The Journal of Business, Entrepreneurship & the Law

Volume 12 | Issue 2 Article 2

May 2019

Copyrighting Experiences: How Copyright Law Applies to Virtual Reality Programs

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COPYRIGHTING EXPERIENCES: HOW COPYRIGHT LAW APPLIES TO VIRTUAL REALITY PROGRAMS

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INTRODUCTION

"The future is exciting, but uncertain."[1] Some predict that virtual reality will fundamentally change the future of the entertainment industry,[2] while others believe it will remain "stuck in neutral."[3] Some say virtual reality will isolate us from each other.[4] Others say virtual reality will bring us together.[5] Some say virtual reality will make us inactive.[6] Others say virtual reality will inspire activity.[7]

Critics and champions of virtual reality (VR) may disagree on what impact it will have on humanity, but one thing for sure: it is

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[1] Steven Ornes, *Everything Worth Knowing About... Virtual Reality,* DISCOVER MAGAZINE (June 12, 2017), http://discovermagazine.com/2017/jul-aug/virtual-reality.

[2] Simon Erickson, *Is There a Future for Virtual Reality?*, THE MOTLEY FOOL (Nov. 25, 2017, 10:34 AM), https://www.fool.com/investing/2017/11/25/is-there-a-future-for-virtual-reality.aspx.

[3] *Id.*

[4] Ornes, *supra* note 1.

[5] *Id.*

[6] *Id.*

[7] "VR has seen use in training surgeons, fighter pilots, and construction workers. Today, it is also used to push our professional athletes to the furthest heights of excellence. Virtual reality firm EON Sports specializes in creating virtual training environments for athletes. Using both commercially available and custom-designed head-mounted displays, Eon places athletes on the field virtually." *How Reality Technology is Used in Business*, REALITY TECHNOLOGIES, http://www.realitytechnologies.com/sports (last visited Feb. 17, 2018).

coming.[8] And while it may only change the way we catch Pokémon,[9] it could also change the entire way we communicate with each other,[10] watch

[8] Ian Sherr, V*R promised us the future. Too bad we're stuck in the present*, CNET (Oct. 10, 2017, 12:14 PM), https://www.cnet.com/news/vr-virtual-reality-future-depends-on-you-buying-a-dorky-headset-oculus-zuckerberg-playstation-vive/ (quoting Mark Zuckerburg saying "[t]he future is coming").

[9] *See* THE POKEMON COMPANY INTERNATIONAL, INC., https://www.pokemongo.com (last visited Jan. 17, 2018)

[10] "As we continue to make big breakthroughs in the technology behind VR, we're also investing in efforts to explore immersive new VR experiences that will help people connect and share." "In the future, VR will enable even more types of connection — like the ability for friends who live in different parts of the world to spend time together and feel like they're really there with each other." *New Steps Toward the Future of Virtual Reality*, FACEBOOK NEWSROOM (Feb. 21, 2016), https://newsroom.fb.com/news/2016/02/new-steps-toward-the-future-of-virtual-reality/.

movies,[11] learn,[12] train,[13] work,[14] play,[15] create,[16] exercise,[17] behave,[18] experience.[19]

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[11] *See* THE VR CINEMA, https://thevrcinema.com (last visited Feb. 27, 2018).

[12] "Educators and students alike are seeking an ever-expanding immersive landscape, where students engage with teachers and each other in transformative experiences through a wide spectrum of interactive resources." Elizabeth Reede, *When Virtual Reality Meets Education*, TECHCRUNCH (Jan. 23, 2016), https://techcrunch.com/2016/01/23/when-virtual-reality-meets-education/; *See also Learn and Train with Virtual Reality*, UNIMERSIV, https://unimersiv.com.

[13] *Learn and Train with Virtual Reality*, UNIMERSIV, https://unimersiv.com.

[14] "[M[any of the world's largest multinational corporations are already integrating virtual reality technologies into their businesses." *How Reality Technology is Used in Business*, REALITY TECHNOLOGIES, http://www.realitytechnologies.com/business (last visited Feb. 27, 2017).

[15] *See* OCULUS, https://www.oculus.com/rift/#oui-csl-rift-games=robo-recall (last visited January 17, 2018); VIVE, https://www.vive.com/us/ (last visited January 17, 2018); PLAY STATION, https://www.playstation.com/en-us/explore/playstation-vr/ (last visited Jan. 17, 2018).

[16] "From architecture to interior home design, VR and related technologies are changing the way we create the places we work, live, and play." *How Reality technology is Being Used in Design*, REALTY TECHNOLOGIES, http://www.realitytechnologies.com/design (last visited Feb. 26, 2018); *See also* TILT Brush, https://www.tiltbrush.com (last visited Jan. 17, 2018).

[17] Kyle Melnick, *Mayweather Boxing & Fitness VR Program Debuts At First Gym This* Month, VR SCOUT (Jan. 11, 2018), https://vrscout.com/news/mayweather-boxing-fitness-vr-program-gym/#.

[18] "Virtual reality therapy isn't a new idea, and the concept far predates the modern easy availability of head-mounted displays. The concept was pioneered in 1992 in the doctoral dissertation of Dr. Max North, a computer scientist. His thesis was that virtual reality was an ideal, safe place to administer psychotherapy through exposure to various phobias and triggers." *How Reality Technology is Used in Therapy*, REALITY TECHNOLOGIES, http://www.realitytechnologies.com/therapy (last visited Feb. 26, 2018).

[19] "Whatever the industry, VR is largely about providing understanding—whether that is understanding an entertaining story, learning an abstract concept, or practicing a real skill. Actively using more of the human sensory capability and motor skills has been known to increase sensory bandwidth between human and information, but there is much more to understanding. Actively participating in an action, making concepts intuitive, encouraging motivation through engaging experiences, and the thoughts inside one's head all contribute to understanding." Jason Jerald, THE VR BOOK 9 (M. Tamer Özsu et

The enormous potential of VR has attracted developers, investors, and users.[20] On the investor side, Digi-Capital reported in July 2017 that in the prior twelve months, investment in Augmented Reality (AR) and VR sectors reached over $2 billion.[21]

On the user side, [c]onsumers will spend $5.1 billion on virtual reality gaming hardware, accessories and software in 2016. That's up from the $660 million spent in 2015, says the marketing leader. Meanwhile, the global market is expected to grow to $8.9 billion in 2017 and $12.3 billion in 2018,[22] and Brendan Iribe, CEO of Oculus, and Mark Zuckerburg, CEO of Facebook, claim there will someday be a billion or more VR users.[23]

So, there is money, passion, and optimism surrounding VR, but is there protection for the VR software? With new kinds of intellectual property comes questions of intellectual property protection, and it is unclear exactly how VR's various aspects will be protected. Patents will presumably protect the hardware, the physical computer components, of VR,[24] but it is less clear which kind regime of intellectual property will protect the underlying software or the experiences themselves. Because VR is a computer-generated environment,[25] and copyright law is the

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al. eds., 2016).

[20] "The recent surge in media coverage about VR has inspired the public to become quite excited about its potential." *Id.*

[21] *AR/VR Dealmakers invested over $800M in Q2 2017*, DIGI-CAPITAL (July 2017), http://www.digi-capital.com/news/2017/07/arvr-dealmakers-invested-over-800m-in-q2-2017/#.Wl_K-CPMzOS.

[22] John Gaudiosi, *Virtual Reality Video Game Industry to Generate $5.1 Billion in* 2016, FORTUNE, http://fortune.com/2016/01/05/virtual-reality-game-industry-to-generate-billions/ (last visited Mar. 5, 2018).

