

**COMMON LAW CONSEQUENCES OF CATCHING ‘EM ALL:
EXCLUSIONARY PROPERTY RIGHTS IN AUGMENTED
SPACE AND AN ALTERNATIVE NOTICE/OPT-OUT
PROCEDURE FOR LOCATION-BASED AUGMENTED
REALITY TECHNOLOGY**

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I. INTRODUCTION

Imagine you are tucked in the privacy of your home located in a quiet neighborhood, when suddenly flocks of strangers enclose your property, linger on the sidewalk, traverse across the lawn, peer through the windows, and block the driveway—all while intently staring at mobile devices in their hands or while gazing through a pair of special glasses. The paparazzi are out of town and no, your home did not become the world’s eighth wonder overnight. Crowds blatantly ignore polite requests to vacate your property; instead, unwelcome visitors respond with threatening expletive language. Strangers knock on the door seeking access to your backyard. The shrubbery aligning your home shields intruders from law enforcement and acts as a substitute restroom for late-night emergencies. Visitors pollute the surrounding peaceful area with trash and loud music. Constant ruckus results in sleep deprivation as you endlessly protect your personal safety and defend your property from unwanted invasions. What can possibly mesmerize crowds to such intrusive extents?

The digital revival of a twenty-year-old game spawned what many deemed a “zombie apocalypse” as Pokémon Go hit smartphones worldwide on July 6, 2016.¹ Pokémon Go transformed nostalgic trading cards from the 1990s into an Augmented Reality (AR) scavenger hunt game, where players

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¹ Matthew Ingram, *Welcome to the Apocalypse, Brought to You by Pokémon Go*, FORTUNE (July 14, 2016), <http://fortune.com/2016/07/14/apocalypse-pokemon-go>; Dawn Landau, *Pokémon Go: It Might be the Zombie Apocalypse*, HUFFINGTON POST (Aug. 1, 2016, 7:19 AM), http://www.huffingtonpost.com/dawn-q-landau/pokemon-go_b_11199526.html.

wander in search of virtual creatures.² Unlike printed creatures on physical playing cards, the AR application uses a smartphone's camera to display the real world, as it appears beyond the camera lens, and superimposes virtual creatures on the same screen.³ A creature's on-screen appearance depends on the player's physical location in the real world, which the game tracks using a smartphone's geolocation technology.⁴

AR is distinct from Virtual Reality (VR), which immerses individuals in an artificial environment entirely disassociated with the surrounding world.⁵ Flight simulators are a widely used form of VR for pilot training in commercial and military contexts.⁶ By contrast, AR combines virtual elements in our physical space by superimposing digital images or objects in our actual environments, which are typically viewed through devices such as smartphones or special glasses.⁷ Thus, AR does not replace, but rather supplements the way we perceive and interact with the physical environment.⁸ A basic and long-standing example of AR is the computer-generated line in televised football games used to indicate the number of yards needed for a first down.⁹ Although the virtual line does not exist on the actual field, the television network projects it for viewers, which aids their perception of the game.¹⁰ More complex AR devices include wearables such as Google Glass and Hololens.¹¹ With steep prices for everyday consumers,¹² however, these wearables are predominately used in specialized occupations—to replace the need for laptops and physical

² Quentin Hardy, *Pokémon Go, Millennials' First Nostalgia Blast*, N.Y. TIMES (July 13, 2016), <http://www.nytimes.com/2016/07/14/technology/pokemon-go-millennials-first-nostalgia-blast.html>.

³ *Id.*

⁴ *Id.*

⁵ GREG KIPPER & JOSEPH RAMPOLLA, *AUGMENTED REALITY: AN EMERGING TECHNOLOGIES GUIDE TO AR 1* (2012) (ebook).

⁶ John Chaney, *How VR Training Keeps Fighter Pilots on Top of Their Game*, NVIDIA (Nov. 26, 2016), <https://blogs.nvidia.com/blog/2016/11/26/virtual-reality-flight-simulation>; Christine Negroni, *The Future of Flying? You Can See It Now*, N.Y. TIMES (Nov. 13, 2017), <https://www.nytimes.com/2017/11/13/business/dealbook/flying-technology-travel.html> (discussing the expansion of aviation VR to passenger simulations as a tool for testing new design concepts and marketing premium seats).

⁷ KIPPER & RAMPOLLA, *supra* note 5, at 5–7.

⁸ *Id.*

⁹ *Piazza v. Kirkbride*, 785 S.E.2d 695, 699 (N.C. Ct. App. 2016); KIPPER, *supra* note 5, at 1–3.

¹⁰ KIPPER & RAMPOLLA, *supra* note 5, at 1–3.

¹¹ Steven Levy, *The Race for AR Glasses Starts Now*, WIRED (Dec. 16, 2017), <https://www.wired.com/story/future-of-augmented-reality-2018>.

¹² Joanna Stern, *Google Glass: What You Can and Can't Do with Google's Wearable Computer*, ABC NEWS (May 2, 2013), <http://abcnews.go.com/Technology/google-glass-goggles-wearable-gadget/story?id=19091948> (reporting the cost of Google Glass at \$1,500 in 2013).

instruction manuals in industrial environments,¹³ and to aid doctors by projecting anatomical models during surgical procedures.¹⁴

As a free mobile application accessible on smartphones and tablets, Pokémon Go introduced AR to a mass audience and set records with over 45 million active users at its peak.¹⁵ Despite the game's subsequent decline in popularity,¹⁶ the future of AR is promising, with a projected global AR market share value of \$133.78 billion by 2021.¹⁷ Currently, Amazon and IKEA mobile applications allow customers to view potential purchases in their homes or offices by superimposing three-dimensional visuals of products and furniture over live images of a chosen space using the smartphone's camera view.¹⁸ Similarly, animal skeletons come to life on visitors' smartphones with the Smithsonian's Skin and Bones application.¹⁹ But the future of AR is most promising in wearables, and some predict that wearable AR devices will ultimately replace our precious smartphones.²⁰

¹³ See Steve LeVine, *Google Is Re-introducing Glass as a Manufacturing Tool*, AXIOS (July 19, 2017), <https://www.axios.com/google-is-re-introducing-glass-as-a-manufacturing-tool-2461886721.html>.

¹⁴ Dan Thorp-Lancaster, *Check Out This Surgery Being Performed with the Help of HoloLens*, WINDOWS CENTRAL (Dec. 5, 2017), <https://www.windowscentral.com/check-out-surgery-being-performed-help-hololens>.

¹⁵ Nick Wingfield & Mike Isaac, *Pokémon Go Brings Augmented Reality to a Mass Audience*, N.Y. TIMES (July 11, 2016), <http://www.nytimes.com/2016/07/12/technology/pokemon-go-brings-augmented-reality-to-a-mass-audience.html>. Further, the game set a record for Apple's App Store as the most downloaded application during its first week of release. Romain Dillet, *Apple Says Pokémon Go is the Most Downloaded App in a First Week Ever*, TECH CRUNCH (July 22, 2016), <https://techcrunch.com/2016/07/22/apple-says-pokemon-go-is-the-most-downloaded-app-in-its-first-week-ever>.

¹⁶ Luke Kawa & Lily Katz, *These Charts Show That Pokémon Go is Already in Decline*, BLOOMBERG (Aug. 22, 2016, 1:19 PM), <http://www.bloomberg.com/news/articles/2016-08-22/these-charts-show-that-pokemon-go-is-already-in-decline>.

¹⁷ Press Release, Zion Market Research, *Augmented Reality (AR) Market Size Predicted to Reach USD 133.78 Bn by 2021* (Dec. 6, 2017), <https://globenewswire.com/news-release/2017/12/06/1233904/0/en/Augmented-Reality-AR-Market-Size-Predicted-to-Rreach-USD-133-78-Bn-by-2021-Zion-Market-Research.html>; see Steven Levy, *The Race for AR Glasses Starts Now*, WIRED (Dec. 16, 2017), <https://www.wired.com/story/future-of-augmented-reality-2018>. In September 2017, Apple released ARKit and Google launched ARCore, which enable developers to integrate AR features in their applications. *Apple's ARKit vs. Google's ARCore*, MEDIUM (Oct. 5, 2017), <https://medium.com/ipg-media-lab/apple-arkit-vs-google-s-arc-core-e00ff42b0547>.

¹⁸ Sarah Perez, *Amazon Adds an AR Shopping Feature to Its iOS App*, TECH CRUNCH (Nov. 1, 2017), <https://techcrunch.com/2017/11/01/amazon-adds-an-ar-shopping-feature-to-its-ios-app>.

¹⁹ Alayna Treene, *The Rise of Augmented Reality*, AXIOS (Dec. 30, 2017), <https://www.axios.com/the-rise-of-augmented-reality-2519188483.html>.

²⁰ Tim Bajarin, *Will Smart Phones Ever Be Obsolete?*, TIME (Apr. 10, 2017), <http://time.com/4744303/will-smartphones-ever-be-obsolete>. Moreover, Google has embraced this prediction as an objective. For example, John Hanke, former VP of Google's Niantic Labs and current CEO of Niantic, Inc., commented on Google's ultimate goal back in 2012: "move the device out of your way and put the information front and center," . . . so

Drivers may no longer look down at mobile devices or dashboard navigations systems for visual guidance on the next left turn in 1,000 feet.²¹ Instead, AR technology in glasses, helmets, or even windshields can project information such as directions, car speeds, and signage in front of the driver as virtual overlays in real time.²²

While many tech-savvy luminaries and researchers predict vibrant and widespread use of AR in our everyday lives,²³ the technology also presents serious concerns unique to its integrative platform in which virtual components overlap with our real-world surroundings. Legal questions inherent to AR technology undoubtedly remain unanswered.²⁴ Can real property owners prohibit AR developers from superimposing virtual objects or information on their land? Who controls the virtual space surrounding private property?²⁵ Are owners entitled to notice before their properties are subject to virtual intrusions? One federal court may soon answer some of these questions. Real property owners across the country filed a consolidated

people can ‘scan the environment and know what the Web knows about the places around you.’” Claire Cain Miller, *A New Google App Gives You Location Information—Before You Ask for It*, N.Y. TIMES: BITS (Sept. 27, 2012, 12:00 PM), <https://bits.blogs.nytimes.com/2012/09/27/a-new-google-app-gives-you-local-information-before-you-ask-for-it/>; John Hanke, LINKEDIN, <https://www.linkedin.com/in/john-hanke-6a896/> (last visited Feb. 6, 2018).

²¹ See Sherri L. Smith, *Augmented Reality Glasses: What You Can Buy Now (or Soon)*, TOM’S GUIDE (Dec. 12, 2017, 9:10 AM), <https://www.tomsguide.com/us/best-ar-glasses,review-2804.html>.

