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Legal and Ethical Issues of Reverse Engineering the Video Game

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ABSTRACT: *A massively multiplayer online role-playing game (MMORPG) is a type of online video game that allows many players to participate in the game simultaneously; Players can interact with each other worldwide to cooperate or compete (Gose, 2014). Reverse engineering could enable the company to improve the efficiency and quality of the game product (CSCHEAFER, 2020). Video game companies could examine the strength of a game system while finding competing companies' weaknesses in terms of security, interoperability, and performance (NC State University, n.d.). The author will analyze intellectual property laws to help understand how to protect the video game industry when implementing reverse engineering. Additionally, the author will explain how a video game companies could strengthen the legal and ethical frameworks for protecting the legal rights of the video game industry, such as the sale, distribution, licensing of games. When a company spends time and money to develop a new game, it should put itself into other inventors' shoes to think about whether it is ethical and legal to reverse engineer others' products without significantly hurting their economic benefits and intellectual property rights (GeeksPrep, n.d.). Moreover, this paper will illustrate the moral obligation of companies and the importance of minimizing the risk of harm to companies and inventors during reverse engineering products.*

KEYWORDS: Role-playing game, reverse engineering, copyright, patent, trade secret

INTRODUCTION

Reverse engineering is a method used by video game developers to analyze how a previously made product or piece of software functions and accomplishes a task. This method can be used to investigate a competitor's product so that the company can design and market a superior product.[5] Reverse engineering a game is a process of extracting knowledge from other products and recreating a new one based on the extracted information (LegalZoom Staff, 2021). Reverse engineering the video game is an accepted practice considered by many lawyers and scholars (Samuelson & Scotchmer, 2002). When reverse engineering, people can learn how to disassemble programs into assembled code (Wong, 2018). This process includes modifying program behavior,

patching process memory, setting breakpoints, analyzing the system, and breaking and tracing the code (Muffin, 2020).

Reverse engineering could be helpful for the startup company to create compatible games. There are several benefits to reverse engineering a game (University of Pittsburgh, n.d.). This method helps explore existing designs, discover any vulnerability in products, inspire creative minds with old ideas, reconstruct outdated products, and bring more efficient products to markets (Lano & Haughton, 1993). Developing a new game using reverse engineering could help serve both customers and game players. Through reverse engineering, game developers can gather technical data and understand the components of a game system (NC State University, n.d.). Reverse engineering consists of several steps, such as observing and assessing the mechanisms that make a product work, studying the inner functions, and comparing the original product with new observations to improve (NC State University, n.d.).

Copyrights in Reverse Engineering

The United States used to have strict rules on reverse engineering (Smith, n.d.). In the 1970s, some states forbade a direct molding process to reverse engineer boat hulls (Samuelson & Scotchmer, 2002). In the early 1980s, the semiconductor industry obtained legislation to protect chip layouts from reverse engineering to make clone chips (GNU Operating System, n.d.). However, starting in the late 1980s and 1990s, reverse engineering has been considered legal as copyright law; The U.S. courts ruled that reverse engineering was acceptable for achieving interoperability (Samuelson & Scotchmer, 2002).

Under copyright law, literary works, musical works, dramatic works, pantomimes, choreographic works, graphic, sculptural works, motion pictures, and sound recordings are copyrightable (LegalZoom Staff, 2021). Additionally, Article 2 of the Berne Convention stated that:

The expression of literary and artistic works shall include every production in the literary, scientific, and artistic domain, whatever may be the mode or form of its expressions, such as books, pamphlets, writings, lectures, dramatic or dramatic-musical works, choreographic works, entertainments in dumb show, and musical compositions with or without words (Berne Convention for the Protection of Literary and Artistic Works, 1971).

Regarding whether to protect the video game industry, the U.S. Copyright Office stated that "Copyright does not protect the ideas for a game, its name or title, or the methods for playing it; nor does copyright protect any system, method, device, or trademark material involved in developing, merchandising, or playing a game" (Pleaders, 2019). However, the video game industry saw a flush of dawn after the Tetris Holding Ruling, which favored the video game industry (Tetris Holding, 2012). In *Tetris Holding, LLC v. Xio Interactive*, the court ruled that "A copyright holder is entitled to copyright protection for how it chooses to express game rules or

gameplay as one would be to how one chooses to express an idea" (Tetris Holding, 2012). Judges differentiated video games from other things and also provided interpretations of rules that can violate copyright law (Pleaders, 2019).

