DIGITAL PIRACY, TECHNOLOGY, AND THE LEGAL SYSTEM

MASTER'S PROJECT

BY

BRYAN S. PASSIONE

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
DEGREE OF MASTER OF SCIENCE IN COMPUTER SCIENCE

DEPARTMENT OF COMPUTER SCIENCE
MONTCLAIR STATE UNIVERSITY
FALL 2016

THESIS ADVISOR:	DR. STEFAN ROBILA
THESIS COMMITTEE MEMBER:	DR. CONSTANTINE COUTRAS
THESIS COMMITTEE MEMBER:	DR. H. M. HUBEY

TABLE OF CONTENTS

TABLE OF FIGURES

COPYRIGHT STATEMENT

ACKNOWLEDGEMENTS

I would first express my gratitude to my thesis advisor Dr. Stefan Robila, Professor of Computer Science at Montclair State University. Dr. Robila provided significant freedom for me to craft my research and accompanying project, but was always available for a quick review and update, and always provided insightful feedback.

Next, I would like to thank Dr. Constantine Coutras, Chairperson of the Computer Science department at Montclair State University, and Dr. H. M. Hubey, Professor of Computer Science at Montclair State University for taking time out of their extremely busy schedules and agreeing to serve on the Committee for my Master's Project.

Lastly, my girlfriend, Jenny Manseau, who through the years has always been supportive of my dreams and goals, from law school through the Master's programs at Montclair State. For always encouraging me, especially those days where I questioned my career choices. For always forgiving me for all the late nights and postponed dates so I could meet deadlines. None of this would have been possible without you. Thank you.

Bryan S. Passione

ABSTRACT

Title: Digital Piracy, Technology, and the Legal System

Technology is evolving at an incredible pace, meanwhile, the evolution of law is struggling to keep pace with technology. Law is largely reactive, as opposed to proactive, with regard to its understanding and application to new technology. The reactive nature of law leads to a negative impact since the law is not prepared to handle the novel ideas that do not fit neatly into a box (not clearly within the bounds of legal precedent). Further prohibiting the adequate advancement of law, many judges and attorneys lack the requisite technical knowledge to accurately argue or craft new or existing laws to sufficiently respond to technological innovation. This lack of understanding leads to misapplication of the law and inappropriate hindrance of technology.

This research paper examines the origin and evolution of Copyright law in the United States, together with an in-depth look at the Stop Online Piracy Act and the PROTECT IP Act. Beginning with Copyright law's basis in the United States Constitution through the law's continued response to peer-to-peer sharing programs and BitTorrent.

I. INTRODUCTION

Typically, when one hears the term "pirate," the first thoughts are of a group of men sailing from port to port, hijacking boats of other sailors' who are unlucky enough to cross paths with these outlaws, and buried treasure. However, today, even though traditional piracy still exists in one form or another, the term "pirate" has taken on a whole new connotation, the digital "pirate." This can be any person with a computer, an internet connection, and a little know-how. Unlike traditional pirates, a digital pirate does not need to know how to sail a boat or even need to be located anywhere near water to infringe upon another's property. The birth of the Internet and the World Wide Web has spawned a vast new world of digital piracy with countless treasures ripe for the pillaging by those with the means, knowledge, and desire. Digital piracy has opened the door for unprecedented and complex legal issues in the field of copyright law.

Digital piracy spans the entire spectrum of property interests protected by modern copyright laws, including music, movies, television broadcasts, photographs, electronic books, and computer software. None of the works listed above originally qualified for copyright protection under United States law; only after technology increased and the country's copyright law evolved, albeit always somewhat behind the times, did these works become recognized as having a legitimate property interest worthy of copyrighting. Music (musical compositions) first became copyrightable under the Copyright Act of 1909;[1] movies (motion pictures) and television broadcasts were first copyright able under the Copyright Act of 1976 due to widespread technological advances;[2] photographs became copyrightable under an intermediate copyright

[1] The 1909 Copyright Act, 35 Stat. 1075 (1909).
[2] An Act for the general revision of the Copyright Law, title 17 of the United States Code, and for other purposes, 17 U.S.C. §§ 101-810 (1976).

revision in 1865;[3] electronic books qualify as standard writings and are copyrightable under early United States copyright law; and computer software became copyrightable in 1983 as a result of *Apple Computer, Inc. v. Franklin Computer Corp*.[4]

As a direct result of the advancement of technology and the vast number of digital pirates, Congress has decided to take drastic measures in the form of new copyright law. The Senate has put forward a proposed bill entitled the PROTECT IP Act, an acronym for "Preventing Real Online Threats to Economic Creativity and Theft of Intellectual Property Act" ("PIPA"). The House of Representatives has also considered their own anti-piracy initiative, the Stop Online Piracy Act ("SOPA").

II. UNITED STATES COPYRIGHT LAW & DIGITAL PIRACY

A. ORIGIN OF UNITED STATES COPYRIGHT LAW

Copyright law in the United States originated with our country's Founding Fathers and the Framers of the United States Constitution. The Copyright Clause of the United States Constitution reads: "[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."[5] The Framers, borrowed from their counterparts in England, adapted the Copyright Act of 1709,[6] which has come to be better known as the "Statute of Anne,"[7] to fit the needs of their new country. Under the Copyright Act of 1709, printers and booksellers were granted

[3] An Act supplemental to an Act entitled "An Act to amend the several Acts respecting Copyright", 13 Stat. 540 (1865).
[4] *Apple Computer, Inc. v. Franklin Computer Corp*., 714 F.2d 1240 (3d Cir. 1983).
[5] U.S. Const. art. I, § 8, cl. 8.
[6] An Act for the Encouragement of Learning, by vesting the Copies of Printed Books in the Authors or purchasers of such Copies, during the Times therein mentioned, 8 Anne c.21 (1710).
[7] The Copyright Act of 1709 became known as the Statute of Anne after Queen Anne, the Monarch of England.

copyright protection for a period of 14 years for books not yet in print, as well as 21 years of protection for books already in print; at the expiration of the initial 14-year protection period, the copyright for the protected work re-vested in the author and his assignee or assigns for an additional 14-year term.

There are notable differences between the language chosen for use in the Statute of Anne and the Copyright Clause of the United States Constitution. First, language in the Statute of Anne was reactive to piracy concerns and intended to prevent reproductions of works without the consent of the owner. Second, the Statute specifically sets out time limits for copyright protections. Meanwhile, the main objective of the Copyright Clause was not to prevent piracy per se, but was intended to promote individual progress and creation by offering legal redress for infringement on works that qualifies for copyright protection. Second, unlike the Statute of Anne, the Copyright Clause does not specifically enumerate time limits for copyright protection: the Copyright Clause simply states "for limited [t]imes" leaving the authority to make the durational determination to Congress, with the only restriction being that copyright protection is not a perpetual protection, and must terminate at some future date.

Following the ratification of the United States Constitution, the Copyright Act of 1790 was enacted by Congress, which established the initial copyright protection law in the United States. Under the Copyright Act of 1790, copyrights were to be issued to authors of any map, chart, or book for a duration of 14 years from the recording of title "[a]nd if, at the expiration of the said term, the author or authors, or any of them, be living, and a citizen or citizens of these United States, or resident therein, the same exclusive right shall be continued to him or them, his or their executors, administrators or assigns, for the further term of [14] years;" so long as if the

work was to be re-recorded and republished within six months of the expiration of the initial term.[8]

B. Evolution of United States Copyright Law

The Copyright Act of 1831[9] was the first significant revision of United States copyright law. The changes to the statute, while seemingly minor in comparison to today's copyright law, had significant implications in 1831. Included among the changes was an extension of the initial copyright protection period from 14 years to 28 years, recognition of written musical compositions as copyrightable works, and extending the statute of limitations for legal redress for copyright infringement to two years.

The next major revision to United States copyright law occurred with the enactment of the Copyright Act of 1909.[10] Under the revised Act, works now had to conform to two specific requirements to be eligible for copyright protection: first, the work was required to be published; and second, the work was required to display a notice of copyright. If the work failed to meet either of the two requirements, the work was not protected under the Act, all intellectual property rights were forfeited, and the work fell into the public domain and became publicly available with no legal redress for the author.

The most significant revision to United States copyright law occurred with the enactment of the Copyright Act of 1976.[11] The Act extended the scope of works that qualified for copyright protections, and for the first time in copyright history, the Act detailed the fundamental rights of

---

[8] An Act for the Encouragement of Learning, by securing copies of maps, charts, and books, to the authors and proprietors of such copies, during the times therein mentioned, 1 Stat. 124 (1790).
[9] An Act to amend several acts respecting copy rights, 4 Stat. 436 (1831).
[10] The 1909 Copyright Act, 35 Stat. 1075 (1909).
[11] An Act for the general revision of the Copyright Law, title 17 of the United States Code, and for other purposes, 17 U.S.C. §§ 101-810 (1976).

a copyright holder, adopted an entirely new method for calculating the duration of copyright protections, and introduced the doctrine of fair use. Under Section 102, the Act extended the scope of copyrightable works to include "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."[12] Under Section 106, it is the exclusive right of a copyright holder to reproduce copyrighted works, prepare derivative works, distribute copies, and perform and display copyrighted works.[13] The 1976 Act extended copyright protection to "a term consisting of the life of the author and 50 years after the author's death."[14] Lastly, the doctrine of fair use for the first time is codified in statutory form under Section 107. The doctrine of fair use, rooted in common law principles, permits unauthorized use of copyrighted works "for purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research, is not an infringement of copyright."[15]

The next, and possibly the most substantial revision of United States copyright law occurred in 1998, resulting in the enactment of the Digital Millennium Copyright Act.[16]

C. DIGITAL MILLENNIUM COPYRIGHT ACT

The main focus of the Digital Millennium Copyright Act ("DMCA"), in light of evolving technology, is to protect copyright protected works from infringement on a digital front. Technological advancement has subjected copyright-protected works to new threats, and these

[12] 17 U.S.C. § 102 (1990).
[13] 17 U.S.C. § 107 (1992).
[14] 17 U.S.C. § 302 (1998).
[15] 17 U.S.C. § 107 (1992).
[16] Sections Created: 17 U.S.C. §§ 512, 1201–1205, 1301–1332; 28 U.S.C. § 4001; sections substantially amended: 17 U.S.C. §§ 101, 104, 104A, 108, 112, 114, 117, 701.

works are no longer only at risk from infringement by unauthorized physical reproductions. Unauthorized digital reproductions of copyright protected works are now taking the forefront in the battle between copyright holders and digital pirates.

