger, Faster, or Both?

For the iMac, the answer is it depends on the type of storage. Baseline versions of the 21.5-inch iMacs come equipped with a 5400 RPM 1TB hard drive while the 27-inch iMac makes use of a 1TB Fusion drive as its baseline. The iMac Pro starts off with a 1TB SSD.

From there, you can [step up to a Fusion drive](#), which combines a small PCIe flash storage drive with a 1, 2, or 3 TB 7200 RPM hard drive. The Fusion drive gives you the best of both worlds because it's able to offer better speed than just a hard drive, and much larger storage space than most SSDs.

If the Fusion drives don't meet your needs, and speed is what you need, then all of the iMac models can be configured with [PCIe-based](#) flash storage systems, from 256GB through 2TB.

Remember, you won't be able to easily change the internal hard drive later, so pick the configuration you can comfortably afford. If cost is really an issue, don't feel you have to blow the budget upfront. You can always add an [external hard drive](#) later, although that somewhat defeats the purpose of an all-in-one computer.

The iMac models provide for external expansion using [Thunderbolt 2](#) and [USB 3](#) ports.

Graphics Processor Options

The iMac's graphics have come a long way since the earlier models. Apple tends to vacillate between AMD Radeon graphics, NVIDIA-based graphics, and Intel integrated GPUs.

Current models of the 27-inch Retina iMacs make use of AMD Radeon Pro 570, 575, and 580. The 21.5-inch iMac uses Intel Iris Graphics 640 or Radeon Pro 555, 560. And the iMac Pro gives users the option of the Radeon Pro Vega 56 with 8GB of HBM2 memory or the Radeon Pro Vega 64 with 16GB of HBM2 memory.

While the Intel graphics options are good enough performers, the AMD Radeon discrete graphics are a much better choice for those who [work professionally with video](#) and photos. They also offer a good deal more performance when you need to take a break and play a few games.

A word of caution: Even though we mentioned that some iMac models make use of discrete graphics, that doesn't mean you can update or replace the graphics. The graphics, while using discrete components dedicated to graphics, are still part of the iMac's motherboard design, and aren't off-the-shelf graphics cards that can be purchased from third parties. You can't upgrade the graphics at a later date.

So, What Are the Advantages of an iMac?

The iMac offers many advantages over traditional desktops. Aside from an obviously smaller footprint, the iMac also has a very good quality, large, widescreen display that could easily cost anywhere from \$300 to \$2,500 if purchased as an equivalent standalone [LCD](#) display.

The iMac comes bundled with some of the same attractive and useful hardware and software that comes with a Mac Pro. The iMac ships with a built-in iSight camera and microphone, built-in stereo speakers, a Bluetooth keyboard, and a [Magic Mouse 2](#).

Is an iMac Right for You?

The iMac is a great computer, one that is a solid choice for most individuals. The built-in display is wonderful. And let's face it: The iMac's form factor is without a doubt one of the sleekest and best available for a [desktop computer](#).

Despite its obvious appeal, the iMac, at least in its base configurations, is probably a poor choice for advanced graphics and video professionals, who need more robust graphics than is available in the entry-level iMac. Graphics and video pros are also better served by more RAM expandability and more drive storage options, features that make the 27-inch iMac and the [Mac Pro](#) a better choice for their needs.

On the other hand, the iMac, especially those with a Retina display, may be just the right choice for any pro or amateur photographer, video editor, audio editor, or just plain multimedia junkie who is looking for outstanding performance without breaking the bank.

Jesus Diaz posted the following article to [tomsguide.com](#) on February 7, 2020. [bit.ly/2latx6s](#). © A Purch Company. Formerly at Gizmodo, he's a creative director, screenwriter, and producer at The Magic Sauce and currently writes for Fast Company and Tom's Guide.

This Is What The Next-Gen iMac May Look Like

By Jesus Diaz

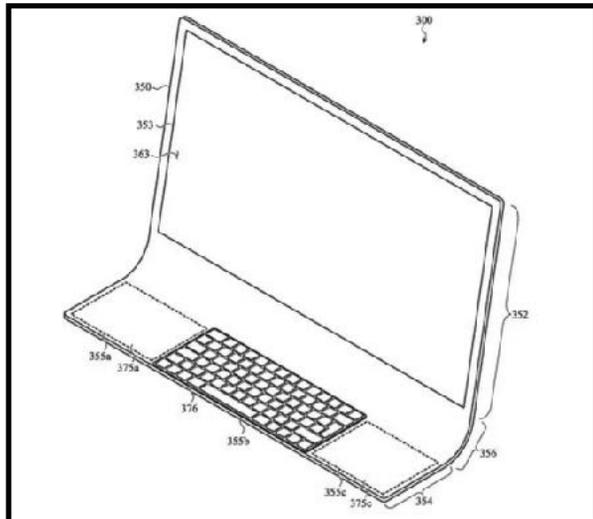
Here is all my money!

Apple hasn't updated the basic iMac design in 16 years, when it first introduced the aluminum base with "floating" screen

structure. It's long due for a major re-design — and you may be looking at it.



The next-gen iMac design appeared in a [this patent](#) published last month. Now, Jermaine Smit — aka [Concept Creator](#) — has created these visualizations for Dutch tech publicacion [LetsGoDigital](#) and I just want to lick it.



The diagram in Apple's patent published by the USPTO (Image credit: Apple)

Apple's "Electronic Device with Glass Housing Member" patent describes a single sheet of ultra-thin glass that curves from your desk up into a roughly 80-degree angle. The base of the curve is flat, allowing it to hold an integrated keyboard and trackpads on both sides of the working area.

That's exactly what we are seeing here in Concept Creator's render and it looks perfect, like a part from a futuristic spaceship with a retro 60s feel.

This new iMac, created by Apple designers Keith Hendren, Paul Wang, Adam Garelli, Brett Degner, Christiaan Ligtenberg, and Dinesh Mathew, is held by a polygonal base on its back, which will house its components and ports.

Concept Creator has taken into account the possibility that the keyboard could be removed from the base too.

Long due for a redesign

Apple adopted the current form iMac of a panel with the screen and guts plus an aluminum base holding it in 2004. That's the Jurassic in web years. The basic shape factor has only been only refined through all these 16 years with thinner and thinner screens and chins.

But beyond that and changing the housing materials from plastic to metal and adding space gray as a color, the 2019 iMac and the iMac Pro are basically the same thing as that first 2004 model.

The single-body Macintosh has only been redesigned a couple of times through history (I'm purposely forgetting about the Performa because I *want* to forget about that horror).

The original 1984 monolithic design was reshaped 14 years later with the first iMac, in 1998. That model revitalized Apple and saw different minor tweaks in elements, materials and colors until

2002, when Jobs and Ive launched a radical change: a semi-spherical base with a floating flat panel that held the display alone through a balanced, stainless steel arm. Two years later we got what we have today.

I hope that we can get this in 2020. Apple, make it so.

Watch our [iMac 2020](#) news page for all the latest developments and announcements for current and upcoming Apple iMac models.

*Adrian Kingsley-Hughes posted the following article to [zdnet.com](#) on **March 4, 2019**. [zd.net/2PAPJLw](#). © CBS Interactive. He has devoted over two decades to helping users get the most from technology and has authored/co-authored technical books on a variety of topics, ranging from programming to building and maintaining PCs.*

With Huge Changes Looming, Should You Avoid Buying New Macs?

Rumors that Apple is planning an architecture switch away from Intel chips to its own silicon have been circulating for some time now, but recent reports suggest that Apple's revamping will be widespread, and bring even tighter integration between iPhone, iPad, and the Mac.

By Adrian Kingsley-Hughes

It seems that Apple is paving the way to change the Mac's processor architecture once again. But the last time the shift was focused exclusively to the desktops and laptops. This time around it will be far more wide-ranging, changing the entire face of Apple's ecosystem.

Also: [10 Apple products you shouldn't buy \(March 2019 edition\)](#)

Rumors that Apple is planning to ditch Intel and stride out into the world of desktop and laptop processors have been making the rounds for quite some time now. However, last year things seemed to firm up a bit, suggesting that the switch could kick off as early as 2020.

Combine this with the equally credible reports that Apple is also planning to bring to developers the tools they need to be able to develop a single app and offer it for the iPhone, iPad, and Mac, then you begin to see just how wide-ranging this change could be.

This is far, far bigger than the shift that Apple made from PowerPC to Intel, a transition it kicked off at its Worldwide Developers Conference (WWDC) back in 2005.

The move makes a lot of sense. The Intel chip inside Macs is the only processor Apple uses that isn't based on ARM technology, and they are the only processors not designed by Apple. The move would unify the Apple ecosystem in a way that no other ecosystem of hardware and software currently on offer could match. It would allow tighter integration between the hardware and the software, paving the way not only for cross-platform apps, but also for improvements such as better battery life and more robust security.

It also means that Apple could be able to lock down Mac apps in the same way that it has been able to do with iOS apps, making them exclusive to the Mac App Store, and grabbing 30 percent of every sale.

As iPhone sales slip, this could be a lucrative revenue stream.

Looking beyond Apple, while the move would no doubt be a bit of a blow for Intel, it's not as significant as it might seem on the surface. Apple only represents about five percent of Intel's revenue.

However, as the first major computer maker to fully turn its back on Intel, it could be a catalyst for the likes of Dell, HP, and Lenovo to start taking ARM chips more seriously.

Also: [Yes, it's possible to upgrade a 2018 Mac mini's RAM. No, it's not easy](#)

But what does this mean for buyers? I've received quite a few questions relating to whether it's wise to be spending money on Apple hardware at a time when a major architecture shift could be happening.

Well, is it?

As always, the answer is that it depends.

If you're someone who is all-in on the Apple ecosystem, and refreshes their hardware every year or so -- or at least as far as Macs are concerned, whenever new stuff comes out -- then this isn't that big of a deal. Yes, the transition will affect you, and could very well affect things like workflow, and render some applications that you currently use obsolete, but people who live and work on the cutting edge are used to this.

The people who, as far as I see, should proceed with caution are those who make their hardware last as long as possible. The folks who tease out every last hour out of their hardware, running it until the last wisp of Magic Smoke has gone, or until Apple renders it obsolete by no longer supporting it (and I know a lot of people out there who still run, and rely on, hardware that Apple considers obsolete).

It's you folks who like to get every last cent of value out of their hardware who need to tread carefully. Changes are undoubtedly coming, and it's likely that a change in processors and architecture is only the tip of the iceberg. It's likely that iOS will also change direction, taking the iPhone and iPad in a direction that aligns them more with Macs. And that means that apps -- both in terms of what they do, how developers interact with their customers, and how we buy them -- will change.

Also: [iMac Pro: A cheat sheet for professionals](#) TechRepublic

Also, by 2021, we will be looking at a few iterations of the iPhone and iPad, bring more power, performance, and storage capacity. And if Apple is looking to move away from Intel over the coming year or so, the Macs currently on offer may very well be the last Intel-based Macs offered.

Another interesting idea to ponder is how exactly will Apple make the switch from Intel to ARM chips? Will it be sudden, with the entire line being shifted over, or will it be more gradual? What about high-end Macs aimed at professionals, such as the iMac Pro and Mac Pro? Will this hardware shift over to ARM too (a move that could cause huge headaches for professionals who rely on them)? Will they stay as Intel-based offerings? Will they be offered in both flavors in the interim?

A clean break with Intel would send a decisive message that the age of Intel-based Macs is over. Offering both ARM and Intel hardware might lessen the headaches but also come across as hedging, which itself could harm adoption of the ARM-based Macs and put a dampener on developer interest.

Also: [iPad 2019 rumors: Price, specs, features and everything else](#) CNET

For those who spend big dollars on pro Macs (I'm talking about people who equip entire production shops with them, not those who buy one or two systems, which I suppose also fall into the category of "big dollars"), this is something to think about. After all, the transition to ARM could be as expensive and painful -- if not more expensive and painful -- than shifting to Windows.

Uncertain times are ahead. As usual, Apple does not comment on rumors and future plans, which itself adds to the uncertainty.

Chris Hoffman posted the following article to howtogeek.com on February 14, 2020. bit.ly/3aqKaaj. © LifeSavvy Media. He is Editor in Chief of How-To Geek and has personally written over 2,000 articles at How-To Geek.

The Future of Phones: What Is Foldable Glass?