The Digital Millennium Copyright Act (DMCA) was established in 1998 (The Digital Millennium Copyright Act of 1988, 1998). This Act was designed to protect copyright holders from internet theft, covering music, movies, and texts (The Digital Millennium Copyright Act of 1988, 1998). It was also designed to prevent pirates from duplicating digital copyrighted works (The Digital Millennium Copyright Act of 1988, 1998). The Digital Millennium Copyright Act protects against the dissemination of information resulting from privileged acts of circumvention and the distribution of circumvention technologies (Samuelson & Scotchmer, 2002). The company should be aware the following clauses violate the Digital Millennium Copyright Act:

When joining a file-sharing network and downloading unauthorized copies of copyrighted materials from the computers of other network members; To gain access to copyrighted materials on the computers of other network members; To pay a fee to join a file-sharing network that is not authorized to distribute or to make copies of the copyrighted materials, and to download unauthorized materials (Wilkes University, n.d.).

The DMCA has a fair use policy, which permits certain copyrighted materials to be used in specific ways (The Digital Millennium Copyright Act of 1988, 1998). Even though this Act leaves ambiguous interpretations for game developers when making copies of other owners' product information; It does not provide a clear description of under which conditions the products of game developers can be protected from reverse engineering (The Digital Millennium Copyright Act of 1988, 1998). A startup company should scrutinize previous cases and rules in courts and examine how to obtain information through reverse engineering legally.

Video game companies need to pay attention to the laws in other countries because players and customers of the game might come from different countries. The company should respect laws in other countries and ensure its conduct will not infringe upon the copyrights in other countries since they have collective understanding and rules regarding intellectual property rights protection. For example, according to China's copyright law, the law recognizes eligible video games for applying for a copyright (Zihao, 2019). A major copyright case over a video game in China was filed in 2007 by Nexon against Tencent. The court ruled in favor of Tencent because it added new concepts to the original games even though the court found substantial similarities in the games of both companies (Zihao, 2019). This case established the idea of originality and copyrights of individual elements; Moreover, there was another case that occurred in China in 2018 (Zihao, 2019). The Taiji Panda's creator, Woniu Technology, sued Tianxiang Company over their mobile game Hua Qian Gu, which constituted a clone of the Taija Panda. The Tianxiang company argued that the game could not be copyrighted; However, the court stated that the video game fell into the category

of cinematographic works because it contains expression and should be copyrightable (Zihao, 2019).

Although certain countries have laws about infringing upon the rights of game companies, some countries do not define a computer game in the matter of copyright law. For example, European copyright law did not specify a computer game, which created uncertainty and confusion (Pleaders, 2019). Computer game cases have not come to the European Court of Justice or any other EU court due to their specific characteristics (Pleaders, 2019). When reverse engineering a game, the company should have a thorough understanding of the copyright laws to avoid violating laws from different countries (Wilkes University, n.d.).

Game developers should understand the copyright laws and choose proper technical means for reverse engineering, protocol decryption, and code disassembling (Fromer & Sprigman, 2021). When game developers know that they may be at risk of going beyond the fair use doctrine when conducting reverse engineering, the company must understand whether reverse engineering can be considered illegal (RAHUL VIJH, 2021). Also, a copyright owner may give the company permission to make copies and authorize reverse engineering (Fromer & Sprigman, 2021). The company could seek consent and pay a royalty to other inventors instead of deceptive use of improper means to gain information from other people. Understanding the copyright law will help the company learn how to balance the public's needs and ethically help the company achieve interests without breaching any legal rights.

Patents in Reverse Engineering

Understanding the patent law is essential for video game companies to safeguard their inventions (Merges & Duffy, 2021). The patent law can protect any product, design, or process when they meet certain specifications according to its originality, suitability, and utility (Merges & Duffy, 2021). In most cases, a patent can protect an invention for up to 20 years (Malek, 2015). A registered patent gives inventions' owners the exclusive right to produce, use, and sell their products for royalties (Sutton, 2019).