[23] Jerald, *supra* note 19, at 474.

[24] "Oculus VR has been assigned at least one utility patent from the U.S. Patent and Trademark Office to protect its headset-based virtual reality technologies. A problem in video playback where the display sometimes pans further right or left than a wearer's head is turning is addressed by the invention protected by U.S. Patent No. 9063330, entitled *Perception Based Predictive Tracking for Head Mounted Displays*." William Cory Spence, *Oculus Rift Patents that chance the Virtual Reality Landscape*, IP WATCHDOG (May 31, 2016), http://www.ipwatchdog.com/2016/05/31/oculus-rift-patents-virtual-reality/id=69483/.

[25] "[Merriam-Webster 2015] has more recently defined the full term virtual reality to be 'an artificial environment which is experienced through sensory stimuli (as sights and sounds) provided by a computer and in which one's actions partially determine what happens in the environment.' In this book, virtual reality is defined to be a computer-generated digital environment that can be experienced and interacted with as if that environment were real." Jerald, *supra* note 19, at 9.

typical avenue of protection for computer programs, developers of VR software will likely look to Copyright Law for protection. Not only is it an open question whether or not the protection of VR software will differ from that of traditional software, it remains an open question exactly what scope of protection copyright law affords traditional computer programs.

This note will attempt to shed light on the question of what kind of protection copyright law affords VR experiences. Part II discusses the nature of VR experiences and their implementation through specifically tailored VR technology. Part III provides an overview of copyright protection, its limitations, and specifically the history of the copyrightability of computer programs. Parts IV and V outline case law relevant to the discussion of the copyrightability of different types of VR experiences and how that case law similarly or dissimilarly apply to the protection of VR experiences. Part IV focuses on protecting VR experiences as a literary work, through its underlying code and Part V will focus on protecting VR experiences as audiovisual works, through its visual outputs. Part VI discusses a potential avenue for obtaining copyright protection through the useful article doctrine, while avoiding some of the major roadblocks to copyright protection that discussed in the previous sections. Finally, Part VII provides a summary and conclusion of the current state of protection for the elements which make up VR experiences as well as suggestions for how VR developers may want to proceed in order to obtain the largest scope of protection for their works.

I. WHAT IS VR?

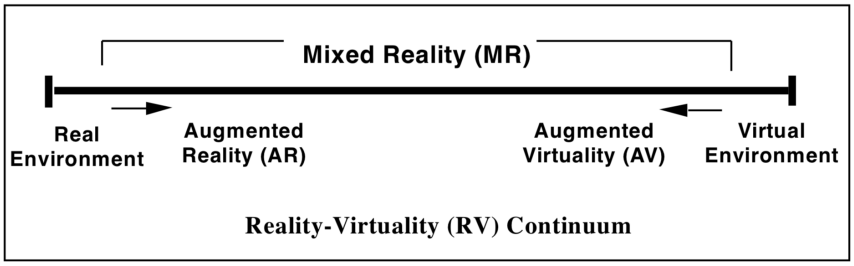
Merriam-Webster 2015 defines virtual reality as "an artificial environment which is experienced through sensory stimuli (such as sights and sounds) provided by a computer and in which one's actions partially determine what happens in the environment."[26] More generally, VR is "computer-generated digital environment that can be experienced and interacted with as if that environment were real."[27]

[26] *Id.*
[27] *Id.*

A. The Reality-Virtuality Continuum

VR is technically one of many phenomena that exist on the spectrum of mixed reality (MR).[28] Paul Milgram, Haruo Takemura, Akira Utsumi, and Fumio Kishino introduced the concept of this "mixed reality spectrum," referred to as the "Reality-Virtuality (RV) Continuum," in their often-cited paper, Augmented Reality: A class of displays on the reality-virtuality continuum, where they dissected and classified the various MR technologies.[29]

Figure 2: Simplified Representation of a VR Continuum[30]



The RV Continuum consists of realities which incorporate both real world and virtual elements in varying degrees and ranges from the real world (with zero virtual components) at one end to a fully immersive virtual environment at the other end.[31] Between these ends lies the "substratum" consisting of Augmented Reality (AR) and Augmented Virtuality (AV), where an AR environment is "principally real, with added computer[-]generated enhancements" and an AV environment is "principally virtual, but augmented through the use of real (i.e.

[28] "Reality takes many forms and can be considered to range on a virtuality continuum from the real environment to virtual environments . . . . These forms, which are somewhere between virtual and augmented reality, are broadly defined as 'mixed reality,' which can be further broken down into 'augmented reality' and 'augmented virtuality.'" Jerald, *supra* note 19, at 9.

[29] Fumio Kishino, Paul Milgram, Haruo Takemura, & Akira Utsumi, *Augmented Reality: A class of displays on the reality-virtuality continuum*, Proc. SPIE 2351 TELEMANIPULATOR AND TELEPRESENCE TECHNOLOGIES 282 (Dec. 21, 1995), http://etclab.mie.utoronto.ca/publication/1994/Milgram_Takemura_SPIE1994.pdf

[30] *Id.* at 283.

[31] *Id.*

unmodelled) imaging data."[32] Simply put, the RV Continuum ranges from actual reality to virtual reality.[33]

Because of the colloquial use of the term and the lack of necessity in distinguishing the different realities for the purposes of this note, this note will use the term "VR" to refer generally to any reality on the RV Continuum (excluding actual reality without any virtual components), unless explicitly noted.

B. The Key Elements of Virtual Reality

VR experiences differ from traditional computer-generated experiences in a variety of ways. Key elements that define and shape a given VR experience include its virtual world, sensory feedback and interactivity, and immersion.

i. The Virtual World

The virtual world is the computer-generated, three-dimensional environment that the user perceives around her in that VR experience.[34] The virtual world is similar to a computer screen display, except that traditional computer screen displays are two-dimensional and spatially confined, whereas virtual worlds are three-dimensional and spatially unrestricted (in the sense that the user perceives it in every direction, everywhere around her). Within the virtual world, there may exist virtual objects, which the user can interact with.

ii. Sensory Feedback and Interaction

Sensory feedback involves the stimulation of senses, such as vision and hearing.[35] The software and hardware of a VR experience will aim to properly stimulate these senses, in a way that mimics how the user's senses are stimulated in a real-world environment.[36] This process of

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[32] *Id.* at 285.

[33] *The Ultimate Guide to Mixed Reality (MR) Technology*, REALITY TECHNOLOGIES, http://www.realitytechnologies.com/mixed-reality (last visited Feb. 27, 2018).

[34] *Id.*

[35] *Id.*

[36] *Id.*

providing feedback based on the user's actions accomplishes the important element of interactivity.

Hardware and software must track the user's movements, such as head movements or motion tracking, so that it can provide the proper visual, aural, or other output. Tracking this correctly and providing the properly calibrated outputs is integral for purposes of increasing immersion and avoiding motion sickness. Beyond the visual and auditory sensations, VR can incorporate other senses, such as taste, smell, and tactile sensations, further immersing the user in the virtual experience.[37]

For example, creating the sensation of "touching" a virtual object is made possible through the use of "haptics." "Haptics are artificial forces between virtual objects and the user's body."[38] Tactile haptics, for example, "provide a sense of touch through the skin": one example of this is Reactive Grip technology, which "utilizes sliding skin-contact plates that can be added to any hand-held controller," to imitate real world forces.[39]

iii. Immersion

Each of these elements together provide the user with the experience of immersion, the perception of being physically present in a non-physical world.[40]

An ideal VR experience is nearly indistinguishable from the real world. In the 1960s, Ivan Sutherland, one of first VR creators, described the ideal VR as "a room within which the computer can control the existence of matter. A chair displayed in such a room would be good enough to sit in. Handcuffs displayed in such a room would be confining, and a bullet displayed in such a room would be fatal."[41] This is a standard that is not currently possible,[42] but it is important to keep in mind when considering the types of programs that may be developed in the future, and what challenges with protection developers may eventually run into.