Copyright holders have developed technological methods of protecting their works from unauthorized reproduction and distribution. For example, copyright holders of music, movies, and electronic books have begun incorporating an encryption technology called Digital Rights Management ("DRM") into the works. The vast majority of computer software companies began implementing similar DRM-style security features, such as serial numbers or individual CD-Keys, which authenticated legitimate copies of the software and undermined piracy of the software. However, it was not long before digital pirates reverse-engineered the algorithms used in creating these serial numbers and CD-Keys; as a result, digital pirates could now create their own "authenticated" serial numbers and CD-Keys for activating the pirated software. Early DVD technology incorporated encryption technology known as Content-Scrambling System ("CSS") to prevent the manufacture of unauthorized copies. However, while this encryption technology has kept honest people honest, digital pirates quickly reverse-engineered the encryption technology and began distributing free software throughout the digital pirate community that was capable of decrypting CSS for the purpose of making unauthorized copies of the DVDs and allowed anyone to circumvent these security measures.

In response to the efforts made by copyright holders to protect their intellectual property interests, and the unlawful efforts of the digital pirate community to circumvent these protections, the DMCA made significant revisions to the previous Copyright Act of 1976. Under the DMCA, it is now a criminal act for any person to circumvent access-control technology built

into works protected under the DMCA[17]; the DMCA also prohibits the manufacture or distribution of any technology that "is primarily designed or produced for the purpose of circumventing protection afforded by a technological measure that effectively protects a right of a copyright owner[.]"[18] However, nonprofit libraries, archives, and educational institutions are exempt for the anti-circumvention provisions under certain circumstances.[19]

As a result of the digital pirate community and their exploitation of technology and the Internet, Internet service providers were facing liability for the copyright infringement undertaken by its subscribers. Congress responded to this liability by incorporating into the DMCA a bar against liability for Internet service providers that were simply "transmitting, routing, or providing connections[.]"[20] However, Internet service providers may still be held liable for a subscribers' copyright infringement if the infringing material is stored on a system or network that is under the control of the Internet service provider, and the service provider, "upon obtaining such knowledge or awareness, [fails to act] expeditiously to remove, or disable access to, the material[.]"[21] In addition to limitations on liability for traditional Internet service providers, public or nonprofit institutions of higher education share similar benefits when acting as a service provider, such as Internet access provided to on-campus dormitories or on-campus computer labs. Under §512(e), "when a faculty member or graduate student who is an employee of such institution is performing a teaching or research function…such faculty member or graduate student shall be considered to be a person other than the institution, and…the faculty

[17] 17 U.S.C. § 1201(a) (1999).
[18] 17 U.S.C. § 1201(b) (1999).
[19] 17 U.S.C. § 1201(d) (1999).
[20] 17 U.S.C. § 512(a) (1999).
[21] 17 U.S.C. § 512(c)(1)(iii) (1999).

member's or graduate student's knowledge or awareness of his or her infringing activities shall not be attributed to the institution[.]"[22]

Additionally, the DMCA extended copyright protection to "a term consisting of the life of the author and 70 years after the author's death."[23] This further 20-year extension of copyright protections, commonly known as the Sonny Bono Act or the Mickey Mouse Protection Act due to the fact that Mary Bono[24] and the Walt Disney Company passionately lobbied for the extended copyright protection in order to encourage progression in art. The extension of copyright protections would ensure that future artists would be required to create new, original works, instead of recycling older works whose copyright protection had lapsed and fallen into the public domain.

The DCMA has been a major step forward for copyright holders in the battle between protecting their intellectual property interests and the digital pirates that intend to make this material free for the masses.

D. COPYRIGHT INFRINGEMENT IN THE NAPSTER ERA

During the Summer of 1999, Napster, a free peer-to-peer[25] file sharing program was released into the world. Napster was immediately thrust into the international spotlight due to the fact that it offered free access to millions of MP3[26] music files. Although file sharing and digital

---

[22] 17 U.S.C. § 512(e) (1999).
[23] 17 U.S.C. § 302 (1998).
[24] Mary Bono is the widow of Sonny Bono and a member of the House of Representatives from California's 45th district.
[25] Peer-to-peer (more commonly designated as "P2P") is an extremely common Internet protocol for the sharing and distribution of files. The most well known applications utilized for P2P file sharing include: Napster, Limewire, Grokster, Ares, and Kazaa.
[26] MP3 is the most common format for music files stored on a computer. The MP3 format combines high quality audio with superior compression technology making it the ideal format to store a large numbers of audio files on a computer efficiently.

piracy predates Napster; the arrival of Napster opened the door to the world of digital piracy to the masses for the first time. Anyone, of nearly any age, anywhere in the world, with access to a computer and the Internet, could access millions of files. Napster worked by allowing end-users to view and search for songs hosted by the digital libraries of other end-users' around the world in a user-friendly environment. It was now open season for copyright infringement, and the music industry fought back.

The first strong negative publicity for Napster came at the hands of the hard rock group Metallica. It had been brought to the group's attention that a demo version of a previously unreleased track was already circulating around the Internet, and had even already had radio airplay prior to the group's official debut of the track. Napster quietly settled with Metallica, but this was just the tip of the infringement iceberg.

Only six months after Napster launched, the record companies had already had enough. Lead by A & M Records, 17 other record companies filed a complaint against Napster for contributory and vicarious copyright infringement, and unfair competition[27] under the DMCA.[28] The record companies sought to enjoin Napster from "engaging in or assisting others in copying, downloading, uploading, transmitting, or distributing copyrighted music without the express permission of the rights owner." In order to be granted a preliminary injunction, plaintiffs were required to establish that "either (1) a combination of probable success on the merits and the possibility of irreparable harm, or (2) that serious questions are raised and the balance of hardships tips in its favor." The United States District Court for the Northern District of California granted A & M Records and the other 17 record companies a preliminary injunction.

[27] *A & M Records, Inc. v. Napster, Inc.*, 114 F.Supp. 2d 896 (N.D. Calif. 2000).
[28] 17 U.S.C. § 106 (2002); 17 U.S.C. § 501(a) (1988).

On appeal, the United States Court of Appeals for the Ninth Circuit upheld the District Court's grant of a preliminary injunction, stating, "a preliminary injunction against Napster's participation in copyright infringement is not only warranted but required."[29] Although the Court of Appeals upheld the grant of the preliminary injunction against Napster, in the Court of Appeals' view, the injunction granted by the District Court was overly broad because the burden placed on Napster was too great. The Court of Appeals placed a notice requirement on the record companies, requiring them to notify "Napster of any copyrighted works…available on the Napster system before Napster has the duty to disable access to the offending content" and remanded the case to the District court for modification of the preliminary injunction.

On remand, following the order of the Court of Appeals the District Court modified the preliminary injunction, and required Napster, upon identification and location of material infringing upon a copyright, to disable access to such material. Napster was unable to comply with the requirements of the preliminary injunction, resulting in the service shutting down in 2001, only two years after it launched.

Napster was the first major peer-to-peer file sharing program to take off, but it was not the last. After Napster, other programs quickly filled the void, such as Limewire, Ares, Kazaa, and Grokster. In 2001, Grokster[30], another peer-to-peer file sharing program, was released. Grokster expanded on the content available for download that was available through Napster; in addition to copyrighted music, end-users could now share copyrighted movies and computer

---

[29] *A & M Records, Inc. v. Napster, Inc.*, 239 F.3d 1004 (9th Cir. 2001).

[30] As of October 14, 2011, Grokster's website is still active, and displays the following warning: "The United States Supreme Court unanimously confirmed that using this service to trade copyrighted material is illegal. Copying copyrighted motion picture and music files
using unauthorized peer-to-peer services is illegal and is prosecuted by copyright owners.
There are legal services for downloading music and movies. This service is not one of them. YOUR IP ADDRESS IS [insert end-user's IP address] AND HAS BEEN LOGGED. Don't think you can't get caught. You are not anonymous." *Grokster*, Grokster, Ltd., http://www.grokster.com (last visited Oct. 14, 2016).

software as well. The Recording Industry Association of America ("RIAA") and the Motion Picture Association of America ("MPAA") estimated that 85,000,000 songs, and 400,000 movies were being illegally downloaded each day, and that an estimated 90% of all songs and movies downloaded through Grokster infringed on valid copyrights.[31]

In 2003, the RIAA and the MPAA filed suit against Grokster for copyright infringement under 17 U.S.C. §501 of the DMCA.[32] Grokster defended its software under a United States Supreme Court decision dating back to 1982, Sony Corp. of America v. Universal City Studios, Inc.[33] In Sony v. Universal Studios, the Supreme Court held that "the distribution of a commercial product capable of substantial noninfringing uses could not give rise to contributory liability for infringement unless the distributor had knowledge of specific instances of infringement and failed to act on that knowledge." The District Court agreed with Grokster holding that "(1) distributors were not liable for contributory infringement absent showing that they had any material involvement in users' conduct, and (2) that distributors were not liable for vicarious infringement absent showing that they had any right or ability to supervise users' conduct."[34] The RIAA and MPAA appealed the District Court's decision, but on appeal the United States Court of Appeals for the Ninth Circuit affirmed the decision of the District Court stating that "the district court correctly applied applicable law and properly declined the invitation to alter it."[35]

---

[31] *Supreme Court Hears Copyright, File-Sharing Case*, National Public Radio (Mar. 29, 2005), http://www.npr.org/templates/story/story.php?storyId=4565116

[32] *MGM Studios, Inc. v. Grokster, Ltd.*, 259 F.Supp. 2d 1029 (C.D. Calif. 2003).