By Chris Hoffman

Samsung's Galaxy Z Flip is the first foldable phone with a glass screen. Previous devices like Samsung's infamous Galaxy Fold featured plastic screens. Bendable glass technology is essential for making better foldable phones and tablets.

Foldable Glass Can't Fold; It Only Bends

"Foldable glass" is a bit of a misnomer. Displays with foldable glass don't fold all the way—there's no sharp crease as if you were folding a piece of paper. Instead, the glass bends.

When a device like the Samsung Galaxy Z Flip closes, there's a gap between the two halves of the glass. There are also raised edges around the screen, which prevent both sides of the glass from directly touching each other when it's folded shut.

In other words, foldable glass is a type of ultra-thin glass that can bend hundreds of thousands of times without breaking. It can't fold so that both sides touch.

Bendable Glass Isn't Completely New

Multiple types of companies are working on this technology. Samsung looks like it's getting its ultra-thin foldable glass from Korean manufacturer Doowoo Insys, but it hasn't talked much about the technology.

Corning, which makes the strong, damage-resistant Gorilla Glass used on iPhones and many other smartphones, is hard at work on bendable glass for electronic devices as well. Corning already makes a bendable type of glass named "Willow Glass."

Bendable glass isn't entirely new. As Corning's senior VP of technology for optical communications, Claudio Mazzali told Fast Company that Corning has been bending glass for nearly 50 years. Corning created flexible glass fibers for fiber-optic cables, which he said can bend at a 90-degree angle and continue functioning perfectly.

While bendable glass isn't new, one of the challenges is making it ultra-thin. Corning's technology Polly Chu told CNET that "to go to a tight bend radius, you have to go to a glass that's much, much thinner than what you have today." The thinner it gets, the more you can bend it.

Making Bendable Glass Work on Phones

Making ultra-thin bendable glass is a big enough challenge, but how do you take that thinner-and-thinner glass and make it as tough and damage-resistant as the Gorilla Glass on current smartphones is?

It's easy to forget just how impressive Gorilla Glass and similar technologies are: The glass on a modern smartphone's display can take a beating without shattering or even scratching. Gorilla Glass is harder than common metals. We take that for granted.

John Bayne, who leads Corning's Gorilla Glass business, explained the challenge to Wired:

“In a glass solution, you’re really challenging the laws of physics, in that to get a very tight bend radius you want to go thinner and thinner, but you also have to be able to survive a drop event and resist damage.”

Bayne said that Corning is working on keeping the bendability of the glass while improving its damage resistance. He told Wired that putting Corning’s existing Willow Glass through the ion-exchange process that creates strong Gorilla Glass would make the Willow Glass less bendable.

Corning still expects that bendable glass for electronics will be mainstream within the next few years. So how are Corning and other companies solving the manufacturing challenges? That’s the kind of thing these companies won’t reveal publicly. After all, they have a lot of competitors, and the race is on.

Why Foldable Glass Is So Important

In its Galaxy Z Flip reveal video, Samsung says it “made a leap” from polymer (plastic) screens to ultra-thin foldable glass. It’s not just an impressive technological leap. Glass is a better material for a smartphone display.

To bypass the challenges of bendable glass, foldables like the Samsung Galaxy Fold, Motorola Razr, and Lenovo ThinkPad X1 Fold have plastic screens that feel like a plastic screen protector. It probably won’t feel as nice as a glass screen, but that’s the least of your worries. These soft plastic screens are much easier to scratch and ding than glass. Motorola actually says that “bumps and lumps are normal” on its folding Razr smartphone with a plastic screen.

With a glass screen, you won’t have “bumps and lumps” on your display. They won’t scratch and become damaged as easily as plastic, either. That’s why current smartphones—from iPhones to Android phones—have glass touchscreens. Glass is a much more durable material that will hold up better under real-world use. Your fingernail won’t damage a glass screen, but it could easily leave an indentation on a plastic screen.

Are foldable devices the future? Our colleagues at Review Geek certainly think so. Either way, bendable glass is the future of foldable devices.

Michelle Goldberg posted the following article to [nytimes.com](https://www.nytimes.com) on January 24, 2020. [nyti.ms/3ajTFYX](https://www.nytimes.com/2020/01/24/opinion/cyberpunk.html). © The New York Times Company. She became an Op-Ed columnist for The Times in 2017 She is the author of three books and has won several literary prizes.

Many of you can ignore the political material, but do pay attention to the bolded comments on technology on the next page. Editor.

The Darkness Where the Future Should Be

What happens to a society that loses its capacity for awe and wonder at things to come?

By Michelle Goldberg

William Gibson, the writer who coined the term “cyberspace” and whose novel “Neuromancer” heavily influenced the film “The Matrix,” has spent a lifetime imagining surreal and noirish possibilities for human development. But Donald Trump’s victory threw him off balance. “I think it took me about three months to come out of the shock of his actually having been elected,” Gibson told me. And when he finally did come out of it, Gibson still wasn’t quite sure what to do with the manuscript he’d been working on, about a young woman in modern-day San Francisco, since the world he’d situated her in seemed to have suddenly disappeared.

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“If I had somehow been able to finish it, by the time it was published, it would have just been this lost thing,” he said, “completely out of time and unconcerned with what I immediately saw as being the beginning of something extraordinary, and almost certainly something extraordinarily bad.”

In the end, he turned the new book into a sequel to his 2014 novel, “The Peripheral.” Part of “The Peripheral” is set in a 22nd century where the world as we know it has been wiped out by a confluence of events known as “The Jackpot,” which is, as Gibson put it to me, “all the bad stuff that we’re worried about now coming true.” Eighty percent of the population has died, and many of the survivors live under the authority of a hereditary oligarchy descended from Russian kleptocrats. People in that future have developed the ability to use data to reach back in time, but when they do, rather than changing the course of events, they inaugurate new, parallel continuums, called “stubs.”

Much of the new book, “Agency,” takes place in a stub where Hillary Clinton won the election and Brexit never happened. Characters from the future — from Gibson’s extrapolated version of our own dark timeline — try to help people in the alternate past avoid a similarly cataclysmic fate. The question looming over the book is not whether the future will be horrifying but whether there’s even the possibility of a future that isn’t.

Gibson is famed for his sensitivity to the zeitgeist, and I asked him if he thought that part of what he’d picked up on here is a growing sense of the future as an abyss. “In my childhood, the 21st century was constantly referenced,” he said. “You’d see it once every day, and it often had an exclamation point.” The sense, he said, was that postwar America was headed somewhere amazing. Now that we’re actually in the 21st century, however, the 22nd century is never evoked with excitement. “We don’t seem to have, culturally, a sense of futurism that way anymore,” he said. “It sort of evaporated.”

The dearth of optimistic visions of the future, at least in the United States, is central to the psychic atmosphere of this bleak era. Pessimism is everywhere: in opinion polls, in rising suicide rates and falling birthrates, and in the downwardly mobile trajectory of millennials. It’s political and it’s cultural: At some point in the last few years, a feeling has set in that the future is being foreclosed. When, in the 1970s, the Sex Pistols sang “There is no future,” there was at least a confrontational relish to it. Now there’s just dread.

The right and the left share a sense of creeping doom, though for different reasons. For people on the right, it’s sparked by horror at changing demographics and gender roles. For those on the left, a primary source of foreboding is climate change, which makes speculation about what the world will look like decades hence so terrifying that it’s often easier not to think about it at all.

But it’s not just climate change. **In his forthcoming book, “The Decadent Society,” my colleague Ross Douthat mourns the death of the “technological sublime,” writing that our era “for all its digital wonders has lost the experience of awe-inspiring technological progress that prior modern generations came to take for granted.” This is true, but doesn’t go nearly far enough. Our problem is not just that new technologies regularly fail to thrill. It’s that, from artificial intelligence to genetic engineering to mass surveillance, they are frequently sources of horror. [Editor Bolding]**

Consider some recent headlines. The New York Times reported on Clearview AI, a start-up whose facial-matching technology could give strangers access to the identity and biographical information of anyone seen in public. (“Sure, that might lead to a dystopian future or something, but you can’t ban it,” one investor said.) Reuters described classes in South Korea that teach people how to arrange their features for job interviews performed by computers that use “facial recognition technology to analyze character.” Wired had a story about “smart contact lenses” that

could overlay digital interfaces on everything you see, which is not so different from the visual feeds that the post-Jackpot characters have in “The Peripheral” and “Agency.”

Around the world, the social media technologies that were supposed to expand democracy and human connection have instead fueled authoritarianism and ethnic cleansing. Andrew Yang is running a remarkably successful insurgent presidential campaign premised on the threat that automation and robots pose to the social order.

Fear of the future doesn't pose much of a political problem for conservatism. Reactionary politics feed on cultural despair; the right is usually happy to look backward. In his 1955 mission statement for National Review, William F. Buckley Jr. famously wrote that the magazine “stands athwart history, yelling Stop.”

It's a bigger problem for the left, which by definition needs to believe in progress. In 2013, Alyssa Battistoni wrote in the socialist magazine Jacobin about the challenge that climate change poses to left politics, asking, “What should the orientation be of a politics that's playing the long game when the arc of the universe is starting to feel frighteningly short?”

I suspect that one reason Pete Buttigieg, the 38-year-old former mayor of a Midwestern city, has vaulted into the top tier of presidential candidates is that he speaks so confidently about the future. He asks voters to picture the day after the last day of Trump's presidency and discusses how the world might be when he's nearly as old as his septuagenarian competitors. “You just have a certain mind-set based on the fact that — to put it a little bluntly — you plan to be here in 2050,” he once said. But his forward-looking technocratic pitch has mostly failed to resonate with his own generation. Instead, it appears that the people most soothed by Buttigieg's ideas about what America might look like decades hence are those who won't be here to experience it.

The candidate who polls show has the most support among young people is Bernie Sanders, the oldest person in the race.

Clearly, Sanders fills his followers with hope and makes them feel that a transformed world is possible, but he also speaks to their terrors. Recently Sanders backers released one of the more moving campaign videos of this cycle. Set to a mournful cover of “The Times They Are A-Changin’,” it features inspirational scenes of the senator and his supporters, but also flooded streets, wildfires and an emaciated polar bear; in one scene protesters hang a banner that says, “We deserve a future.” It's an ad that speaks to the desperate longing for kindness and solidarity to replace the cruelties of a society devouring itself, but also a grief-stricken apprehension of what's in store if they don't.

Writing about the future is usually just a way of writing about the present, and were it not for climate change, one might see widespread anxiety about what's coming as just an expression of despair about what's here. It's still possible, of course, that someday people will look back on the dawn of the 2020s as a menacing moment after which the world's potential opened up once again. But that would seem to require political and scientific leaps that are hard to envision right now, much less stake one's faith in.

Though Gibson's older work is frequently described as dystopian, he used to consider himself an optimist. “Neuromancer,” he pointed out, was written in the early 1980s and posited a future in which the Cold War hadn't led to apocalypse, something far from guaranteed at the time. “Since the end of the Cold War, I've prided myself on being the guy who says, eh, don't worry, it's not going to happen tomorrow,” he said. “And now I've lost that.” This darkness where the future should be, he said, “makes my creative life much, much more difficult,” since he doesn't simply want to surrender to gloom. Gibson is a man renowned for his prophetic creativity, but he can't imagine his way out of our civilizational predicament. No wonder so many others are struggling to do so.

Lance Ulanoff posted the following article to *lifewire.com* on December 12, 2019 bit.ly/39c0JXq. © about.com. He is Editor-in-Chief of *Lifewire*.

11 Bold Predictions for the Next Decade in Tech

Goodbye awkward teens, hello 2020s: The next decade in tech

By Lance Ulanoff

As a rule, I never look forward without looking back. I truly believe that, as the saying goes, the past is prologue. In the days and weeks leading up to this now almost exhausted decade, we had high hopes [and predictions](#) for:

- A rapidly growing Internet
- Vast and unprecedented miniaturization
- Nano technology
- The end of physical computers
- On-retina displays
- Conversations with virtual assistants
- An artificial brain

Where We've Been

Having just lived through this century's teenage years, you know that our predictions were about half right. The Internet has consumed us, and we are talking to personality-starved Siri, Alexa, and Google Assistant, but PCs still exist, and no one is putting a display on my retina.

I'm not sure anyone could've predicted all that's happened in the last 10 years. It was the decade of social media, Zuckerberg, Musk, and AI.