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[37] Jerald, *supra* note 19, at 42.

[38] *Id.* at 37.

[39] *Id.* at 37–38

[40] *The Ultimate Guide to Virtual Reality (VR) Technology*, *supra* note 33.

[41] "Perhaps the most graphic, well-known, and advanced example of this is the 'holodeck' in Star Trek: The Next Generation, in which the user is immersed in an environment which, for all intents and purposes, is real . . . it represents a future ideal of virtual reality's potential." Jack Russo & Michael Risch, *The Law of Virtual* Reality, COMPUTERLAW GROUP LLP, http://www.computerlaw.com/Articles/The-Law-of-Virtual-Reality.shtml.

[42] Jerald, *supra* note 19, at 9.

C. The Hardware & Software of VR

The previous section discussed the experience of VR. The other side to VR is the hardware and software that actually generate the user experience.

On the hardware side, a VR experience will generally require a high-performance computer[43] and hardware that generates the visual display, which typically takes the form of a head set. These headsets provide what are referred to as "head-mounted displays" (HMDs).[44] These HMDs are "more or less rigidly attached to the head."[45] In a fully immersive VR experience, the HMDs will block off the user's vision to the real world around her, and in its place, the HMD will project the computer-generated reality.

The software component of VR is the program that instructs the HMD. The software is "the computer code that creates virtual environments, the audiovisual presentation to the user, the interactive media including tactile components of the environment which are experienced by the user, as well as video recordings of audiovisual components to be played on a standard television or movie screen."[46] This computer software is the expression that copyright law would potentially protect.[47]

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[43] Russo & Risch, *supra* note 41. "Virtual reality environments, such as rooms, cities, or entire worlds are created by computer software executing on high-performance computer hardware." *Id.*

[44] Jerald, *supra* note 19, at 32.

[45] *Id.*

[46] Russo & Risch, *supra* note 41.

[47] "Generally, existing statutory and case law will readily extend protection to virtual worlds and even to particular original virtual objects, but the very nature of virtual reality requires that subsequent participants be allowed greater freedom to adapt, modify and extend existing virtual worlds and existing virtual objects without liability for infringement except in the cases where (1) strikingly similar or nearly identical copying occurs for virtual worlds and virtual objects that simulate the real world and real objects or (2) substantial similarity exists for unique virtual worlds and unique virtual objects." *Id.*

II. COPYRIGHT LAW & THE COPYRIGHTABILITY OF COMPUTER PROGRAMS

The source of Congress's ability to grant copyrights to authors of copyrightable works through the Copyright Act is found in Article 1, Section 8, Clause 8 of the United States Constitution.[48] It grants Congress the power "[t]o promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries."[49] This clause articulates the purpose and method of granting copyrights.[50] The purpose is to "promote the progress of . . . the useful arts," which, in other words, is to incentivize authors to create works of art.[51] Congress can incentivize authors by "securing for limited times to authors . . . the exclusive right to their respective writings," which grants the author with a temporary monopoly over his or her work of authorship.[52]

A balance must be struck, however, between the breadth of these monopolies and the public's ability to use and enjoy those things which should remain in the public domain for all to use; "[a]ny legislature has only two basic considerations in designing a copyright law to provide incentives: the breadth or scope of protection, and its length. Increasing either one increases the opportunity for profit but also imposes a greater cost on the public. There exists a tradeoff between these two dimensions: the more there is of one, the less there needs to be of the other."[53] Thus, the Copyright Act articulates limitations on the proper subject matter of copyrightable works.[54] The Copyright Act notes in the first Chapter that: "In no case does copyright protection for an original work of authorship extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied in such work."[55] This limitation, which is referred to as the idea-expression dichotomy, stands

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[48] U.S. Const. art 1, § 8, cl. 8.

[49] *Id.*

[50] *Id.*

[51] *Id.*

[52] *Id.*

[53] FINAL REPORT 126, 292–93 (National Commission on New Technological Uses of Copyrighted Works ed., 1978), http://digital-law-online.info/CONTU/PDF/AppendixH.pdf.

[54] *Id*.

[55] 17 U.S.C. § 102 (2016).

for the rule that ideas cannot be copyrighted, but the expression of those ideas can.[56]

A closely related concept to the exclusions outlined in §102(b) is the merger doctrine. While expression of an idea is copyrightable, it is possible that in a particular circumstance the expression will "merge" with the idea into an uncopyrightable whole.[57] This occurs when "only one of a limited number of ways exist to express an idea."[58] In such a circumstance, the idea and the expression become indistinguishable from each other, and the expression, like the idea, becomes uncopyrightable.[59]

Also related is the doctrine of scenes á faire.[60] Under this doctrine, when features in a given work are "indispensable, or at least standard, in the treatment of a given idea, they are treated like ideas and are therefore not protected by copyright."[61]

Each of these limitations to copyrightability, including the exclusions outlined in §102(b), the merger doctrine, and the doctrine of scenes á faire, play large roles in the case law concerning the scope of copyright protection of computer software, and will be discussed in more detail in Part IV and V.

A. Copyright Law Can Change

Technological advances often provide authors with novel avenues of expression and unprecedented mediums in which they can manifest art.[62] "Furthermore, the House Report suggests that the subject matter of copyright may be expanded to include 'those in which "scientific discoveries and technological developments have made possible new forms of creative expression that never existed before," and those "in existence for generation or centuries [but that] have only gradually come to be recognized as creative and worthy of protection."'"[63] The presence

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[56] Stephen M. McJohn, COPYRIGHT: EXAMPLES AND EXPLANATION 103 (2006).

[57] *Apple Computer, Inc. v. Microsoft Corp.*, 35 F.3d 1435, 1444 (9th Cir. 1994).

[58] *Id.*

[59] *Id.*

[60] *Id.*

[61] *Id.*

[62] Ellii Cho, *Copyright of Trade Dress? Toward IP Protection of Multisensory Effect Designs for Immersive Virtual Environments*, 33 CARDOZO ARTS & ENT. L.J. 801, 816 (2015).

[63] *Id.*

of one of these technological advances coupled with the limitations on copyrightable subject matter begs the question: is the new medium of expression created by this new technology "a natural extension of works now protected by the [Copyright] Act or is it completely outside congressional intent?"[64]

VR presents an example of one of these technologies. Through VR and its corresponding computer software, authors can create virtual worlds, experiences, objects, and interfaces, which represent a new kind of artistic expression, and it is unclear exactly what scope of protection Congress will afford to these virtual realities.[65]

B. Subject Matter Evolution

The Copyright Act protects "original works of authorship fixed in any tangible medium of expression now known or later developed, from which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device."[66] Following this general statement of copyrightable subject matter, Congress lists eight broad categories which serve as examples of copyrightable works.[67] This list, however, is not exhaustive[68] and "the Copyright Act and its legislative history reflect foresight and intent to expand the scope of copyrightable subject matter to accommodate future technological advances as well as to avoid absolute preclusion of materials that previously considered unsuitable for copyright."[69] For example, Congress added "designs, prints, etchings and engraving in 1802, 'musical composition' in 1831, 'dramatic composition' in 1856, 'photographs and the negatives thereof' in 1865, and 'statuary' and 'models or designs intended to be perfected as works of fine arts' in 1870."[70]

C. History of the Copyrightability of Computer Programs

Another example of this kind of accommodation occurred in 1980, when Congress added the definition of a computer program to the Copyright Act, after the Commission On New Technological Uses of

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[64] Greg S. Weber, *The New Medium of Expression: Introducing Virtual Reality and Anticipating Copyright Issues*, 12 COMPUTER/L.J. 175, 187 (1993).

