



What are Pennsylvanians Fixing?

The devices Pennsylvanians tried to fix in 2018 and why it's harder to repair them than it should be

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The authors bear any responsibility for factual errors.

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EXECUTIVE SUMMARY

Here in Pennsylvania, we want to fix our stuff.

Something breaks, or doesn't work right. You could throw it away, but you don't want to be wasteful so you try to figure out how to get it fixed.

According to a review of data from iFixit, a self-described "repair guide for everything, written by everyone," more than 2 million unique users from Pennsylvania went onto their website, www.ifixit.com, to look up how to repair something in 2018.

2.3 million

**UNIQUE VISITORS FROM
PENNSYLVANIA WENT TO
IFIXIT.COM IN 2018.**

Looking more closely into that data from iFixit, the top ten device types that Pennsylvania attempted to fix were cell phones, laptops, automobiles, gaming consoles, tablets, vacuums, desktop computers, watches, instruments, and wireless speakers. Cell phone repair guides were by far the most popular, receiving 28 percent of all the page views.

INTRODUCTION

REPAIR IS GOOD FOR OUR POCKETBOOKS AND GOOD FOR THE PLANET

Every item that can be reused should be reused. But our use of increasingly disposable electronics is creating a brewing ecological crisis.

Electronic waste is now the fastest growing waste stream in the world.¹ In America, 416,000 phones enter the waste stream each day, approximately 15,200 per day in Pennsylvania.² According to the Institute of Electrical and Electronics Engineers, 165 pounds of raw material are required to produce one 8-ounce cell phone.³ The vast majority of the greenhouse gas emissions associated with cell phones comes from the production of the phone, not the cell phone's use.⁴

FINDINGS

TOP PRODUCTS THAT PENNSYLVANIANS ARE TRYING TO FIX

One of the benefits of the rise of the internet is that consumers have many ways to learn how to fix their stuff. One of the most popular and utilized do-it-yourself repair websites is iFixit, which offers guides, videos and tutorials to consumers and professional independent repairers on how to fix everything from vacuums to cars to cell phones.

On this website, Pennsylvanians can learn how to replace batteries and screens on our phones, change the spark plugs on our cars, add memory to our computers, and many other repairs.

According to data from iFixit, the top ten devices that Pennsylvanians attempted to fix most often in 2018 were cell phones, laptops, automobiles, gaming consoles, tablets, vacuums, desktop computers, watches, instruments, and wireless speakers. Cell phones repair had the most views of all device types, receiving 28 percent of the views by Pennsylvanians.

FIGURE 1 - TOP 10 DEVICES PENNSYLVANIANS ATTEMPTED TO REPAIR IN 2018 ACCORDING TO IFIXIT DATA

Rank	Device Type
1	Cell Phone
2	Laptop
3	Automobile
4	Gaming Console
5	Tablet
6	Vacuum
7	Desktop Computer
8	Watch
9	Instrument
10	Wireless Speaker

Eight of the top ten devices that Pennsylvanians tried to repair are consumer electronics. Because consumer electronics represent the majority of devices that Pennsylvanians tried to fix in 2018 and they feature similar types of problems, we focused on these devices to determine the problems that Pennsylvanians were trying to solve in 2018 and identify potential barriers that stand in the way of a Pennsylvanian's right to repair their stuff.

MOST SOUGHT AFTER FIXES BY PENNSYLVANIANS FOR CONSUMER ELECTRONICS

The top ten consumer electronic issues that Pennsylvanians attempted to fix were issues with batteries, screens, hard drives, buttons, logic boards or motherboards, disassembly, forcing a restart, cleaning, problems with a cable, and WiFi or Bluetooth.

FIGURE 2 - TOP 10 PROBLEMS IN CONSUMER ELECTRONICS THAT PENNSYLVANIANS WERE TRYING TO FIX IN 2018 ACCORDING TO IFIXIT DATA

Rank	Problem
1	Battery
2	Screen
3	Hard Drive
4	Buttons
5	Logic / Motherboard
6	Disassembly
7	Force Restart
8	Cleaning
9	Cable
10	WiFi / Bluetooth

The battery was the most popular problem that Pennsylvanians were trying to fix – 20 percent of page views featuring consumer electronics were guides to replacing batteries. Roughly 1 in 12 of those pages were for iPhone 6, iPhone 6 Plus, iPhone 6s, iPhone 6s Plus, iPhone SE, iPhone 7 Plus, and iPhone 7. These were the iPhone models that Apple slowed down in late 2017, in an incident that is referred to as [Throttlegate](#)⁵ or [Batterygate](#).⁶

In January 2017, Apple rolled out internal operating system (iOS) update [10.2.1](#)⁷ that, according to the company, slowed down phones with older batteries to prevent them from unexpectedly shutting down if they were experiencing performance issues. Apple [hid this from consumers](#),⁸ but eventually users discovered this intentional throttling, discussing the issue on forums including Reddit.⁹ After this information became public and was supported by testing and data, dozens of news stories broke about Apple’s lack of transparency and speculation about Apple’s intentions.¹⁰ Consumers banded together in multiple groups to [sue the company](#).¹¹