We said goodbye to floppy drives and our short-lived obsession for e-readers. 3DTVs were briefly a thing, but now most of those

3D glasses sit unused in living room credenzas. 3D printers were supposed to change humanity, but consumers couldn't be bothered with the finicky systems and often uninspiring 3D output.

Cloud storage and computing is arguably one of the decade's most important technologies. I challenge you to find a business or tech consumer that isn't a cloud customer.

Mobile broadband is taken for granted and we now watch HD video on the smallest screens wherever we are.



Elon Musk will be just as influential in the 2020s as he was in this decade.

We lost [Steve Jobs](#) and watched Mark Zuckerberg become one of the richest and most powerful tech CEOs in the world.

Elon Musk made his mark in electric and self-driving cars as well as space and solar technology. He went from a name only the [most tech savvy knew](#) to an inescapable tech and innovation [personality](#).

The gig economy employed and made millions (mostly for those running companies like Uber), but also generated massive and [still growing disillusionment](#), part of the great tech realignment of the early 21st century.

Artificial Intelligence is now an accepted part of everyday life and one of the [least trusted](#) technologies on the planet.

Augmented reality and virtual reality have changed how we view the world and ourselves (hello Lens), but virtual reality still lags AR in overall influence.

What's Next

Obviously, all that happened over the past 3,652 days laid the groundwork for what's to come in 2020 and beyond.

Regulation and Trust

We can't have a [tech reckoning](#), for example, without the growing tech distrust of 2016-2019.

California is about to become the capital of tech regulation. The progressive state passes tech legislation faster than virtually any other and its smart and sometimes draconian laws are often followed to the letter by tech companies for all its users across the U.S. Starting on January 1, 2020, for example, companies producing virtually all smart technology will have to follow [California's strict](#) information privacy act

Federal regulation won't even be fully discussed in Congress or the White House until after the 2020 Presidential Election, but that won't stop California from steering the S.S. Tech Regulation for the rest of the country. And whatever California doesn't regulate, the [European Union will](#).

The tech future is 'all very fascinating and frightening at the same time.'

5G and Beyond

Whatever wires remain in our connected society should

disappear throughout the next decade. Whether it's the shift to ubiquitous 5G (and 6G) or wireless electricity, power and networking cables will, at least for consumer technology, soon be a thing of the past.

In the case of 5G, competing 5G technologies will fold into one, dominant technology by mid-decade (if not sooner), which should accelerate rollout and adoption. Of course, by that time, we'll be obsessed with 6G, [whatever that will be](#).

Battery Power

In the next decade, [scientists will squeeze](#) every drop of performance out of lithium-ion battery technology. We'll see new ultra-fast charging technologies, more efficient chemical components (graphite instead of silicon), and nanowire batteries that never die. In addition, mobile technology companies like Apple, Google, and Samsung will continue to tweak and enhance AI to improve on-device battery management.

Unfortunately, any real breakthroughs in battery technology, something that [moves us away](#) from lithium-ion, is illusory, at best.

Our Mobile Screen Choice

In the near-term, 2020 will be filled with a wider array of mobile screen choices. We'll see more flexible displays in a [variety of form factors](#), but dual and triple screens (yes, like the current dual, triple, and quadruple camera lens craze) will be [just as popular](#). Transparent screens, which thanks to OLED are already technically feasible, might finally start appearing on some mobile devices by 2025.

Our Evolving Smart Homes

Despite privacy concerns, the smart home revolution shows no signs of slowing down. The biggest changes in the coming decade will revolve around protocols and ubiquity. There will be an underlying, agreed-upon smart home language that will enable all competing smart home technologies to [seamlessly integrate and communicate](#). By the end of the decade,

introducing smarts to virtually anything (clothing, a coffee maker, nano paint on a wall) may take little more than attaching a smart, wirelessly-enabled sticker.

Car Tech

Self-driving car technology and the infrastructure to support them will meet in the middle in the latter part of the next decade, with virtually all states supporting [self-driving car licenses](#) and adding autonomous vehicle lanes (similar to HOV Lanes) to keep those who still want to drive from mixing too much with driverless cars, buses, and autonomous semi-trucks.

Also, by the end of the decade, 75% of those cars will be [all electrical vehicles](#).

Staying Social

Our [fraught relationship](#) with social media doesn't mean that platforms like Facebook and Twitter die in the next decade (I guess they could, but it's unlikely). Instead, just as 2019 has witnessed [the rise of TikTok](#), we'll see many more new platforms come and go. If there's a theme among any of them, it will be tighter community and real relationships as opposed to fake friends and empty-calorie Likes.

End of Cable

Throughout the 2020s, we'll witness the steady decline of broadcast and traditional cable with a proliferation of à la carte streaming options. However, by mid-decade, consolidation and bundling will be the norm as more consumers buy combo streaming packages, essentially recreating the current cable system without the carriage fees.

My Robo Friend

If Boston Dynamics parkour-capable [Atlas robot](#), [Spot robot dog](#), and even [Sony's new AIBO](#) are any indication, we will see our first [C-3PO-style](#) home assistants by the end of this next decade. They'll still be prohibitively expensive and used primarily in elder care, some production and factory situations, and by the wealthy,

but I envision a personal robotics tipping point on or around 2035. The 2020s will be the spark, though.

Quantum

Quantum computing holds the potential to solve world and human problems with the speed and awe-inspiring power of a Thanos Snap, but while IBM, Intel, and Google declare "[Quantum Supremacy](#)," none of them have managed to move quantum computers out of the laboratory. I think the 2020s is when that changes. Of course, I'm worried that when they finally feed the Climate Change problem into one of these boxes that the result will be "you're screwed."

Not Quite

Even though we'll probably see our first completed [hyperloop](#) by the end of the 2020s, it won't be in the U.S. and it probably won't be for commuters. The 2030s will be the breakthrough decade for that sub-supersonic transportation technology.

Similarly, NASA's plans to [take us to Mars](#), which it hopes to do in the 2030s, are already behind schedule. I wonder if we'll even make it [back to the moon](#) before 2025.

I'm certain that cryptocurrency will be a vibrant part of the economic and financial conversation in the 2020s, but I don't see it replacing any standard monetary systems. Instead, crypto will become the immutable backend for a wider variety of secure accounting and transaction systems.

An Expert Opinion

Finally, I asked my tech and sci-fi idol [William Shatner](#), who has seen almost nine decades of technological innovation and is, even at 88, a true digital citizen, what he sees for the future of technology (one I fully expect him to witness with us).

Like me, Shatner sees a future world of even "faster smaller better" technology. However, there's a broader concern that will dog us over the next 10 years: "privacy and how it relates to

technology being used by us and reported back to whomever,” wrote Shatner in a Twitter DM.

The actor, author, and sometimes futurist thinks we may see a more transactional world where “one may opt in on revealing privacy for some benefits. Would you allow a company that manufacturers a device to keep track of your usage of it if they offered you that device for free or at a discount?”

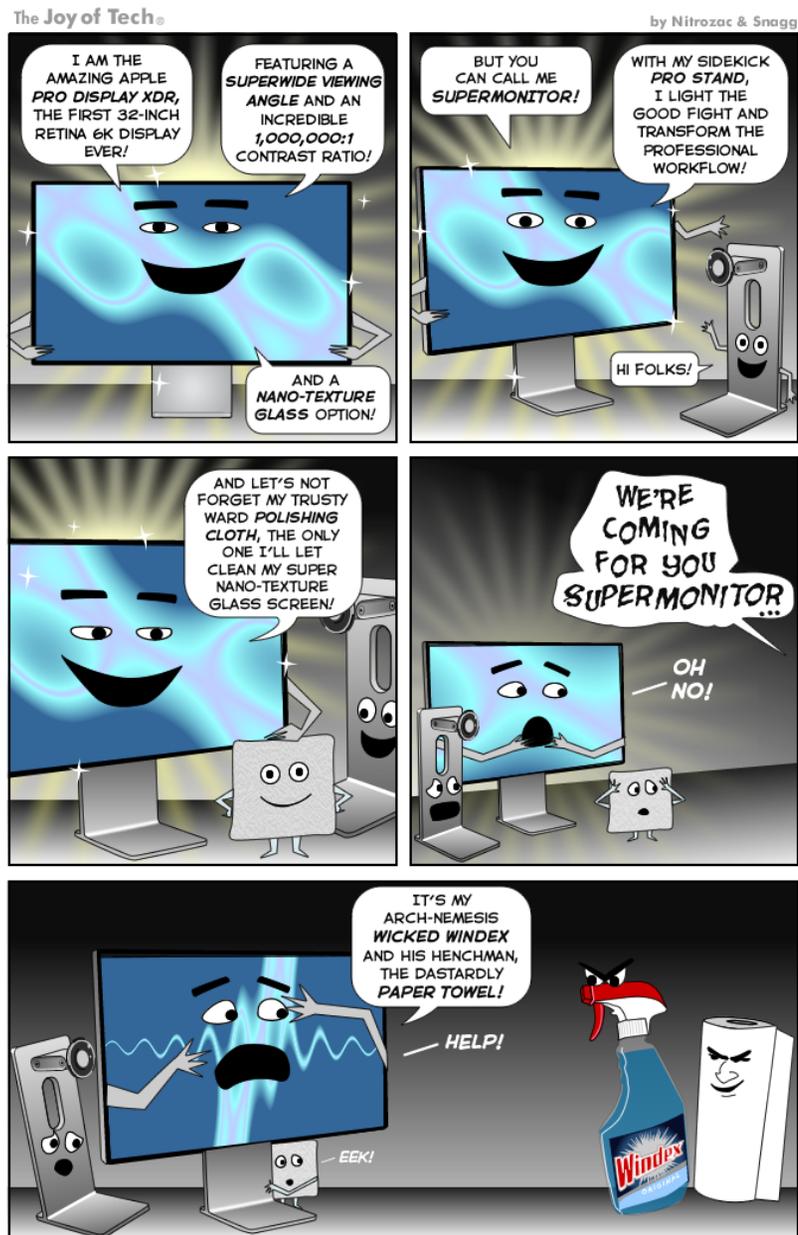
Wearables will only grow in prominence and utility over the next few years. Shatner and I agree that the core benefit here is the potential ability for an always-on-your body device to help diagnose potential health problems. The past few years have been filled with stories of Apple Watches and their built-in health monitoring technology [saving lives](#).

That tension, though, between the palliative potential of modern technology and our need to live authentic, digitally unencumbered lives will remain.

Perhaps, Shatner put it best when he told me the tech future is “all very fascinating and frightening at the same time.” [Editor Bolding]

So What

Anyone who tells you they know exactly what’s going to happen in the technology (or any other sector) over the next 10 years is lying. I have no crystal ball, only my experience, my research, and a sense of which way the innovation wind is blowing. I suggest we all meet on this spot right before 2030 to see if I was right.



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Tim Fisher posted the following article to lifewire.com on October 19, 2019. bit.ly/38dYbXg. © About.com. He is a freelance technology author, co-owner of a technology services company for small businesses, and author of *Windows 8 Basics in 30 Minutes*.

13 Ways You're Screwing Up Your Computer *(Ways relating to Windows products are omitted so you will see missing numbers)*

By Tim Fisher

We're not here to judge. Really, we're not. I have, however, been fixing computers, in one capacity or another, for well over two decades, and I see the same thing over and over....

People are constantly screwing up their own computers!

Some computer problems are due to [hardware](#) failures or lemons, exactly how your microwave or dishwasher might fail due to age, wear, or maybe a factory defect. While there are things you can do to identify and even help prevent these sorts of problems, we'd never say you've screwed something up just because you have some bad luck.

Beyond that, though, is *almost* every other problem: the ones we cause ourselves, mostly by ignorance, which hopefully we can solve for you here.

Sometimes, however, procrastination is the enemy. We put off a computer maintenance task because we don't have time, or tell ourselves that we'll back up our stuff next week instead.

Regardless of where you sit on the ignorant-to-procrastinating scale, let the following 13 tips remind you of some of the most important things you can do to **stop screwing up your computer!**

We even rate your screw up from 1 to 10. You're welcome!

01 You're Not Backing Up Continuously



One big way to screw up your computer, *and by extension yourself*, is to back up in some way that's not continuous.

This is a **LEVEL 10 SCREW UP!**

Yes, you should be backing up your data *continuously*, as in *virtually nonstop... all the time... at least once per minute*. It sounds excessive, but it's true.

This is *one of the biggest way you're screwing up your computer* (and your [smartphone](#), and your [iPad](#), etc.).