²² See Eric Adams, *Drive a Car Like You’d Fly an F-35 with Augmented Reality*, WIRED (Feb. 2, 2017, 9:00 AM), <https://www.wired.com/2017/02/drive-car-like-you-d-fly-f-35-augmented-reality>.

²³ Nav Athwal, *How Pokémon Go and Other AR Tech Platforms Are Reshaping Real Estate*, FORBES (Nov. 3, 2016, 12:24 PM), <http://www.forbes.com/sites/navathwal/2016/11/03/pokemon-go-is-the-latest-example-of-how-tech-is-reshaping-real-estate/#3098745941dd>; Josh Constine, *Zuck Says Augmented Reality Will Flourish on Phones Before Glasses*, TECH CRUNCH (July 28, 2016), <https://techcrunch.com/2016/07/28/pokemon-not-magic-leap>; Ana Javornik, *The Mainstreaming of Augmented Reality: A Brief History*, HARV. BUS. REV. (Oct. 4, 2016), <https://hbr.org/2016/10/the-mainstreaming-of-augmented-reality-a-brief-history>; Kif Leswing, *Apple CEO Tim Cook Thinks Augmented Reality Will be as Important as ‘Eating Three Meals a Day’*, BUS. INSIDER (Oct. 3, 2016, 11:19 AM), <http://www.businessinsider.com/apple-ceo-tim-cook-explains-augmented-reality-2016-10?r=UK&IR=T>; Dean Takahashi, *Deloitte’s Tech Predictions for 2018: More AI, Digital Subscriptions, AR, and Live Events*, MEDIA (Dec. 11, 2017, 9:01PM), <https://venturebeat.com/2017/12/11/deloittes-tech-predictions-for-2018-more-ai-digital-subscriptions-ar-and-live-events>; Jay Samit, *4 Technology Trends That Will Transform Our World in 2018*, FORTUNE (Dec. 26, 2017), <http://fortune.com/2017/12/26/4-technology-trends-2018>.

²⁴ See generally Andrew Rossow, *Gotta Catch . . . A Lawsuit? A Legal Insight into the Intellectual, Civil, and Criminal Battlefield Pokémon Go Has Downloaded onto Smartphones and Properties Around the World*, 16 J. MARSHALL REV. INTELL. PROP. L. 329, 336 (2017).

²⁵ Alex Hern, *Pokemon Go: Who Owns the Virtual Space Around Your Home?*, GUARDIAN (July 13, 2016), <https://www.theguardian.com/technology/2016/jul/13/pokemon-virtual-space-home>.

class action law suit against the developers of Pokémon Go (“Pokémon Go Litigation”).²⁶ The plaintiffs argue that the unauthorized, intentional placement of in-game objectives on or near their properties compromises their use and enjoyment of land, and is thus actionable under both trespass and nuisance law.²⁷

This Comment seeks to address the various ways landowners may attempt to assert exclusionary rights against AR developers who disrupt their property with virtual location-based data. Part II describes AR through the lens of Pokémon Go, a mobile AR application accessible on smartphones. Part III provides a general overview of common law trespass and analyzes the viability of an expanded trespass to augmented space doctrine. Additionally, Part III discusses common law nuisance and examines whether human conduct ensuing from AR can formulate a valid nuisance claim. Next, Part IV evaluates two failed solutions, on state and local levels, to exclude unwanted virtual intrusions over public and private properties. Part V offers an alternative solution, in the form of state-based AR databases that will provide landowners with appropriate notice and effective opt-out procedures when AR developers superimpose virtual elements over or around their properties. Finally, Part VI concludes that, in light of developing AR technology, proactive solutions are necessary to help property owners retain every stick in their “bundle of rights,” including rights that arguably exist in virtual space.

II. AR BASICS: POKÉMON GO

A. *Gotta Catch ‘em All*

Pokémon Go is a mobile AR application that debuted with 151 distinct characters up for grabs, and avid players aim to “catch ‘em all.”²⁸ But do not expect the hunt to occur from a couch with a video-game controller in hand. Instead, a player searches for fictitious, virtual characters on foot using a smartphone.²⁹ Characters appear and vanish at random on the smartphone screen depending on the player’s physical location.³⁰ The game tracks a player’s location using the device’s built-in Global Positioning System

²⁶ See generally Amended Complaint, *In re Pokémon Go Nuisance Litigation*, No. 16-CV-04300, 2016 WL 6126786 (N.D. Cal. Aug. 28, 2017) [hereinafter *Pokémon Go Nuisance Litigation*].

²⁷ *Id.* at 47–48.

²⁸ Alex Heath & Ben Gilbert, *Here Is Every Single Pokémon Currently in Pokémon Go*, BUS. INSIDER (Feb. 19, 2017, 10:30 AM), <http://www.businessinsider.com/every-pokemon-in-pokemon-go-full-list-2016-7/#2-ivysaur-2>. Since its release, Niantic has added roughly 100 new characters. *Pokémon Go Nuisance Litigation*, *supra* note 26, at 8 n.2.

²⁹ Wingfield, *supra* note 15.

³⁰ *Id.*

(GPS) technology.³¹ Thus, more steps equate to more calories burned and increased chances to find the game's complete index of creatures.³²

Pokémon Go also uses the smartphone's camera to portray the player's actual surroundings, as they exist in front of the camera lens.³³ For example, the screen appears as if the player is about to take a photograph on his or her phone.³⁴ Consequently, when the virtual creature appears on screen, it is visually fused within the player's real world, as depicted on the smartphone.³⁵ From the building ledge to the office bookshelf, Pokémon can exist anywhere.³⁶

Unlike characters that spontaneously appear and vanish, Pokéstops ("Stops") are permanent access points, or points-of-interest, for game players.³⁷ Stops provide various tools and items used to advance in the game, and once a player visits a Stop, the Stop will refresh every five minutes.³⁸ The game superimposes Stops in our real world using GPS coordinates.³⁹ Thus, Stops are continuously accessible within the game application when players are physically within range of their GPS coordinates.⁴⁰ As a result, if players remain near a Stop, they will have more opportunities to obtain valuable game items.⁴¹ In addition, players can use a special game item to attract creatures to Stops for thirty consecutive minutes; this item essentially guarantees characters' appearances at Stops, temporarily eliminating the need to search for creatures on foot.⁴² Consequently, crowds of players flock towards and congregate around Stops.⁴³

³¹ *Id.*

³² *See id.*

³³ *Id.*

³⁴ *See id.*

³⁵ Wingfield, *supra* note 15.

³⁶ *See id.*

³⁷ *See* Thomas Hobbs, *Why Pokemon Go Is a Game Changer for Augmented Reality and Marketers*, MARKETING WEEK (July 18, 2016, 3:26 PM), <https://www.marketingweek.com/2016/07/18/why-pokemon-go-is-a-game-changer-for-augmented-reality-and-marketers>; *see also* Brad Jones, *Pokemon GO Guide: How to Use Pokestops*, GAMERANT (2016), <https://gamerant.com/pokemon-go-pokestop-guide>.

³⁸ Hobbs, *supra* note 37; Jones, *supra* note 37.

³⁹ Tresa Baldas, *Michigan Couple Suing Pokémon Go for Ruining Their Quality of Life*, USA TODAY (Aug. 16, 2016 7:19, AM), <https://www.usatoday.com/story/news/nation-now/2016/08/15/mich-couple-suing-pokmon-go/88810806/>; Conner Forrest, *How Your Business Can Make Money on Pokemon Go*, TECHREPUBLIC (July 22, 2016, 4:30 AM), <https://www.techrepublic.com/article/how-your-business-can-make-money-on-pokemon-go/>.

⁴⁰ Jones, *supra* note 37.

⁴¹ *See id.*

⁴² Jason Evangelho, *How 'Pokemon GO' Can Lure More Customers to Your Local Business*, FORBES (July 9, 2016, 2:44 PM), <http://www.forbes.com/sites/jasonevangelho/2016/07/09/how-pokemon-go-can-lure-more-customers-to-your-local-business/#502bb167fe48>; Hobbs, *supra* note 37.

⁴³ Jones, *supra* note 37.

How did Pokémon Go's developers choose the GPS coordinates for Stops? The answer entails a brief history about the game's interesting origins and its creators. Niantic Inc. (Niantic), Pokémon Go's developer and publisher, began as an internal startup called Niantic Labs at Google.⁴⁴ Before Niantic spun off from Google as a separate entity in 2015,⁴⁵ it released Ingress, an AR game that requires players to find and capture virtual portals located in the real world.⁴⁶ Like Stops, Niantic Labs assigned GPS coordinates to portals, making portals accessible in our physical environment from a mobile device.⁴⁷ The designers of Ingress aspired to spark outdoor adventure and accordingly chose historical and cultural sites as initial portal locations.⁴⁸ Niantic Labs developed additional portals based on popular geographically-tagged photos in Google (images uploaded to Google with GPS coordinates) and, more significantly, players' recommendations.⁴⁹ Thus, Ingress contains approximately five million crowdsourced portals.⁵⁰ Capitalizing on Ingress's infrastructure of location data, Niantic used the portals' GPS coordinates to create Stops in Pokémon Go.⁵¹ Stops exist on or near private property as a result of the crowdsourced portals from Ingress, as well as changes in land use or ownership.⁵²

B. *Removal of Virtual Elements From Real-World Locations*

According to an unaffiliated third party, over five million Stops and other permanently placed in-game objectives with corresponding GPS coordinates currently exist worldwide.⁵³ Before Niantic designated private property as Stops, however, the company did not obtain consent or provide notice to property owners.⁵⁴ The game's website even admits that Stops may

⁴⁴ Matt Weinberger, *The Hit Pokemon Game Everyone Is Talking About Could Never Have Happened Without Google*, BUS. INSIDER (July 7, 2016, 2:40 PM), <http://www.businessinsider.com/pokemon-go-google-niantic-ingress-2016-7>.

⁴⁵ *Id.*

⁴⁶ Sam Prell, *Why Your Church, Art and Water Towers Are Pokemon Go Gyms and Pokestops*, GAMESRADAR (July 11, 2016), <http://www.gamesradar.com/why-your-local-church-and-water-towers-are-pokemon-go-gyms-and-pokestops>.

⁴⁷ See Ian Bogost, *The Tragedy of Pokémon Go*, ATLANTIC (July 11, 2016), <https://www.theatlantic.com/technology/archive/2016/07/the-tragedy-of-pokemon-go/490793/>; see also Vindu Goel, *Ingress Has the World as Its Game Board*, N.Y. TIMES (June 8, 2016), http://www.nytimes.com/2016/06/09/technology/ingress-has-the-world-as-its-game-board.html?_r=0.

⁴⁸ Prell, *supra* note 46.

⁴⁹ *Id.*

⁵⁰ *Id.*

⁵¹ *Id.* Bogost, *supra* note 47.