In response to the public blowback, Apple admitted to slowing down phones, and also admitted a battery replacement would solve the issue. The company also offered to replace consumers’ batteries for \$29 instead of the \$79 they normally charged for the entire year of [2018](#).¹² Customers flocked to get their batteries swapped, [and long waitlists formed](#).¹³

By the end of the year, at least [11 million](#)¹⁴ people took advantage of Apple’s battery replacement service, 10 times more than in other years, indicating that battery replacement is a simple fix that can help millions of Americans. A U.S. PIRG report found that even though independent shops did not offer the same discounted battery swap rate, those shops saw a 37 percent increase in battery replacement requests after the story broke, demonstrating that people want more repair options than just the manufacturer.¹⁵ Still, Apple does not sell replacement batteries to customers or independent repair technicians.

BARRIERS TO REPAIRING OUR STUFF

Despite the best efforts of websites like iFixit to provide Pennsylvanians with the tools and knowledge to repair our stuff, some manufacturers create unnecessary and unwarranted barriers, especially in the world of consumer electronics.

Barriers to consumers to easily fix their electronic devices include:

- Limiting a consumer or even a professional independent repairer from accessing the tools, parts, schematics, or software needed to perform simple repairs.
- Only making parts available to their own repair staff even if you wanted to pay fair market value to fix your stuff.
- Limiting important manufacturer information that would allow consumers to make easy fixes to their phones.

Here are some examples of how these barriers impact our ability to fix our phones in ways that we would expect to be able to fix them.

Worn-down Battery: If your phone dies quickly or slows down considerably, the battery could be wearing out. According to iFixit website usage, battery replacement is the most common problem for consumer electronics that Pennsylvanians tried to fix in 2018. Replacing phone batteries today isn't as easy as it used to be. Depending on what manufacturer made your phone, you may be able to find manufacturer batteries online or at an authorized repairer and replace your old one. However, many manufacturers don't sell their batteries, so you have to find a third-party battery. Once you have a battery, you may also have to find the tools necessary to unscrew all of the screws holding your phone together. Once you have taken your phone apart, you might realize that the battery has been glued in, an increasingly common practice by phone manufacturers. While many people do this repair on their own, changing batteries has gone from a very simple process to one that requires special tools and hard to source parts in modern devices.

Clogged Charging Port: If you plug your phone in to charge and nothing happens, it could mean that the charging port is clogged. If it is clogged with something like lint, you can easily clean out the charging port, but if you need to replace it, not all manufacturers sell replacement ports or repair them in their stores. Even if you can purchase a new charging port, the port sold by the manufacturer can be a lot more expensive. For an LG G5 phone, the LG-authorized port costs [\\$74.39](#),¹⁶ or you could go to the iFixit website and purchase the charging port for [\\$4.99](#).¹⁷

Cracked Screen: Broken screens and displays were the second most common problem among electronics that Pennsylvanians were trying to fix in 2018. Many manufacturers do not sell their screens. Apple even attempted to sue independent repair businesses for selling recycled screens, [though the company lost the case in court](#).¹⁸

Exposure to Liquid: If you spill something on your phone or drop it in a puddle, the device is not automatically broken. You can turn it off to make sure the battery does not short out, take the phone apart, wipe the parts down with anhydrous alcohol, let everything dry, put the phone back together, and turn it back on. Unfortunately, many manufacturers will refuse to repair a device that has been exposed to liquid, even if the exposure to liquid did not damage the device and is not what the client wants to fix. They can tell if a device has been exposed to liquid because many devices

come with liquid detecting sensors. These sensors can tell if a device has been exposed to moisture; however, they are sensitive enough that they can be triggered by a humid environment in addition to direct contact with liquid. These sensors are present in [many](#) phones and other consumer electronics like laptops. So if you spilled water on the part of your phone that contains the home button and you dried and fixed that part as described above, then after a few weeks, the volume buttons on the opposite side of your phone aren't working so you take it into the manufacturer's store, the repair technician would not repair the volume buttons on your phone because the phone had been exposed to liquid, and in many cases would tell you the phone could not be fixed, even if another technician could do the repairs.¹⁹

While there are numerous barriers to fixing our consumer electronics, those barriers are not present when it comes to fixing an automobile. Pennsylvanians have a lot of freedom to repair their automobiles because the automobile industry agreed to a national Right to Repair system nationwide. The national agreement on Right to Repair was reached after Massachusetts passed an auto [Right to Repair law in 2012](#).²⁰ Under this agreement, independent auto mechanics can access the same diagnostic tools and repair schematics available to dealerships. This agreement not only increases the freedom and ability for consumers to fix their cars but ensures that car manufacturers can't monopolize repair and force service to be done only by dealerships.