In the United Kingdom, the law generally excludes computer software from being patented, as stated in the UK Patents Act of 1977 (Gov.UK, n.d.). In the United States, Congress prohibited the creation and distribution of tools for reverse engineering (except in limited circumstances) in 1998 (Samuelson & Scotchmer, 2002). There have been arguments in courts about whether software can be patentable (The Guardian, 2014). In some situations, it is unclear whether reverse engineering should be considered illegal under the patent law. More recently, questions have arisen about whether reverse engineering software or games might infringe upon patent rights (Samuelson & Scotchmer, 2002).

Although different countries have various definitions and interpretations toward software and computer game patents, the startup company should respect other owners' inventions that are from around the world. Game developers should not misuse other people's information under the patent law. Allowing the violation of others' patents should be considered to contradict the company's core values of loyalty, caring, and integrity (Kruspig & Schwarz, 2017). When reverse engineering others' products is necessary, the company should train employees to understand the value of a product to a business and the effort of others to invest in intellectual property. Game developers need to understand how much damage might occur when others' intellectual property is stolen, misused, or mishandled (United States, 2016). Moreover, the company should obtain proper authorization and software libraries licensing agreements before using others' intellectual property (GNU Operating System, n.d.). The company should always respect patents by not copying, reproducing, and operating without consent from the patent owners (Craig Allen Nard, 2020).

Trade Secret Laws in Reverse Engineering

The United States Supreme Court has ruled that state trade secret laws may not cover cases "discovery by fair and honest means" (Duke Law School, n.d.). In *Bonito Boats, Inc v. Thunder Craft Boats, Inc*, the Supreme Court upheld reverse engineering and ruled that "Discover and exploit the trade secret through reverse engineering of products in the public domain or by independent creation is legitimate" (Bonito Boats, Inc. v. Thunder Craft Boats, Inc., 1989). The Supreme Court concluded that the trade secret law may not preclude "discovery by fair and honest means" (Prescott et al., 2020). In California, reverse engineering has not been considered a wrongful act (Prescott et al., 2020). Similarly, in Texas, reverse engineering is defined as the proper means of obtaining information except for any specification of prohibited conduct (Prescott et al., 2020). Similarly, in Texas, reverse engineering is considered a fair and legal means of obtaining information if it is not prohibited by law (Prescott et al., 2020). The startup company should respect states' laws and consider using any appropriate means to gain knowledge by reverse engineering (Shah & Siegel, 2021).

The World Intellectual Property Organization defined intellectual property as the creation of the mind, such as inventions, literary, artistic works, and images used in commerce (Emmert, 2020). However, this definition overlooks confidential business information and some trade secrets (Shah & Siegel, 2021). Historically, different states have developed their definitions and rules regarding trade secrets in the United States (Emmert, 2020). In 1979, the Uniform Trade Secrets Act (UTSA) standardized the trade secret law across states (Emmert, 2020). Trade secret owners could enforce their rights through a civil claim for misappropriation under state or federal law (Hornick, 2004). Additionally, in 2016, Congress passed the Defend Trade Secrets Act, which indicates that a secret can lose any protection if someone independently discovers it; it depends on the company to assess its trade secret and safeguard the secret information (Congress.gov, 2016). The trade secret law protects a wide range of information, including trade secrets that could not be covered under the patent, trademark, or copyright law; However, the trade secret law did not provide a uniform

definition for trade secrets because the trade secret law was developed at both state and federal levels (National Law Review, 2019).

Whether the original products of different owners could be protected by states' intellectual property laws or not, the startup company has an ethical obligation to not obtain confidential data by using improper means or disclosing information of others without consent. The startup company should carefully observe information and not uncover secrets protected by trade secret laws. The Uniform Trade Secrets Act recognizes that it is lawful to conduct reverse engineering "using fair and honest means" (National Conference of Commissioners on Uniform State Laws, 1985). When utilizing reverse engineering to develop a game, the company should be careful not to intrude on the trade secrets of others. Also, game developers should not use improper means to obtain information, including theft, bribery, misrepresentation, espionage through electronic or other means, or breaching a duty to get secrecy from others; If the company needs critical information from another company to develop a new game, it should gain consent or sign nondisclosure agreements with another party (Hornick, 2004).