[65] Russo & Risch, *supra* note 41.

[66] 17 U.S.C. § 102.

[67] *Id.*

[68] Cho, *supra* note 62.

[69] *Id.* at 815–16.

[70] *Lotus Dev. Corp. v. Paperback Software Intern.*, 740 F. Supp. 37, 47 (D. Mass. 1990).

Copyrighted Works (CONTU) issued its final report.[71] In 1974, the 93rd Congress recognized that certain problems raised by computer and other new technologies were not adequately addressed in the pending bill (which would become the Copyright Act of 1976).[72] To deal with these problems, they established the CONTU to study the nature of computer programs, as they related to copyright law, and to make recommendations as to changes in the law.[73]

CONTU's findings emphasized a need for copyright protection of the creative expression embodied in computer programs.[74] Accordingly, in 1980, Congress added the definition for computer programs: "a set of statements or instructions to be used directly or indirectly in a computer in order to bring about a certain result."[75] Since this addition, "computer programs have been considered 'literary works' under the Copyright Act."[76]

III. PROTECTING COMPUTER PROGRAMS AND VIRTUAL REALITY EXPERIENCES AS A LITERARY WORKS

"Literary Works" are the first example listed in the Copyright Act's list of works of authorship, and thus are undoubtedly eligible for copyright protection.[77] The Copyright Act defines a literary work as "works, other than audiovisual works, expressed in words, numbers, or other verbal or numerical symbols or indicia, regardless of the nature of the material objects, such as books, periodicals, manuscripts, phonorecords, film, tapes, disks, or cards, in which they are embodied."[78] Computer programs "fall squarely within the statutory definition of literary works"[79] because they are "written in some form of computer programming 'language'" consisting of words or numbers.[80]

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[71] Weber, *supra* note 64, at 187–88.
[72] *Paperback Software Intern,* 740 F. Supp. at 49.
[73] FINAL REPORT, *supra* note 53, at 1.
[74] *Paperback Software Intern*, 740 F. Supp. at 50.
[75] 17 U.S.C. § 101 (2016).
[76] Weber, *supra* note 64, at 188.
[77] 17 U.S.C § 102.
[78] 17 U.S.C § 101.
[79] *Paperback Software Intern,* 740 F. Supp. at 49.
[80] *Id.* at 43–44.

A. Protecting the Literal Code

So, the written code that underlies computer programs is copyrightable as a literary work and protected against exact copying. However, there exist more than one type of computer program.[81] Specifically, there are operating system programs and application programs that are written in difference types of code.[82] In Apple v. Franklin, Franklin called into question the copyrightability of operating system programs, while conceding the copyrightability of application programs.[83] The Third Circuit, in its ruling of the case, decided the copyrightability of operating system programs and whether or not operating system programs and application programs deserved dissimilar treatment under copyright law.[84]

i. Basic Computer Program Concepts

Two different categories of programming language exist: source code and object code.[85] Program developers write application programs, programs which "perform specific tasks for the computer user, such as word processing, checkbook balancing, or playing a game,"[86] in source code, which consists of "high level readable language".[87] A compiler, "a separate program that reads the source code," translates the source code into object code.[88] Object code is "written in machine language that can be executed directly by the computer's CPU without need for translation."[89] Object code, at its lowest level, typically consists of binary language: i.e., ones and zeros.[90] A computer interprets these ones and zeros as

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[81] Ronald S. Laurie, Daniel S. Lin, & Matthew Sag, *Source Code versus Object Code: Patent Implications for the Open Source Community*, 18 SANTA CLARA HIGH TECH. L.J. 235 (2001), https://digitalcommons.law.scu.edu/cgi/viewcontent.cgi?article=1300&context=chtlj.

[82] *Id.*

[83] *Apple Computer, Inc. v. Franklin Computer Corp.*, 714 F.2d 1240, 1243 (3d Cir. 1983). Arguably, Franklin conceded the copyrightability of application programs because it had already been established in precedent and also because they likely wanted protection for their own application program.

[84] *Id.*

[85] Laurie, Lin & Sag, *supra* note 81.

[86] *Franklin Computer Corp.*, 714 F.2d at 1243.

[87] Laurie, Lim & Sag, *supra* note 81, at 238.

[88] *Id.*

[89] *Paperback Software Intern*, 740 F. Supp. at 40.

[90] *Id.*

instructions to operate in a particular way, creating the visual displays and interactions typically associated with what users experience the program to be.[91]

ii. Protection for Both Source Code & Object Code

In 1984, the Third Circuit established that both source code and object code are proper subjects of copyright protection as literary works.[92] In Apple v. Franklin, Franklin admitted to copying Apple's programs, but argued that Apple's programs were not protected by copyright law.[93] Franklin argued that Apple's programs were operating systems written in object code, and thus constituted either (1) processes, systems, or methods of operation,[94] or (2) ideas.[95]

The court decided that "Franklin's attack on operating system programs as 'methods' or 'processes' seems inconsistent with its concession that application programs are an appropriate subject of copyright."[96] Franklin conceded that application programs written in source code were an appropriate subject of copyright, and the court found no relevant distinction between the operating system and application programs that would justify denying copyright protection for one and affording copyright protection for the other.[97] So, without explicitly ruling that Apple's operating system programs were or were not processes, systems, or methods of operation, the court concluded that so long as application programs written in source code are not categorically excluded from copyright protection, neither are operating system programs written in object code.[98]

The court did not necessarily reject Franklin's argument that the operating system program constituted an idea, but it decided that the record lacked sufficient evidence for the court to make the determination at the appellate level.[99] When analyzing whether or not Apple's operating

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[91] *Id.*

[92] *Franklin Computer Corp.*, 714 F.2d at 1249. "Thus[,] a computer program, whether in object code or source code, is a 'literary work' and is protected from unauthorized copying, whether from its object code or source code version." *Id.*

[93] *Id.* at 1245.

[94] *Id.* at 1250.

[95] *Id.* at 1252.

[96] *Id.* at 1251.

[97] *Id.*

[98] *Id.*

[99] *Id.* at 1253.

system programs constituted unprotectable ideas instead of protectable expressions, the court employed the merger doctrine: "If other programs can be written or created which perform the same function as an Apple's operating system program, then that program is an expression of the idea and hence copyrightable."[100] In this particular context, the court considered the idea of one of Apple's programs to be "how to translate source code into object code" and decided that if, as a practical matter, there exist other ways of expressing that idea, then the expression does not merge with the idea into an unprotectable whole.[101]

iii. Applicability to VR

Developers of VR technology will likely develop both application and operating system programs, because the user experiences will come from application programs and those programs will interact with the hardware of VR technology through operating system programs. In this sense, protection for VR experiences should not different from that for traditional computer programs, and both VR application and operating system programs should, in the very least, not be categorically barred from copyright protection.