⁵² Prell, *supra* note 46.

⁵³ *Pokémon Go Map*, CYANSUB, <https://www.pokemongomap.info/> (last visited Jan. 13, 2017).

⁵⁴ See *Pokémon Go Nuisance Litigation*, *supra* note 26, at 6, 18.

exist on private property.⁵⁵

Upon request and public backlash shortly after the game's release, Niantic removed Stops from reverent locations such as the United States Holocaust Memorial Museum and the Hiroshima Peace Memorial Park.⁵⁶ Pokémon Go's website provides a removal request form, which necessitates an email address and some information in support of the request.⁵⁷ For example, requestors must categorize the Stop as either (1) a safety issue; (2) on private property; (3) a raid location; or (4) other.⁵⁸ Removals are not fulfilled automatically, however, and numerous requests remain unanswered.⁵⁹ Further, because Niantic ignored a request from one Florida townhouse complex (who is also a plaintiff in the Pokémon Go Litigation), the developer hired off-duty police to patrol the grounds between 11:00 P.M. and 4:00 A.M.⁶⁰

III. PROPERTY BASICS: THE RIGHT TO EXCLUDE

The right to exclude is a fundamental aspect of property ownership.⁶¹ The Supreme Court recognizes the right to exclude as "one of the most essential sticks in the bundle of [property] rights."⁶² At common law,

⁵⁵ See *Get Up, Get Out, and Explore!*, Niantic, Inc., <http://www.pokemongo.com/en-us/explore/> (last visited Jan. 6, 2018) ("If you can't get to the PokéStop because it's on private property, there will be more just around the corner, so don't worry!").

⁵⁶ Tim Mulkerin, *You Officially Can't Play Pokémon Go at the Hiroshima Memorial or the Holocaust Museum*, BUS. INSIDER (Aug. 9, 2016, 11:33 AM), <http://www.businessinsider.com/pokemon-go-pokestops-removed-from-hiroshima-memorial-and-holocaust-museum-2016-8>. Other inappropriate locations for Stops include the Arlington National Cemetery, 9/11 Memorial and Museum, and various church sites. *'Pokémon Go': 10 Strangest Pokéstop Locations*, ROLLING STONE (July 13, 2016), <https://www.rollingstone.com/culture/pictures/pokemon-go-10-worst-pokestop-locations-20160713/arlington-national-cemetery-20160713>.

⁵⁷ *Request Removal of a PokéStop or Gym*, Niantic, Inc., https://support.pokemongo.nianticlabs.com/hc/en-us/requests/new?ticket_form_id=341148 (last accessed on Jan. 4, 2018) [hereinafter *Request Removal*].

⁵⁸ *Id.*

⁵⁹ See generally Pokémon Go Nuisance Litigation, *supra* note 26, at 18–34. Alex Heath, *A New Bill Called 'Pidgey's Law' Aims to Force the Removal of Pokéstops in Pokémon Go*, BUS. INSIDER (Aug. 25, 2016), <http://www.businessinsider.com/pidgeys-law-bill-aims-to-force-removal-of-pokestops-in-pokemon-go-2016-8>.

⁶⁰ Pokémon Go Nuisance Litigation, *supra* note 26, at 19–20.

⁶¹ See U.S. CONST. amend. V ("No person shall . . . be deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation."); see also 2 WILLIAM BLACKSTONE, COMMENTARIES ON THE LAWS OF ENGLAND 2 (facsimile ed. 1979) (1765) ("There is nothing which so generally strikes the imagination, and engages the affections of mankind, as the right of property; or that sole and despotic dominion which one man claims and exercises over the external things of the world, in total exclusion of the right of any other individual in the universe."); Thomas W. Merrill, *Property and the Right to Exclude*, 77 NEB. L. REV. 730, 731 (1998).

⁶² *Kaiser Aetna v. United States*, 444 U.S. 164, 176 (1979).

landowners' rights extended from the heavens to the earth's core.⁶³ Although this maxim purports to vest powerful exclusionary rights in landowners, the right to exclude is not absolute.⁶⁴ Exclusionary rights are often limited by transportation improvements,⁶⁵ economic developments,⁶⁶ and social policies.⁶⁷ Despite permanent fixture in physical space, the notion of real property is malleable over time, especially in light of technological advancements.⁶⁸

This section provides a general overview of common law trespass and nuisance doctrines. It then expands the application of those doctrines to AR as a new and adapting technology.

A. *Trespass*

Trespass is historically a direct, tangible, intentional, and unauthorized intrusion onto another's property.⁶⁹ Consent justifies entry and reflects an owner's essential right to permit or exclude access to his or her land.⁷⁰ Trespass to land is a strict liability tort—whether the invasion results in extensive harm or a mere inconvenience is irrelevant.⁷¹ Even those who conduct themselves reasonably remain subject to liability for the trespassory actions of persons, animals, objects, or substances for which they are responsible.⁷² Thus, trespass does not require intent to harm the land, but

⁶³ John G. Sprankling, *Owning the Center of the Earth*, 55 UCLA L. REV. 979, 980–81 (2008) (stating the applicable Latin maxim, “cujus est solum, ejus est usque ad coelum et ad inferos”).

⁶⁴ Natalie Banta, *Property Interests in Digital Assets: The Rise of Digital Feudalism*, 38 CARDOZO L. REV. 1099, 1111 (2017).

⁶⁵ See *United States v. Causby*, 328 U.S. 256, 260–61 (1946) (finding that airplanes changed the landscape of the ancient property doctrine).

⁶⁶ JAMES W. ELY, JR., *THE GUARDIAN OF EVERY OTHER RIGHT: A CONSTITUTIONAL HISTORY OF PROPERTY RIGHTS* 6 (3d ed. 2008) (“[C]ourts frequently compelled existing property arrangements to give way to new economic ventures and changed circumstances.”).

⁶⁷ *State v. Shack*, 277 A.2d 369, 373–74 (N.J. 1971) (discussing public and private necessity as a social limitation on property rights).

⁶⁸ STUART BANNER, *AMERICAN PROPERTY: A HISTORY OF HOW, WHY, AND WHAT WE OWN* 2 (Harvard Univ. Press 2011).

⁶⁹ 75 AM. JUR. 2D *Trespass* § 1 (2015).

⁷⁰ See *id.*; see also W. PAGE KEETON ET AL., *PROSSER AND KEETON ON THE LAW OF TORTS* § 13, at 71 (5th ed. 1984).

⁷¹ JOHN C. P. GOLDBERG ET AL., *TORT LAW: RESPONSIBILITIES AND REDRESS* 817 (3d ed. 2012); Thomas W. Merrill, *Trespass, Nuisance, and the Costs of Determining Property Rights*, 14 J. LEGAL STUD. 13, 16 (1985).

⁷² See *Burns Philp Food, Inc. v. Cavalea Cont'l Freight, Inc.*, 135 F.3d 526, 529 (7th Cir. 1998). Relying on an inaccurate land survey, the plaintiff mistakenly constructed a fence on the defendant's property. *Id.* The defendant was entitled to damages, if any, caused by the trespassory invasion of the fence, regardless of whether the defendant notified the plaintiff of the intrusion when it became apparent. *Id.* at 529–31. GOLDBERG, *supra* note 71, at 813.

rather a mere intent to touch or make contact with the land.⁷³ For example, a driver suffering a paralytic stroke at the wheel is *not* liable for trespass if the vehicle subsequently crashes into a home, because the driver intended (presumably) to keep his car on the street rather than to make contact with the property.⁷⁴

Minimal physical interferences with land remain actionable under trespass law despite trivial physical damage.⁷⁵ In *Jacque v. Steenberg Homes, Inc.*, the Wisconsin Supreme Court upheld a jury verdict awarding landowners \$1 in nominal damages and \$100,000 in punitive damages for intentional trespass.⁷⁶ The dispute arose after the defendant drove a mobile home across the plaintiffs' land following unsuccessful attempts to obtain permission; no damage to the land occurred.⁷⁷ *Jacque* is a quintessential example of trespass that is both intentional and harmless.⁷⁸

Trespass claims may also arise from intrusions involving invisible substances, which typically require proof of physical harm to the land.⁷⁹ But, in *Martin v. Reynolds Metals Company*, the Oregon Supreme Court upheld a trespass action for the invasion of toxic gases by stressing that the object's unobservable, yet measurable, energy or force was a constructive "invasion" of the landowner's exclusionary rights.⁸⁰ By contrast, in *Bradley v. American Smelting & Refining Company*, particle emissions from the defendant's copper smelter failed to constitute trespass without proof of *actual and substantial* harm, despite some presence of arsenic and cadmium in the plaintiffs' soil.⁸¹ The court feared that a favorable ruling for the

⁷³ *Id.* at 816.

⁷⁴ RESTATEMENT (SECOND) OF TORTS § 166 cmt. b, illus. 2 (AM. LAW INST. 1965).

⁷⁵ Generally, tort law embodies the maxim *de minimis non curat lex*—the law does not concern itself with trivial matters. GOLDBERG, *supra* note 71, at 818. Historically, trespass actions afforded courts an opportunity to define unclear property boundaries. *Id.*

⁷⁶ 563 N.W.2d 154, 156 (Wis. 1997).

⁷⁷ *Id.* at 157. The plaintiffs had previously lost land valued at over \$10,000 to neighbors under the doctrine of adverse possession, and following their loss, the plaintiffs adamantly rejected the defendant's monetary consideration to traverse the property. *Id.*

⁷⁸ See RESTATEMENT (SECOND) OF TORTS § 165 cmt. b.

⁷⁹ *Abrams v. Nucor Steel Marion, Inc.*, 694 F. App'x 974, 979–80 (6th Cir. 2017) (stating that the standard for indirect-trespass claims in Ohio requires that a plaintiff "establish substantial physical damage or interference with . . . property"); *Bradley v. Am. Smelting & Ref. Co.*, 635 F. Supp. 1154, 1157 (W.D. Wash. 1986) (citing *Borland v. Sanders Lead Co.*, 369 So. 2d 523, 530 (Ala. 1979)). The approach embodied by the Restatement (Second) of Torts requires proof of physical harm to the property resulting from the defendant's reckless, negligent, or abnormally dangerous activity. RESTATEMENT (SECOND) OF TORTS § 165.

⁸⁰ 342 P.2d 790, 794 (Or. 1959) (en banc); Merrill, *supra* note 71, at 28–30.