The video game company should not only protect the rights of the intellectual property of other owners but also should protect its trade secret and intellectual property (Shah & Siegel, 2021). Upper management, game developers, and staff could regularly assess all information to evaluate what information should be maintained as trade secrets; Also, employees should sign a nonconfidential employment agreement to identify their obligations toward protecting trade secrets (Shah & Siegel, 2021). Moreover, the company can ask the employee who plans to leave not to retain any information or documents after leaving work (Shah & Siegel, 2021).

HOW TO MITIGATE THE RISKS OF REVERSE ENGINEERING?

Clean-Room Reverse Engineering

Reverse engineering may benefit the game developer when the developer utilizes clean-room design legally and ethically. If the company only uses other people's ideas, it might be fine; however, reverse engineering others' ideas and later selling the derivative products without applying for a license or paying royalty may be illegal or unethical. A company should examine the game system and ask a lawyer to evaluate the process to ensure that no material, which has been protected under intellectual property law, will be included in the game design.

Clean-room design is copying a design or a game by reverse engineering and recreating a product without infringing any intellectual property rights (Wikiwant, n.d.). Clean-room design implies that an environment is "clean" or uncontaminated by techniques used by competitors (Elkins, n.d.). It relies on independent creation and is a good defense against copyright infringement; However, cleanroom designs typically cannot be used to circumvent patent restrictions (Elkins, n.d.). The objective of using the cleanroom reverse engineering method is to help achieve zero-

defect and improve the reliability of a product (University of Missouri-Kansas City, n.d.). Before reverse engineering products, the company needs to have thorough test planning strategies, employees need to gather different legal requirements, understand the code of ethics, verify correctness, and examine statistical use in the game development (GeeksforGeeks, 2021).

It is essential to improve software maintainability by using the clean-room reverse engineering method (GeeksPrep, n.d.). This method would help reduce costs when creating games (University of Missouri-Kansas City, n.d.). When a startup video game company builds a new MMORPG product based on clean-room reverse engineering of a competing product, it needs to consider if the act is legal or ethical. The company should improve its policy to regulate and supervise reverse engineering activities to avoid any intellectual property rights infringement and immoral practices.

GNU General Public License Application

The video game company can consider using the GNU general public license to access different online software libraries to learn new inventions (GNU Operating System, n.d.). This license can enable game developers to take advantage of the libraries; The GNU general public license is a copyleft license for accessing software and different kinds of work. This license guarantees users' freedom to share and change a program (GNU Operating System, n.d.). After gaining the license, the company will "have the freedom to use the software for any purpose; it will have the freedom to change the software, the freedom to share the software with others, and the freedom to share the changes with others" (Smith, n.d.). Even though the license is free in general (GNU Operating System, n.d.), game developers should be aware of the intellectual property rights of other holders to avoid violating the copyright (GNU Operating System, n.d.). If the license authorizes the company to utilize specific software in the libraries and allows proper reverse engineering, then the company may gain permission to access the information in the libraries (Electronic Frontier Foundation, n.d.).

Judge Jacqueline Scott Corley, in a California district court, ruled that the GNU general public license is an enforceable contract even without signing by parties (McCarthy, 2017). The GNU general public license could benefit the company because it would offer strong protection against patent threats (Smith, n.d.). According to the GNU general public license, a company "may copy and distribute verbatim copies of the program's source code as the company receives it, in any medium, provides that the company conspicuously and appropriately publishes on each copy an appropriate copyright notice and disclaimer of warranty" (GNU Operating System, n.d.).

The software libraries provide user-friendly and easy ways for developers to obtain updated information on newly invented products and games (Sriram, 2019). Developers can search and manage data to enhance the learning process; Also, effectively utilizing software libraries could be cost-effective for the company (Sriram, 2019). The proper management of information and using

the GNU general public license may help the company improve the productivity of new games, reduce operation costs, and save time (Sriram, 2019).