Your data is **the** most important stuff you own. They're your irreplaceable photos and videos, your expensive music, your school paper you've invested hours and hours in, etc., etc., etc.

While it's possible to use [traditional backup software](#) to back up continuously to an [external hard drive](#) or a network drive, it's easier to get started with, and safer on several levels, to back up continuously with an online backup service.

We've [reviewed dozens of these online backup services](#), and take a fresh look at each one again every month. All are great

choices and prevent just about any chance of you losing your important stuff.

[Backblaze](#) and [Carbonite](#) are our favorites, backup non-stop, and both allow unlimited space for surprisingly affordable prices.

So, stop screwing up your computer and start *continuously* backing up to the [cloud](#)! Most smartphones have built-in auto-backup capabilities, so be sure to turn those on, too!

(Wait, *you're not backing up at all?* Here's your chance to get started, and do so the right way from the get-go.)

02 You're Not Updating Your Antivirus Software



Another "good" way to screw up your computer is to not keep updated that [antivirus program](#) you took the time to install or even purchase.

This is a **LEVEL 10 SCREW UP!**

Those nefarious [malware](#) authors out there make new [viruses](#) every day, change how they work, and find new ways of avoiding antivirus [software](#). In response, antivirus software has to respond just as quickly.

In other words, *your antivirus software only worked 100% the day you installed it.* Kind of depressing, isn't it?

Most antivirus software, even free antivirus programs (of which there are plenty), automatically update their *definitions*, the term used to describe the set of instructions the programs use to identify and remove viruses and other malware.

That said, there are sometimes pop-up messages that ask you to do this manually or notices that appear on screen about needing to update the core program before definition updating can continue.

Unfortunately, we see people screw up all the time by closing these...*without reading them at all!* A message that shows up over and over is usually a good indication that's it's important.

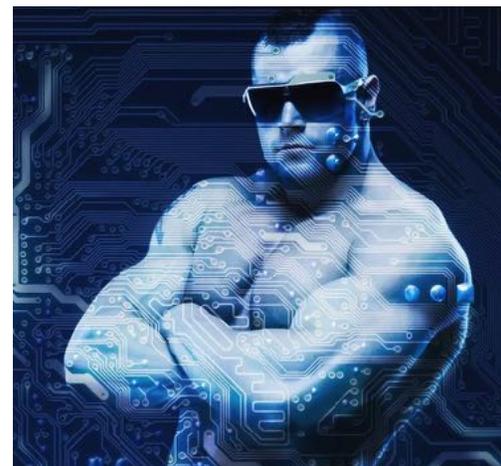
So, stop screwing up your computer's ability to fight the bad guys and make sure your antivirus program is updated! Just open the program and look for the "update" button.

If you think you may have been running your computer with a significantly outdated antivirus program, [learn how to scan your computer for malware](#) for help making sure nothing slipped in while your computer's defenses were down.

(You don't even have an antivirus program installed? GO INSTALL ONE RIGHT NOW! There are lots of [free antivirus tools](#) out there, ready and waiting.)

04 You're Not Using Strong Passwords

We all use passwords. Most of the devices and services we use *require* that we do.



What they don't (usually) require is that the passwords not suck. A "strong" password, in case you didn't know, is a password that doesn't suck...in some specific ways.

Hopefully you know that passwords that include your name, simple words, 1234, etc., are all "bad" passwords. Information security experts call these types of passwords *weak passwords*.

Weak passwords are easy to "crack" with special software. Very weak passwords are even easy enough to guess. Yikes.

This is a **LEVEL 9 SCREW UP!**

We've written about [guessing your own simple passwords](#) and even [hacking in to your own computer](#), both things you may be happy to have the ability to do when needed but that **every other expert computer user can also do**.

See [what what makes a password weak or strong](#) if you're not quite sure how great, or not-so-great, your passwords are. If they don't meet that "strong" criteria, [learn how to make a strong password](#).

Do yourself one better and use a password manager to store your hard-to-remember passwords, leaving you with just a single, strong password to memorize. There are plenty of [free password manager apps, programs, and web services](#) out there.

07 You're Downloading the Wrong Stuff

Another very common way to screw up your computer is to [download](#) the wrong types of software, filling your computer up with stuff you never wanted, including [malware](#) and adware.

This is a **LEVEL 7 SCREW UP!**

As you probably know, there are *tens of thousands*, maybe more, completely free software programs and apps out there.

What you may *not* know is that there are different levels of free software. Some are completely free, often called [freeware](#), while

others are only "sort of" free, like *trialware* programs and [shareware](#) programs.

Some sites trick users by advertising that the download is free when in reality the only thing they're saying is that the actual download *process* is free. (Well duh!)

What all of this confusion does is help you end up with something other than what you thought you were getting. It's frustrating, I know.

[How to Safely Download & Install Software](#)

08 You've Left Junk Installed...and Probably Running!



A pretty easy way to screw up your computer is by installing, or leaving already-installed, junk software on your computer, the worst of which is the kind that runs in the background all the time.

This is a **LEVEL 7 SCREW UP!**

The bulk of the blame for this one is with *your computer maker*. Seriously.

Part of the reason some companies can sell their computers at such a low cost is by taking money from software makers to include trial versions of their programs on your brand new computer.

Unfortunately, most people have little to no use for these programs. What the majority of new computer users will do, at most, is just delete the shortcuts to these programs. Out of sight, out of mind.

What some people don't realize is that these programs are *still installed* and wasting space, just hidden from your daily view. Worse yet, some of these programs start up in the background when your computer starts, wasting your [system resources](#) and slowing down your computer.

In fact, *preinstalled, always-on software is one of the biggest reasons for a sluggish overall computer experience.*

Fortunately this problem is easy to fix. Promptly uninstall anything you know you don't use. Search online for more information about any programs you're not sure about.

09 You're Letting Needless Files Fill Up the Hard Drive

No, it's certainly not the most important thing you can screw up, but letting needless stuff fill up your [hard drive](#), especially with today's smaller [solid state drives](#), can impact how quickly some parts of your computer work.

This is a **LEVEL 5 SCREW UP!**

In general, having "stuff" on your computer that doesn't do anything but take up space is not anything to worry about it. When it can be an issue is when the free space on the drive gets too low.

The operating system, Windows for example, needs a certain amount of "working" room so it can temporarily grow if need be. [System Restore](#) comes to mind as a feature that you'll be happy to have in an emergency but that won't work if there's not enough free space.

To avoid problems, we recommend keeping 10 percent of your main drive's total capacity free. You can [check free hard drive space in Windows](#) if you're not sure how much you have.

Having hundreds or thousands of extra files also makes it harder for your antivirus program to scan your computer and makes [defragmenting](#) more difficult.

If you want something that does even more of a detailed job, [CCleaner](#) is excellent. It's also completely free.

Oh, and don't worry, it's usually by no fault of your own that these files accumulate over time. It's just part of how software works.

12 You're Putting Off Fixing Problems That You Can Probably Fix Yourself



You may be rolling your eyes a little right now but we're serious. You (yes YOU) can fix your own computer problems! The huge majority of them, anyway.

This is a **LEVEL 2 – LEVEL 10 SCREW UP!**

Yes, this one has a range of screw-up-ness thanks to the wide variety of consequences that your procrastination — due to your

fear of DIY computer repair — might have on your computer's health.

I often hear from people that they've been putting up with a problem for days, weeks, or even years, because they didn't think they were smart enough to tackle it or couldn't afford to have someone look at it. How sad is that?!

We have a secret that your techie friend you rely on might not tell you and that the women and men that work at that big computer repair service most *certainly* won't:

Most computer problems are pretty easy to fix!

No, not all of them, but most...yes. In fact, I often tell people that 90 percent of the problems I hear about these days can be fixed after trying one or more super-easy things!

Wondering what they are? See [these five simple fixes for most computer problems](#). No doubt you're familiar with the first one, but the rest are almost as easy to try.

Still not convinced about your amazing capabilities? Even if those few simple things don't do the trick, there's *so much more you can do yourself* which will save you both money and time.

[Why You Should Try to Fix Your Computer Problem Yourself](#)

13 You're Not Asking for Help When You Need It

Last, but certainly not least, and very much related to the last big screw up you just read about, is not asking for help when you need it.

This is probably **THE BIGGEST SCREW UP EVER!**

Don't feel bad! This is something just about *everyone* screws up on.

If you think you might be able to fix a problem that pops up yourself, you run to your favorite search engine for help.

Maybe you ask a friend on Facebook or Twitter, or maybe your 12 year old is a wiz and fixes everything for you.

All of those things are **great**. Consider yourself lucky that they worked out.

What if, on the other hand, you're not that great at even knowing what the problem is so you're not even sure what to search for? What if you don't have a 12-year old computer genius living upstairs? What if none of your social media friends are techie types?

Lucky for you, **there are plenty of places to get free computer help**, such as tech support forums. Just make sure to learn [how to properly communicate your problem](#) to someone helping you out.



Joff Thyer posted the following article to blackhillsinfosec.com on June 6, 2016. bit.ly/32EGNdc. He has been a penetration tester and security analyst with Black Hills Information Security since 2013. He was a systems administrator and an enterprise network architect.

10 Ways to Protect Your Online Digital Life

By Joff Thyer

Recently I have been thinking about online challenges I encounter in daily life. As I thought about it, I realized that many of these items I practice on a regular basis. While it feels pretty intuitive to me to follow these guidelines, it may not feel as mainstream to many others so I thought I would write some things down. Adopt a mindset that there will be a business that gets compromised and that you have provided some of your data to in the past. How are you going to mitigate the risk to your own personally identifiable information? What are you doing proactively before a breach occurs, and how will you protect yourself when you learn that your own data is at risk? Below is a suggestion list of good digital hygiene items that I came up with.

1. Use long pass-phrases.

In the information security community, we talk about this all the time. Our line of thinking is that a pass-phrase (ie: unique sentence) is easier to remember than a complex password. On the subject of length, longer than 16 characters make for good strength. One example might be: "WeLoveDriving2TheMountains4FunTimesAndAdventures!". Shorter length passwords are subject to both brute force and dictionary attacks. In addition to pre-computed encrypted password representations, there exist very large dictionaries of common passwords, and plenty of computing cycles to perform

offline attacks. It is entirely feasible that any organization you are doing online business with will have their encrypted password database stolen (ex-filtrated) at some point in time. Your choice to use a very long passphrase is going to make plaintext recovery of your specific password computationally challenging.

2. Use an online password vaulting application with two-factor authentication.

There are many good choices in this arena today. The beautiful thing about a password vaulting application is that remembering your own master passphrase (key) is the main responsibility. For passphrases/passwords to all applications within the vault, you can choose to use the maximum length, complexity, and pseudo-randomness that the application permits, and avoid reusing passphrases entirely. Sadly with some applications the passphrase length, and complexity is limited. The downside of a password vaulting approach is that all your eggs are indeed in one basket so you better choose an application vendor that is time tested, highly reputable, and of course has a very secure approach to managing this critical data. In addition to choosing your strong primary passphrase to the vault, I would strongly advise using a second-factor authentication to access the vault.

3. Use a dedicated computer and/or dedicated web browser for financial transactions.

Your browser gets significantly polluted and potentially compromised from generalized web surfing. You have all seen persistent cookies which present targeted advertising in different browser tabs. Tracking and profiling using cookie information are very common these days. A cross-site request forgery (CSRF) attack could easily happen and you would never know what hit you until it's too late. A CSRF attack involves exploiting an existing application by manipulating the trust relationship that your browser has in one browser tab from a separate browser tab or window. Trusted browser cookie data is usually manipulated in order to perform the attack.

You know which banking, and other financial sites which are important to you and that you use to manage your own sensitive data on a regular basis. At a minimum, dedicate a web browser to perform those actions, and make sure that the browser never visits any other website other than what you have selected to be within the inner circle of trust. Clear all browser history and cookie data upon exit every single time from that browser. Even better if you can dedicate a computer (or virtual machine) entirely to this task. It takes some discipline but it is worthwhile to pursue.

4. Guard your privacy as much as possible.

Let's admit that many of us use social media. How much information are you sharing about yourself in the process? Think for a moment how much information you wish to share and only go that far. Know that once you sign-up for social media, anything you provide is potentially public information. Understand and control your public media presence. Only share information that you are comfortable standing in the middle of a busy street and yelling the same information aloud.