⁸¹ 635 F. Supp. at 1156–57 (distinguishing the relationship between trespass by imperceptible substances and nuisance by referring to the latter's alternative avenues for recovery, including discomfort and annoyance).

plaintiffs would open the floodgates and hinder industrial progress.⁸² Furthermore, without proof of property depreciation, the court rejected the plaintiffs' contention that the defendant's substances diminished their property's value.⁸³

1. Analyzing AR Under Trespass

First, we can assume that an AR developer's creation of virtual elements with GPS coordinates over private property, absent the owner's consent, constitutes an intentional and unauthorized act for purposes of a trespass analysis. The hurdle in applying common law trespass to virtual AR elements is the direct and tangible invasion requirement. AR's virtual elements—those that are incorporated in our environment using GPS and other technologies—are indiscernible and impalpable in our physical world, without the appropriate mobile application or wearable AR headset.⁸⁴ Accordingly, a landowner's right to exclude harmless, physical intrusions, which was firmly upheld in *Jacque*,⁸⁵ is attenuated in the context of AR because the technology involves physically nonexistent components that are discernable only with the aid of specific devices. For the same reason, AR elements *alone* cannot physically damage land, and therefore fail *Bradley*'s actual and substantial harm standard for trespasses by invisible substances.

While it is impossible to physically wreak havoc on land with virtual AR elements themselves, their fundamental existence at GPS coordinates of private properties remains troubling.⁸⁶ Contrary to digital information viewed in the privacy of our homes and under our control, location-based AR components, like those in Pokémon Go, are deliberately placed without regard for potential conflicts with land ownership.⁸⁷ For example, if AR glasses eventually replace our smartphones, we may be equipped to see the following information superimposed over front lawns: information about the landowner and his or her picture, the land's value, virtual advertisements, or even virtual graffiti.⁸⁸ Because traditional trespass does not neatly fit in the context of AR, landowners are precluded from exercising their exclusionary rights against virtual intrusions. Therefore, courts should adopt a modern construction of trespass to account for virtual intrusions in augmented space.⁸⁹

⁸² *Id.* at 1156 (citing *Bradley*, 709 P.2d at 791).

⁸³ *Id.* at 1157.

⁸⁴ See discussion *supra* Parts I & II.

⁸⁵ *Jacque v. Steenberg Homes, Inc.*, 563 N.W.2d 154, 156 (Wis. 1997).

⁸⁶ See generally Rossow, *supra* note 24.

⁸⁷ See generally Pokémon Go Nuisance Litigation, *supra* note 26.

⁸⁸ See Adams, *supra* note 22; see also Bajarin, *supra* note 20; see also Miller, *supra* note 20.

⁸⁹ See ANDREW MURRAY, INFORMATION TECHNOLOGY LAW: THE LAW AND SOCIETY 98

Donald J. Kochan, an Associate Dean and Professor of Law at Chapman University School of Law, proposed a new cause of action: “trespass to augmented space.”⁹⁰ In essence, Kochan argues that trespass to augmented space creates an added ownership value, or another stick in the bundle of property rights.⁹¹ For example, via an opt-in regime rather than an opt-out regime, the new cause of action would enable landowners to grant developers licenses or easements for specific AR elements, perhaps in exchange for financial incentives.⁹²

First, a “trespass to augmented space” claim should establish ownership of the augmented space that overlaps with the physical space.⁹³ Theoretically, ownership of augmented space is easily discernable by locating the GPS coordinates of a piece of property. Taking the analysis one step further, if the GPS coordinates of the property and AR elements at issue are identical or arguably within range, the claim should proceed. Second, the cause of action should empower landowners with exclusionary rights to the augmented space.⁹⁴ While Kochan does not elaborate further on this element,⁹⁵ it is most conceivable for state legislators or state courts to empower landowners with exclusionary rights in augmented space because states are the traditional gatekeepers of property rights.⁹⁶ Finally, absent consent, Kochan equates placement of AR elements in the landowner’s augmented space to an augmented trespass.⁹⁷

The plaintiffs in the Pokémon Go Litigation offer a different virtual trespass theory based on the right to exclude virtual objects that overlap with private property, but only when the virtual objects incentivize people to congregate in the vicinity.⁹⁸ The plaintiffs’ virtual trespass theory is problematic because if AR seamlessly integrates into our everyday lives, it will be difficult for claimants to establish how virtual objects attract crowds to specific locations. Niantic refutes the plaintiffs’ virtual trespass claim because its virtual objects are not tangible invasions.⁹⁹ Akin to Niantic’s

(3d ed. 2016); Donald J. Kochan, *Playing with Real Property Inside Augmented Reality: Pokemon Go, Trespass, and Law’s Limitations*, 38 WHITTIER L. REV. (forthcoming 2018).

⁹⁰ Kochan, *supra* note 89.

⁹¹ Kochan, *supra* note 89.

⁹² Kochan, *supra* note 89.

⁹³ Kochan, *supra* note 89.

⁹⁴ Kochan, *supra* note 89.

⁹⁵ See generally Kochan, *supra* note 89.

⁹⁶ See U.S. CONST. amend. X.

⁹⁷ Kochan, *supra* note 89.

⁹⁸ Plaintiffs’ Opposition to Niantic’s Motion to Dismiss at 15–16, *In re Pokemon Go Nuisance Litigation*, No. 3:16-CV-04300 (N.D. Cal. Mar. 2, 2017) [hereinafter Plaintiffs’ Opposition Motion].

⁹⁹ Defendant Niantic, Inc.’s Reply Memorandum in Support of Motion to Dismiss Consolidated Class Action Complaint at 3, *In re Pokemon Go Nuisance Litigation*, No. 3:16-

defense, one legal scholar surmised that marketers engaged in virtual advertising on private property (e.g. digital graffiti and billboards perceptible via wearable devices), will ultimately succeed against virtual trespass claims because virtual elements lack physical substance and therefore cannot harm the land.¹⁰⁰ Similar to the plaintiffs' argument, Kochan's augmented trespass claim, while appealable, also dodges the tangibility requirement in trespass actions.¹⁰¹

A malleable definition of "tangible" will encompass AR's virtual elements, strengthen Kochan's augmented trespass framework, and eliminate the need to prove actual and substantial harm to the property. According to the Merriam-Webster Dictionary, something is "tangible" if it is capable of being: (1) "perceived especially by the sense of touch"; (2) "precisely identified or realized by the mind"; or (3) "appraised at an actual or approximate value[.]"¹⁰² Notably, the definition does not narrowly focus on objects that activate our sense of touch, but broadly includes concepts, emotions or things that are cognitively discernable.¹⁰³ Thus, trespass should not be limited to invasions that are perceptible only to the naked eye. Rather, AR elements superimposed on private property are direct and "tangible" because one can see and identify the intrusion with the appropriate technological hardware.¹⁰⁴ Moreover, unlike the invisible emissions at issue in *Bradley*, AR elements are completely visible, identifiable, and realized by our minds when viewed from the right device—i.e., from a smartphone application or pair of AR glasses.¹⁰⁵ AR predicates itself on these visual components to enhance the reality around us.¹⁰⁶ Consequently, some of the weakest facts in *Bradley*'s trespass claim—intrusion by visually imperceptible substances—are arguably absent in the context of AR due to the technology's visually interactive nature.

Additionally, AR elements may also fall under the third definition of "tangible," "appraised at an actual or approximate value,"¹⁰⁷ in two ways. First, AR elements can acquire monetary value.¹⁰⁸ For example, businesses

CV-04300 (N.D. Cal. Mar. 23, 2017) [hereinafter Defendant's Reply Motion].

¹⁰⁰ See Woodrow Barfield, *Commercial Speech, Intellectual Property Rights, and Advertising Using Virtual Images Inserted in TV, Film, and the Real World*, 13 UCLA ENT. L. REV. 153, 171–72 (2006).

¹⁰¹ Kochan, *supra* note 89.

¹⁰² *Tangible*, MERRIAM-WEBSTER, <https://www.merriam-webster.com/dictionary/tangible> (last visited Feb. 6, 2018).

¹⁰³ See *id.*

¹⁰⁴ See discussion *supra* Part I.

¹⁰⁵ See discussion *supra* Part I.

¹⁰⁶ See discussion *supra* Part I.

¹⁰⁷ *Tangible*, MERRIAM-WEBSTER, <https://www.merriam-webster.com/dictionary/tangible> (last visited Feb. 6, 2018).

¹⁰⁸ See generally *Pokémon Go Reveals Sponsors Like McDonald's Pay It Up to \$0.50 Per*

may monetize AR elements on their property as a marketing tool to attract customers.¹⁰⁹ Location-based AR components may also be appraised using the “values” of their corresponding GPS coordinates. Furthermore, because location-based AR elements are visible exclusively at their assigned GPS coordinates, these “values” are distinctly tied to physical locations in the real world.

A “trespass to augmented space” claim should incorporate the “direct and tangible” invasion requirement from common law trespass. Although AR is invisible to the naked eye, like the substances at issue in *Bradley*, a broad definition of “tangible” negates the need to prove that a substantial harm to the land occurred. Thus, a modern interpretation of the word “tangible” can encompass AR’s virtual components and strengthen the viability of a common law doctrine in an era with new technologies. Expansion of traditional trespass may seem like a novel stretch at first glance. Yet in fact, courts expanded common law trespass, including the scope of a “tangible” invasion, during the Internet’s infancy.

A. *Trespass to Chattel as the Precursor to Augmented Trespass And Segue to an Expanded Nuisance Doctrine*

A revival of the common law trespass to chattel doctrine advanced the theory of digital trespass at the end of the twentieth century.¹¹⁰ Trespass to chattel involves intentional dispossessions or interferences with an individual’s personal property, such as his or her goods.¹¹¹ Similar to trespass by imperceptible particles, liability for trespass to chattel involves some proof of harm in connection with the chattel.¹¹²

In *Thrifty-Tel, Inc. v. Bezenek*, a case of first impression, the Court of Appeal of California upheld an award against the defendant hackers under a modern construction of the trespass to chattel doctrine.¹¹³ The defendants obtained the plaintiff’s long-distance telephone access codes without authorization and conducted long-distance calls.¹¹⁴ Although phone codes are not physical objects, the court adopted a broad definition of “tangible”

Visitor, TECH CRUNCH, (May 31, 2017) <https://techcrunch.com/2017/05/31/pokemon-go-sponsorship-price/>.

¹⁰⁹ See *id.*

¹¹⁰ MURRAY, *supra* note 89, at 99.

¹¹¹ RESTATEMENT (SECOND) OF TORTS § 217 (AM. LAW INST. 1965).

¹¹² Interferences with chattel must extend beyond mere meddling; thus, liability exists only if: (1) the owner’s chattel is dispossessed; (2) the chattel’s condition, quality or value suffers impairment; (3) the owner is deprived of the chattel’s use for a substantial time; or (4) the owner or his legally protected interest (whether a thing or person) suffers physical harm. *Id.* § 218.

¹¹³ MURRAY, *supra* note 89, at 99 (citing *Thrifty-Tel, Inc. v. Bezenek*, 54 Cal. Rptr. 2d 468 (Cal. Ct. App. 1996)).