Policy Implementation

Game developers should be trained to understand intellectual property assets, such as copyrights, patents, and trade secrets. Specifically, game developers should understand the laws and restrictions for reverse engineering. Consulting a lawyer is essential when designing a game by using the method of reverse engineering. The upper management and developers should work with lawyers to support compelling intellectual property valuation for developing a game. Also, when research involves the interception of products without the consent of the products' owners, the company should consult a lawyer to minimize risks.

The video game company should understand that it has a responsibility to learn software and license agreements carefully. Employees should be trained to understand policies for acquiring appropriate licenses. Also, the company could create a bylaw or policy to protect intellectual rights. The company should oversee training and guidance for employees with the intent of respecting intellectual property and creativity. Upper management should also warn of the consequences of violating authorial integrity, invasion of privacy, and unauthorized access. Moreover, the upper management should describe the requirements for developing a new game and require the reverse engineering team to learn the code from a guiding manual. Finally, the company may encourage creativity and provide adequate incentives to advocate for innovations of new games.

Fair Use

Fair use aims to ensure the First Amendment's freedom of expression, and it is often used by individuals when creating new thoughts or products by learning from the sources (Legal Information Institute, n.d.). One important "fair use" note of the U.S. Copyright Office indicates that "The distinction between what is fair use and what is infringement in a particular case that will not always be clear or easily defined (University of Pittsburgh, n.d.); There is no specific number of words, lines, or notes that may safely be taken without permission; Acknowledging the source of the copyrighted material does not substitute for obtaining permission" (Fromer & Sprigman, 2021). Can reverse engineering of video games be considered fair use? According to the U.S. Copyright Office's explanation of fair use, the doctrine of fair use allows users to reproduce copyrighted works in a way that will be considered fair, such as making criticism, comment, news reporting, and teaching (Copyright.gov, 2021). Section 107 of the U.S. copyright law explained the factors for evaluating fair use of copyrighted works:

The purpose and character of the use, including whether the use has a commercial nature or is for educational purposes; the nature of the copyrighted work; the substantiality of the portion used in the copyrighted work as a whole; and the effect of the use or the value of the copyrighted work (Copyright.gov, 2021).

Fair use might provide justifications for software users to make unauthorized copies in specific environments (Electronic Frontier Foundation, n.d.). Courts have found that reverse engineering for interoperability can be a fair use (Electronic Frontier Foundation, n.d.). For example, in *Sega Enterprises v. Accolade*, the maker of a leading video game console, Sega Genesis, sued a video game publisher, Accolade, after the publisher reverse engineered the console to make other games (Sega Enters. v. Accolade, Inc., 1992). The Ninth Circuit found that Accolade's intermediate copying (copying solely for discovering functional interface specifications) was a fair use because disassembling was the only way to gain access to the ideas and functional elements (Sega Enters. v. Accolade, Inc., 1992). Without fair use, a creator or developer would have to ask permission when taking the views from the sources (Copyright.gov, 2021).

Consulting a lawyer is essential to make reasonable and safe decisions. When developing a new game, the company should consult a lawyer to see if they can reverse engineer products in a way that will be allowed by the law. The following factors may be helpful for developers when reverse engineering products: "The company should lawfully obtain the right to use a computer program; it should obtain information in a good-faith manner that will not promote copyright infringement or computer fraud; the sole purpose of reverse engineering is to analyze parts of the program to achieve interoperability; obtain authorization from the owners of the software, and provide timely notice of findings to other IP owners" (Electronic Frontier Foundation, n.d.). Additionally, the lawyer could help analyze how a program works and how to access information legally. The lawyer might help develop strategies for the company when searching internet sources and making license agreements.

Ethical Considerations for Reverse Engineering

Even though there are some arguments about which types of software can be protected under intellectual property laws and whether online games can be patentable, game developers have a moral obligation to not intrude on other people's bottom line to infringe on their intellectual property. Game developers should address reverse engineering from both ethical and legal perspectives. Philosopher John Locke explained that "The origin of property rights is a natural right to the fruits of a person's efforts:

the state has a duty to respect the rights and enforce those natural rights" (Smith, 2015). This implied that intellectual property laws should protect inventions that create social and economic values. A company could train employees to understand their obligations associated with intellectual production and respect property interests, as well as recognize the fruits of intellectual products when accessing private and open sources (Alfino, 1991).

