

Environmental and Ethical Considerations

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Abstract—Right-to-repair legislation is challenged by OEMs and larger firms, claiming concerns for end-user data privacy, IP infringement, and degrading of products with cheaper replacement parts. They use these claims to perpetrate practices of locking down software crucial for diagnosing technical issues, building products to be difficult to disassemble, and voiding warranty if they are opened. These practices reduce the incentive for a consumer to continue using a product after it fails, even if the issue is a minor fix, such as replacing the screen or battery. These often still functional electronic products are treated as disposables, instead of a tool which is able to be serviced back to its original function. Supporting right to repair is crucial to allowing the extension of product lifespan, which will reduce electronic waste, and minimize the environmental footprint of consumer goods. This paper examines the modern right to repair debate, outlining the principles of the movement while highlighting environmental and ethical consequences of barriers to repair.

I. WHAT IS RIGHT TO REPAIR?

The principle of right to repair (RTR) is that if you own a product, you should have the ability to obtain the parts, documentation, tools, and software access needed to repair or modify the product. Right to repair as a movement is assertive of the concept “that ownership should be absolute”—that buying means buying the freedom to maintain it and restore it without relying exclusively on the manufacturer [1]. A meaningful piece of RTR legislation should include several consumer-rights guarantees: access to fairly priced replacement parts; access to service manuals, or at the minimum, schematics; access to diagnostic or specialty tools; and the ability to unlock any software restrictions [2].

Decades ago, most consumer goods—such as cars and radios—were designed to be opened and serviced by anyone

with basic mechanical skills, a lot of the time, there were even service manuals and schematics printed inside the products or supplied with them. [2]. Louis Rossmann, founder of Rossmann Repair Group Inc. notes in a 2020 video introducing his standpoint on RTR, that personal computers “came with thick books of schematics,” however, as of 2016, “repair centers cannot get access to schematics and diagrams.” This shows the modern shift in the culture surrounding repair, as electronics advanced and became physically smaller, these practices expanded beyond personal computers; household devices became increasingly dependant on software, began being sealed shut, and their technical information gate-kept from end users. Disposable products are becoming the norm, and with repair being hindered heavily, the modern RTR movement was born. A major turning point came in 2012, when Massachusetts passed the nations first automotive repair laws [3]. Fisher from Landline.Media, a news outlet reporting on the trucking industry recounts that these laws required tools made available to the auto dealers also be made available for purchase to both owners and independent repair shops. With proprietary tools being made available to consumers and professional repairers, vehicle maintenance is made far more accessible to those with fewer funds, allowing their cars to last a lot longer than they would without regular scheduled maintenance.

II. WHY SHOULD RIGHT TO REPAIR BE IMPORTANT TO ME?

Right to repair should be important to you because it allows you to maintain control over the products you own, reduce your waste production, save money, and increases technical literacy. Without regulations on anti-repair prac-

tices, people would become dependant on corporate monopolies—which can restrict repair access, inflating prices, and stripping freedom over the products you bought and paid for.

A. *Environmental concerns*

Apart from preserving liberty, increasing product maintainability has positive implications for environmental concerns. Global e-waste has reached critical levels: in 2024, the International Telecommunication Union reported that the world produced 62 million tons of discarded electronics, yet only 22.3% were properly collected and recycled [4]. This E-waste carries a much larger environmental footprint than traditional waste due to the complex manufacturing processes and vast amounts of resources needed to produce them. Discarding these devices prematurely requires new resources to be extracted, refined, and manufactured into a new product. Furthermore, electronic devices also contain heavy metals and chemicals which pose major pollution and health risks when improperly disposed of [4]. As shown in analytical models from the 2022 article “Right to Repair: Pricing, Welfare, and Environmental Implications,” prolonging the use of a product can reduce waste generation and material exploitation, making right-to-repair crucial for sustainable consumption [5].

B. *Cost saving*

In addition to saving the planet, regulating anti-repair practices through RTR laws would directly save you money. As discussed previously, manufacturers make repairs needlessly difficult, leaving you with no option other than to discard devices. Instead of being forced to buy costly replacements, if repairable products were more commonplace, you would have the option to use an independent repair service, which are often cheaper (and quicker) than the official options. The average consumer spends about \$1,767, although in an Investopedia article covering apple’s support of new legislation it is reported that you could save roughly \$382 if you were empowered by right to repair [6]. RTR laws, such as the European Union’s Ecodesign for Sustainable Products Regulation (ESPR), aim to remove the arbitrary barriers to repair by requiring companies to provide access to repair manuals and affordable ways to obtain spare parts [7]. For instance, Kass writes about how she only paid a

fifth of the cost of a new phone for a battery replacement, and it reportedly “was like getting a new phone without getting a new phone” [8]. Standardizing RTR would make affordable repairs widely accessible, helping you spend less while extending the life of the products you already own.