B. Protecting the Non-Literal Elements

Beyond the discussion of the protectability of literal source or object code, a special nature of computer programs creates a "vexatious issue in Intellectual Property law" as programs can copy the functions and operations of another computer program without copying the underlying code[102] because there exists more than one way to write object code for any given program operation.[103] This nature of computer programs raises the question of whether or not the functions and operations, the "non-literal elements" of a computer program, are protectable under Copyright law.[104]

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[100] *Id.*

[101] *Id.*

[102] Daniel A. D. Hunter, *Protecting the Look and Feel of Computer Software in the United States and Australia*, 7 SANTA CLARA HIGH TECH. L.J. 95, 96 (1991).

[103] Stephen M. McJohn, COPYRIGHT: EXAMPLES AND EXPLANATION 102 (2006).

[104] *Hunter*, *supra* note 102, at 96.

i. Early & Broad Protection of Non-Literal Elements

In an early case, in 1986, the Third Circuit extended copyright protection beyond the literal object code to the "structure, sequence, and organization" of the code of a computer program.[105] Whelan concerns alleged infringement of the structure of a program used by dental laboratories.[106] There, the court considered "whether the structure (or sequence and organization) of a computer program is protectable by copyright, or whether the protection of the copyright law extends only as far as the literal computer code."[107]

In its analysis, the court focused on the distinction between an uncopyrightable idea and a copyrightable expression of an idea, and it determined that "[w]here there are various means of achieving the desired purpose, then the particular means chosen is not necessary to the purpose; hence, there is expression, not idea."[108]

The court in Whelan created a rule for determining when an aspect of a computer program is an idea and when it is an expression of that idea, and the court limited the expression to "everything that is not necessary to [the program's] purpose or function."[109] Everything else is protectable as expression.[110] This decision extends copyright protection far beyond the literal object code, and for this reason, it has attracted criticism from other courts and commentators.[111]

Where the court in Whelan analogized computer programs to other literary works, such as novels, critics contend that this analogy is faulty because computer programs are largely factual, and thus deserve a much thinner layer of protection.[112]

ii. Limiting the Protection of Non-Literal Elements

Oracle v. Google represents the most recent decision on the subject of the copyrightability of the structure, sequences, and

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[105] *Whelan Assoc. v. Jaslow Dental Laboratory, Inc.*, 797 F.2d 1222 (3d Cir. 1986).

[106] *Id.* at 1224.

[107] *Id.*

[108] *Id.* at 1236.

[109] *Id.* (italics omitted).

[110] *Id.*

[111] *See generally* McJohn, *supra* note 103.

[112] *Id.*

organization of a computer program.[113] Initially, the district court found that the structure, sequence, and organization of Oracle's computer program "were not subject to copyright protection," and dismissed Oracle's claims based on Google's copying of the structure, sequence, and organization of its computer programs.[114] While acknowledging that "the structure, sequence, and organization of a computer program may (or may not) qualify as a protectable element," the court decided that the specific elements under scrutiny in this case were not eligible for protection, because, in the court's opinion, Oracle claimed "that it owns, by copyright, the exclusive right to any and all possible implementations of the taxonomy-like command structure" for the particular packages of code, "even though it copyrighted only one implementation."[115] Further, it decided that even though the structure, sequence, and organization of the program was "creative and original, it nevertheless held that it is a 'system or method of operation . . . and, therefore, cannot be copyrighted.'"[116]

The Federal Circuit, in 2014, reversed and remanded the district court's decision, finding that the structure, sequence, and organization of the packages of code were entitled to copyright protection.[117] In its analysis, the court rejected Goggle's contention that "there is a two-step copyrightability analysis, wherein Section 102(a) grants copyright protection to original works, while Section 102(b) takes it away if the work has a functional component."[118] The functional bar suggested by Google is a reference to Section 102(b)'s exclusion of "methods of operation" to copyrightable subject matter.[119] Instead, the court contended that Congress's intention with Section 102(b) is not to take away any rights otherwise afforded, but is to "restate . . . that the basic dichotomy between expression and idea."[120] Further, the court noted that if it "were to accept the district court's suggestion that a computer program is uncopyrightable simply because it carr[ies] out pre-assigned function, no computer program is protectable."[121]

While the court acknowledged that "[c]icuit courts have struggled with, and disagree over, the tests to be employed when attempting to draw the line between what is protectable expression and what is not," it decided to use the test followed by the Ninth Circuit and Second Circuit, called the

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[113] *Oracle Am., Inc. v. Google Inc.*, 872 F. Supp. 2d 974 (N.D. Cal. 2012).
[114] *Id.*
[115] *Id.* at 1001–02.
[116] *Id.* at 997.
[117] *Oracle v. Google, Inc.*, 750 F.3d. 1339, 1348 (Fed. Cir. 2014).
[118] *Id.* at 1356.
[119] *Id.* at 1357.
[120] *Id.* at 1356.
[121] *Id.* at 1367 (internal quotations omitted).

"abstraction-filtration-comparison test."[122] This test represents a medium approach between the broad protection offered in Wheelan and the narrow protection offered in Lotus.[123]

The first step of the test, the abstraction step, "break[s] down the allegedly infringing program into its constituent structural parts."[124] All circuits agree this step contributes to the copyrightability analysis.[125] The second stop, the filtration step, "sift[s] out all non-protectable material, including ideas and expression that is necessarily incidental to those ideas."[126] The circuits have a less uniform opinion on this step, in terms of whether it contributes to the analysis of copyrightability or to the analysis of infringement, however the Ninth Circuit treats it as a defense to infringement.[127]

The third step, which is considered by all circuits to be part of the infringement analysis,[128] "compares the remaining creative expression with the allegedly infringing program."[129]

Ultimately, the court decided that a "an original work—even one that serves a function—is entitled to copyright protection as long as the author had multiple ways to express the underlying idea."[130] This analysis of the dichotomy between idea and expression resembles the merger doctrine and declares that so long as there exists multiple ways to express a particular idea, the expressions do not merge with the idea and they constitute copyrightable subject matter.

Oracle suggests that there is protection for the non-literal components of computer programs, so long as there exist multiple ways to accomplish the functionality of the program. While this is a promising step towards protection for computer programs, the Supreme Court denied certiorari, there has been anything but consistency throughout the district and circuit courts on the topic.

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[122] *Id.* at 1357.
[123] *Id.*
[124] *Id.*
[125] *Id.* at 1358.
[126] *Id.* at 1357 (internal quotations omitted).
[127] *Id.* at 1358.
[128] *Id.*
[129] *Id.* at 1357.
[130] *Id.* at 1367.

iii. Applicability to VR

Because of the lack of clarity amongst the courts, programmers of VR software wanting to protect the structure, sequences, and or operations of their programs, should be wary of the scope of the protection that copyright law will afford them.[131] Regarding copyrightability, the nuances of VR programs, as compared to traditional computer programs, arguably lie in their audiovisual outputs, as opposed to their underlying code. This is because, while acknowledging the intricacies and challenges involved in developing new kind of software, there is no obvious additional component involved in the object code of VR software, as opposed to traditional software, that would be anymore copyrightable than those components discussed in the aforementioned cases.[132] For this reason, the copyrightability of a VR program's structure, sequence, and operations will likely be interpreted the same way it would be for a traditional program.[133]

How, then, do VR developers protect their programs from nonliteral infringement? The answer to this question is also unclear, because, as articulated in CONTU's final report, the other avenues of protection are just as unreliable.[134] While patent protection offers a more robust monopoly, "the acquisition of a patent . . . is time consuming and expensive, . . . and the legal hurdles an applicant must overcome are high."[135] Further, it remains unclear if computer programs are even eligible for patent protection because the Supreme Court has never explicitly addressed the matter.[136] Trade secrecy is arguably further inadequate because "it is inappropriate for protecting works that contain the secret and are designed to be widely distributed."[137] Not only are many computer programs widely distributed, but also many of the non-literal elements are readily observable from interaction with the program. These features make trade secret protection inadequate for many aspects of computer programs.