5. Don't install risky applications with known vulnerabilities.

While the operating system landscape has slowly evolved and improved over the years to automate vulnerability remediation and patch management, the application landscape is quite different. There are many known vulnerabilities in applications over time. In particular, products like Java, Adobe readers, and flash media software have had a string of known vulnerabilities. Think about whether you really need to use this software? Does it belong on your computer at all, and can you live without it?

6. Use full disk/flash media encryption on mobile devices.

Your mobile computing device might get lost or stolen at some point in your travels. What data is contained on that device, and

what prevents the thief from mercilessly pillaging the information from the device? Make sure that you have an idle timeout and screen lock configured on the device. Make sure the passphrase is strong, and ensure that data is only acceptable after your credentials have been successfully entered.

7. Always use credit cards when traveling and monitor accounts closely.

This one is directed more towards the road warriors. Here in the U.S., the danger of compromising your debit card means potentially losing your banking funds and not being able to recover them. As sad as it is, the larger credit card companies have become very good at data analytics and identifying out of character transactions. They will shut your account down very quickly if they suspect fraud. Those of us who travel frequently know this all too well because invariably it becomes a false positive situation for us. But more to the point, you are not putting your personal banking funds directly at risk by using credit and recovery from a fraudulently used credit card has become fairly routine.

A useful addendum to this idea is to use Paypal for online purchases. It is a well tested and secure transaction service that affords a nice level of protection for your online experience.

8. Restrict access to your credit report/credit freeze

Whenever you apply for a new loan of some sort, your credit scores will be checked with the major agencies. There is very little reason to allow your credit scores to be checked indiscriminately and since there have been numerous personal identity compromises, the credit agencies do allow you to freeze your credit line checks not allowing the credit line check to proceed without your authorization. In many U.S. states, this is now backed by law.

9. Backup your data

How would you recover if you became a victim of ransomware?

This type of malware usually results in your data getting encrypted and then results in a demand for payment to recover an encryption key and decrypt said data. From a personal user perspective, there are many backup services available which will make sure your secure data is stored in the cloud. Rather than pay the ransom, I suspect most would prefer to format and start over.

10. Make a copy of key account numbers, and store it in a safe or other physically secure location.

When all else fails, sometimes you just need the paper. I would suggest having a small fireproof/waterproof safe at home in which you can store valuable information such as birth certificates, passports, backup media (if you like), and more to the point some printed information that gives you some recovery mechanisms should a real disaster occur that renders your digital devices worthless.

Chris Hoffman posted the following article to howtogeek.com on November 15, 2019. bit.ly/38bewfl. © LifeSavvy Media. He is Editor in Chief of How-To Geek and has personally written over 2,000 articles at How-To Geek.

Why You Shouldn't Use Your Web Browser's Password Manager

By Chris Hoffman

[We recommend using a password manager](#) like 1Password, LastPass, or Bitwarden. But modern web browsers have built-in



password managers, so why install a different one? There are many good reasons to avoid your web browser's built-in tool.

Why You Need a Password Manager

Using a password manager is crucial. The biggest risk to your accounts online is password re-use. If you use the same passwords over and over, a breach at one website means your email and password is out there. Attackers will try to use that email and password to log into other sites. This simple trick is [how accounts are often "hacked" these days](#).

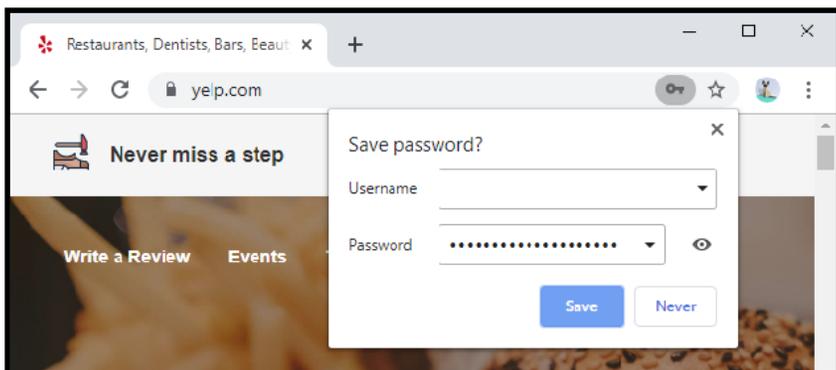
The solution is using strong, unique passwords everywhere. But who can remember hundreds or even dozens of strong passwords? A password manager can remember if for you. You remember your password manager's master password, which unlocks your secure vault. Your password manager can randomly generate strong passwords, remember them for you, and log you into websites with them.

[1Password](#), [LastPass](#), [Bitwarden](#), and [Dashlane](#) are all reliable, stand-alone password managers. The open-source [KeePass](#) is okay, too, but it doesn't have built-in sync features.

Web browsers have been able to remember your passwords for many years, but their password managers are now getting more sophisticated. Still, we recommend skipping the password manager built into your web browser—whether that's Chrome, Firefox, Safari, or Edge—and using a dedicated password manager.

RELATED: [Why You Should Use a Password Manager, and How to Get Started](#)

Your Web Browser's Password Manager Is Just Okay



Your web browser's password manager is better than nothing. With no additional software, your web browser can remember all your passwords and securely sync them between your devices. They can be stored encrypted in the cloud. You can use strong, hard-to-remember passwords because your software is automatically remembering them for you. This keeps your accounts secure, as you won't need to re-use passwords.

The account it's synced with—like your Google account in Chrome or your Apple ID in Safari—can be protected with two-step authentication to prevent people from signing in.

But there are some problems. Built-in password managers in web browsers aren't as powerful and useful as third-party password managers. They are catching up, but they're not as good yet. Here's why.

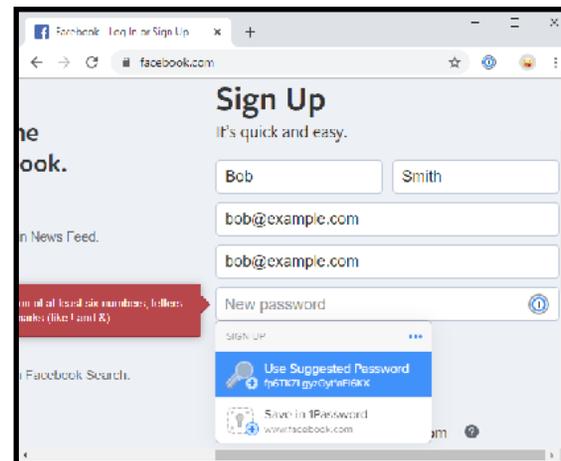
Beyond Just One Browser

Third-party password managers are cross-platform and cross-browser. Built-in browser password managers are limited to that specific browser. Let's say you use Google Chrome on your PC

or Mac and Safari on your iPhone. If you use a third-party password manager, you can have your passwords in any browser. If you use a built-in web browser password manager, you can't mix and match browsers.

Beyond that, password managers offer good desktop and mobile applications, making it easy to access passwords, license keys, Wi-Fi codes, and anything else you want to store everywhere.

Generating Passwords



Third-party password managers don't just remember your existing passwords—they can automatically generate strong new ones when you're creating an account or changing an existing account's passwords.

Some browsers are now adding built-in password generators—Chrome and Safari now have this feature—but they don't necessarily offer all the options found in password managers, such as the ability to control how long the password is and what type of characters it contains.

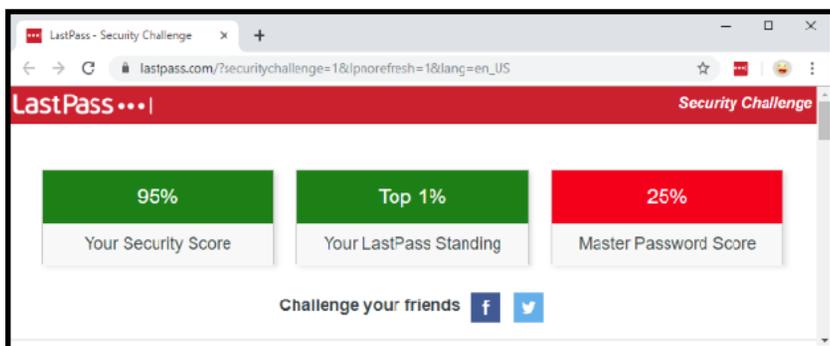
Easily Sharing Passwords

Password managers have easy password-sharing features. Want to [share your Netflix password](#) with your family members? You

can do it with a password manager with a built-in sharing feature. You'll all get access to the same password entry and, if you update the password, it'll change for everyone else.

Browsers don't have built-in password-sharing features. You can send a password to someone else in a text message or email, which isn't very secure. If you do that, it also won't be automatically updated if you ever have to change it. Password-sharing features are a great way to share household accounts.

Warnings About Password Dangers



Password managers have built-in warnings like [LastPass's Security Challenge](#) and 1Password's WatchTower. They'll point out weak and reused passwords to you and even tell you when a password you use has appeared in a leaked password database. This helps you stay up-to-date on protecting your digital accounts. There's no need for a separate [service to check whether your password has been stolen](#).

Web browsers are slowly getting features like these, too—Google [has a password-checker](#) in its password manager. Google also offers the [Password Checkup extension for Chrome](#), which it's building into the browser, but this isn't as powerful as the similar features built into password managers.

RELATED: [The Best Way to Tackle the LastPass Security Challenge](#)

Storing More Than Passwords

Password managers let you [store more than just passwords](#). For example, you can create secure notes containing text like building entry codes and Wi-Fi passphrases. You can even add file attachments to your vault, which makes it a great place to store tax documents, scanned copies of your passport and driver's license, and other sensitive information.

To store files like these securely, you might find yourself [creating encrypted archive files](#) and uploading them to a cloud storage service. Taking advantage of your password manager's vault is more convenient.

This works nicely with sharing, too—you can store all sorts of sensitive information and documents and share them with anyone else who needs access.

RELATED: [How to Use LastPass for More Than Just Managing Passwords](#)

Making the Switch Is Easy

We're happy web browser password managers are getting more powerful, but they aren't competitive with the more powerful password managers just yet.

If this has convinced you and you're currently using your web browser's password manager, don't worry—you can switch to a password manager and import all your usernames and passwords from your web browser's built-in password manager. The password manager you choose will walk you through the import process.

Are Password Managers Safe?

Storing all your passwords in a single program may seem a little odd—weren't you supposed to remember all these things?—but we (and many other experts) argue it's safer than the alternative. [Here's why you should trust password managers](#).

Courtney Linder posted the following article to howtogeek.com on November 6, 2019. bit.ly/3cjJm8X © IDG Consumer & SMB. She is Senior News Editor at Popular Mechanics and before that she was the technology reporter at the Pittsburgh Post-Gazette.

How To Wipe a Computer of All Your Personal Data

And also recycle it once you're done.

By Courtney Linder



Whether you're selling it, trashing it, or reusing it, that old computer of yours has a bunch of extremely private data stored inside.

And there's a good chance that tossing files in the recycling bin and hitting factory reset won't protect you. If a hacker finds the pattern your computer used to move those 0s and 1s around, they can reverse engineer the original state of your computer and pull out the goods.

This guide will take you through how to factory reset your computer or take a step beyond that by hiring a professional company to ensure your data has been destroyed (or smash up the computer yourself).

What Is a Factory Reset?

A factory reset will definitely make it impossible for you to practically access programs or files on your computer. It's the nature of a [factory reset](#): deleting anything that wasn't on the device after it came out of production.

It's important to know what a factory reset actually does, though. It puts all applications back into their original state and removes anything that wasn't there when the computer left the factory. That means user data from the applications will also be deleted. However, that data will still live on the hard drive.

Factory resets are simple because they're programs included on the computer when you first get your hands on it. It's useful to reset errors with an operating system or helping restore the computer's functionality or speed.

There are limitations, though. Factory resets leave data in the hard drive, so those pieces will live on until your hard drive is overwritten with new data. In short, the reset can give you a false sense of security. A complete erasure would actually look more like degaussing, or destroying the magnetic field around a hard drive to destroy its data, or actually smashing up the hard drive to bits.

Context is still key. If you're an everyday user that only really played games or finished school work on your computer, there's probably little risk in using a factory reset as your primary form of data wiping.

But if you own a company and complete that work on a computer, you may have employees' social security numbers on the hard drive, for example. That means you should probably consider hiring an expert to finish the data wiping—especially because the government has certain standards for data sanitation, depending on the field you work in.