[33] *Sony Corp. of Am. v. Universal City Studios, Inc.*, 464 U.S. 417 (1984) (also known as the "Betamax Case").

[34] *MGM Studios, Inc. v. Grokster, Ltd.*, 259 F.Supp. 2d 1029 (C.D. Calif. 2003) (The Court also noted that it was "not blind to the possibility that [Grokster] may have intentionally structured their businesses to avoid secondary liability for copyright infringement, while benefitting financially from the illicit draw of their wares.").

[35] *MGM Studios, Inc. v. Grokster, Ltd.*, 380 F.3d 1154 (9th Cir. 2004).

After being victorious in the District Court, and again in the Court of Appeals, Grokster found itself before the Supreme Court of the United States in 2005. Writing for a unanimous Supreme Court, Justice Souter held that "one who distributes a device with the object of promoting its use to infringe copyright, as shown by clear expression or other affirmative steps taken to foster infringement, is liable for the resulting acts of infringement by third parties."[36] As a direct result of the Supreme Court's decision, Grokster shut down, stating on its website: "[t]he United States Supreme Court unanimously confirmed that using this service to trade copyrighted material is illegal."

Napster style peer-to-peer file sharing programs had a novel and legally complex effect on United States copyright law in its relatively short lifespan, spanning approximately only six years; and the popularity of this style of peer-to-peer file sharing has dramatically declined since the early 2000's. Then came BitTorrent.

E. COPYRIGHT INFRINGEMENT IN THE BITTORRENT ERA

Since 2005 and the shutdown of Napster and Grokster, traditional peer-to-peer file sharing applications have substantially declined in use. BitTorrent[37], originally released in 2001, has increased in popularity and worldwide usage since the decline of traditional peer-to-peer file sharing applications.

---

[36] *MGM Studios, Inc. v. Grokster, Ltd.*, 545 U.S. 913 (2005).

[37] BitTorrent is both an application used for P2P file sharing, and a new protocol in the evolution of P2P file sharing. The BitTorrent protocol allows a single file to be downloaded from multiple sources that are uploading the file being downloaded. According to a 2011 Internet Traffic Report, BitTorrent traffic accounted for 21.6 percent of all United States Internet traffic. *Netflix Beats BitTorrent's Bandwidth*, Wired.com, http://www.wired.com/epicenter/2011/05/netflix-traffic/ (last visited Oct. 14, 2016).

BitTorrent enables end-users to connect to a large number of peers acting as hosts ("seeders") and downloaders ("leechers"), collectively known as a "swarm,"[38] which allows for simultaneous uploading and downloading. The main difference between BitTorrent and traditional peer-to-peer file sharing is the method utilized to share files. Applications such as Napster and Grokster utilized a single source for distributing files, while BitTorrent utilizes several sources simultaneously, which may be located anywhere in the world. After a download is completed, the "leecher" becomes a "seeder." The survival of BitTorrent relies on the constant addition of new seeders to promote the "health"[39] of a torrent file. Due to the fact that BitTorrent utilizes several sources simultaneously, and that the sources of the seeds are constantly changing and updating, BitTorrent technology has significantly increased the difficulty of tracing either the source or the destination of copyright infringing downloads.

In addition to the inherent difficulty to trace both sources and destinations, the scattered information technique utilized by BitTorrent allows end-users to employ their own means of frustrating tracing attempt by law enforcement or copyright holders. The three most common methods for defeating trace attempts over the Internet are the utilization of a Virtual Private Network ("VPN"), IP address spoofing, and encrypted peers." A VPN works by allowing an end-user to log into a remote server via a secure connection, effectively acting as a secure tunnel for the end-user to connect to a virtual network and protect their identity and actual location. IP address spoofing is a technique most commonly utilized by malicious hackers, which masks or publishes a fraudulent IP address for the purposes of concealing the end-user's identity.

---

[38] A swarm is all the seeders and leechers connected together. i.e. If you are downloading from five seeders and there are ten leechers downloading from you, your swarm consists of those fifteen peers. *BitTorrent Jargon*, TorrentFreak.com, http://torrentfreak.com/BitTorrent-jargon/ (last visited Oct. 14, 2016).

[39] The health of a torrent file is determined by the ratio of seeders to leechers. The higher the ratio of seeders increases the overall health of the torrent because there are more individuals uploading the torrent than there are downloading the same torrent.

Encrypted peers encrypts the BitTorrent network traffic in an attempt to make traffic harder to identify by third parties. Utilizing encrypted peers seeks to avoid detection from ISPs, who may throttle bandwidth or prevent seeding in an attempt to prevent its users from torrenting.

The most notorious and largest torrent tracker in the world is The Pirate Bay; it is estimated that 20 percent of all torrents are tracked through The Pirate Bay. In 2006, Swedish law enforcement raided The Pirate Bay, confiscating servers and shutting down the website. In response to the raid, The Pirate Bay website stated that "We are not sure when it will return, but we are moving it to another country if necessary[.]"[40]

On the same day as the raid on The Pirate Bay in 2006, Dan Glickman, the CEO of the MPAA, released an official press release entitled "Swedish Authorities Sink Pirate Bay." It stated "[s]ince filing a criminal complaint in Sweden in November 2004, the film industry has worked vigorously with Swedish and U.S. government officials in Sweden to shut this illegal website down." The press release also stated that The Pirate Bay facilitated and enabled the illegal "swapping of millions of illegal copyrighted movies, music, software, and games." Tellingly, according to Alexia.com, The Pirate Bay was the 497th most visited website in the world, and the 312th most visited site in the United States.[41]

In 2009, the creators of The Pirate Bay were put on trial for violation of Swedish copyright laws. After a two month trial, the defendants were convicted and sentenced to one year imprisonment and ordered to pay thirty million kronor (approximately $3.6 million USD) in damages to "entertainment companies, including Warner Bros, Sony Music Entertainment, EMI

[40] *The Piratebay is Down: Raided by the Swedish Police*, Torrent Freak, http://torrentfreak.com/the-piratebay-is-down-raided-by-the-swedish-police/ (last visited Oct. 14, 2016).
[41] Press Release, Motion Picture Association of America, Swedish Police Sink Pirate Bay (May 31, 2006) (on file with author).

and Columbia Pictures."[42] Following the defendants' convictions, their attorney has filed a notice of appeal arguing bias and conflict of interest due to the fact that the presiding judge was a member of several copyright protection organizations.[43] As of this writing, appeal is still pending.

Since the 2006 raid, The Pirate Bay is currently up and running, and its primary location has remained in Sweden.

Currently, copyright holders enlist the services of third-party companies that specialize in identifying and locating the IP addresses of BitTorrent end-users alleged to be participating in the distribution of copyright-protected materials. The process is as follows:

> companies identify the service provider for each IP address from a public database, then generate a spreadsheet, with the IP, the name of the service provider, the date and time of the download, and sometimes the size of the file and the BitTorrent client used…The spreadsheet is converted to a PDF and attached to a discovery demand filed with the court, asking a judge to grant subpoenas to all the ISPs. Once the film company has the name and address of the customers, they send out settlement letters…[The following are excepts from settlement letters:] '[i]f forced to proceed against you in a lawsuit, we will most certainly have a computer forensic expert inspect your computer in an effort to locate the subject movie file, or to determine if you have deleted any media files' and '[i]f in the course of litigation the forensic computer evidence suggests that you did delete media files after being on notice of our client's claims, our client will add a spoliation of evidence claim against you.'[44]

F. COPYRIGHT INFRINGEMENT IN THE FUTURE

There is no doubt that digital copyright infringement is going to continue beyond the mass BitTorrent litigation, just as BitTorrent succeeded the use of Grokster, and as Grokster succeeded the use of Napster. So what is next?

---

[42] *4 Convicted in Pirate Bay file-sharing trial*, Kari Ritter, USA Today, http://www.usatoday.com/tech/news/2009-04-17-pirate-bay_N.htm (last visited Oct. 14, 2016).
[43] *Pirate Bay lawyer calls for retrial*, The Local, http://www.thelocal.se/19028/20090423/ (last visited Oct. 14, 2016).
[44] *How Mass BitTorrent Lawsuits Turn Low-Budget Movies Into Big Bucks*, David Kravets, Wired, http://www.wired.com/threatlevel/2011/03/bittorrent/ (last visited Oct. 22, 2016).