Through interpreting the Copyright Act, courts may find that copyright protection does not extend to the nonliteral components of computer programs, but if those Congress decides those elements are worthy of some form of protection, they may have to consider either revising the Copyright Act or exploring new avenues of protection. With VR being such a long-anticipated, promising, and coveted technology, it

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[131] Russo & Risch, *supra* note 41.
[132] Jerald, *supra* note 19, at 9.
[133] *Id.*
[134] FINAL REPORT, *supra* note 53, at 16.
[135] FINAL REPORT, *supra* note 53, at 17.
[136] *Id.*
[137] *Id.*

may incentivize the Supreme Court to take more cases on the subject, solidifying the rules governing its protection, which may, in turn, incentivize Congress to expand the scope of protection for computer software, whether it be through Copyright Law or some new form of Intellectual Property devoted to computer software.

IV. PROTECTING COMPUTER PROGRAMS AND VIRTUAL REALITY EXPERIENCES AS AUDIO-VISUAL WORKS

Also, relevant to the discussion of the copyrightability of VR software is the line of cases concerning the copyrightability of the visual display of programs registered as audiovisual works.[138] Originally, the Copyright Office allowed separate registrations for the visual displays of programs (on Form PA for audiovisual works) and for the underlying code (on Form TX for literary works),[139] but in 1987, it held hearings "to obtain comments and recommendations on how it should proceed in this area."[140]

One of the views suggested at these hearings advocated for a "single registration to cover the entire work including visual displays."[141] Under a single registration regime, one registration, whether it be as a literary work or an audiovisual work, would "cover the entire work including visual displays."[142] A similar and related view advocates for a single registration, where the registration form would not be a Form PA or Form TX, but an entirely new form designed specifically for computer programs.[143]

Another view argues for separate registrations: one for the underlying program code and one for the visual displays.[144] Under this regime, advocates argued, "it would be clearer that an infringement of visual displays can occur independent of any infringement of the underlying program code."[145]

The last view contends that "the Copyright Office should not allow any registration of visual displays of computer software" because

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[138] Hunter, *supra* note 102.
[139] Russo & Risch, *supra* note 41.
[140] *Id.*
[141] *Id.*
[142] *Id.*
[143] *Id.*
[144] *Id.*
[145] *Id.*

"such displays are generally functional" and therefore not copyrightable.[146] This view will be discussed in more detail below.

In June 1988, the Copyright Office settled on a single registration regime, where the choice between registering a program on a Form PA or Form TX depended on "which aspect of the work 'predominates.'"[147]

A. VR Video Games

Gaming is one of the most common and anticipated applications of VR technology.[148] There is precedent in case law, specifically in Stern Electronics v. Kaufman,[149] concerning the copyrightability of videogames as audiovisual works, however the interactivity of VR experiences may differentiate it from the video game discussed in Stern.

i. Stern Electronics v. Kaufman

The Second Circuit decided an early case which established the copyrightability of video games as audiovisual works.[150] The case concerned a coin-operated video game entitled "Scramble" and its alleged infringement by another game, which replicated its visual display and accompanying sounds.[151] Because the "knock-off" game did not copy the underlying code, the Defendant argued that only the underlying code deserved copyright protection and that the "visual images and accompanying sounds of the video games fail[ed] to satisfy the fixation and originality requirements of the Copyright Act."[152]

The Defendant's claim rested on the fact that user interaction dictated which images and sounds the program displayed.[153] Specifically with "Scramble," which displayed a spaceship moving through different scenes and obstacles, the user "control[led] the altitude and speed of the spaceship" and controlled when the spaceship would release bombs and fire lasers.[154] So, the Defendant argued that because the visual displays were different every time anyone user played the game, there was no one

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[146] *Id.*

[147] *Id.*

[148] "[B]oth of the current major players in the consumer VR space, Oculus and HTC, have their roots in the video games industry." *How Reality Technology is Used in Gaming*, REALITY TECHNOLOGIES, http://www.realitytechnologies.com/sports (last visited Feb. 17, 2018).

[149] *Stern Electronics, Inc. v. Kaufman*, 669 F.2d 852 (2d Cir. 1982).

[150] *Id.*

[151] *Id.*

[152] *Id.* at 853.

[153] *Id.*

[154] *Id.*

audiovisual copyright applicable to each play of the game.[155] The court disagreed, deciding that "the repetitive sequence of a substantial portion of the sights and sounds of the game qualifies for copyright protection as an audiovisual work."[156]

ii. VR Application

One of the most widely known and anticipated applications of VR is video games.[157] A similar, and more general, application is a general virtual "experience," where the focus is not necessarily on an objective the user must accomplish, but instead the focus is on the user having an entertaining experience, such as participating in a storyline resembling a theatrical work or experiencing a particular setting, like sitting in a park.[158] In any of these applications, the user's experience will comprise audiovisual displays in a perceived three-dimensional environment.[159] Courts will likely analyze the copyrightability of these displays in a similar way they analyze audiovisual displays in video games because while each user's experience will be different, there exists the same sort of repetitive sequences in both.[160]

However, there may be additional challenges brought by defendants concerning the special nature of virtual works.[161] First, virtual experiences will be highly interactive on a scale unprecedented by previous audiovisual works. Defendants could potentially argue that the extreme level of interaction in VR differs so much from that employed in the coin-operated "Scramble" so it destroys the presence of consistency between the audiovisual displays; the different experiences of the different users may be so different that there is no one consistent audiovisual display.[162]

Secondly, arguments against protecting a VR experience as an audiovisual work may arise from the fact that VR may "exploit additional senses, including, but not limited to, tactile and olfactory stimuli."[163] This could pose a problem because the Copyright Act defines an audiovisual

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[155] *Id.*
[156] *Id.* at 856.
[157] Russo & Risch, *supra* note 41.
[158] *Id*.
[159] *Id*.
[160] *See id.*
[161] *Id*.
[162] *Id*.
[163] Cho, *supra* note 62, at 811.

work as "works that consist of a series of related images which are intrinsically intended to be shown by the use of machines, or devices such as projectors, viewers, or electronic equipment, together with accompanying sounds,"[164] limiting the scope of an audiovisual work to the visual and audio components.[165] So, while developers may intend to protect the holistic experience of a VR environment, they may be limited to protecting only certain components of the environment.

Instead of copyrighting a VR experience as an audiovisual work, developers may attempt to protect the experience as a "compilation." The Copyright Act defines a "compilation" as "a work formed by the collection and assembling of preexisting materials or of data that are selected, coordinated, or arranged in such a way that the resulting work as a whole constitutes an original work of authorship."[166] A VR experience may fit this definition as a collection of sensory effects, where originality is found in the selection, coordination, and arrangement of the effects.[167]

It is possible that Trademark law could provide an avenue of protection. "Scent marks in particular are becoming increasingly popular, as the imitation (or exploitation) of the senses or certain aesthetics is revealed to play a significant role in consumer psychology."[168] Further, in Two Pesos v. Taco Cabana, the Supreme Court decided that the design of a restaurant warranted trade dress protection.[169] Since this holding, trade dress has protected user interfaces and website designs.[170] This suggests that a virtual environment could be eligible for trade dress protection if sufficiently distinctive.