Upper management and game developers should address ethical principles for reverse engineering video games, such as how to create goodness while preventing harm to others (Laerd Dissertation, n.d.). According to the utilitarian theory, meeting the needs for the happiness of the greatest

number of individuals is considered the greatest goodness within society (Troyer, 2003). When using the utilitarian approach to analyze reverse engineering, the company can focus on how to maximize the benefits for consumers while appropriately utilizing others' knowledge to create new games (Troyer, 2003). Utilitarianism may argue that society will benefit when a product innovation occurs; The company can justify this by reverse engineering; subsequently, newly developed or improved products will benefit the general public because it would provide knowledge and insight for creating new games (Troyer, 2003). Additionally, legally implementing reverse engineering would help design interesting characters in games and create more attractive game schemes (Troyer, 2003).

When a company wants to disassemble data and analyze information to learn from other people's inventions, it is important to evaluate the benefit and cost of an action. Secretly and inappropriately gaining information might benefit the company for short-term gains. However, if the company ignored the law and business ethics, it could have a negative outcome, such as paying monetary damages, receiving injunctions, or even being terminated from doing business according to the laws in different jurisdictions. The company should have ethical considerations when learning from others and creating new games. Ethics is originated from cultural morals and values (Alfino, 1991). Ethical differences exist within society when individuals have different cultures. The company might find it challenging to determine which action is ethical or not (Alfino, 1991).

In business, ethical conflicts may arise when individuals with different cultures and values dispute ownership for protecting their intellectual properties (Fisher, n.d.). Proper ethical and legal training is vital for the company when creating a new product. Upper management could initiate training for employees to comprehend intellectual property and information security. Upper management and developers could consult with staff and experts with different cultural values and backgrounds to provide suggestions for potential legal and ethical disputes regarding reverse engineering. Additionally, the company might hire experts to evaluate technological, political, and economic circumstances and the current trend to analyze intellectual property rights (Shah & Siegel, 2021). Most importantly, the company could preserve its business reputation while maintaining trustworthiness. At all costs, creating a fair and comfortable working environment is essential. Staff could be trained on improving mutual understanding of ethical norms within the workplace. Additionally, employees should uphold transparency and honesty and respect the rights of intellectual property. Upper management might make it clear that anyone who violates the law should be investigated and condemned in order to preserve reasonable, cooperative, and ethical team spirit.

CONCLUSION

The video game company has a moral and legal obligation to minimize the risk of harm to other companies and inventors during reverse engineering products. The company should ethically

practice when reverse engineering a product. It can gain the license to access information and ensure that others' intellectual property rights are not violated. Game developers, upper management, and staff should comply with intellectual property laws and codes of professional ethics. They should create shared standards for all employees to provide fair guidance to compete in markets. Moreover, acquiring sufficient knowledge of the legal and ethical codes would inspire employees to work with more commitment and cooperate in a more effective way to serve the public when creating games.

References

Brett Smith, *A Quick Guide to GPLv3*, https://www.gnu.org/licenses/quick-guide-gplv3.html.Berne Convention for the Protection of Literary and Artistic Works (1971), https://www.law.cornell.edu/treaties/berne/2.html#:~:text=Works%20protected%20in%20the%20country,be%20protected%20as%20artistic%20works.

Bonito Boats, Inc. v. Thunder Craft Boats, Inc., 489 U.S. 141 (1989).

CSCHEAFER, *Benefits of Reverse Engineering* (May 28, 2020), https://www.meanseng.com/benefits-of-reverse-engineering-2/.

Congress.gov, Defend Trade Secrets Act of 2016 (2016), https://www.congress.gov/bill/114th-congress/senate-bill/1890.

Craig Allen Nard, The Law of Patents (2020).

Copyright.gov, More Information on Fair Use (2021), https://www.copyright.gov/fair-use/more-info.html.