Due to the fact that costs of litigating a large number of copyright infringement claims[45] in court would be cost prohibitive, the MPAA and film studios are still seeking more cost effective avenues for combating digital copyright infringement. In July 2011, after approximately three years of negotiations between the major film studios, major record labels, and the major Internet service providers, a deal, known as the Copyright Alert System[46], was created. The Copyright Alert System establishes "mitigation measures" to be implemented by Internet service providers in response to digital copyright infringement by its subscribers. According to the mitigation measures include in the agreement, Internet service providers, after an end-user has four copyright offenses, are to reduce the end-users "internet speeds and redirect a subscriber's service to an 'educational' landing page about infringement…Internet companies may eliminate service altogether for repeat filesharing offenders[.]"[47] According to the Copyright Alert System:

> on the first offense, internet subscribers will receive an e-mail 'alert' from their ISP saying the account 'may have been' misused for online content theft. On the second offense, the alert might contain an 'educational message' about the legalities of online file sharing…On the third and fourth infractions, the subscriber will likely receive a pop-up notice 'asking the subscriber to acknowledge receipt of the alert.'…After four alerts…'mitigation measures' may commence. They include 'temporary reductions of internet speeds, redirection to a landing page until the subscriber contacts the ISP to discuss the matter or reviews and responds to some educational information about copyright, or other measures (as specified in published policies) that the ISP may deem necessary to help resolve the matter.'[48]

---

[45] Even though these litigation costs have already been mitigated by Judge Howell's decisions permitting mass-joinder and settlement demand letters sent by the MPAA and film studios the costs of litigation are still high.

[46] Press Release, Music, Movie, TV and Broadband Leaders Team to Curb Online Content Theft *Announce Common Framework for "Copyright Alerts"*, (July 7, 2011) (on file with author).

[47] *ISPs to Disrupt Internet Access to Copyright Scofflaws*, David Kravets, Wired, http://www.wired.com/threatlevel/2011/07/disrupting-internet-access/ (last visited Oct. 23, 2016).

[48] *ISPs to Disrupt Internet Access to Copyright Scofflaws*, David Kravets, Wired, http://www.wired.com/threatlevel/2011/07/disrupting-internet-access/ (last visited Oct. 23, 2016).

Groups such as the Center for Democracy and Technology, "a non-profit public interest organization working to keep the Internet open, innovative, and free"[49], along with Public Knowledge, "a non-profit, public-interest advocacy organization"[50], are opposed to the agreement between the Internet service providers and copyright holders to implement the Copyright Alert System. The public-interest organizations released a joint statement asserting that, "it would be wrong for any ISP to cut off subscribers, even temporarily, based on allegations that have not been tested in court."[51]

While the Copyright Alert System does not insulate end-users from potential litigation for copyright infringement, the agreement seeks to alleviate the high cost of litigation by preventing copyright infringement though getting the attention of the end-user and informing and educating the end-user of the illegality of their action.

In addition to the Copyright Alert System, the United States became a signatory of the Anti-Counterfeiting Trade Agreement ("ACTA") in October 2011.[52] The Anti-Counterfeiting Trade Agreement is "an international framework that improves the enforcement of intellectual property right ("IPR") laws. It does not purport to create new intellectual property rights, but to create improved international standards as to how to act against large-scale infringements of IPR."[53] The "ACTA aims to build on existing international rules in the area of intellectual property…and is intended to address a number of enforcement issues where participants have

---

[49] Center for Democracy & Technology | Keeping the Internet Open, Innovative and Free, http://www.cdt.org/about (last visited Oct. 23, 2016).
[50] Public Knowledge | Fighting for your digital rights in Washington., http://www.publicknowledge.org/about (last visited Oct. 23, 2016).
[51] CDT, Public Knowledge Joint Statement on 'Copyright Alert System' | Public Knowledge, http://www.publicknowledge.org/cdt-public-knowledge-joint-statement-copyright-ale (last visited Oct. 23, 2016).
[52] *U.S. Signs International Anti-Piracy Accord*, David Kravets, Wired, http://www.wired.com/threatlevel/2011/10/united-states-signs-acta/ (last visited Oct. 23, 2016).
[53] The Anti-Counterfeiting Trade Agreement, Fact Sheet. European Commission. (Updated November 2008).

identified that an international legal framework does not exist or needs to be strengthened."[54] Other notable signatories to the ACTA include Australia, Canada, Japan, Morocco, New Zealand, Singapore and South Korea.[55]

The primary objective of the PROTECT IP Act ("PIPA") is to aid law enforcement in "'[cracking] down on rogue Web sites dedicated to the sale of infringing or counterfeit goods.' The actual bill text, however, doesn't require that the piratical Web site sell anything."[56] PIPA allows the government to require a "service provider [to] take technically feasible and reasonable measures, as expeditiously as possible, to-- (i) remove or disable access to the Internet site associated with the domain name set forth in the order; or (ii) not serve a hypertext link to such Internet site."[57]

A House proposal, dubbed the "Stop Online Piracy Act" ("SOPA"), which would authorize the government to disrupt or shutdown piracy websites that hosted copyright infringing material, as well as the authority to order search engine companies, such as Google or Yahoo!, to remove piracy websites from search results. Additionally, the language of the proposal is so broad that it could possibly permit the government to bring an action against anyone who "tells people how they can get around that block," or "order news sites to take down stories noting workarounds."[58]

---

[54] The Anti-Counterfeiting Trade Agreement – Summary of Key Elements Under Discussion", Swiss federation of Intellectual Property. (November 2009).
[55] *U.S. Signs International Anti-Piracy Accord*, David Kravets, Wired, http://www.wired.com/threatlevel/2011/10/united-states-signs-acta/ (last visited Oct. 23, 2016).
[56] *Senate bill amounts to death penalty for Web Sites*, Declan McCullagh, CNet, http://news.cnet.com/8301-31921_3-20062398-281.html (last visited Oct. 21, 2016).
[57] PROTECT IP Act, S. 968, 112th Cong. §3(d)(2)(D); "Text of S. 968," Govtrack.us. May 26, 2011. Retrieved Oct. 21, 2016.
[58] *Feds to Blacklist Piracy Sites Under House Proposal*, David Kravets, Wired, http://www.wired.com/threatlevel/2011/10/feds-to-blacklist-piracy-sites-under-house-proposal/ (last visited April 11, 2016).

The main issues with both, PIPA and SOPA, are the "constitutional problems and that could have potentially disastrous consequences for the stability and security of the [Internet,]…the principle of interconnectivity that has helped drive the Internet's extraordinary growth, and for free expression." Both, PIPA and SOPA:

> [authorize] courts to order all [United States] Internet service providers, domain name registries, domain name registrars, and operators of domain name servers—a category that includes hundreds of thousands of small and medium-sized businesses, colleges, universities, nonprofit organizations, and the like—to take steps to prevent the offending site's domain name from translating to the correct Internet protocol address. These orders can be issued even when the domains in question are located outside of the United States…whose operators are themselves located outside the United States.

"The Supreme Court has made it abundantly clear that governmental action suppressing speech, if taken prior to an adversary proceeding and subsequent judicial determination that the speech in question is unlawful,[59] is a presumptively unconstitutional 'prior restraint.' In other words, it is the 'most serious and the least tolerable infringement on First Amendment rights,'[60] permissible only in the narrowest range of circumstances. The Constitution requires a court "to make a final determination" that the material in question is unlawful 'after an adversary hearing before the material is completely removed from circulation.'"[61] [62]

The greatest network and computer security risks caused by SOPA and PIPA stem from their DNS filtering requirement. Both, SOPA and PIPA would require DNS servers "filter resolution of queries for certain [domain] names[,]", and display text notices to users attempting to reach certain pages.[63] While, on its face, the requirements of SOPA and PIPA may seem fairly innocuous, however, implementation of DNS filtering and text displays are incompatible with

---

[59] Freedman v. Maryland, 380 U.S. 51, 58-60 (1965).
[60] Neb. Press Ass'n v. Stuart, 427 U.S. 539, 559 (1976).
[61] Ctr. For Democracy & Tech. v. Pappert, 337 F. Supp. 2d 606, 657 (E.D. Pa. 2004) (emphasis added).
[62] Mark Lemley, David S. Levine, & David G. Post, *Don't Break the Internet*, 64 Stan. L. Rev. Online 34, http://www.stanfordlawreview.org/online/dont-break-internet (last visited Oct. 21, 2016).
[63] Steve Crocker, David Dagon, Dan Kaminsky, Danny McPherson, & Paul Vixie, *Security and Other Technical Concerns Raised by the DNS Filtering Requirements in the PROTECT IP Bill*, May 2011

the security policies of DNS Security Extension ("DNSSEC")[63], and creates serious circumvention issue.

The security polices implemented by DNSSEC allow for DNS records to be cryptographically signed, prevention of man-in-the-middle attacks, secure authentication to prevent distribution of malware, and prevention of authentication flaws exposing sensitive data (ex. Banking information or confidential communications).[63] Circumvention of the proposed DNS filtering requirement is not only possible, it is simple to achieve, thereby DNS filtering will prove ineffective in achieving the main goals of SOPA and PIPA, combating digital piracy. Even with DNS filtering in effect, users have several methods of circumvention, including simply using the site's IP address rather than domain name, and/or manually modifying the user's DNS settings to by-pass filtered servers.[63]

Of primary concern is the notion that innumerable users could manually modify their DNS settings, which could, and most likely would, result in very serious security vulnerabilities. Resolving domain names through DNS servers not observing DNSSEC's security policies would expose countless users to potentially malicious public DNS servers. [79] Additionally, If enough users manually modify their DNS settings, IPSs will lose visibility of their networks, resulting in inaccurate traffic patterns or a limited ability to recognize and neutralize potential security threats. [79] Lastly, Content Distribution Networks will suffer from serious performance degradation due to the number of users resolving through non-localized DNS servers. [79]

G. CONCLUSION

These bills propose "to give the power to censor the internet to the entertainment industry." Under PIPA and SOPA, the government would be authorized to force "United States Internet service providers to block access to infringing domain names, they can also sue U.S.