How To Factory Reset a Mac

1. Make sure you've backed up all of your important data in a cloud service. For a primer on cloud services, [click here](#).
2. Log out of all services that you use.
3. Make sure your computer is plugged in for the duration of the reset.
4. Restart in [Recovery Mode](#): Click  and choose Restart. When the computer shuts off and powers back on, hold Command + R until you see the Apple logo.
5. You won't see your usual login page, anymore, but instead will see a "macOS Utilities" window.
6. Choose disk utility > continue.
7. Choose the correct startup disc and select erase.
8. Choose MacOS Extended (Journaled) as the format.
9. Click erase
10. Wait until the process finishes, then go to the Disk Utility menu > quit.
11. If you like, reinstall MacOS.

How To Factory Reset a PC - Deleted by Editor

Why a Reset Sometimes Isn't Enough

Inside your hard drive are a pair of rotating discs that sort of resemble a CD. These are called platters and they're the pieces of hardware that actually store all of those cat videos and family photos.

The [platter](#) stores data onto its circular surface in chunks of 1s and 0s. The platters are usually ceramic, glass or aluminum and work like a record player. Centered on a spindle, the platter rotates and an electronic current reads and writes data onto the surface. Electronic components power the whole operation.

When you delete data from the computer through a factory reset, the information is hidden from the computer, but still stored on the hard drive. If a hacker uses [data forensics tools](#), he or she

can find bits and pieces of those deleted files in the hard drive storage, making it possible to recover pretty much everything.

There's much online debate about the best ways to completely destroy the data inside, but most solutions come down to water, hydrochloric acid, magnets or a blunt object you can smash them with easily.

Those might sound hardcore but three of those methods *still* aren't completely reliable. Microwaves often don't get hot enough to properly wipe the platters. Acid doesn't seep deeply enough inside the discs to ensure complete destruction. Hackers [have recovered laptops thrown into bodies of water](#) and dug data out of the hard drive afterward. Magnets aren't always strong enough.

But smashing the platters is a different story. Just make sure you wear safety glasses, because the platters often break into tiny shards when smashed. Remember: the key to destroying the platter properly is ensuring that it can't spin. If it can't do that, the platter's contents can't be read.

If you do want to reuse the hard drive, a factory reset should be your course of action. As stated above, be sure that you don't have any comprising information on the hard drive, first, because it could take a long time for new data to overwrite all of the old data on the drive.

Solid State Drives

While there's a pretty decent chance that the old computer you're looking to nix has a hard drive disc, as it's an older, slower form of data storage, newer computers are fast adopting a new standard called a [solid state drive](#), or SSD. These contain the microchips that you may picture inside of your phone against a green circuit board.

More or less, a solid state drive is a larger and more sophisticated version of a flash drive. Information is stored on microchips and contains no moving platters. An SSD also



doesn't have magnetic coatings like a hard drive disc. Rather, solid state drives have an embedded processor, its "brain," and interconnected memory chips that retain data.

To destroy a solid state drive, you can't use a degausser, because there is no magnetic storage. Instead, you should physically destroy the device with something like the [SSMD-2MM Solid State Media Disintegrator](#), which is something that professional data destruction companies should have. It essentially shreds up your hard drive until it's in no way recoverable.

How To Tell If You Have a Solid State Drive?

[On Macbook](#): select the  menu > About this Mac > System Report > Hardware > Storage.

Otherwise, you can take the computer apart to check. If you don't routinely work on this hardware, though, you're better off checking out your hardware through the software menus.

Now...How Do I Recycle My Computer?

After you've wiped your drive and smashed your computer, you must find a specialty recycling company that will take the parts. In other words, do not put glass shards, aluminum, and plastic from the device into your recycling bin. Sure, the trash person

may pick it up, but it's just going to end up in a landfill because general recycling facilities don't have the capability to reuse these parts.

Below are just a few places you can send your devices if they're in-tact and you've only done a software wipe. Some places will give you cash for the computer and other places will do the destroying for you.

CyberCrunch: This Pittsburgh-based company specializes in data destruction, so if you've done a factory reset on your laptop but haven't bothered to destroy or at least take out your hard drive, these folks are definitely going to do that for you. In fact, it's part of their recycling process. Rates aren't disclosed on the website, so you'll have to make a phone call. Simply mail in your device and it will be securely recycled.

Best Buy: As far as corporate companies that offer electronics recycling go, this is one of your best options, since Best Buy has a wide span of stores. The store will let you recycle three items per household per day for free and you can even check out their [trade-in program](#) to see if you'll get any money for it. So far, Best Buy has "responsibly disposed" of more than one billion pounds of electronic waste, which the company claims makes it the largest retail collection program in the country. The company is working with certified partners to reach two billion pounds.

eStewards: Whether a full-fledged enterprise company or an individual consumer, this organization will help you find a local place to take your electronic junk as it's part of a global mission. Through its ["Find a Recycler"](#) tool, simply enter your country, state and zip code to find recycling shops nearby.

David Nield posted the following article to wired.com on January 12, 2020. bit.ly/3cpon4q. © Conde Nast Digital. He is a freelance tech and science writer for many sites, including *Wired*, *Gizmodo*, *TechRadar*, *PopSci*, *The Guardian*, and *Popular Science*.

All the Ways Facebook Tracks You—and How to Limit It

If you have a Facebook account—and even if you don't—the company is going to collect data about you. But you can at least control how it gets used.



By David Nield

It won't come as much of a surprise that Facebook tracks you on its platform—that's why it can resurface your birthday photos from five years ago—but you might not yet realize the scope and the depth of its tracking all across the internet. Facebook's tentacles stretch out across other websites and services, into the various apps you're using on your phone, and to the places you physically visit in the real world—especially if you decide to check in on Facebook while you're there.

Some of this comes with the territory of using Facebook: If you want to take advantage of its features, then you have to give up a certain amount of information about yourself. But Facebook has ways of keeping tabs on people who aren't even signed up for

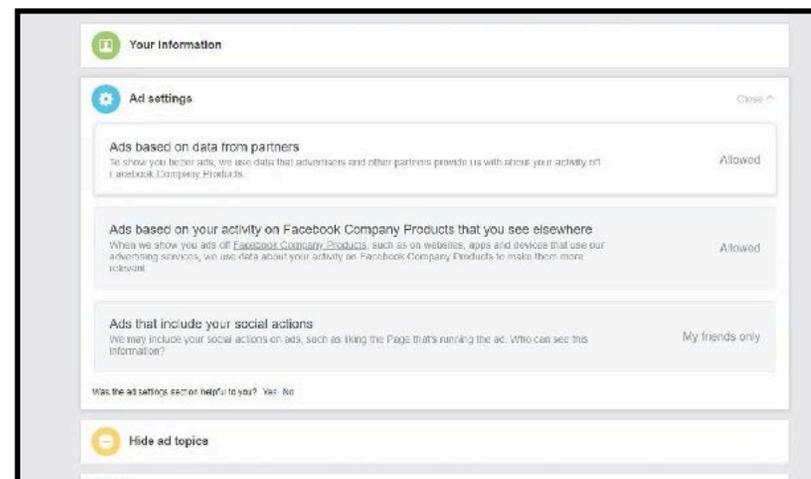
the service. Fortunately, there are [numerous ways to limit the volume of data](#) that it logs.

How hard you want to pull back depends to a certain extent on how much you [trust Facebook](#). The social network behemoth says it uses your data to show relevant ads and keep you safe; if someone signs into your account from a country you're not usually in, for instance, Facebook can flag the activity as suspicious.

However, this is not a company [with a good track record](#) when it comes to looking after your data. Irrespective of how Facebook itself has used your information, it's certainly [been careless](#) in the ways that information has been shared with third parties.

To make matters more complicated, Facebook owns WhatsApp and Instagram too, and can pool some of the information it gathers in those apps as well. The best way to limit Facebook's tracking is to quit all three apps for good. If that's too extreme for you, we've got some more suggestions.

For reference, the Facebook data policy is [here](#), and you can read a more user-friendly explainer on how your data is handled [here](#).



On the Web

If you want to use Facebook, you give it permission to log your activity on the site: where you check into, the groups you join, who you interact with. This data is primarily used to serve up advertising that's more relevant to you, which in turn makes more money for Facebook.

You can't really stop Facebook from collecting this information—it's the deal you make when you sign up—but you can limit how it affects the advertising you see by visiting the [ad preferences page](#) in your account on the web. Open up **Your interests** to get a quick glance at what Facebook thinks you're into. It might have made some assumptions that are well wide of the mark.

Under the **Your information** tab, you can see some of the ways Facebook is targeting advertising at you: your relationship status, your job title, where you went to college, and more. If you don't want some or all of these pieces of information to be used by advertisers, hit the relevant toggle switch.

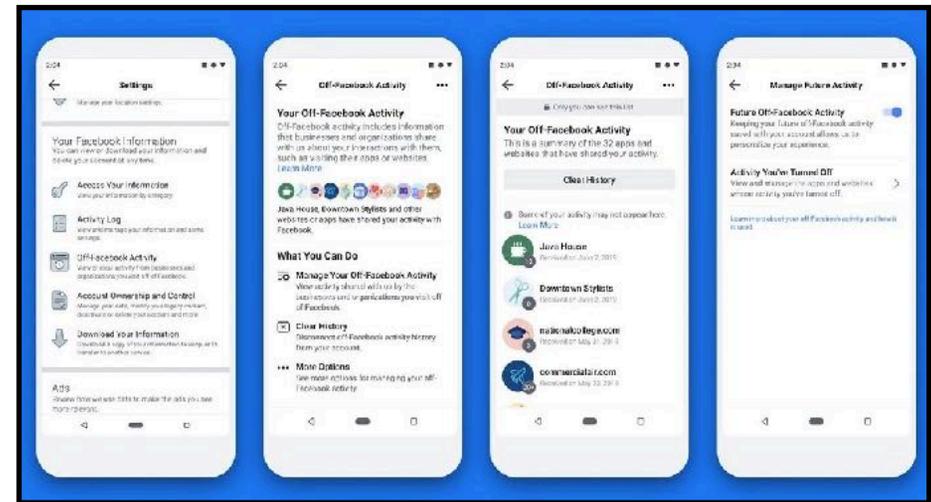
Open up **Ad settings** to make even more changes. Here you can control whether Facebook can use data from its marketing partners—and there are an awful lot of them—to put more relevant advertising in front of you. If you don't want this to happen, switch the setting from **Allowed** to **Not allowed**.

Bear in mind that these settings don't reduce the number of advertisements you see on Facebook, nor do they delete the data that Facebook has amassed on you. They just stop advertisers from specifically targeting you using that data. If you're happily married, you might suddenly start seeing ads for dating sites, but Facebook itself will still know your relationship status.

Facebook's reach also goes way beyond Facebook itself. It has partnerships with a whole host of marketing firms and ad networks so that activities on other sites—including but not

limited to logging into a third-party service with your Facebook account—can be combined with your Facebook profile.

This activity has attracted enough bad press that Facebook [announced a tool in August called "Off-Facebook Activity"](#) that will disconnect this data from what you actually do on Facebook. It's a more comprehensive solution, but still not widely available. It also still doesn't affect how much data Facebook actually *collects*, it just breaks the association between what you do on Facebook and off it. If you're shopping for shoes on a third-party retail site, you won't suddenly see ads for them all over your News Feed.



This off-Facebook activity is also monitored whether or not you have a Facebook account. Tracking tools like the Facebook Pixel enable websites and online retailers to get information about their visitors, including whether they come back. A vast number of third parties are using Facebook's advertising and tracking technologies, which means it isn't just Facebook you need to worry about.

Site owners are able to build up a profile of who is visiting their pages, and Facebook collects even more data about what

people are shopping for and looking at on the web. If that data can be added to a Facebook profile so much the better for Facebook, but the social network can still use in general terms to analyze aggregated user behavior.

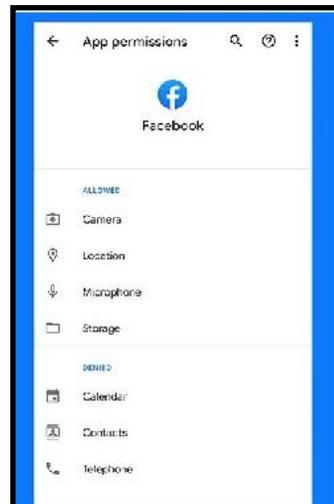
More broadly, you can stop some of the web activity being used to target you with ads by visiting the [YourAdChoices site](#) run by the Digital Advertising Alliance. You'll notice Facebook advertising targeting is on the list of entries—tick the **Opt Out** box to do just that. Note that you'll need to do this separately for each browser you use; for the biggest impact, you should opt out of all the other platforms as well.