¹¹⁴ *Thrifty-Tel*, 54 Cal. Rptr. 2d at 471.

and found that “the electronic signals . . . were sufficiently tangible to support a trespass cause of action.”¹¹⁵ Consequently, *Thrifty-Tel* established a significant precedent during the Internet’s rise by providing legal grounds to redress digital trespass.¹¹⁶

Following *Thrifty-Tel*, Internet service providers (ISPs) brought successful trespass to chattel actions against spammers.¹¹⁷ For example, in *American Online v. LCGM, Inc.*, the court acknowledged that spam emails hindered the plaintiffs’ use of their computer systems by decreasing processing power and filling disk space.¹¹⁸ Furthermore, the court held: “[t]he transmission of electrical signals through a computer network is sufficiently ‘physical’ contact to constitute a trespass to property.”¹¹⁹ Collectively, *American Online* and similar cases highlight the success of a common law cause of action applied to digital invasions of personal property.¹²⁰

After victorious trespass to chattel actions by ISPs, Intel sued a former worker who spammed the company’s current employees six separate times on Intel’s email system.¹²¹ The emails condemned Intel’s employment practices and were sent to approximately 35,000 email addresses per incident.¹²² Intel claimed that its efforts to prevent spam from reaching employees resulted in productivity loss.¹²³ Absent physical damage or impaired functions of Intel’s computer systems, however, the court declined to find a harmed interest in the “physical condition, quality or value . . . of the computers.”¹²⁴ Preceding trespass to chattel actions were factually distinguishable based on “actual or threatened interference with the computers’ functioning.”¹²⁵ Thus, the California Supreme Court required a showing of *substantial harm* before Intel could obtain an injunction—an element that mirrors the law of nuisance.¹²⁶ Significantly, the court did not overrule cases that recognized trespass to chattel actions where “plaintiff[s]

¹¹⁵ *Id.* at 473 n.6.

¹¹⁶ MURRAY, *supra* note 89, at 99.

¹¹⁷ *See, e.g.*, *CompuServe Inc. v. Cyber Promotions, Inc.*, 962 F. Supp. 1015 (S.D. Ohio 1997); *Am. Online, Inc. v. IMS*, 24 F. Supp. 2d 548 (E.D. Va. 1998); *Am. Online, Inc. v. LCGM, Inc.*, 46 F. Supp. 2d 444 (E.D. Va. 1998); *Verizon Online Servs. v. Ralsky*, 203 F. Supp. 2d 601 (E.D. Va. 2002).

¹¹⁸ *LCGM*, 46 F. Supp. 2d at 452 (quoting *CompuServe*, 962 F. Supp. at 1022).

¹¹⁹ *Id.*

¹²⁰ *See generally id.*; MURRAY, *supra* note 89, at 100.

¹²¹ *Intel Corp. v. Hamidi*, 71 P.3d 296, 301 (Cal. 2003).

¹²² *Id.*

¹²³ *Id.* at 307.

¹²⁴ *Id.* at 303–04.

¹²⁵ *Id.*

¹²⁶ *See Adam Mossoff, Spam—Oy, What A Nuisance!*, 19 BERKELEY TECH. L.J. 625, 645 (2004).

could establish damage, or the likelihood of damage, to the network.”¹²⁷

Although the concept of digital trespass to chattel ultimately faded with the *Intel* decision,¹²⁸ the aforementioned cases demonstrate how courts are willing to adapt a common law doctrine to new technology. Professor Adam Mossoff argued that the California Supreme Court in *Intel* should have interpreted spam (as it existed in 2004) under the law of nuisance, rather than trespass.¹²⁹ While computers are personal property rather than real property, Mossoff analogized their functionality to the heart of a nuisance claim: like farmers’ animals or industrialists’ machinery, computers are integral, necessary, and vital “for the productive use of real property by a commercial firm.”¹³⁰ Thus, Mossoff reasoned, a spammer’s interference with a computer (or its network) is similar to a disruption effecting the use and enjoyment of real property.¹³¹ Accordingly, in the context of AR, a nuisance claim is even more tenable because AR components can directly interfere with the use and enjoyment of land.¹³²

B. Nuisance

Nuisance law embodies the ancient maxim “sic utere tuo ut alienum non laedas,” which encourages the use of property in ways that do not injure another’s land.¹³³ Nuisance claims focus on landowners’ vicinities to others rather than the sanctity of exclusionary rights.¹³⁴ Consequently, the doctrine of private nuisance protects landowners against non-trespassory interferences with the use and enjoyment of their land.¹³⁵

Accordingly, there must be *substantial* harm caused by conduct that is either (a) intentional and unreasonable; or (b) unintentional and negligent, reckless or abnormally dangerous.¹³⁶ Landowners need not show physical

¹²⁷ MURRAY, *supra* note 89, at 102.

¹²⁸ See Mossoff, *supra* note 126, at 640.

¹²⁹ *Id.* at 647–48. Interestingly, Intel’s complaint also included a nuisance claim, but it ultimately dismissed the nuisance action before the summary judgment phase. *Id.* at 646.

¹³⁰ *Id.* at 647–48 (“When land is dedicated to commercial goals that are achieved only with computers, the interference with the use of these computers is *ipso facto* an interference with the use of the land.”).

¹³¹ *Id.*

¹³² See Rossow, *supra* note 24, at 341 (“A better argument would be that the right to quiet enjoyment and use of the property is being interfered with [by AR over real property], and as such, those rights do extend into cyberspace.”).

¹³³ *Sans v. Ramsey Golf & Country Club, Inc.*, 141 A.2d 335, 338 (N.J. Super. Ct. App. Div. 1958); Jeff L. Lewin, *Compensated Injunctions and the Evolution of Nuisance Law*, 71 IOWA L. REV. 775, 775 (1986).

¹³⁴ Merrill, *supra* note 71, at 29; Mossoff, *supra* note 126, at 646–47.

¹³⁵ Mossoff, *supra* note 126, at 646–47. Common examples of nuisance include dust, smoke, odors, noises and vibrations. Merrill, *supra* note 71, at 28; Lewin, *supra* note 133.

¹³⁶ RESTATEMENT (SECOND) OF TORTS § 822 (AM. LAW. INST. 1965). Because the placement of virtual AR elements over private property is presumably intentional by AR

property damage to prove the existence of a substantial harm, but rather, they must show that a defendant's actions affected their use and enjoyment of property.¹³⁷ Thus, a nuisance may be found where disturbances surrounding land result in an annoyance, discomfort, or inconvenience to the landowner.¹³⁸

Because no guiding precedent on nuisance claims in the context of AR technology exists, courts must analyze such claims using analogous case law. In early nuisance actions, courts declared recreational pastimes as nuisances, and granted injunctions prohibiting playful activities.¹³⁹ *Cronin v. Bloemecke* is one of the earliest examples, which involved disorderly conduct at a park adjacent to the plaintiff's residence.¹⁴⁰ In *Cornin*, baseball games resulted in trespass by players, spectators, and baseballs, and resulted in disorderly crowds in the surrounding streets.¹⁴¹ In *Miller v. Jersey Coast Resorts Corp.*, the court noted that a *potential* nuisance exists where private games commence for considerable time with "such zest and vigor" to cause interference with the landowner's occupancy; however, *Miller* involved typical noises associated with seaside recreation and pleasure.¹⁴² In *Sans v. Ramsey Golf & Country Club, Inc.*, a golf course tee located fifty-feet from the plaintiffs' home constituted a private nuisance; golfers played between 6:00 A.M. and 8:00 P.M., demanded complete silence and stillness from everything in the surrounding area, and engulfed the plaintiffs' home with noise and golf balls.¹⁴³

A nuisance can also exist in the absence of physical contact with the landowner's property or the surrounding area. For example in *Macca v. General Telephone Co.*, the court upheld a jury verdict for nuisance as a result of the defendant's inaccurate phone book, which listed the plaintiff's home telephone number under a florist's "after hours" listing.¹⁴⁴ Several months of late-night calls hindered the plaintiff's ability to sleep and caused distress.¹⁴⁵ The Oregon Supreme Court noted in the context of nuisance, a

developers, this Comment focuses solely on the first standard—intentional and unreasonable conduct resulting in substantial harm.

¹³⁷ *Id.* § 821F cmt. d.

¹³⁸ *Id.* § 821F cmt. c.

¹³⁹ See generally J.T.B., Annotation, *Injunction Against Games on Neighboring Property*, 62 A.L.R. 782 (1929) (superseded in part by Jonathan M. Purver, Annotation, *Children's Playground as Nuisance*, 32 A.L.R. 3d 1127 (1970)).

¹⁴⁰ 43 A. 605, 605–06 (N.J. Super. Ct. Ch. Div. 1899).

¹⁴¹ *Id.* at 606–08.

¹⁴² 130 A. 824, 828 (N.J. Super. Ct. Ch. Div. 1925).

¹⁴³ 141 A.2d 335, 336–37 (N.J. Super. Ct. App. Div. 1958).

¹⁴⁴ 495 P.2d 1193 (Or. 1972).

¹⁴⁵ *Id.* at 1194. The plaintiff also had medication for nervousness. *Id.* It is unclear, however, whether plaintiff's medication was prescribed before or after the telephone calls began. See *id.*

disturbance or annoyance must be evaluated objectively based on “a person of ordinary habits and sensibilities.”¹⁴⁶ Similarly under Restatement (Second) of Torts, subjective distress or anxiety are insignificant harms and cannot substantiate a nuisance claim.¹⁴⁷ Thus, a mere inconvenience or subtle annoyance is not automatically a nuisance, unless others in the community perceive the same as a “real and appreciable interference” with their use or enjoyment of land.¹⁴⁸

While the cases above describe nuisance generally, *Carter v. Lake City Baseball Club, Inc.*, is most factually analogous to the current Pokémon Go Litigation.¹⁴⁹ In *Carter*, the South Carolina Supreme Court held that baseball is not a nuisance per se, but may be performed in a manner that creates a nuisance.¹⁵⁰ A handful of residents aligning the town’s school baseball field sought to enjoin professional night games, which occurred on the field pursuant to a lease agreement, as a private nuisance.¹⁵¹ Landowners cited multiple grievances, including: obnoxious disturbances such as bright flood lights, large crowds, loud noises, and vehicle congestion; inappropriate conduct such as drinking and profanity, and; deficient accommodations such as police supervision and restrooms.¹⁵² The plaintiffs also listed issues pertaining to their properties, specifically: blocked driveways and muddled shrubbery, as well as the presence of trash, foul balls, and trespassers.¹⁵³ After considering alternative ways to address plaintiffs’ concerns, the court categorized the mischief as continuous and permanent in character.¹⁵⁴ The Supreme Court of South Carolina concluded that conditions amounted to a private nuisance, and enjoined the school from hosting future professional games on the field.¹⁵⁵

Although *Carter* failed to explicitly categorize the conduct associated with professional games on the defendant’s property as “unreasonable,”¹⁵⁶ an interference with the use and enjoyment of land must be unreasonable to establish liability for a private, intentional nuisance.¹⁵⁷ Specifically, courts balance whether the utility of the defendant’s conduct outweighs the gravity of harm suffered by the plaintiff, using factors cited in the Restatement

¹⁴⁶ *Id.* at 1196.