based search engines, directories, or even blogs and forums to have links to these sites removed. Secondly, [PIPA and SOPA] gives corporations and the government the ability to cut off to infringing websites by having U.S. based advertisers and payment systems [cancelled].” Neither PIPA nor SOPA will prevent or stop digital piracy in its entirety; pirates will still be able to access infringing websites directly by using the websites IP address, rather then the name of the infringing website. However, PIPA and SOPA will be successful in one aspect, it will stifle new startups because it “permits corporations to sue any website the corporation feels is not filtering infringing content well enough. These lawsuits could easily bankrupt new search engines and social media sites.” A lot “of trailblazing websites could look like piracy havens to the wrong judge: Tumblr, SoundCloud, an early YouTube, wherever people express themselves, make art, broadcast news, or organize protests, there is plenty of TV footage, movie clips, and copyrighted music mixed in.” Reduced Internet security and stability is the most likely result of allowing the government to interfere with systems and processed underlying the structure of the Internet. In the end, neither PIPA nor SOPA will stop digital piracy, but what both, PIPA and SOPA, will certainly do, is introduce vast opportunity for government and corporate censorship and abuse, meanwhile making the Internet less secure and less stable.[64]

The United States has taken significant steps in preparing for the future legal issues in the area of digital copyright infringement. The Copyright Alert System, Anti-Counterfeiting Trade Agreement, the PROTECT IP Act, and the Stop Online Piracy Act seek to fill voids in the current law and attempt to give some semblance to issues arising from digital copyright infringement of valid United States held copyrights, occurring outside the borders of the United States. To the dismay of copyright holders, digital pirates will continue to pillage the digital

[64] *PROTECT IP / SOPA Breaks The Internet*, Fight for the Future, http://vimeo.com/31100268 (last visited April 11, 2016).

realm for valuable treasures, despite the revolutionary evolution of the copyright law. The Copyright Alert System and the Anti-Counterfeit Trade Agreement will provide copyright holders with additional avenues for legal redress and further their efforts in protecting their intellectual property rights in the future legal battles that are sure to develop. However, the questions we need to be asking are "do we, the people, really want to permit so much government and corporate censorship?" "Do we want to risk them interfering with the security and reliability of the Internet, a huge contributor to the growth and stability of our economy?" All of this censorship in order to encourage a minority of individuals to purchase more movies and music, does the end really justify the means? Neither the PROTECT IP Act nor the Stop Online Piracy Act is the answer to the problem of digital piracy.

II. TECHNICAL DESCRIPTION

A. PORTABLE EDUCATION SYSTEM

The portable education system is a compact and portable device that provides an introduction to copyright law with a focus on technology. The education system incorporates a graphical user interface programmed with a combination of HTML, CSS, Python, JavaScript, and PHP set up through a kiosk type environment. The education system may be connected to a power source and any display device, ideally a touchscreen device, through an HDMI connection. Through the GUI, users are able to access educational material relating to copyright law, recent news and developments in intellectual property law, a legal analysis of the Stop Online Piracy Act and PROTECT IP Act, and an interactive quiz to test the user's knowledge of copyright law as applied to technology and real world scenarios.

The portable education system was developed on a Raspberry Pi 3 Model B, which boasts a 1.2GHz 64-bit quad-core ARMv8 CPU, 1GB RAM, 802.11n wireless, and Low Energy Bluetooth wrapped in a minimal form factor of roughly 3.37″ x 2.21″ x 0.83″ and weighing in at only 45g. The minimal footprint of the Raspberry Pi 3 Model B makes it a prime platform to develop a lightweight and portable system. The Raspberry Pi Operating System is a modified Debian Linux Distribution called "Raspbian."

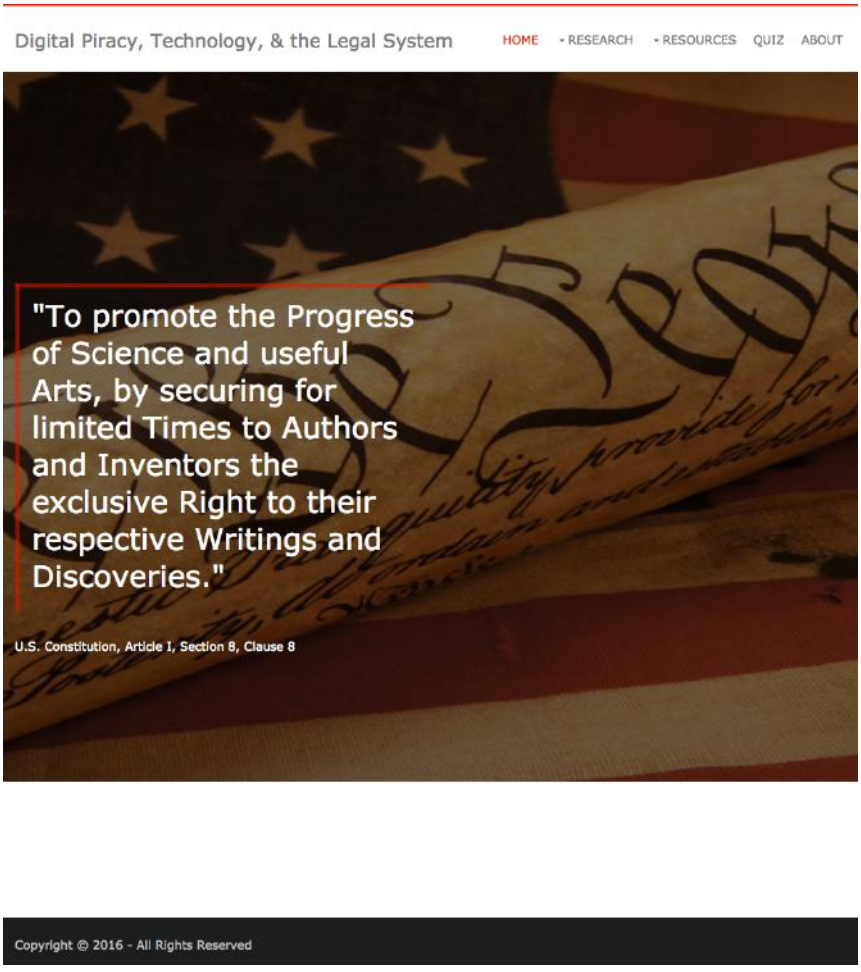
I developed the GUI for the portable education system based on a web interface running in kiosk mode. Initially, the GUI was developed using the web development platform, Adobe Dreamweaver. Running locally on my device, I coded the GUI as a web interface. The GUI is a general combination of HTML, CSS, and JavaScript. The main body of the website is composed of HyperText Markup Language (HTML) wrapped in Cascading Style Sheets (CSS) to set the style and layout of the GUI. The recent news section incorporates JavaScript to frequently pull new and updated data from various Rich Site Summary (RSS) feeds. Similarly, the interactive quiz incorporates JavaScript to style and implement the quiz, utilizing an array of questions to be displayed.

Upon setting up the Raspberry Pi, I downloaded and installed Kweb (Minimal Kiosk Browser) through the command prompt. Once Kweb was installed, I edited the Kweb configuration file to cause it to default to kiosk mode, and set the local instance of the education system GUI to be the default home page. Kiosk mode runs the web browser in full screen mode without any user interface such as toolbars and menus. I then modified the GUI autorun file (LX Session or LXDE) to cause Kweb to automatically launch in kiosk mode upon startup of the education system.

Once Kweb was successfully setup, I connected to the Raspberry Pi 3 over my local network utilizing FileZilla, and uploaded the education system GUI. Upon restart of the education system, the Raspberry Pi automatically logged in, launched Kweb in kiosk mode, and displayed the education system GUI.

B. Site Map & Explanations

Figure 1. Index.html



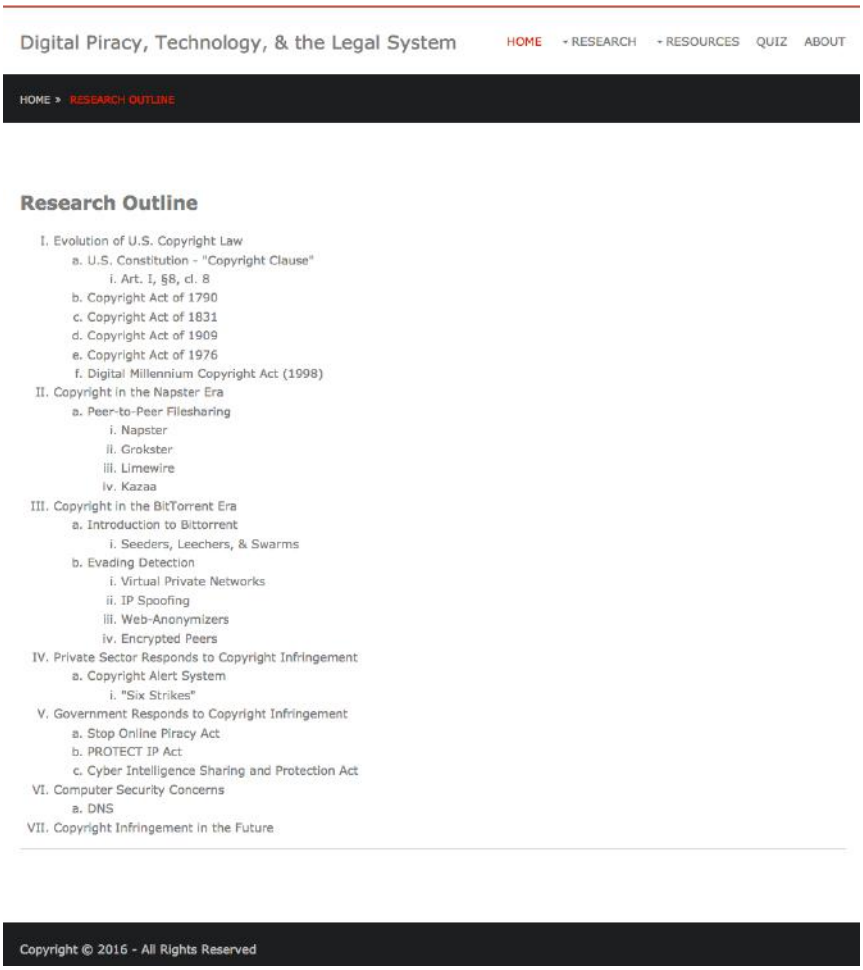
Index.html established the general layout of the site utilized by the Portable Education System. The header contains the page title as well as the site-wide navigation bar providing easy and intuitive access to the entire site. The footer contains a general copyright notice. This general

notice puts every user on notice of the copyright status of the content contained within the Portable Education System, thereby complying with both State and Federal copyright requirements.