III. HOW ARE MANUFACTURERS FIGHTING BACK?

Manufacturers increasingly employ design and business practices that make independent repair difficult or even impossible. Common tactics include the use of proprietary screws, excessive adhesive, soldering typically modular components onto boards, and physically welding housings together, blocking internal access [1]. These obstacles make simple maintenance impractical. Another barrier is the introduction of digital locks, many companies—such as Apple—require “part-pairing” on all hardware used in their devices. Without reprogramming of replacement parts by an authorized servicer, pervasive warnings may appear on screen, and the replacement parts could even be completely rejected by the motherboard [9]. Together, these barriers consolidate repair power within corporate monopolies, driving repair costs up, and eroding consumer choice and product longevity. But there is a bigger question than just how they are fighting back: are original equipment manufacturers (OEMs) justified for doing so? A 2023 article published by the Competitive Enterprise Institute authored by Alex Reinauer covers a few reasons why manufacturers may make it difficult to repair their devices.

A. *Disincentivizing Innovation*

One of the claims brought up in Reinauer’s article is that RTR mandates might reduce incentive for innovation by forcing standardization: “the mandate ... could ultimately influence how manufacturers design their devices, leading to more standardization across product lines and less innovation” [10]. The argument is that if OEMs are required to make parts, tools, and diagnostic documentation broadly available, then they may shy away from novel designs, simplifying them to be “repair-friendly,” and potentially trading off performance, miniaturization, or advanced features. The article also raises concerns that smaller manufacturers “may lack the capital and resources to both create innovative

digital products and produce adequate repair documentation” [10].

B. IP Infringement and Ethics

Another argument presented is that RTR legislation undermines intellectual property (IP) protections: “Right to repair legislation forces manufacturers to reveal trade secrets ...” and may infringe on copyright [10]. The claim is that, as mentioned previously, if manufacturers are compelled to give over access to information and tools they deem as proprietary, then the manufacturers own right of ownership over those tools is put in jeopardy. Reinauer frames parts of the law as imposing “Compulsory Contracts” on manufacturers, and initiating a double standard where the consumer has more property rights than the manufacturer.

These IP concerns do have some legal standing. The Cato Institute, for example, highlights the fact that right-to-repair can force companies to disclose source code, which undermines copyright protection, potentially enabling competitors to duplicate designs [11]. Additionally, trade secret laws do not always block reverse engineering, and in many jurisdictions, reverse engineering is lawful so long as it is done in certain ways [12]. If corporations are not protected from someone reverse engineering their device, then there is a heavy incentive to make those products as obfuscated and difficult to access as they can.

C. Consumer Data Privacy Concerns

The most major criticism of enforcing broad right-to-repair laws is that it could compromise consumer data privacy and system security. As the original article warns, “industry representatives have raised concerns over data security and cybersecurity regarding the mandates” because they would require “the original equipment manufacturer [to] make available ... any special documentation, tools ... to access and reset [the] lock.” [10]. In a 2021 FTC report that Microsoft noted that “independent repair shops that conduct repairs could compromise the embedded hardware security” [13]. The inherent security risk of independent repair is once again mirrored an article by Ike Brannon, an author of multiple anti-RTR articles, who cautions that such access could be misused by bad actors, giving them full access to any of their customers’ personal information [11].

And These concerns aren’t purely speculative, in a study conducted in 2022, the authors reveal that some repair shops not only access customer files when conducting unrelated repairs—such as battery replacement—but also sometime copy them off the device.[14]. The figure below shows a brief summary of the trials that caught a repair person snooping.