¹⁴⁷ RESTATEMENT (SECOND) OF TORTS § 821F cmt. d. (AM. LAW. INST. 1965).

¹⁴⁸ *Id.* at § 821F cmt. c.

¹⁴⁹ 62 S.E.2d 470 (S.C. 1950).

¹⁵⁰ *Id.* at 475.

¹⁵¹ *Id.* at 471.

¹⁵² *Id.* at 476.

¹⁵³ *Id.*

¹⁵⁴ *Id.* at 477–78.

¹⁵⁵ *Carter*, 62 S.E.2d at 477–78.

¹⁵⁶ *Id.* at 477–78.

¹⁵⁷ RESTATEMENT (SECOND) OF TORTS §§ 822, 826 (AM. LAW. INST. 1965).

(Second) of Torts.¹⁵⁸

In examining the gravity of harm, the Restatement focuses on: (1) the harm's extent based on degree and duration; (2) the harm's character, including physical damage or discomfort and annoyance; (3) social value attached to the land use or enjoyment; (4) suitability of the use or enjoyment in relation to the neighborhood's character; and (5) the burden imposed on the individual in avoiding the harm.¹⁵⁹ Utility is measured by analyzing: (1) the conduct's social value; (2) the conduct's suitability in relation to the neighborhood's character; and (3) "the impracticability of preventing or avoiding the invasion."¹⁶⁰

Thus, if disturbances from AR are trivial or amount to petty inconveniences, the plaintiffs will face difficulty in overcoming both the unreasonableness and substantial harm prongs of private nuisance claims.¹⁶¹

1. Analyzing AR Under Nuisance

AR's virtual components are distinct from odors, particles, noises, and other traditional nuisances because their mere co-existence on private property in augmented space alone, without additional activity, does not result in a substantial interference with the use and enjoyment of land.¹⁶² AR's virtual components, such as Stops and characters in Pokémon Go, become nuisances when they attract crowds and disrespectful behavior.¹⁶³

As the plaintiffs in the Pokémon Go Litigation point out, however, nuisance claims against AR developers are unique at the outset because they do not involve competing land uses—developers are not using real property in ways that interfere with others' use and enjoyment of land.¹⁶⁴ The competing interests of AR developers include their intellectual property, such as patents,¹⁶⁵ rather than real property. Before courts evaluate nuisance claims that stem from AR, they should determine whether intellectual

¹⁵⁸ *Wilson v. S. Cal. Edison Co.*, 184 Cal. Rptr. 3d 26, 56–58 (Cal. Ct. App. 2015); *Hall v. Phillips*, 436 N.W.2d 139, 143–44 (Neb. 1989); RESTATEMENT (SECOND) OF TORTS §§ 826(a), 827, 828.

¹⁵⁹ RESTATEMENT (SECOND) OF TORTS § 827.

¹⁶⁰ *Id.* § 828.

¹⁶¹ See Defendant's Reply Motion 1, *supra* note 99, at 6.

¹⁶² See generally *Pokémon Go Nuisance Litigation*, *supra* note 26; see also discussion *supra* Parts I and II.

¹⁶³ See *Pokémon Go Nuisance Litigation*, *supra* note 26, at 15–34.

¹⁶⁴ Plaintiffs' Opposition Motion, *supra* note 98, at 12.

¹⁶⁵ Sys. and Method for Transporting Virtual Objects in a Parallel Reality Game, U.S. Patent No. 8968099 (filed Nov. 1, 2012). This patent "protects a computer implemented method of transporting virtual objects in a virtual world having a geography that parallels real-world geography." Steve Brachmann, *Pokemon Go Developer Niantic Owns Three Patents on Location-Based Gaming*, IPWATCHDOG (Aug. 10, 2016), <http://www.ipwatchdog.com/2016/08/10/pokemon-go-patents-location-based-gaming/id=71648/>.

property rights and real property rights are sufficiently competitive interests in the context of nuisance law. Because both property and patent rights embody the right to exclude others from specific uses that affect or improperly exploit the property at issue, these interests are arguably similar.¹⁶⁶ Next, under private nuisance, courts should categorize AR developers' actions as "intentional" because AR inherently involves the deliberate placement of virtual elements in specific real-world locations to enhance the surrounding environment.¹⁶⁷

To determine the reasonableness of an AR developer's conduct, courts following the Restatement's approach would balance the harm suffered by landowners (as a result of virtual AR elements superimposed over property) against the technology's social utility.¹⁶⁸ Under the first factor examining harm—the harm's extent based on degree and duration—the scale and continuous use of AR applications are relevant.¹⁶⁹ For example, if AR results in occasional passersby, a substantial harm does not exist.¹⁷⁰ By contrast, analogous to the court's finding in *Carter*, if AR spectators or gamers engulf a residence late at night, for multiple hours, over a considerable period of time, the harm is arguably continuous in nature.¹⁷¹ Because *Carter* recognized seasonal baseball disruptions as a continuous nuisance, the continuity of harm is not necessarily destroyed when obnoxious conduct ceases and periodically resurges.¹⁷² Consequently, the fact that Pokémon Go-related disruptions reoccurred during warmer months is not dispositive.¹⁷³

¹⁶⁶ See Henry E. Smith, *Intellectual Property as Property: Delineating Entitlements in Information*, 117 YALE L.J. POCKET PART 87 (2007), <http://www.yalelawjournal.org/forum/intellectual-property-as-property>. For example, in the Pokémon Go Litigation, if the plaintiffs successfully enjoin the defendant from superimposing AR elements over private land, the injunction would preclude the defendant from exercising its patent rights in certain geographical locations in the real-world.

¹⁶⁷ See discussion *supra* Part I.

¹⁶⁸ See RESTATEMENT (SECOND) OF TORTS § 826 (AM. LAW. INST. 1965).

¹⁶⁹ See *id.* § 827(a), cmt. c.

¹⁷⁰ If an AR application does not trigger disruptive human activity in landowners' vicinity, then the theory of virtual trespass to augmented space, discussed in Part III.A.1, becomes particularly relevant. For example, in a world with widely accessible AR wearables, if graffiti or data entry applications allow developers to superimpose derogatory images or personal information about an owner over his or her property, nuisance does not provide a promising avenue of recourse (unless the image or information embodies some sort of notoriety, which may attract disorderly crowds).

¹⁷¹ For example, in *Carter*, the professional baseball games occurred during the summer recess months for a period of three years. *Carter v. Lake City Baseball Club, Inc.*, 62 S.E.2d 470, 474 (S.C. 1950).

¹⁷² *Id.* at 474–75, 478.

¹⁷³ For example, initial disruptions from the game began in July 2016. Ingram, *supra* note 1. Although the harmful conduct tapered off with its decline in popularity, a resurgence occurred the following spring and summer. Pokémon Go Nuisance Litigation, *supra* note 26,

The second factor—the harm’s character—considers whether AR results in physical damage to land or discomfort and annoyance to its owners.¹⁷⁴ As noted above, the overlapping of virtual AR elements over private property cannot produce physical damage; however, physical harm can occur from the use (and misuse) of AR components by humans. For example, the plaintiffs in the Pokémon Go Litigation allege physical property damage from players that trample landscaping, meddle with shrubbery, break fences, litter, and defecate on private property.¹⁷⁵ Belligerent gamers also cause disturbances and annoyances to landowners, which involve: personal threats, loud music and noise, sleep deprivation, blocked driveways, and anxiety from an influx of individuals lurking (and trespassing) on their property.¹⁷⁶ Niantic asserts that it is not responsible for players’ disobedient conduct because it expressly warns gamers to abide by all applicable laws, rules, and regulations while partaking in the game, including property laws.¹⁷⁷ In addition, Niantic admits and explicitly warns that in-game objectives may appear on private property.¹⁷⁸

Notwithstanding the applicability of Niantic’s browse-wrap and clickwrap terms, the plaintiffs assert grievances that directly mirror those cited in *Carter*.¹⁷⁹ Thus, under *Carter*’s reasoning, the plaintiffs allege sufficient harms in support of their nuisance claim.¹⁸⁰ Furthermore, while some of the plaintiffs’ assertions may amount to trivial inconveniences, others, when viewed objectively, are comparable to the late-night phone calls described in *Macca*.¹⁸¹ For example, anxiety—stemming from an influx of people lurking on or around private property—may be objectively reasonable after reading reports on criminals’ use of AR to commit robberies.¹⁸² Thus, if developers incentivize in-person assembly or integrate

at 23, 27, 33.

¹⁷⁴ See RESTATEMENT (SECOND) OF TORTS § 827(b), cmt. d.

¹⁷⁵ Pokémon Go Nuisance Litigation, *supra* note 26, at 16, 19, 24–27, 33–34.

¹⁷⁶ *Id.*

¹⁷⁷ Defendant’s Exhibit 1 at 4, 8, *In re Pokemon Go Nuisance Litigation*, No. 3:16-CV-04300 (N.D. Cal. Nov. 17, 2017). *Pokémon GO Terms of Service*, NIANTIC, INC., <https://www.nianticlabs.com/terms/pokemongo/en> (last visited Jan. 13, 2017). For example, the game’s terms of service state that players agree to not: (1) “abuse, harass, harm, stalk, threaten or otherwise violate the legal rights . . . of others”; (2) “trespass, or in any manner attempt to gain or gain access to any property or location where [players] do not have a right or permission to be”; and (3) “violate, or encourage any conduct that would violate, any applicable law or regulation or would give rise to civil liability.” *Id.* Similar language exists in the game’s user guide. Defendant’s Exhibit 2, *In re Pokemon Go Nuisance Litigation*, No. 3:16-CV-04300 (N.D. Cal. Nov. 17, 2017).

¹⁷⁸ NIANTIC, INC., *supra* note 55.

¹⁷⁹ Pokémon Go Nuisance Litigation, *supra* note 26, at 15–34.

¹⁸⁰ See generally *Carter v. Lake City Baseball Club, Inc.*, 62 S.E.2d 470 (S.C. 1950).

¹⁸¹ *Macca v. Gen. Tel. Co.*, 495 P.2d 1193, 1194 (Or. 1972).