Locking down tracking in your browser is also recommended: Look out for the option to block third-party cookies in your browser settings (the sort that can track activity across multiple sites), and consider using well-respected tracker blocking browser extensions such as [Ghostery](#) or [Privacy Badger](#).

On Mobile Devices

Much of what we've already said applies to Facebook's mobile apps as well. If you want to limit what Facebook knows about you, you're best off not installing the mobile apps at all. Doing so [gives Facebook permission](#) to log the Wi-Fi networks you connect to, the type of phone you have, the other apps you have installed, and more besides, as well as everything you do on Facebook itself.

You can't stop all of this data collection, but you can curb it. Head to the Facebook permissions page—under **Apps and notifications** and **Facebook** in Android settings and under **Facebook** in iOS settings—to block Facebook's access to your phone's location, your contacts, your phone's microphone and camera, and more.

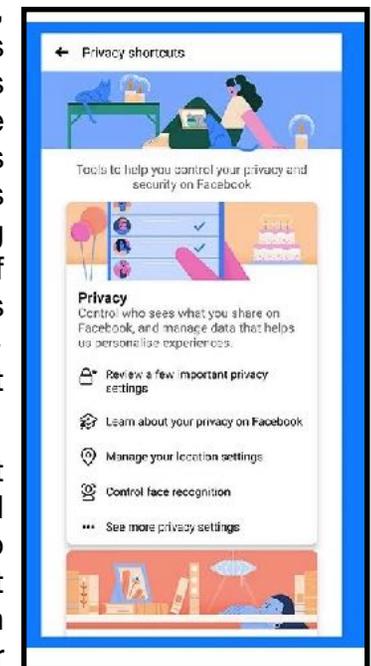


The bad news? Even with location tracking turned off, Facebook [still makes note](#) of the approximate location that you access the web from via your IP address. It's only a rough guide—and Facebook says it's necessary to keep accounts secure and users verified—but you can't stop this from happening if you use Facebook.

More bad news: Other [apps send data to Facebook](#) as well, often automatically. Almost everyone has a Facebook account, and third-party apps want to make use of that data, whether it's to target users with advertising or to simplify the login process and get more user data as a result. Facebook isn't working in isolation here, and has many profitable partnerships with other apps and data brokers.

It's worth emphasizing that Facebook, like Google, promises to use this treasure trove of data to improve its services and make life safer and more convenient for its users, as well as generating more profitable ads across its network. You are, after all, using everything Facebook offers for free. If you don't trust Facebook's intentions—which is by now understandable—then you really need to quit using it altogether.

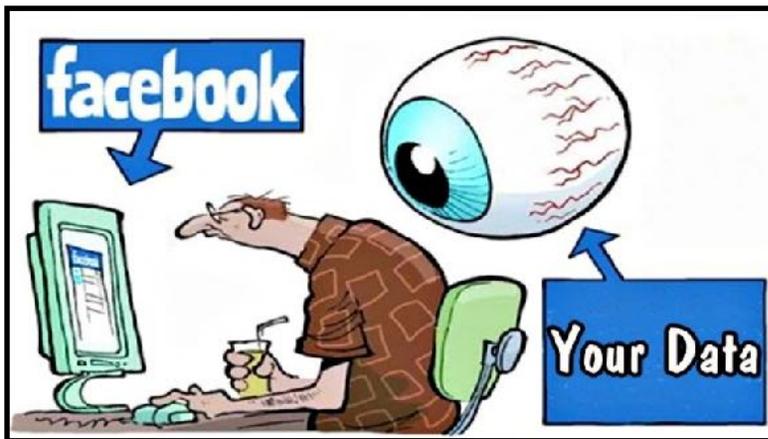
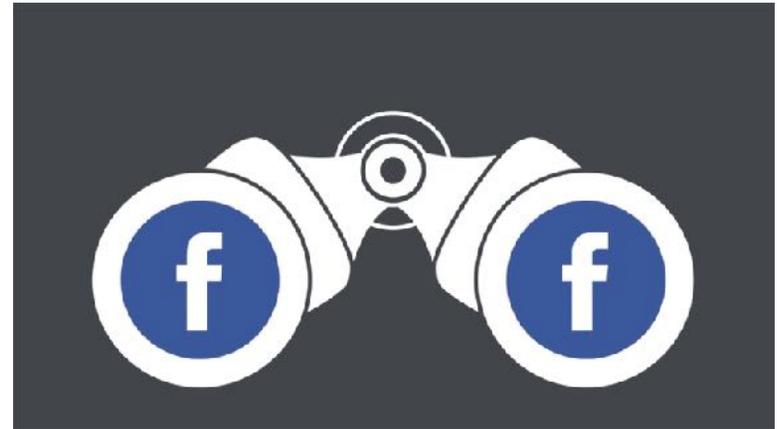
If you're going to stay with it, limit your activity and become a social media lurker. Don't check into locations, don't tag photos, and don't fill out quizzes that tell you which Disney character you are. Keep your profile information down to a minimum, and think twice about sharing anything at all. On the phone, consider using Facebook on the mobile web instead of in the app.



Keep the apps you've connected to Facebook down to a minimum as well; you can find a list on the web [here](#). Not only does this restrict the third parties who have access to your data, it's also a good idea from a security point of view, limiting the number of ways hackers could potentially get at your data.

Facebook knows full well that users are uneasy about its data collection policies, and is trying to [push out tools](#) that ostensibly offer more control. In reality, these don't do much in regards to data collection, and are more about how that data is used to personalize ads. At this stage, if you don't want Facebook to know a lot about you, you really need to close down your Facebook, Instagram, and WhatsApp accounts and not look back.

More general privacy tips can slow down Facebook, too: [Use a VPN](#) to disguise your location, [lock down your browser's privacy settings](#) so you're not tracked so extensively by marketers, and make liberal use of your browser's incognito mode wherever you can. Ultimately though, using Facebook comes with a cost, even if it's not paid up front in dollars and cents.



The following article was posted to techviewer.com around August, 2019. <http://bit.ly/2TfkQhQ>. © techviewer.com.

How To Free Up Space On macOS Catalina

By John

When we were first introduced to the macOS Mojave during 2018's Apple Worldwide Developers Conference (WWDC), no one could have imagined that its successor would have any bells and jingles to outclass it. On June 3, 2019, the inevitable happened, and Apple's Mac lovers finally saw the newly-rolled out MacOS Catalina.

With the macOS Catalina, you'll find everything you love about the Mac, but will some outstanding upgrades. iTunes revolutionized the means through which users experienced music, videos, TV shows, and podcast. However, the macOS Catalina brings you all that in three dedicated apps – Apple Podcast, Apple TV, and Music. Additionally, you can run both your mac apps and iPad apps simultaneously, allowing you to drag and drop content between them. Other upgraded features are the photo search engines that have made it easier and quicker to find notes and images, fast browsing and a revamped and reorganized reminder.

But with so much to do with the macOS 10.15 Catalina, it may not take long before you fill up the 15GB space capacity. This article gives you in-depth coverage on how to free up space on macOS Catalina and some tips of performing that quickly and effortlessly.

How to Free Up Space on macOS Catalina

1. Remove App Junk

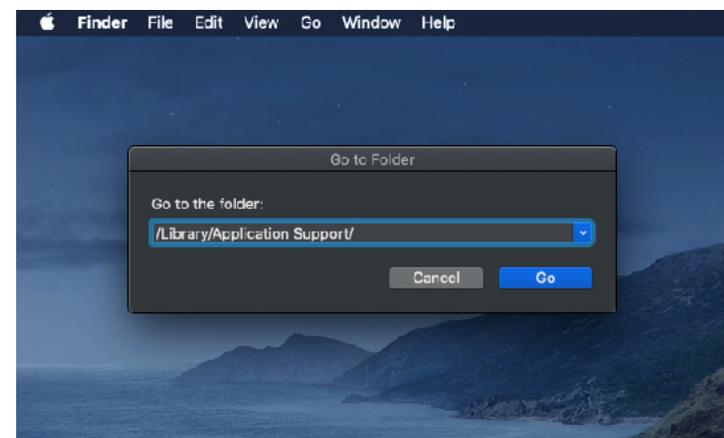
App junk are those programs that tend to remain hidden on your macOS even after dropping them on Trash. However, it is worth

understanding that deleting unwanted app manually increases your chances of completely removing some critical programs. Therefore, carefully check the filename before deleting it to ensure that it's for the intended app.

If you want to ensure that you delete all the program junk from your macOS Catalina, follow the following steps:

1. Take note of the apps you've sent to Trash and jot them down. Afterward, find the app junk and the files they are related to.
2. Visit the app location to find the associated programs. Open Finder, Select "Go" and choose "Go to Folder".

Type `/Library/Application Support` and click "Go".



Go to the folder in macOS Catalina

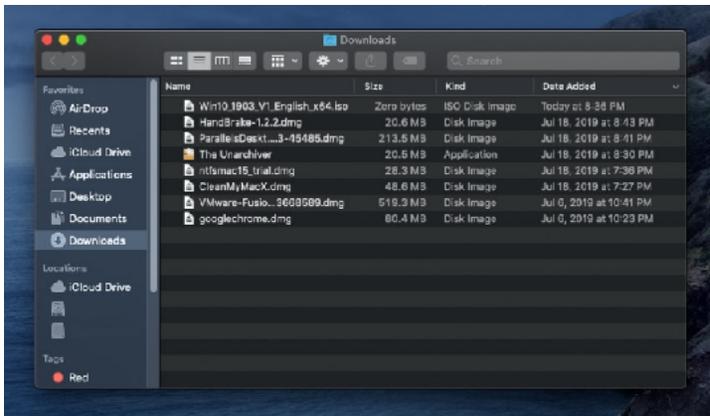
If you want to locate a particular program for a specific app, follow the following commands:

- Library apps - `/Library/Application Support/`
- File Support Cache - `/Library/Caches/`
- Launch Agents - `/Library/Launch Agents/`
- Preference Files - `/Library/Preferences/`
- Application Support Files - `/Library/ Application/`

- Binary and Dock Items - /Application/
- Start-Up Items - /Library/Startup Items/
- Saved App States - ~/Library/Saved Application State/

2. Clean Your Download Folder

Are you still puzzled on how to get rid of all those PDF files you obtained from the internet or the images you opened after reception from friends or relative? All these files end up in the Downloads folder on your macOS. Without wiping them off, they end up taking up a considerable chunk of your hard drive space. To get rid of file junk from your downloads, follow the following steps:



Clean Download Folder

Visit the Downloads folder near the Trash Can icon to reveal downloaded items.

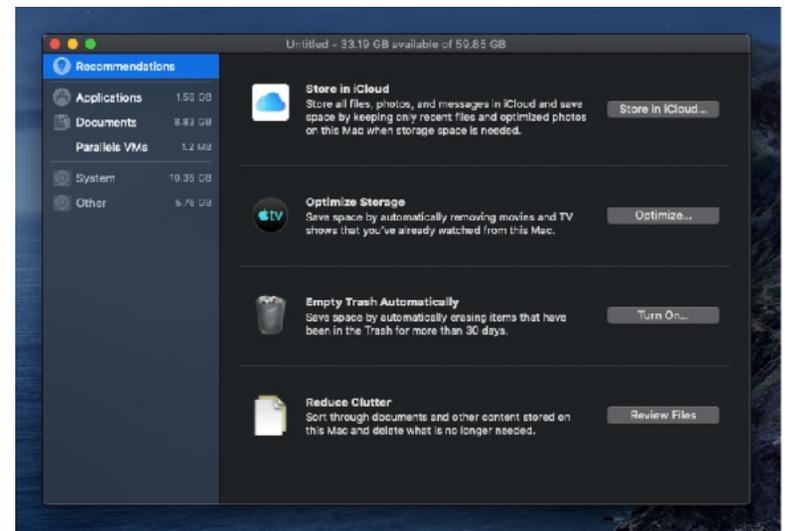
Click the "Open In Finder" button to find the "Downloads" folder, which contains all your downloads. Once here, you can either press Command + A to select all files or choose each file one at a time. Once you're done highlighting the intended files for deletion, drag and drop them in the Trash Can.