The general layout is contained within two files, layout.css and framework.css. Layout.css handles the site-wide design of the text, font, format, navigation, and color scheme of the site. Meanwhile, framework.css handles the site-wide spacing, text format, and image properties of the site. In the <head> section of each page, the site references the layout.css and framework.css to ensure that each page displays the text, images, and other information in a uniform manner.

Article I, Section 8, Clause 8 of the United States Constitution, also known as the Copyright Clause, is highlighted at the center of the page.

FIGURE 2. OUTLINE.HTML



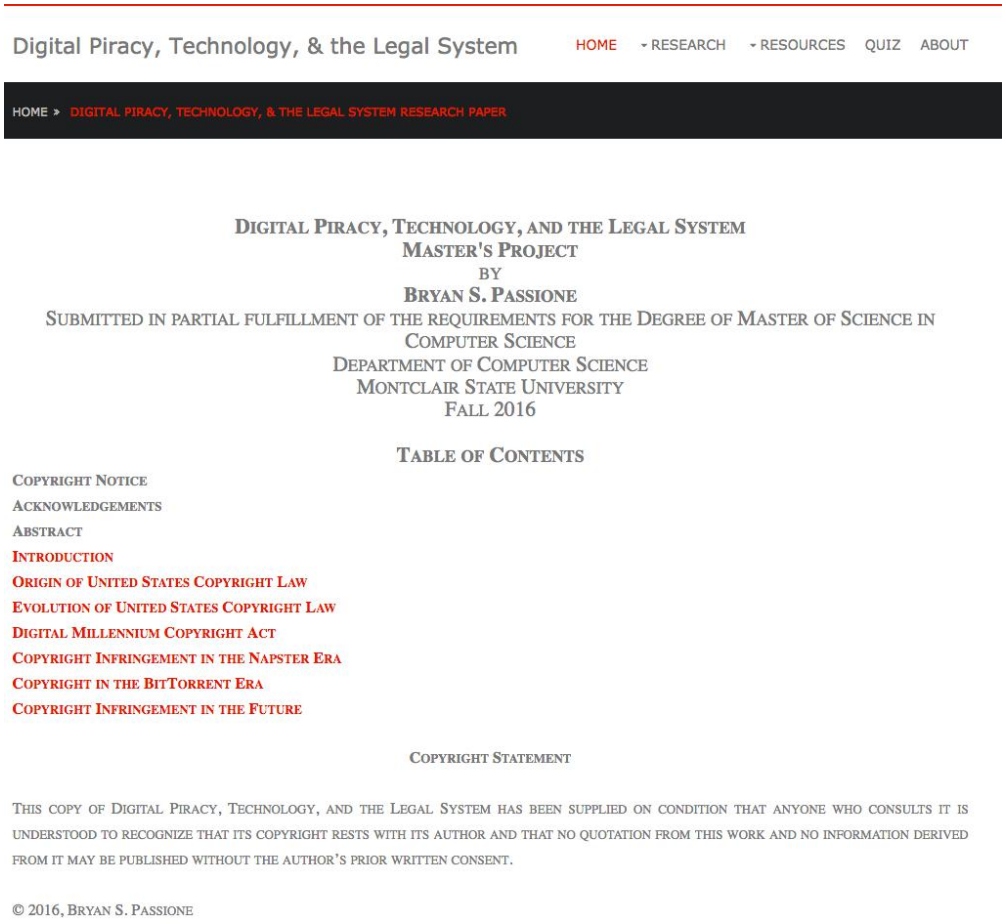
Outline.html provides the user with an outline of the research and topics covered by the Portable Education System. The outline is a HTML formatted Ordered List in an outline format.

SAMPLE CODE FOR ORDERED LIST:

```
<ol>
     <li type="I">Evolution of U.S. Copyright Law</li>
          <ol>
               <li type="a">U.S. Constitution - "Copyright
               Clause"</li>
          <ol>
               <li type="i">Art. I, §8, cl. 8</li>
          </ol>
               <li type="a">Copyright Act of 1790</li>
               <li type="a">Copyright Act of 1831</li>
```

```
        <li type="a">Copyright Act of 1909</li>
        <li type="a">Copyright Act of 1976</li>
        <li type="a">Digital Millennium Copyright Act
        (1998)</li>
</ol>
```

FIGURE 3. PAPER.HTML



Paper.html is an "interactive" version of the research paper, reproduced in its entirety. The page includes all information and citations contained within the research paper. The Table of Contents includes clickable links to each heading of the research paper. The links contained within the Table of Contents were achieved through the use of anchor links tied to each heading in the research paper. Each citation in the research paper is linked to a complete list of resources at the bottom of the page, also through the use of anchor links. Use of these links enables a user

to quickly and easily navigate the research paper. Easy and quick navigation is extremely important on a page such as this due to the extensive material and sheer length of the page. Otherwise, navigation of this page would be difficult and frustrating for users.

SAMPLE CODE FOR ANCHORED LINK:

```
<p class=MsoNormal style='line-height:150%'><b><span
style='font-family:Times; mso-bidi-font-family:"Times New
Roman";font-variant:small-caps'><a
href="#intro">Introduction</a><span style='mso-tab-count:10'>
</span><o:p></o:p></span></b></p>
```

FIGURE 4. HISTORY.HTML

History.html provides the user with access to a PowerPoint presentation displayed in various slides. Each slide contains information contained within the research report. The slides

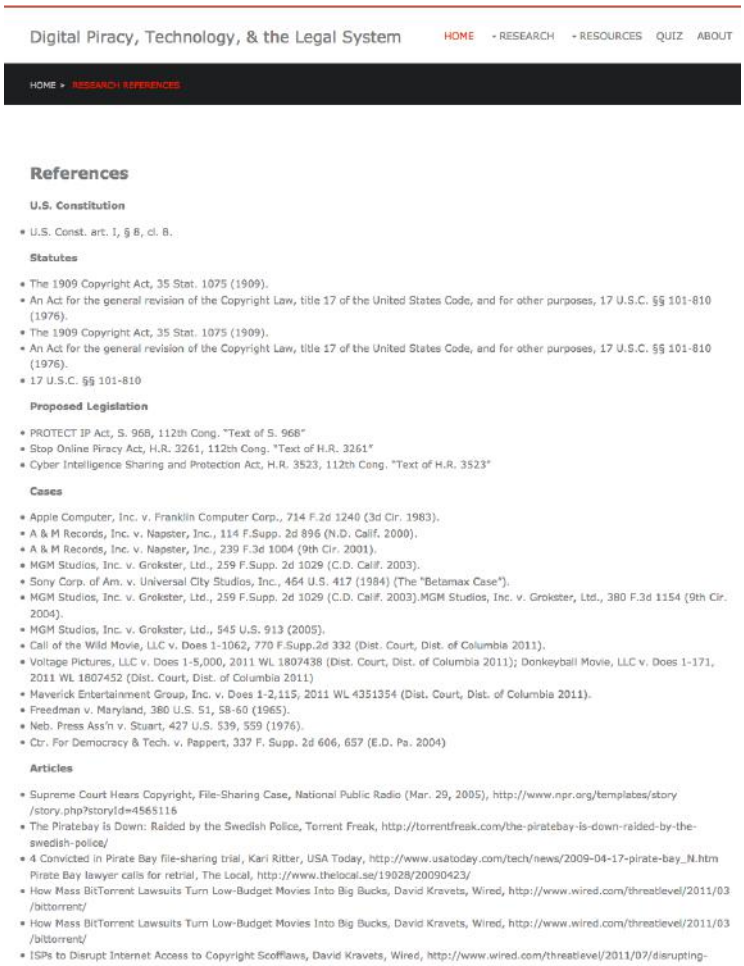
begin with a history of copyright law and its development with the expansion of technology, and follows up with the computer security concerns of proposed laws. The slide display was developed with the use of JavaScript and open source resources available through the MIT License. Software covered under a MIT license permits its reuse, even within proprietary software, under the simple condition that it includes a copy of the MIT License terms and the copyright notice (a copy of the MIT license is provided within the website documentation). Interestingly, the MIT license is flexible enough to comply with both copyright and "copyleft" license requirements.