Duke Law School, Trade Secrecy & Preemption, https://web.law.duke.edu/cspd/papers/pdf/ipcasebook_chap-22.pdf.

Drew Emmert, Intellectual Property And The Importance Of Trade Secrets (May 26, 2020), https://www.dbllaw.com/intellectual-property-and-the-importance-of-trade-secrets/.

David S. Elkins, A Guide to Using "Clean Room" Procedures as Evidence", Computer Law Journal, 4, 10, 453–481.

Edward Gose, *What Video Game Genres Are Teaching Us* (2014) (Ph.D. dissertation, University of Hawai).

Eric Sutton, Software Patents: A Practical Perspective: Version 4.1 (2019).

Electronic Frontier Foundation, Coders' Rights Project Reverse Engineering FAQ, https://www.eff.org/issues/coders/reverse-engineering-faq#:~:text=Reverse%20engineering%20generally%20doesn't,without%20violating%20trade%20secret%20law.

Faisal Shah & Nolte Lackenback Siegel, Corporate Counsel Solutions: Intellectual Property Management: Strategies and Tactics (2021).

GeeksPrep, *Reverse Engineering and Memory Hacking with Cheat Engine*, https://geeksprep.com/reverse-engineering-and-memory-hacking-with-cheat-engine/.

GNU Operating System, *Frequently Asked Questions about the GNU Licenses*, https://www.gnu.org/licenses/gpl-faq.html#WhatDoesGPLStandFor.

GNU Operating System, GNU General Public License, https://www.gnu.org/licenses/gpl-3.0.en.html.

GNU Operating System, Why you shouldn't use the Lesser GPL for your next library, https://www.gnu.org/licenses/why-not-lgpl.html.

GNU Operating System, Violations of the GNU Licenses, https://www.gnu.org/licenses/gpl-violation.html.

Gov.UK, The Patents Act 1977, https://www.gov.uk/government/publications/the-patents-act-1977#:~:text=The%20Patents%20Act%201977%20sets,the%20Patent%20Co%2Doperation%20Treaty.

GeeksforGeeks, Overview of Clean Room Software Engineering (Mar, 31 2021), https://www.geeksforgeeks.org/overview-of-clean-room-software-engineering/.

George H. Smith, JOHN LOCKE: THE JUSTIFICATION OF PRIVATE PROPERTY (Oct. 19th, 2015), https://www.libertarianism.org/columns/john-locke-justification-private-property.

Jeanne C. Fromer & Christopher Jon Sprigman, Copyright Law (2021).

John F. Hornick, Trade Secrets: What Your Company Needs to Know (Aug. 2004), https://www.finnegan.com/en/insights/articles/trade-secrets-what-your-company-needs-to-know-1.html.

John Troyer, The Classical Utilitarians (2003).

K. Lano & H. Haughton, *Reverse Engineering and Software Maintenance: A Practical Approach* (1993).

Katherine Prescott, Qiuyi Autumn Wu, Fish & Richardson, Is "Reverse Engineering"

Kieren McCarthy, For now, GNU GPL is an enforceable contract, says US federal judge (May 2017), https://www.theregister.com/2017/05/13/gnu_gpl_enforceable_contract/.

Misappropriation of Trade Secrets? (July 31, 2020), https://www.jdsupra.com/legalnews/is-reverse-engineering-misappropriation-96161/#:~:text=Is%20reverse%20engineering%20permissible%20under%20state%20trade%20secret%20laws%3F,Kewanee%20Oil%20Co..

LegalZoom Staff, *What Can Be Copyrighted* (July 09, 2021), https://www.legalzoom.com/articles/what-can-be-copyrighted.

Legal Information Institute, Copyright and the First Amendment, https://www.law.cornell.edu/constitution-conan/article-1/section-8/clause-8/copyright-and-the-first-amendment.

Li, Zihao, The Copyright Protection of Video Games from Reskinning in China - A Comparative Study on UK, US and China Approaches. Tsinghua China Law Review. 11, 2, 293–340 (2019).

Laerd Dissertation, Principles of research ethics, https://dissertation.laerd.com/principles-of-research-ethics.php.