3. Use Storage Optimization Tool on macOS Catalina

The new macOS Catalina has a new storage optimization tool that ensures the device has an optimized storage usage at all times by avoiding space wastage. Also referred to as the "Storage Tool", this feature offers additional space in your hard drive for you to store other programs and files.

To activate the storage optimization tool in your macOS Catalina, follow the following procedure: Visit the "Apple Menu" located on the top-left of your screen.

Click on About This Mac > Storage > Manage



Use New Storage Optimization Tool on macOS Catalina

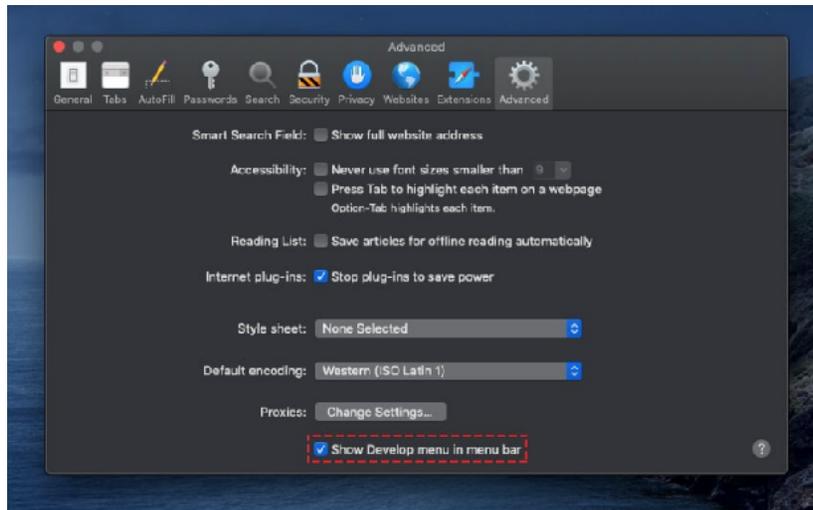
You'll see a pop-up message with several options. Click on the "Optimize Storage" button. Once activated, the optimizer will automatically arrange your files, removing any program junk to free up space. The reason why the storage optimization feature excels in the macOS Catalina is that the device has an enhanced space for additional storage.

4. Clean Cache on your Mac

In simple terms, a cache is a type of temporary files that enable the macOS Catalina to operate efficiently. There are various types of cache files. They include Browser cache, System cache; and User cache. Although these caches are helpful, they are temporary and can usurp a large space on your macOS disk.

Clearing Browser Cache on Your macOS

If you are a heavy internet user, you may end up clearing megabytes of cache files on your macOS Catalina. The official MacBook browser is Safari, and you can remove the cache by following the following steps:



Show Develop Menu in Safari

- Click the Safari icon to open the browser.
- Go to the menu and click on "Preferences".
- Go to the "Advanced" feature and tick the "Show Develop" in the menu bar.
- Click the "Develop" button in the menu bar and choose the "Empty Caches."

- Close the Safari browser for cache clearance to be complete.

Clear System Cache and User Cache

The system and user caches are the temporary files that let you use your macOS on daily operations. For example, when you listen to music or view a video on your MacBook, the information is stored in the system cache file. The device can, therefore, locate the file quicker and easier on a subsequent command. With time, these caches can occupy a large space on your macOS Catalina. If you'd like to clear all cache from your macOS or delete a cache belonging to a particular application, here's the procedure:

Terminate the operations of all applications. Launch "Finder".

Select "Go" on the Finder menu and choose "Go to Folder".

Type ~/Library/Caches/ and click "Go".

Find the cache file related to a specific app and choose the items you need deleted and drag them to the Trash Can.

5. Use Cloud Drives

Is your MacBook filled up because of storing a lot of programs and apps? Additionally, you may lose your personal data by frequent misplacement of your USB flash drive. That's why software developers have created cloud-based storage apps to help you to free up space on your macOS. There are several cloud drives you may consider, but each operates differently with different operating systems. Below are some of the best cloud drives for you macOS Catalina.

Google Drive. Albeit Google Drive was initially intended for storage purposes, it expanded its featured tools by incorporating an office suite that comprises Google Docs too. Fr merely having a Google Drive, users get 15GB free storage space. However, for additional space, you'll have to incur monthly subscription fees.

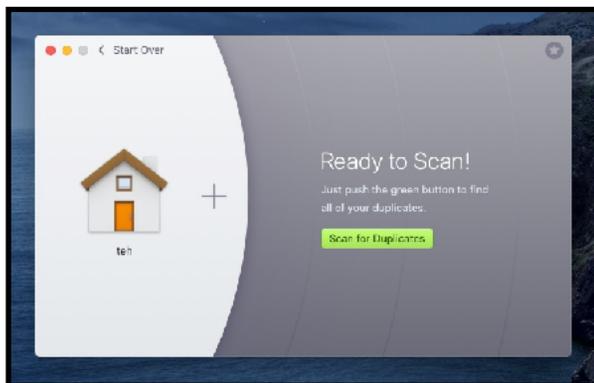
iCloud Drive. This Apple cloud-based storage software works best with Apple's latest gear on the macOS Catalina. When you

use it on any macOS device or an iDevice, you get an extra 5GB of free space. It comes with an integrated office suite, although it only contains basic features like Pages, Keynote, and Numbers. iCloud supports Windows but is still not supportive of Android.

Dropbox. Dropbox free storage is 2GB. The advantage of this cloud storage app is that it's compatible with different platforms, including Windows, Mac, Linux, iOS, Kindle, Android, and Fire mobile application programs. Dropbox also provides different promotional offerings such as an extra 250MB for just getting started with the tutorial or 3GB extra space for uploading images through the mobile app.

6. Find and Remove Duplicate Files

The daily utility of your macOS may mean having duplicate files. The most common reason why you may have duplicate files is because of program installations. When an essential program feels under threat from other applications, it may duplicate itself to minimize the risk of malfunctioning.



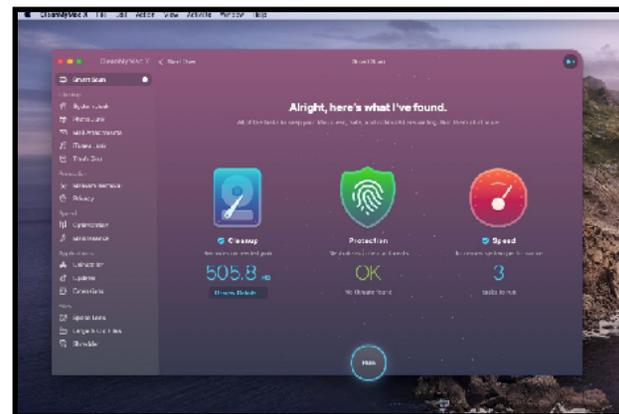
Find and Remove Duplicate Files

But if you find an unimportant program with it duplicate, you can install the Gemini 2 App for macOS. Gemini helps you identify, locate, and get rid of duplicate content in whichever corner they lay concealed. Regardless of the capacity of your hard Drive, Gemini can scan it at a lightning-fast speed. Furthermore, the

software also locates and removes similar files to ensure you have free space on your MacBook.

7. Use Third-Party Apps

Instead of using the manual method of clearing space, you can use automated software that performs all that work in a fraction of the time. The Clean My Mac app automatically rids your macOS system of junk file and other remnant programs that eat up space in the device. By using the Clean My Mac software, you can clear up space to revamp the speed and operations of your MacBook.



Clean up both your System and App Junk

You can download the clean-up app and get started with a free version that clears a massive space at no cost. Afterward, you may opt to upgrade it to a paid version that gives you macOS a junk-proof clean-up.

Bottom line

Your startup disk full shouldn't hinder you from performing various tasks with your macOS device. As you've understood, there are several ways or a different mix of ways that you can use to ensure your MacBook is running with excellent speed. Adhere to the tips on this piece and see your macOS Catalina offer you unrivaled computer performance.



AI and Humans

The Third Dimension and Beyond

By Kathy Garges

The remarkable developments in recent years in face and image recognition, self-driving cars, and artificial intelligence generally, have come through deep learning (neural networks), that views images and other data as flat, two-dimensional. But our world has at least three spatial dimensions and one time dimension. Some physicists believe it has nine or ten spatial dimensions.

Our heads may spin when we try to visualize a world of more than three spatial dimensions. Yet we regularly work with many dimensions in another area – information. Think about the multiple dimensions of a monthly budget. They typically include rent or mortgage, utilities, phone, food, clothing, car, medical, pets, education, entertainment and more.

You may have come across a classic logic puzzle or riddle that illustrates the multiple dimensions of everyday data. Five neighbors have different names, house numbers, kinds of pets, pet names, and other individual characteristics. A series of clues is given. The puzzle asks for a piece of missing information, such as “Whose pet is a fish?” A recent variation, for example, gives as the first clue: “Linda lives on a higher floor than the dog named Buttercup but on a lower floor than the pekingese, which is not named Rose.” Albert Einstein’s version of the puzzle is probably the most well-known (see link at the end of this column).

The ability of deep learning AI to detect patterns in multi-dimensional information like this, and in three dimensional images, has been held back by its structure, which uses two-

dimensional layers that analyze data and then transfers (convolutes) the result to the next layer for further analysis. These limitations appear in the typical need for large amounts of training data and in the programs’ difficulty identifying two-dimensional renderings of some kinds of three-dimensional objects, like airplanes. Better AI is also needed to analyze globes and spheres, irregular three-dimensional objects, human poses, and protein structure, among other important data.

There have been various attempts to advance deep learning to the third and higher dimensions. The most promising approach is coming from the University of Amsterdam and Qualcomm AI Research. This team uses a key (but easy-to understand) insight of the very same Albert Einstein, that the laws of physics are the same no matter what. The laws of physics do not change when we use a different unit of measurement (yards or meters) or when an observer has a different viewpoint (moving or standing still). This principle of physics goes by the opaque term “gauge covariance” or “gauge equivariance.”

The researchers call their new deep learning structure “gauge convolutional neural networks” or “gauge CNNs.” Instead of giving the neural network complete freedom to analyze data and forward the result to the next layer, a gauge CNN allows results to be reported only if they preserve covariance. The program implementation is complex, but the basic principle is to apply a filter to the layer results that rejects results that do not preserve defined physical properties. In a recent study, the team tested the gauge CNN architecture on global climate data, which has an underlying three-dimensional spherical structure, successfully training the program to detect extreme weather patterns, such as tropical cyclones, from climate simulation data. The gauge CNN detected cyclones with 97.9% accuracy compared to a 74% accuracy rate in a 2017 study by government and academic researchers that used standards CNNs.

Beautifully, gauge CNN theory encompasses earlier efforts by others to solve the same problem, even though at first glance

they seem to take a very different approach. In 2015, a team at the Imperial College London focused on the problem of globes and other curvy three-dimensional objects. A line on a globe, for example, changes right-left orientation if it is moved over the “North Pole.” This team used a circular flexible web rather than a flat plane, to map human poses, and the program was enabled to recognize that different poses were of the same object. A 2016 report by a Stanford University team used volumetric analysis and multiple observation viewpoints to improve image analysis of airplanes, i.e., unit of measure and observer position approaches.

In 2017, a Northwestern University team used an analogy-based AI program to solve Raven’s Progressive Matrices, performing in the 75th percentile for American adults. You may have seen these puzzles, which are 3x3 matrices of images with one missing. They range from easy to difficult, and are used as a nonverbal standardized human intelligence test that measures abstract, fluid reasoning. Each row of a puzzle image might display a circle, square or diamond, a smaller central geometric shape and a patterned background such as stripes or dots, in various configurations.

Analogy-based AI has not been popular. The most well-known proponent is Douglas Hofstadter. It fits right in to gauge CNNs, however. Analogies are, in essence, proportions, ratios which preserve fundamental characteristics, like the gauge CNN. Raven’s Progressive Matrices can also be viewed as visual representations of some of the information central to the neighborhood logic puzzle described at the beginning of this column. No wonder Einstein liked this puzzle! It illustrates part of his key insight of gauge covariance.

Gauge CNN theory likely will be useful not only for analyzing images and data but also for generating visualizations. See links at the end of this column for some useful visualization tools already available. With gauge CNN concepts added, tools like these could help physicists, mathematicians, and the rest of us, understand better higher physical dimensions and complex data.

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