SOME MANUFACTURERS EMBRACE REPAIR

When we reviewed Pennsylvanians' use of the iFixit website we found that of the top ten manufacturers that produced things Pennsylvanians tried to fix, one manufactures automobiles, while the rest of them manufacture consumer electronics.

FIGURE 3 - TOP 10 MANUFACTURERS OF DEVICES THAT PENNSYLVANIANS TRIED TO FIX IN 2018 ACCORDING TO IFIXIT DATA

Rank	Manufacturer
1	Apple
2	Samsung
3	Sony
4	Honda
5	Microsoft
6	Lenovo
7	Shark
8	Motorola
9	Nintendo
10	HP

An analysis, combined with expert advice from Repair.org, of the nine consumer electronic companies that made this top ten list found that six of them do not sell the parts or tools necessary to repair their devices to the public.

Because of the automobile Right to Repair law, Honda provides access to repair information and tools. HP provides manufacturer parts for sale, and provides free access to repair schematics and diagnostic software, therefore making manufacturer-quality independent repair largely accessible to Pennsylvanians. [Motorola](#) has been leading the pack by moving toward providing repair information and spare parts for their mobile phones, but for other

products it can be a challenge to access spare parts and service information.²¹ SharkNinja products offer some replacement accessories, but not internal components.²²

But the other companies that made the devices that Pennsylvanians most commonly tried to fix via iFixit's website, [Apple](#)²³ along with [Samsung](#),²⁴ [Sony](#),²⁵ [Microsoft](#),²⁶ and Nintendo²⁷ frequently do not offer the parts, tools, schematics, and information necessary to repair their devices for sale to consumers, thereby making manufacturer-quality independent repair inaccessible to Pennsylvanians.²⁸ SharkNinja products offer some replacement accessories, but not internal components.²⁹

Limiting consumers' ability to access the parts and information necessarily makes repairs more difficult, and in some cases impossible. For example, without access to diagnostic software, you cannot replace the home button on an iPhone – the phone will not recognize the new button. For other repairs, sourcing parts is difficult and repair technicians might be unable to find a suitable part to complete the repair.

CONCLUSION

A significant number of Pennsylvanians want to repair their devices. A single repair guide website, iFixit.com, had more than 2 million unique visitors from Pennsylvania. The top products those Pennsylvanians are trying to fix are consumer electronics. Unfortunately, for much of the stuff Pennsylvanians are trying to fix, we can't get the information, schematics, diagnostic software, parts and tools we need.

Making it hard to fix electronic devices increases the number of fixable devices that enter our waste stream and the number of new devices that need to be produced. Not only does this cost consumers money as we are forced to purchase unnecessary, new devices, but it also requires us to waste materials and energy producing those devices.

The easiest action the consumer electronics industry can take is making its devices with repairability in mind. Making repair more accessible will increase the likelihood that people repair their devices, save money, and prevent another device from entering our waste stream.

If the electronics industry wants to become more transparent and consumer-friendly, manufacturers should adopt and adhere to basic Right to Repair principles which include providing the information, schematics, software, tools, and parts necessary to repair their devices for free or at fair cost. Pennsylvania's governor and legislators should consider taking action to ensure Pennsylvanians have the ability to repair their stuff.

METHODOLOGY

According to iFixit, 2.32 million unique visitors from Pennsylvania accessed their site in 2018. We collaborated with them to determine what devices Pennsylvanians are trying to fix, what problems they are trying to fix, and what manufacturers make the things they are trying to fix.

We obtained the total number of unique users from Pennsylvania that accessed iFixit.com from the company, which calculated this number based on Google Analytics data. We also obtained the pages that were viewed by browsers in Pennsylvania and the number of views those pages had in Pennsylvania.

We were able to group the pages by manufacturer, device type, and problem by viewing the guides and sorting them accordingly. Most of the information is clear from the title. For example, one page was titled “Sony ICFC1T Battery Replacement.” We can navigate from the page to the device page to determine that the Sony ICFC1T is an alarm clock; and confirm that it is made by Sony, and the guide shows how to replace a battery.

After we had created lists of pages sortable by device type, manufacturer and repair category, we calculated the total views within those categories. We created a top 10 list of the most common manufacturers of devices that Pennsylvanians tried to fix in 2018. We used the same methods for device type.

Because more than half of the top ten devices Pennsylvanians tried to fix in 2018 were consumer electronics, we drilled down into what types of repairs were being attempted. We isolated consumer electronics and identified the problems that people were trying to fix. We grouped the problems into categories and used the total number of pages per problem to determine the top ten problems that Pennsylvanians tried to fix in their consumer electronics.

To determine which manufacturers did not make spare parts, service information or other repair resources available, we reviewed the information available through company online stores and consulted with the Repair Association’s Executive Director Gay Gordon-Byrne. The Association, also known as Repair.org, represents independent repair technicians and advocates for Right to Repair. Gordon-Byrne confirmed which manufacturers do not provide access to parts and manuals.

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