¹⁸² See Ryan W. Miller, *Teens Used Pokémon Go App to Lure Robbery Victims, Police*

user communication platforms in their AR technology, it will be difficult to differentiate AR users generally from unsavory characters with ill intentions.

The third and fourth factors involve an examination of the social value attached to the land use or enjoyment, and the suitability of such use in relation to the neighborhood's character.¹⁸³ More specifically, these factors examine whether a land use "advances or protects the general public good" and whether such use is compatible within the locality.¹⁸⁴ The complainants against Niantic own mostly residential properties in suburban neighborhoods,¹⁸⁵ however, other localities not included in the litigation that experienced an unwanted influx of irreverent conduct include places of public congregation such as churches, museums, and cemeteries.¹⁸⁶ While the latter examples of land use certainly benefit the general public, residential uses also maintain a "general or intrinsic social value."¹⁸⁷

Finally, factor five evaluates the burden imposed on the landowner in avoiding the alleged harm.¹⁸⁸ Although Niantic appears to provide a simple opt-out request form on its website,¹⁸⁹ the plaintiffs submitted removal requests to no avail.¹⁹⁰ If AR developers adopt opt-out policies that become too onerous for timely review and upkeep, then landowners' burden to avoid harm will increase. For example, frustrated landowners may install physical blockades, signage, or surveillance around their properties to reduce obnoxious crowds. Or, in other instances, property owners may hire private security to remove loiterers and ensure safety on the premises.¹⁹¹ As extra monetary expenses, these options may not fit every landowner's budget or philosophy.

Say, USA TODAY (Jul. 10, 2016), <https://www.usatoday.com/story/tech/2016/07/10/four-suspects-arrested-string-pokemon-go-related-armed-robberies/86922474/> (describing how criminals allegedly used Pokémon Go to lure innocent (and distracted) players to specific real-world locations).

¹⁸³ RESTATEMENT (SECOND) OF TORTS § 827(c), (d) (AM. LAW. INST. 1965).

¹⁸⁴ *Id.* § 827(c), (d), cmts. f, g. Because the determination of land use compatibility is largely subsumed by local zoning laws, it is beyond the scope of this Comment. See generally STEWART E. STERK, EDUARDO M. PEÑALVER, & SARA C. BRONIN, LAND USE REGULATION, (Foundation Press, 2d ed. 2016).

¹⁸⁵ Pokémon Go Nuisance Litigation, *supra* note 26, at 15–34.

¹⁸⁶ Grace Williams, 'Pokemon Go' Takes World by Storm, But Sparks Controversy, FOX NEWS (July 13, 2016), <http://www.foxnews.com/tech/2016/07/13/pokemon-go-takes-world-by-storm-but-sparks-controversy.html> (reporting robberies and noting inappropriate disruptions at locations including the U.S. Holocaust Memorial Museum, Arlington National Cemetery, and the Auschwitz Memorial site).

¹⁸⁷ RESTATEMENT (SECOND) OF TORTS § 827(c), cmt. f.

¹⁸⁸ *Id.* § 827(f).

¹⁸⁹ *Request Removal*, *supra* note 57.

¹⁹⁰ Pokémon Go Nuisance Litigation, *supra* note 26 at 20–21, 25–26, 28, 31. In many instances where landowners contacted Niantic, via its request form or other communications, the company responded months after the plaintiffs' requests. *Id.*

¹⁹¹ *Id.* at 17.

Next, courts must examine the utility associated with an AR developer's conduct, which begins with an analysis of the conduct's social value.¹⁹² Pokémon Go, and other AR applications for smartphones and wearables benefit society in various ways. For example, Pokémon Go's scavenger hunt premise helped boost exercise among players in the United States.¹⁹³ Some individuals welcome and even market their close proximity to Stops and other in-game objectives.¹⁹⁴ The Smithsonian's Skin and Bones application provides visitors with a valuable educational opportunity, especially for visual learners.¹⁹⁵ AR functionality in Amazon and IKEA applications is a cost and time-saving feature for the indecisive or detail-oriented buyer.¹⁹⁶ In addition, AR wearables help streamline procedures in industrial work environments and save lives in operating rooms.¹⁹⁷ But, at what point does AR tip the scale of social value?

In addition to the grievances alleged in the Pokémon Go litigation, many argue that the game is addictive, senseless, and time consuming.¹⁹⁸ In other contexts, however, the socially invaluable nature of AR is more extreme. For example, if an increased number of motor vehicle accidents is attributable to AR glasses, helmets, or windshields that superimpose driving directions and virtual advertisements over operators' views, then the AR technology would be more distractive than socially beneficial.¹⁹⁹

The second utility factor is the activity's suitability in relation to the neighborhood's character.²⁰⁰ Virtual AR elements that attract people to specific real-world locations are naturally more suitable in densely populated cities. For example, unlike suburbanites, the owner of a New York City

¹⁹² RESTATEMENT (SECOND) OF TORTS § 828(a).

¹⁹³ *Pokémon Go Increased U.S. Activity Levels by 144 Billion Steps in Just 30 Days*, MIT TECH. REV. (Oct. 21, 2016), <https://www.technologyreview.com/s/602706/pokemon-go-increased-us-activity-levels-by-144-billion-steps-in-just-30-days/>.

¹⁹⁴ Steve Schaefer, *The Real Estate Play on Pokemon GO: Data Centers and Telecom Towers*, FORBES (Aug. 24, 2016), <http://www.forbes.com/sites/steveschaefer/2016/08/24/the-real-estate-play-on-pokemon-go/#386908063cf6>; *Does Pokemon GO Add Value to Real Estate Assets?*, INVESTOR (Sept. 1, 2016), <http://www.theinvestor.jll/news/apac/00/does-pokemon-go-add-value-to-real-estate-assets/>.

¹⁹⁵ See Treene, *supra* note 19.

¹⁹⁶ See Perez, *supra* note 18.

¹⁹⁷ See Treene, *supra* note 19.

¹⁹⁸ See JV Chamary, *Science Explains Why You're Addicted to Pokémon Go*, FORBES, (July 12, 2016), <http://www.forbes.com/sites/jvchamary/2016/07/12/science-collecting-pokemon/#111706a36d2e>; Sean O'Grady, *Pokemon Go: I Caught Them All and It Wasn't Worth It*, INDEPENDENT (July 15, 2016), <http://www.independent.co.uk/life-style/gadgets-and-tech/features/pokemon-go-i-caught-them-all-and-it-wasn-t-worth-it-a7139116.html>. In addition, some conduct associated with the game (expletive threats, loiterers, trash, and driveway obstructions) is not socially valuable, especially near homes.

¹⁹⁹ See Adams, *supra* note 22.

²⁰⁰ RESTATEMENT (SECOND) OF TORTS § 828(b) (AM. LAW. INST. 1965).

apartment is likely accustomed to noisy crowds congregating in the vicinity of his or her abode. Because criminals can utilize AR to engage in illegal activity,²⁰¹ however, densely populated neighborhoods also provide more opportunities for AR-related crime.

Finally, the third utility prong—"impracticability of preventing or avoiding the invasion"²⁰²—is equally availing for both landowners and AR developers. First, individual property owners will assert that AR developers can simply remove the virtual element superimposed over or around their land upon request. In theory, the task is simple; however, it becomes less feasible as the number of requests increase, especially for smaller, start-up AR companies. The plaintiffs in the Pokémon Go Litigation admit that their proposal—mandatory removal of stops located within 100 meters of private property—will burden Niantic with significant administrative costs for both compliance and upkeep.²⁰³

Overall, the mere existence of AR elements alone cannot substantiate a valid nuisance claim. When AR elements on or near private property create questionable or distasteful human conduct, however, nuisance claims are an appropriate avenue of recourse for landowners. Ultimately, courts must decide whether the harm suffered by landowners outweighs the social benefits of AR technology.

IV. FAILED ATTEMPTS TO REGULATE AR

In the context of AR, trespass and nuisance claims are fundamentally flawed for three reasons. First, an overabundance of AR litigation based on common law property doctrines will stifle AR as a developing, socially beneficial technology, particularly when small start-up developers cannot finance court costs. Second, even if landowner plaintiffs successfully enjoin a developer from superimposing AR elements over or around their property, more lawsuits may be required to exclude other developers from engaging in similar subsequent acts. Finally, nuisance and trespass actions do not completely address AR's negative externalities because they are reactive measures rather than proactive initiatives. As a result, some states responded

²⁰¹ Unfortunately, Pokémon Go provides a unique platform to connect registered sex offenders to children. *Governor Cuomo Directs Department of Corrections and Community Supervision to Restrict Sex Offenders on Parole from Playing Pokémon Go*, (Aug. 1, 2016), <https://www.governor.ny.gov/news/governor-cuomo-directs-department-corrections-and-community-supervision-restrict-sex-offenders> (last visited Feb. 9, 2018); Miller, *supra* note 182.

²⁰² RESTATEMENT (SECOND) OF TORTS § 828(c).

²⁰³ Pokémon Go Nuisance Litigation, *supra* note 26, at 43–44.

by proposing legislation²⁰⁴ and enacting local ordinances²⁰⁵ in an attempt to regulate location-based AR games.

In August 2016, Illinois submitted a bill²⁰⁶ that would have required developers of location-based AR games to remove in-game objectives from ecological and historical sites²⁰⁷ and private properties within two business days of a request from property owners, managers, or custodians.²⁰⁸ The bill defined a “location-based video game” as any game played on a mobile device “that encourages users to travel to specific real property sites, locations, or coordinates for the purpose of achieving specific goals within the game.”²⁰⁹ In addition, the bill demanded that AR developers provide “an easily accessible procedure for removal” of the location-based elements.²¹⁰ AR developers could be fined up to \$100 per violation, per day.²¹¹

On a local level, Milwaukee County passed an ordinance which requires AR developers of location-based games to obtain permits from the Department of Parks, Recreation, and Culture (DPRC) before they superimpose any virtual in-game element over county parks.²¹² Milwaukee County acted in response to disorderly conduct, traffic jams, and trash caused by massive Pokémon Go crowds along Lake Michigan,²¹³ which ultimately resulted in increased security needs at taxpayers’ expense.²¹⁴ The ordinance states that the DPRC retains the authority to issue permits based on the appropriateness of a proposed location of an AR game element.²¹⁵ In reviewing a permit application, the DPRC considers the intensity of gaming

²⁰⁴ Alex Heath, *A New Bill Called ‘Pidgey’s Law’ Aims to Force the Removal of Pokéstops in Pokémon Go*, BUS. INSIDER (Aug. 25, 2016, 12:11 PM), <http://www.businessinsider.com/pidgeys-law-bill-aims-to-force-removal-of-pokestops-in-pokemon-go-2016-8>.