SAMPLE CODE FOR JAVASCRIPT:

```
<script>
     $(function() {
          // Load the classic theme
          Galleria.loadTheme('galleria.classic.min.js');

          // Initialize Galleria
          Galleria.run('#galleria');
     });
</script>
```

FIGURE 5. REF.HTML



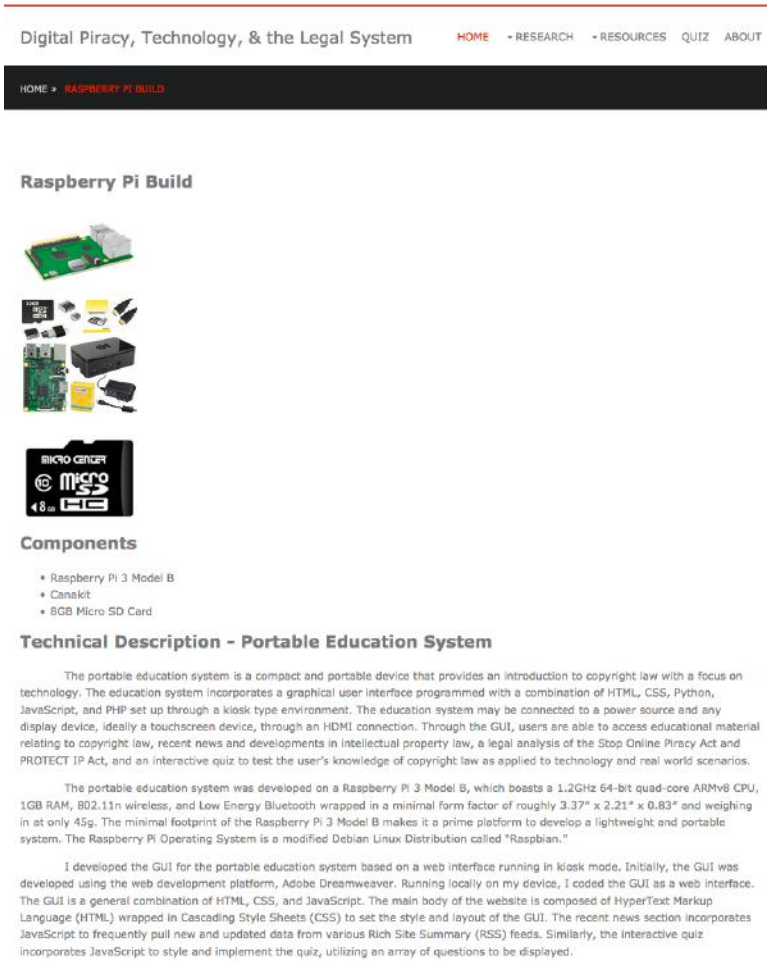
Ref.html contains a full list of references utilized during the initial research for the research paper. The list of references is a HTML formatted unordered list designed to display the list in bullet points, rather than the ordered list as utilized for the Research Outline.

SAMPLE CODE FOR UNORDERED LIST:

```
<p><strong>U.S. Constitution</strong>
     <li>U.S. Const. art. I, § 8, cl. 8.</li>
</p>
<p><strong>Statutes</strong>
     <li>The 1909 Copyright Act, 35 Stat. 1075 (1909).</li>
     <li>An Act for the general revision of the Copyright Law,
title 17 of the United States Code, and for other purposes, 17
U.S.C. §§ 101-810 (1976).</li>
     <li>The 1909 Copyright Act, 35 Stat. 1075 (1909).</li>
```

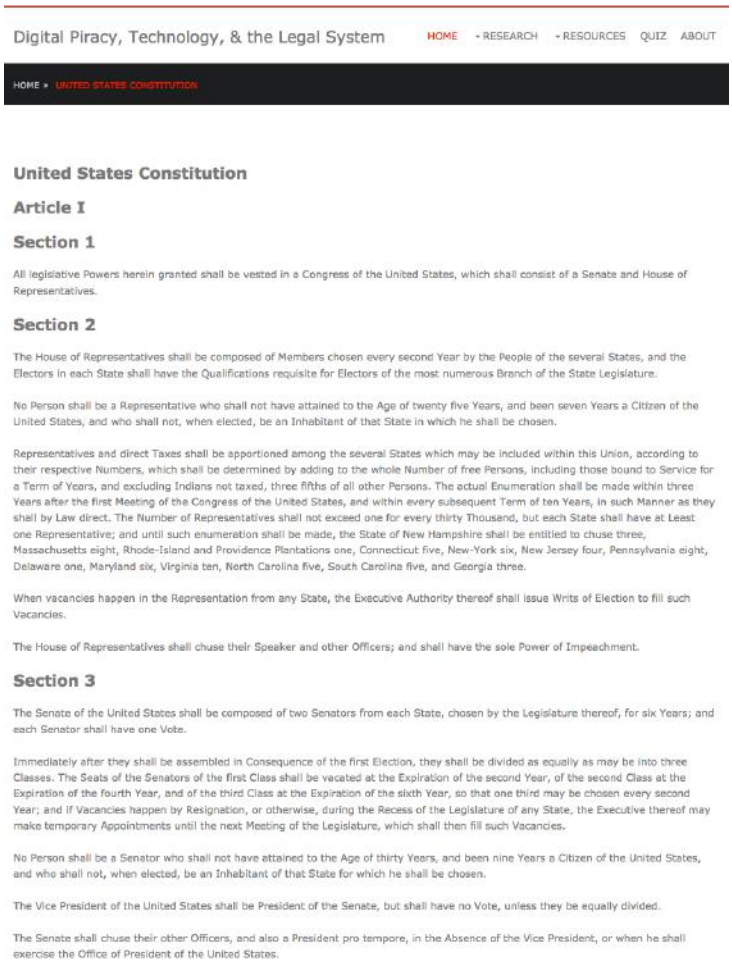
```
    <li>An Act for the general revision of the Copyright Law,
title 17 of the United States Code, and for other purposes, 17
U.S.C. §§ 101-810 (1976).</li>
    <li>17 U.S.C. §§ 101-810</li>
</p>
```

FIGURE 6. RPI.HTML



Rpi.html contains a small image gallery of the physical components used to develop the Portable Education System, which is comprised of a Raspberry Pi 3 Model B, a kit containing necessary wiring, and an 8GB SD card. This page also contains the full technical description of the build as contained within this report.

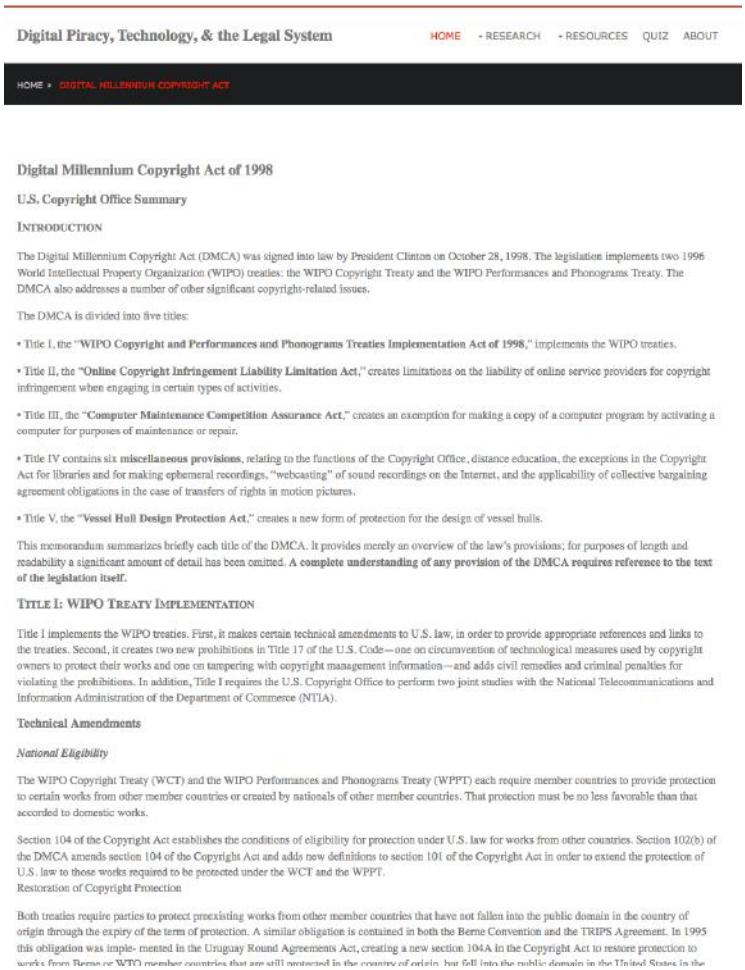
FIGURE 7. USCONST.HTML



Usconst.html provides the user with a full transcription of the United States Constitution. While only one small section of the Constitution applies to Copyright law, Article I, Section 8, Clause 8, knowledge of the U.S. Constitution is immeasurable. The U.S. Constitution is the supreme law of the United States, it establishes various rights and limitations of the federal government, and has been amended 27 times since its ratification in 1788.