B. VR User Interfaces

i. Apple v. Microsoft

In Apple v. Microsoft, which is one of the more recent cases concerning the copyrightability of user interfaces, Apple sued Microsoft, claiming that Microsoft infringed on its Lisa Desktop and Macintosh Finder.[171] Specifically, Apple claimed Microsoft infringes on its "desktop

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[164] 17 U.S.C. § 101.
[165] Cho, *supra* note 62, at 811.
[166] 17 U.S.C. § 101.
[167] Cho, *supra* note 62, at 819.
[168] Cho, *supra* note 62, at 812.
[169] *Two Pesos, Inc. v. Taco Cabana, Inc.*, 505 U.S. 763 (1992).
[170] Cho, *supra* note 62, at 825.
[171] *Apple Computer, Inc. v. Microsoft Corp.*, 35 F.3d 1435, 1438 (9th Cir. 1994).

metaphor with windows, icons and pull-down menus which can be manipulated on the screen with a hand-held device called a mouse."[172]

The district court case represented the first "claim of copying a computer program's artistic look as an audiovisual work instead of program codes registered as a literary work."[173] This fact impacted Apple's contention that there was an ambiguity between the audiovisual components and the literal program.[174]

When looking at the line between copyrightable expression and unprotected ideas, the court took into consideration the merger doctrine.[175]In its analysis of a desktop icon representing a document, the court considered an iconic image shaped like a page to be an obvious choice.[176] The court also noted that this idea closely relates to the doctrine of scenes à faire.[177] This doctrine posits that when particular features "are as a practical matter indispensable, or at least standard, in the treatment of a given [idea], they are treated like ideas and are therefore not protected by copyright."[178] The court relied on this doctrine in deciding that nothing protects the mere use of Apple's system of overlapping windows.[179]

While not explicitly addressing the idea of functionality, the merger doctrine and the scenes à faire doctrine inevitably incorporated functionality.[180] For example, when applying the merger doctrine, the court considered the expression of the icons to merge with the "idea" or the icon, i.e. representing a document.[181] This "representation" is functional in nature because the icon functions as an indication that when you click on it, a document will come up.[182] Similarly, in its analysis of the scenes à faire doctrine, the court decided that the system of overlapping windows was indispensable to the "idea" of having multiple windows.[183]

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[172] *Id.*

[173] *Id.* at 1439.

[174] *Id.* at 1441.

[175] "Well-recognized precepts guide the process of analytic dissection. First, when an idea and its expression are indistinguishable, or 'merged,' the expression will only be protected against nearly identical copying." *Id.* at 1444.

[176] *Id.*

[177] *Id.*

[178] *Id.* (quoting *Frybarger v. Int'l Bus. Machs. Corp.*, 812 F.2d 525, 530 (9th Cir. 1987)).

[179] *Id.*

[180] *Id.*

[181] *Id.*

[182] *Id.*

[183] *Id.*

However, it is only indispensable if ease of functionality on the program is essential.[184]

The fact that functionality is inevitably part of the analysis of the copyrightability of computer programs should come as no surprise because the Copyright Act defines a computer program as "a set of statements or instructions to be used directly or indirectly in a computer in order to bring about a certain result."[185] One can define functionality as the ability to bring about a certain result.[186] Accordingly, it seems impossible to separate a computer program's copyrightability from its functionality. However, the courts have viewed programs' functionality as an obstacle to the programs' copyrightability.[187] In many cases, Section 102(b) justifies this hurdle, by stating that "[i]n no case does copyright protection for an original work of authorship extend to any . . . method of operation . . . ."[188] However, in Oracle America, Inc. v. Google Inc., the court noted that this is not supposed to be a second step to copyrightability that deters from already copyrightable subject matter, but rather it is supposed to emphasize the distinction between idea and expression.[189]

ii. VR Application

Apple poses many problems for protecting VR experiences through copyright, particularly because VR experiences, in a way, are the ultimate user interface.[190] Instead of a user interface having an icon shaped like a blank document, representing a document, a virtual environment could have the actual document (represented virtually).[191] Instead of a user clicking on an icon with a cursor controlled by a mouse, the user may simply interact with the virtual document just as he or she would interact with a real-world document.[192] This could implicate the merger doctrine because there would be an extremely finite amount of ways to express the "idea" of any given interaction.[193]

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[184] *Id*.

[185] 17 U.S.C. § 101 (emphasis added).

[186] *Functionality*, MERRIAM-WEBSTER (2019), https://www.merriam-webster.com/dictionary/functionality.

[187] *Oracle Am., Inc. v. Google Inc.*, 750 F.3d 1339, 1356 (Fed. Cir. 2014).

[188] 17 U.S.C. § 102.

[189] *Oracle Am., Inc.*, 750 F.3d at 1356.

[190] "Software designers continually strive to produce increasingly user-friendly interfaces. Virtual Reality is the utmost fulfillment of that end." Weber, *supra* note 64, at 189.

[191] *Id*.

[192] *Id.*

[193] *See generally Oracle Am., Inc.*, 750 F.3d at 1339.

For example, in Manufacturers Technologies Inc., v. Cams, Inc., the district court decided that "the placement of common screen components in certain specific locations is limited by several constraints," and that the narrow range of possibilities for the placement of headings and other formatted displays rendered the screen display uncopyrightable.[194] Similarly, the court decided that the method of navigation of screen displays was not protected because the navigation was highly dependent on the hardware and the possibility of internal navigation was limited.[195] The court also considered its limitations in the number of ways to appeal to the user's comfort,[196] and decided that "to give the plaintiff . . . protection for this aspect of its screen displays, would come dangerously close to allowing it to monopolize a significant portion of the easy-to-use internal navigational conventions for computers."[197]

Applying this analysis to VR, hardware limitations and limitations created by facilitating user comfort would severely limit protection. Issues with motion sickness, headaches, and general discomfort arise in many VR experiences when the experiences do not align with the user's expectation of reality, particularly when a visual display lags behind the user's motion.[198] This is an extreme case of user discomfort, unparalleled to the discomfort users could experience with a traditional computer program.[199] In a less extreme, but also very relevant example, users would expect an experience that attempts to imitate the real world to resemble the real world. For example, objects would fall to the ground if not held up, and if a user "grabbed" a virtual document, it would move with the user's hand. Generally speaking, user's expectations of real-world interactions may significantly limit user's expectations in a VR experience, and this could inhibit the range of possibilities for VR user interfaces and methods of interactions with virtual objects.

This aspect of VR may incline courts to decide that the visual displays in VR experiences merge very often with the courts' idea. Thus, protection will likely be more probable for interfaces and interactions that are dissimilar from the real-world experience.

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[194] *Mfs. Tech. Inc. v. Cams, Inc.*, 706 F. Supp. 984, 995 (D. Conn. 1989).

[195] *Id.*

[196] *Id.*

[197] *Id.*

[198] Anastasiia Ku, *Motion Sickness in VR*, UX PLANET (Nov. 29, 2018), https://uxplanet.org/motion-sickness-in-vr-3fa8a78216e2).