²⁰⁵ James C. Kozlowski, *Park Permit for Location-Based ‘Pokemon Go’ Games*, PARKS & RECREATION, Nov. 2017, <http://www.nrpa.org/parks-recreation-magazine/2017/november/park-permit-for-location-based-pokemon-go-games/>.

²⁰⁶ H.R. 6601, 99th Gen. Assemb., Reg. Sess. (Ill. 2016).

²⁰⁷ “Ecologically sensitive sites” encompass any area protected by local, state or federal government due to the presence of endangered species. *Id.* “Historically significant sites” are those protected by any level of government for preservation. *Id.*

²⁰⁸ *Id.*

²⁰⁹ *Id.*

²¹⁰ *Id.*

²¹¹ H.R. 6601, 99th Gen. Assemb., Reg. Sess. (Ill. 2016).

²¹² MILWAUKEE COUNTY, WIS. CODE § 47.03 (2017), https://library.municode.com/wi/milwaukee_county/codes/code_of_ordinances?nodeId=MICOCOGEOORVOI_CH47PAPA [hereinafter *MILWAUKEE ORDINANCE*].

²¹³ Matt Wild, *Lake Park’s Pokemon Go Meeting Was Boring, Livid, and Gloriously Absurd*, MILWAUKEE REC. (Sept. 8, 2016), <http://milwaukeeeerecord.com/city-life/lake-parks-pokemon-go-meeting-was-boring-occasionally-livid-gloriously-absurd/>.

²¹⁴ *See Milwaukee Now Requires Permits For ‘Pokémon GO’ in Parks*, CBS MINN. (Feb. 18, 2017, 10:52 AM), <http://minnesota.cbslocal.com/2017/02/18/milwaukee-pokemon-permits/>.

²¹⁵ *MILWAUKEE ORDINANCE*, *supra* note 212.

activity in parks as well as any potential impacts on safety, wildlife, and vegetation.²¹⁶ Furthermore, gaming activity is limited to the park's operating hours.²¹⁷ In addition to applicable fees, the permit application states that all applicants must submit proof of liability insurance, in the amount of at least \$1,000,000, which names "Milwaukee County Parks" as an insured.²¹⁸

Soon after its enactment, Milwaukee's ordinance came under attack in federal court by an AR game developer that claimed the ordinance violated its right to free speech under the First Amendment.²¹⁹ After concluding the developer's game constituted protectable speech under the First Amendment, the court found that Milwaukee's ordinance was content-neutral because it did not impose restrictions based on a game's subject matter, but rather its AR functionality generally.²²⁰ The ordinance ultimately failed, however, because it granted the DPRC unfettered discretion to determine the appropriateness of any proposed AR location-based gaming element in county parks.²²¹ Thus, the criteria of review included in the ordinance were "too vague to afford adequate protection to free speech interests."²²² Under a recent settlement, the AR developer will receive \$83,000 from Milwaukee County for attorneys' fees, and the county is enjoined from enforcing the ordinance.²²³ Interestingly, the county allegedly has plans to revise the ordinance.²²⁴

Although Illinois and Milwaukee County are pioneers in confronting the negative externalities associated with virtual AR game elements over public and private land, the lawmakers failed to recognize the bigger implications of AR technology beyond mobile gaming applications. The texts drafted by Illinois and Milwaukee are ultimately flawed because they target only developers of AR *games*, rather than AR generally. For example, under the legislation and the ordinance, AR developers are permitted to superimpose other virtual elements over property, such as information, pictures, or virtual advertisements.²²⁵ Illinois narrowly defined a location-

²¹⁶ *Id.*

²¹⁷ *Id.*

²¹⁸ MILWAUKEE COUNTY PARKS: 2018 SPECIAL EVENT APPLICATION 1 (2018), <http://county.milwaukee.gov/ImageLibrary/Groups/cntyParks/permits/SpecialEventPermitApplication.pdf>.

²¹⁹ *Candy Lab Inc. v. Milwaukee Cty.*, 266 F. Supp. 3d 1139, 1141 (E.D. Wis. 2017).

²²⁰ *Id.* at 1146, 1149–50.

²²¹ *Id.* at 1150–54.

²²² *Id.* at 1152.

²²³ Emily Zantow, *Milwaukee Must Pay App Maker's Legal Fees*, COURTHOUSE NEWS SERV. (Dec. 15, 2017), <https://www.courthousenews.com/milwaukee-must-pay-app-makers-legal-fees/>.

²²⁴ *Id.*

²²⁵ See H.R. 6601, 99th Gen. Assemb., Reg. Sess. (Ill. 2016); *MILWAUKEE ORDINANCE*, *supra* note 212.

based game to those that mimic Pokémon Go by encouraging travel to real world locations.²²⁶ Likewise, even if Milwaukee provides the DPRC with specific criteria to review AR permit applications, the ordinance fails to protect private property owners because it only applies in public parks.²²⁷

The solutions proposed by Illinois and Milwaukee are also unfeasible because they impose a tremendous administrative burden on AR developers. If more counties and municipalities adopt ordinances in Milwaukee's footsteps, they will hinder innovation in AR by inflicting exorbitant compliance costs on developers, who will be forced to review and abide by every local code throughout the country. Similarly, Illinois's attempt to force AR game developers to adopt a seamless removal procedure, without defined guidance, imposes an extra burden on developers; this burden would increase with the number of states imposing different opt-out procedure requirements. Furthermore, based on the Pokémon Go Litigation, the success of developer-run opt-out systems appears slim.²²⁸

V. PROPOSED SOLUTION

Although Illinois failed to expand on what constitutes an “easily accessible [removal] procedure”²²⁹ to be adopted by AR game developers, the process of regulating AR elements superimposed over land is ultimately best delegated to the individual states, as the traditional gatekeepers of property rights. Regulation should target location-based AR technology that uses GPS coordinates to superimpose virtual components in specific real-world locations. Accordingly, AR applications viewable from a single device, which allow users to temporarily incorporate customized AR elements in their surrounding environment (such as Amazon and IKEA's AR feature), are excluded from this proposal.

First, states should develop online databases containing all GPS coordinates within their territories, with portals for both AR developers and landowners, who must verify their identities and provide contact information (thus, certifying that John Smith owns Blackacre). Second, states should enact legislation requiring all location-based AR to be registered in the databases under their corresponding GPS coordinates, within a certain timeframe following an application's debut, such as fourteen days. After registration, a property owner who logs into the database will see a list of all AR elements superimposed over his or her land or within a 200-foot radius.²³⁰ Thus, registration of AR elements by developers effectively puts

²²⁶ H.R. 6601, 99th Gen. Assemb., Reg. Sess. (Ill. 2016).

²²⁷ See *MILWAUKEE ORDINANCE*, *supra* note 212.

²²⁸ Pokémon Go Nuisance Litigation, *supra* note 26 at 31, 20–21, 25–26, 28.

²²⁹ H.R. 6601, 99th Gen. Assemb., Reg. Sess. (Ill. 2016).

²³⁰ The 200-foot radius mirrors the notice requirement in some municipalities for zoning

property owners on notice of AR-based property invasions.²³¹

Finally, if a landowner wants to remove a virtual element that *directly* overlaps with his or her property, the portal should provide an opt-out form for the corresponding virtual components. Upon completion, both the state and AR developer should receive the opt-out request. Because the landowner's portal automatically verifies the owner's identity, the AR developer would not have to engage in further verification procedures, which will save the developer both time and money.²³² Once a developer receives an opt-out request, state statutes should designate a reasonable period for compliance (perhaps ten business days).

But the process to contest an element that does not match the GPS coordinates of a landowner's property should differ. For example, the portal can provide a separate form to oppose any virtual element that falls within a 200-foot radius of the landowner's property ("radial elements"). Theoretically, radial elements will either exist over (a) private property of a neighbor; or (b) public property such as a park or school. Once the state and developer receive the opposition form, the developer should have a reasonable period, such as fourteen days, to review the request and submit a decision. If the developer denies the request, the state can act by either: (1) informing the neighboring landowner of the opposition, and his or her ability to submit an opt-out form; or (2) informing the local municipality of the opposition if the radial element falls on public property.

In the latter option, where virtual AR elements such as Stops appear in public parks, the local zoning board can review the Stop, and neighbors' complaints under specific criteria designed under state statute. If the board determines that the AR element does not comply with the state's review criteria, then the municipality can elect to submit an opt-out form on behalf of its residents. As a localized body with particular knowledge of the town, zoning boards are best fit to determine the compatibility of virtual AR components on public property.

Centralized online databases for developers and property owners are preferable over individually operated platforms by developers, because they would alleviate burdens for both parties. For example, a landowner's desire

board hearings that concern a neighboring parcel. PATRICK J. ROHAN & ERIC DAMIAN KELLY, ZONING AND LAND USE CONTROLS, ch. 51, § 51.04 (Matthew Bender 2017).

²³¹ Rossow, *supra* note 24 (arguing that a notice scheme for virtual AR components over private property would be appropriate).

²³² For example, nearly four months after a landowner emailed Niantic to request removal of a Stop on her property, the developer responded: "If you would like to proceed with this request, please reply to this message with the following statement to confirm that you are authorized to make this request: 'I am the owner of the property or have authority to make this request with the owner's consent.' Please include your title and phone number." Pokémon Go Nuisance Litigation, *supra* note 26, at 31–32.

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or ability to afford AR hardware, such as wearable glasses, will not affect his or her ability to discover AR components lurking on their properties. Similarly, state-run databases and opt-out procedures alleviate the need to create and modify take-down platforms on the part of AR developers.

VI. CONCLUSION

Although the expansion of AR technology remains unpredictable, the first mobile AR application to reach a mass audience undoubtedly precipitated a slew of legal questions concerning the clash of intellectual property and real property rights. Currently, the only legal recourse available to address landowners' concerns is common law property claims, including trespass and nuisance. These claims, however, involve inherent shortcomings due to the unique nature of location-based AR technology. For example, without the appropriate device or application, AR intrusions are essentially undetectable. Moreover, the mere presence of location-based AR on or near private property does not automatically interfere with one's use and enjoyment of land. Thus, in order to enjoin unwanted AR intrusions, courts must be willing to expand and apply common law doctrines to new technologies.

Alternatively, states can proactively eliminate the need for costly and time-consuming litigation by aiding landowners in detecting, preventing, and excluding unwanted location-based AR intrusions. States should adopt legislation to establish rules and expectations for AR developers and landowners alike. Akin to title systems, states should also implement AR tracking systems, or databases, as mechanisms for both notice and opt-out procedures. Furthermore, because AR has the potential to seamlessly integrate information into our everyday lives—through wearables or other devices—drafters of AR legislation must apply rules and regulations broadly to all types of location-based AR data. Overall, transparency and cooperation between states, landowners, and AR developers will remain key to protecting property rights in augmented space, and allowing AR to flourish as a growing technology.