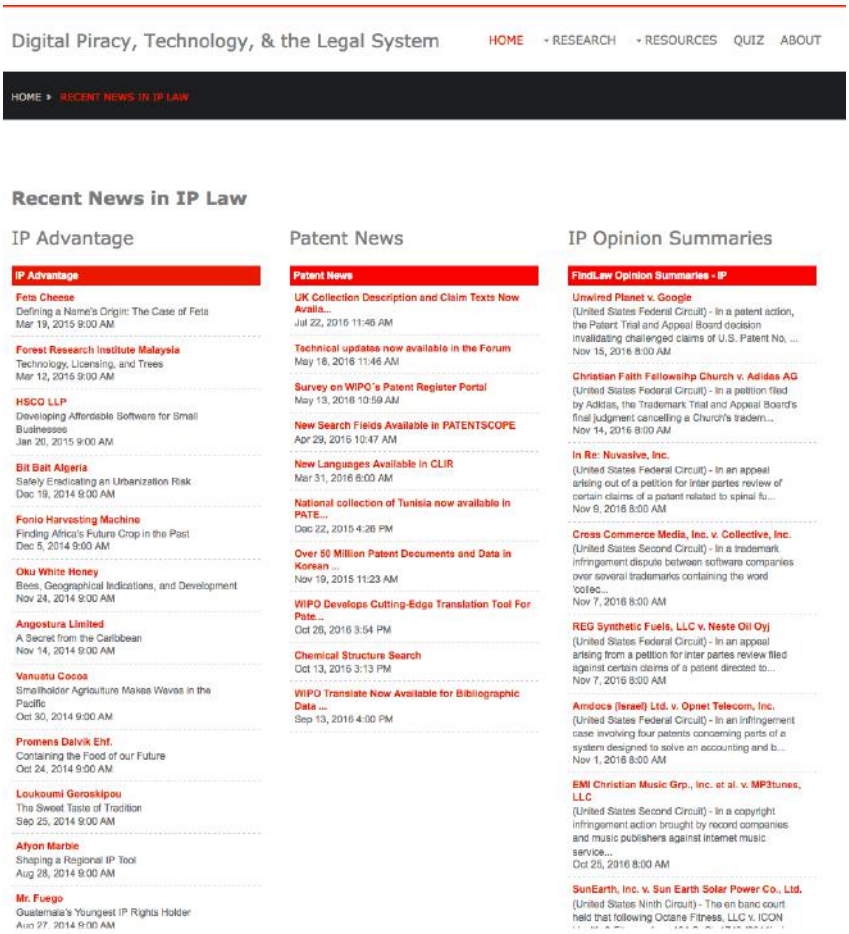
The pertinent section, Article I, Section 8, Clause 8, which states: "To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries;" is highlighted on this page.

FIGURE 8. DMCA.HTML



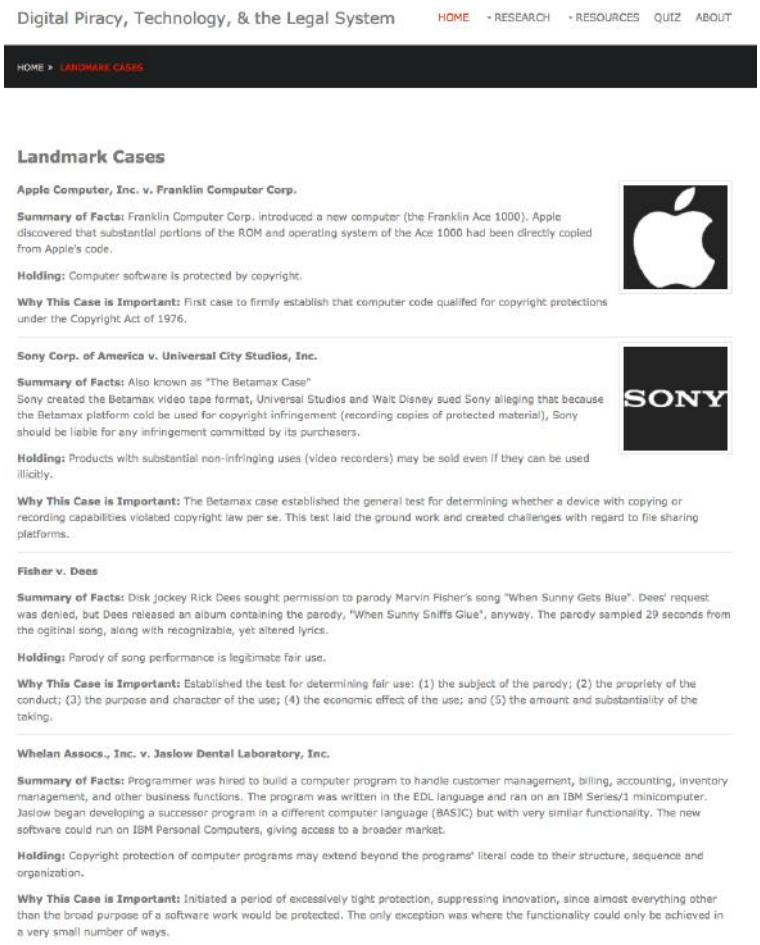
The DMCA or Digital Millennium Copyright Act is the most current major revision to Copyright law in the United States. The DMCA is a long and convoluted law with its interpretation constantly debated. The DMCA is far from clear even to lawyers, let alone lay people with no legal training. In an effort to make the DMCA more intelligible to the masses, the U.S. Copyright Office released a printed summary in 1998. Dmca.html is an electronic reconstruction of the Copyright Office's 1998 summary publication.

FIGURE 9. RSS.HTML



Rss.html utilizes JavaScript to provide users with constantly updated resources retrieved from well-known intellectual property news resources. The JavaScript is tied to various RSS feeds from reliable resources and populates a list of the most recent publication from each resource. Keeping up-to-date with developments in technology and IP law is extremely difficult, so being able to have various lists of automatically updated resources available enables users to view the most recent developments with minimal effort and time.

FIGURE 10. CASES.HTML



Cases.html provides users with a sample of some of the most important and/or groundbreaking cases in IP law. Each case provided is accessible by an anchor link to ease navigation, similar to the research paper page. Each case also provides a short summary of pertinent facts from the case, the courts holding (decision or brief rule of law established), and a short reason as to why a particular case is so important or groundbreaking in the areas of IP law and/or technology.

FIGURE 11. QUIZ.HTML

Quiz.html is simply a wrapper for display of the Intellectual Property Quiz, which is contained in quiz.js. On page load, quiz.js launches an interactive Intellectual Property Quiz. The Quiz is composed of 12 multiple choice questions contained in an array. Along with each question are answer choices, and each answer is indicated by its position in the array. Each possible answer is displayed below the question as a clickable option. If the answer selected is correct, a green box will appear at the bottom of quiz bounding box. If the answer selected is incorrect, a red box will appear at the bottom of quiz bounding box. Regardless of the answer selected, the quiz will move to the next question in the array. Upon completion of the quiz, a link

to explanations.html will appear directing a user to the answers and explanations of each question.

SAMPLE CODE FOR JAVASCRIPT QUIZ:

```
<div class="qwrapper">
     <div id="quiz">
          <h1></h1>
          <p class="questions">
          <div class="answers"></div>
          <div class="checkAnswers">
               <h3>Results</h3>
                    <div class="checker"></div>
                    </div>
          </div>
     </div>
</div>
```

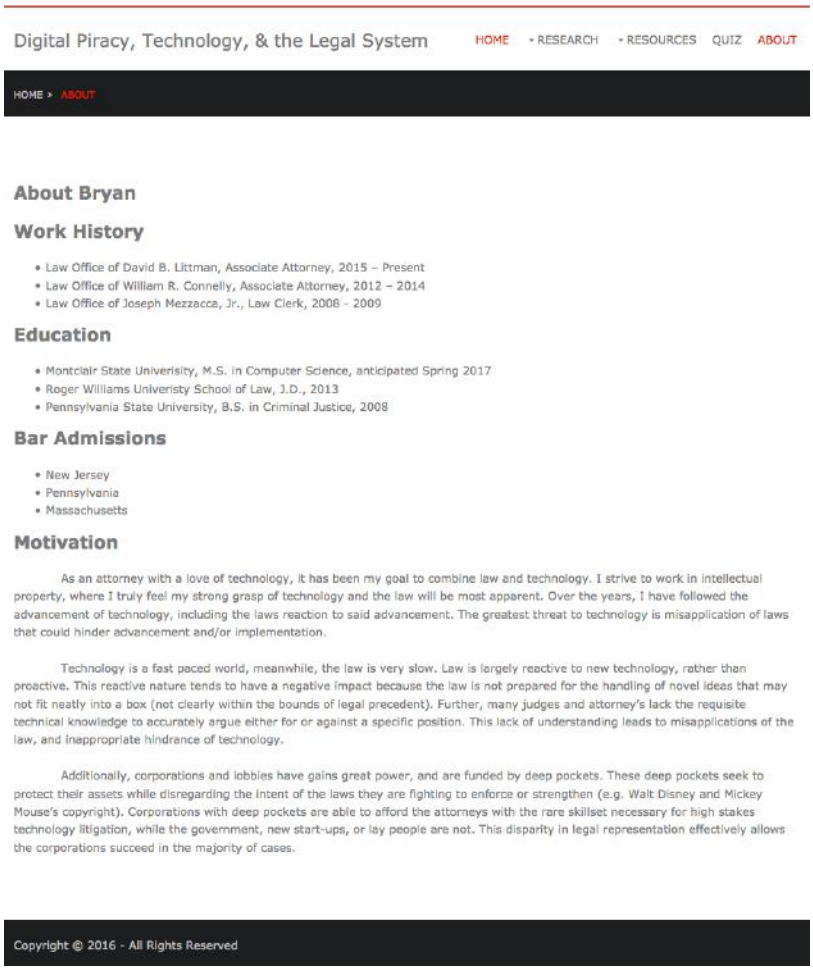
SAMPLE CODE FOR JAVASCRIPT QUIZ:

```
window.onload = function () {

var questionArea =
document.getElementsByClassName('questions')[0],
answerArea = document.getElementsByClassName('answers')[0],
checker = document.getElementsByClassName('checker')[0],
current = 0,

allQuestions = {
     'Which of the following ARE protected by copyright law?' :
     [' A) An article written last year that was rejected by a
     journal',
     'B) A chart accompanying an article published in a
     journal',
     'C) The procedure followed by a group of researchers',
     'D) A and B only',
     'E) B and C only',
     'F) A, B, and C', 3],
```

FIGURE 12. ABOUT.HTML



About.html contains a short informational page about the author of the research paper and developer of the Portable Education System. The short biography contains the author's legal work history, education, bar admissions, and the motivation for creating this project.