[199] *Id*.

iii. Useful Articles

Many cases deciding the copyright eligibility of computer programs hinge on determining whether particular aspects of computer programs are functional in nature, which would bar protection either through the "method of operation" limitation in the Copyright Act, or through the merger or scenes à faire doctrine.[200] If any of these three limitations apply to part of a computer program, courts will consider the aspect more an idea than a protectable expression and will not afford the aspect protection under Copyright Law.[201] While computer programs have been registered and protected as literary and audiovisual works historically, an additional category of copyright protection arguably exists: sculptural, pictorial, or graphical works.[202] If one were to consider a program (or the visual output of a program) a sculptural, pictorial, or graphical work, then a protection exception to the functionality limitations would exist. This exception is the useful article doctrine. The Copyright Act defines a "useful article" as "an article having an intrinsic utilitarian function that is not merely to portray the appearance of the article or to convey information".[203]

While the Copyright Act defines "useful article" in its general definitions section, every other reference to "useful articles" appears either in the definition of "pictorial, graphic, and sculptural works" or in Section 113: "Scope of exclusive rights in pictorial, graphic, and sculptural works."[204] These references comprise the rules for the treatment of "useful articles" in Copyright law, and are arguably only applicable to pictorial, graphic, and sculptural works.[205]

The Copyright Act's definition of pictorial, graphical, and sculptural works states the rule regarding the copyrightability of useful articles:

"[T]he design of a useful article, as defined in this section, shall be considered a pictorial, graphic, or sculptural work only if, and only to the extent that, such design incorporates pictorial, graphic, or sculptural

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[200] *See generally Oracle Am., Inc. v. Google Inc*., 750 F.3d 1339, 1348 (Fed. Cir. 2014); *Mfs. Tech. Inc. v. Cams, Inc.,* 706 F. Supp. 984, 995 (D. Conn. 1989).

[201] *Id*.

[202] *See* 17 U.S.C. § 101.

[203] *See* 17 U.S.C. § 101.

[204] 17 U.S.C. § 113.

[205] *See generally* 17 U.S.C. § 101, 113.

features that can be identified separately from, and are capable of existing independently of, the utilitarian aspects of the article."[206]

In 2017, the Supreme Court interpreted this section of the Copyright Act.[207] The Court determined that to meet the first requirement in the statute, the "separate identification," "[t]he decisionmaker need only be able to look at the useful article and spot some two- or three-dimensional element that appears to have pictorial, graphic, or sculptural qualities."[208] The second requirement, the "independent-existence requirement," is "more difficult to satisfy," and "[t]he decisionmaker must determine that the separately identified feature has the capacity to exist apart from the utilitarian aspects of the article," meaning that "the feature must be able to exist as its own pictorial, graphic, or sculptural work as defined in § 101 once it is imagined apart from the useful article."[209]

There is arguably potential for the rules of pictorial, graphic, and sculptural works to apply to virtual objects. The Copyright Act defines pictorial, graphic, and sculptural works to "include two-dimensional and three-dimensional works of fine, graphic, and applied art, [and] photographs . . . " among other examples.[210] While not an obvious or immediate conclusion, a potential plaintiff could argue that one should consider a virtual object as pictorial, graphic, or sculptural, and thus the virtual object is immune to any arguments that it should not receive protection because of the virtual object's utilitarian nature. This would require an analysis of the ontological status of virtual objects and whether to consider them as two-dimensional or three-dimensional. One may more likely consider virtual objects two- or three-dimensional than considering components in a traditional computer program two- or three-dimensional because of the level of interactivity between the virtual objects and the user, and because they behave in a way very similar to real world two- or three-dimensional objects. This is especially true because virtual objects appear to exist in the world around the user.[211]

This argument could potentially carry more weight when the display of the virtual object maps itself onto a real-world physical object in the real-world space surrounding the user. For example, a display of a baseball bat could appear on a real-world rod, and when the user looks in

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[206] 17 U.S.C. § 101.
[207] *Star Athletica, LLC v. Varsity Brands, Inc.*, 137 S. Ct. 1002 (2017).
[208] *Id.* at 1010.
[209] *Id.*
[210] 17 U.S.C. § 101.
[211] *See generally* Weber, *supra* note 64.

the direction of the real-world rod, he or she sees the display of the bat in the rod's place. This could strengthen the argument that one should consider the virtual display of the object sculptural.

If virtual objects classify as pictorial, graphical, or sculptural works, the useful article doctrine, as interpreted in Star Athletica v. Varsity Brands, could apply, eliminating any bar to copyright protection based on functionality.[212] Further, it appears that many virtual objects could meet the standard set forth in Star Athletica v. Varsity Brands.[213] Consider a potential virtual object: a folder that contains documents in a user interface-focused experience. The folder may be functional, in the sense that it serves utilitarian functions by indicating a repository of documents, but so long as it (1) appears to have pictorial, graphical, or sculptural qualities and (2) can exist on its own as a pictorial, graphical, or sculptural work,[214] it may be eligible for copyright protection despite its utilitarian aspects.

CONCLUSION

In the absence of a Supreme Court case on the subject and a lack of uniformity between the circuits, the scope of copyright protection afforded to the code of computer programs (particularly the scope of protection for the non-literal elements of computer programs) is uncertain.[215] However, precedent exists, from which future cases can draw, including the abstraction-filtration-comparison method[216] and the standards set forth in Apple Computer, Inc. v. Microsoft Corp. Apple v. Microsoft indicates that the more original and expressive a given element is in a user interface the more likely it will receive protection, because it

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[212] *See Star Athletica, LLC*, 137 S. Ct. at 1010.

[213] *See generally Star Athletica, LLC*, 137 S. Ct.

[214] *See Star Athletica, LLC*, 137 S. Ct. at 1010.

[215] "The three views expressed in the Copyright Office roughly correspond to the views also found in the conflicting judicial opinions addressing these same issues: like Apple's position in the Copyright Office, one body of case law provides broad protection; another would provide only limited or narrow protection (as suggested by some of the user associations in the Copyright Office hearings); and the most recent cases appear to take a middle ground approach of protecting certain user interface elements on a case-by-case basis (somewhat similar to the majority view in the Copyright Office). No U.S. Supreme Court case has yet directly resolved the conflicting decisions." Jamie Nafziger & Jack Russo, *Look And Feel In Computer* Software, COMPUTERLAW GROUP LLP (1993), http://www.computerlaw.com/Articles/Look-and-Feel-in-Computer-Software.shtml#Supreme%20Court%20Developments.

[216] *See Oracle v. Google, Inc.*, 750 F.3d. 1339, 1348 (Fed. Cir. 2014).

will be less likely that the merger or scenes á faire doctrine will bar it from protection. Similarly, even if a visual non-literal aspect of a computer program is barred from protection, or filtered out through the abstraction-filtration-comparison test based on its functional nature, there is a possibility that it instead could be protected as a pictorial, graphical, or sculptural work. If so, it's protection will also be based off of its original and expressive aspects. So, as a general guideline, developers should emphasize the expressive visual elements of a VR experience, particularly because VR experiences seem to fall prey to the limits of copyright law more easily than traditional programs.

A further reason to consider protection as a pictorial graphical, or sculptural work is that the precedent giving interactive experiences like computer games copyright protection may be distinguished from a case concerning a VR experience. It remains possible that VR experiences, being considered as one congruent audiovisual work, may not satisfy the fundamental, threshold requirements for copyrightability, originality and fixation. Stern decided that a coin-operated videogame had enough consistency to be considered original and fixed, but with the extraordinarily high level of interaction in a VR experience, it remains entirely possible that a court could find a unsatisfactory amount of consistency between different users' experiences in a VR application.

Because of the potential for VR to become a revolutionary technology, it may serve as a motivation for the Supreme Court to clarify the scope of protection for computer programs, and the relationship between copyrightability and functionality. In the meantime, developers should be wary of idiosyncrasies of VR that may affect its eligibility of copyright protection, and should consider emphasizing the expressive individual elements of their programs and registering them as pictorial, graphical, or sculptural works.

The development and future of VR technology will undoubtedly be exciting to watch unfold, and so will the development and possible clarifications of copyright protection for highly interactive computer programs, like VR experiences.