TABLE 1. RECORDED PRIVACY VIOLATIONS. EACH SYMBOL REPRESENTS VIOLATIONS IN A UNIQUE EXPERIMENT. (F=FEMALE; M=MALE)

	National		Regional		Local	
	F x 2	M x 2	F x 2	M x 2	F x 4	M x 4
Privacy Violation						
Accessed Documents Folder			*	◊	††	
Accessed any Picture Folder	*		*	◊	††	
Accessed Revealing Pictures	*		*	◊	††	
Accessed Finance Folder					†	
Accessed Browsing History				◊		▷
Copied Customers’ Data				◊	†	
Covering Tracks						
Cleared “Quick Access”				◊	††	
Cleared Logs					●	◁

The resolution to this lies in the computer literacy of the customer. In the study, three repair providers claimed to require credentials to preform a battery replacement [14]. This may be a red flag to anyone with a technical background, however, most people wouldn’t question it at all, just like you wouldn’t question letting your exterminator into your house. If consumers were made aware that for nearly every repair—apart from data recovery—unlocking of the device was unnecessary, then they may avoid places which ask for a password. If a repair service gains a reputation for asking for too much access, or creeping around in devices, then they may lose customers or go out of business entirely. Freedom of repair shouldn’t be prohibited for everyone simply because of a few wrongdoers.

IV. ETHICAL CONSIDERATIONS

Evaluating whether manufacturers are justified in restricting repair access requires an ethical standpoint—not one purely based on facts. Using Kantian Ethics, we can analyze these practices and discuss if they are morally permissible or unjustified. Kantian ethics, also known as Deontological ethics, specifically focuses on the action itself, not the consequences. A morally acceptable action must stem from good will, and be guided by a sense of duty [15], not motives like profit, convince or desire. Under this framework, companies cannot justify harmful practices by appealing to beneficial outcomes.

A. Does restricting repair treat users as merely revenue sources?

From a Kantian perspective, certain anti-repair practices such as part-pairing and software locks serve as tools for generating revenue, rather than having grounds in any benefit such as consumer safety. These measures are designed to force customers to use parts and peripherals sold and installed exclusively by the OEM. Kant's philosophy explicitly prohibits treating people "simply as a means" to another's end [15], yet these tactics function precisely by forcing the consumer to meet the manufacturer's financial interests. The intention behind these barriers is therefore not guided by duty, and is therefore not morally permissible under a Kantian analysis.

This idea even holds in cases where OEMs claim that restrictions are there to protect device integrity or reduce user error. Kantian ethics rejects justifications based on consequences; an action that violates autonomy is morally wrong regardless of any beneficial side effects. If users are denied control over their property, then they are not being respected as autonomous beings whom set their own ends. Thus, the core structure of restricting repair directly conflicts with the foundational moral requirement to treat users as ends of their own.

V. CURRENT STATUS OF RIGHT TO REPAIR

In recent years, right to repair has been gaining a lot of momentum. In 2023, Colorado became the first state to pass RTR laws, with Bedayn from AP News reporting that "Lawmakers in at least 10 other states have introduced similar legislation." [16].

A. An Ongoing Lawsuit

In addition to legislation being passed, is facing John Deere significant legal pressure. Another AP News article by O'Connor details an ongoing FTC lawsuit against the farm equipment company captures, and highlights how far manufacturer are willing to go to retain control over repair. The class action lawsuit filed by the FTC in cooperation with the attorney general of Illinois and Minnesota, accuses them of monopolizing the repair market of their farm equipment. O'Connor reports the FTC's allegations: that the practice

increases repair costs, and causes significant delays for the farmers who rely on the equipment [17]. They also claim that Deere refuses to share the software diagnostics needed to repair their farming equipment, making it impossible for an individual to repair their equipment. O'Connor then presents a quote from Lina M. Khan, an FTC chairperson, stating "[farmers should be] free to repair their own equipment or use repair shops of their choice – lowering costs, preventing ruinous delays, and promoting fair competition." Deere denies all of the allegations, and claims to support customer repair [17].

B. Other Activism

The pushback hasn't just been limited to the courts. Advocates like the previously mentioned Louis Rossmann have spent years documenting the consequences of anti-repair design. Rossmann's activism ranges from regular posts on his YouTube channel exposing specific cases of anti-consumer practices to organized protests in states where pivotal decisions are being made. He also runs a forum—Consumer Rights Wiki—where the public can document their own cases of consumer rights violations [18]. Meanwhile organizations such as Repair.org and the FULU foundation, have been central to converting public frustration into political movement. Repair.org has been empowering consumers with tracking of current bills and templates for news legislation [1], while the FULU foundation sets bounties for finding ways around anti-repair practices. Currently, over \$10,000 have been raised to award to anyone able to bypass "RFID filter authentication" in a variety of GE refrigeration units [19]. If RTR is going to move from state and local legislation to concrete national policy, it will require sustained political pressure. Contact your representative today and tell them you are in support of strong right-to-repair legislation.

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