Muffin, Introduction to Game Hacking! (Dec. 3, 2020), https://medium.com/ax1al/introduction-to-game-hacking-fb70e29de60f.

Mark Alfino, Intellectual Property and Copyright Ethics (1991), http://guweb2.gonzaga.edu/faculty/alfino/dossier/Papers/COPYRIGH.htm#:~:text=In%20the%20case%20of%20copyright,of%20free%20access%20to%20information.

NCState University, *Ethics in Computing*, https://ethics.csc.ncsu.edu/intellectual/reverse/study.php.

National Law Review, Trade Secrets: What You Need to Know (Dec. 12, 2019), https://www.natlawreview.com/article/trade-secrets-what-you-need-to-know#:~:text=With%20its%20broad%20definition%20of,%2C%20trademark%2C%20or%20copyright%20law.

National Conference of Commissioners on Uniform State Laws, Uniform Trade Secrets Act with 1985 Amendments (1985), https://www.wipo.int/edocs/lexdocs/laws/en/us/us034en.pdf.

Pamela Samuelson & Suzanne Scotchmer, *The Law and Economics of Reverse Engineering*(April 10, 2002), http://infosecon.net/workshop/downloads/2002/pdf/the-law-and-economics-of-reverse-engineering.pdf.

Pleaders, Intellectual Property in the Videogame Industry- With Comparative Analysis of PUBG and Fortnite (Dec. 11, 2019), https://blog.ipleaders.in/intellectual-property-videogame-industry/.

Reginald Wong, *Mastering Reverse Engineering: Re-engineer Your Ethical Hacking Skills* (2018).

RAHUL VIJH, Reverse Engineering and the Law: Understand the Restrictions to Minimize

Risks (Mar. 27, 2021), https://www.ipwatchdog.com/2021/03/27/reverse-engineering-law-understand-restrictions-minimize-risks/id=131543/#:~:text=%E2%80%9CTo%20ensure%20you%20steer%20clear,concepts%20contained%20in%20the%20product.%E2%80%9D.

Robert Patrick Merges & John Fitzgerald Duffy, Patent Law and Policy: Cases and Materials (2021).

Sabine Kruspig & Claudia Schwarz, Legal Protection for Computer-Implemented Inventions. A Practical Guide to Software-Related Patents (2017).

Sriram, Top 10 advantages of library management system by using Cloud-based (June 17, 2019), https://www.creatrixcampus.com/blog/top-10-advantages-library-management-system-using-cloud-based.

Sega Enters. v. Accolade, Inc., 977 F.2d 1510 (1992).Tetris Holding, LLC v. Xio Interactive, Inc. 863 F. Supp. 2d 394 (2012).

The Digital Millennium Copyright Act of 1988 U.S. Copyright Office Summary (December 1998). The Guardian, US supreme court to decide whether software can be patented (Mar. 31, 2014)https://www.theguardian.com/technology/2014/mar/31/us-supreme-court-software-patented.

University of Pittsburgh, *Copyright and Intellectual Property Toolkit*,https://pitt.libguides.com/copyright/fairuse#:~:text=The%20doctrine%20of%20Fair%20Use,teaching%2C%20scholarship%2C%20and%20research.

United States, Copyright and Patent Laws of the United States, 1790 to 1870: With Notes oJudicial Decisions Thereunder and Forms and Indexes (2016).
University of Missouri-Kansas City, Overview, http://m.web.umkc.edu/msv5f8/homework_3.htm.
Wilkes University, Digital Millennium Copyright Act, https://www.wilkes.edu/about-wilkes/policies-and-procedures/copyright.aspx#:~:text=In%20addition%20to%20University%20penalties,and%20five%20years%20in%20prison
Widerman Malek, Why are Patents Important? (May 02, 2015), https://www.legalteamusa.net/why-are-patents-important/#:~:text=A%20patent%20is%20important%20because,for%20up%20to%2020%20years.
Wikiwant, Clean room design, https://www.wikiwand.com/en/Clean_room_design.
WilliamWeston Fisher, Economic and ethical issues, https://www.britannica.com/topic/intellectual-property-law/Economic-and-ethical-issues.