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A Compulsory Solution to the Machine Problem: Recognizing Artificial Intelligence as Inventors in Patent Law

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ABSTRACT

Artificial Intelligence (AI) is already disrupting and will likely continue to disrupt many industries. Despite the role AI already plays, AI systems are becoming increasingly powerful. Ultimately, these systems may become a powerful tool that can lead to the discovery of important inventions or significantly reduce the time required to discover these inventions. Even now, AI systems are independently inventing. However, the resulting AI-generated inventions are unable to receive patent protection under current US patent law. This unpatentability may lead to inefficient results and ineffectively serves the goals of patent law.

To embrace the development and power of AI, Congress should grant patents, subject to a compulsory license, to AI-created inventions. Though the AI systems themselves do not need the same incentive that a human or corporation does to engage in the inventorship process, the prospect of patent protection can encourage the use of AI in the first place. AI is already a valuable tool in the innovative process, and its power may only grow with increased sophistication. Because US patent law seeks to incentivize innovation, its goals are best served by embracing AI inventorship.

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The sophistication of computers has long been advancing towards replacing human creativity in the inventive process.[1] In fact, the first case of AI inventorship is making its way through the US court system.[2] Through the chaotic stimulation of neural nets, the AI system, DABUS, invented a container and attention-attracting device.[3] DABUS's inventor filed patent applications for these inventions, listing DABUS as the inventor.[4] Though this is the first case of its kind, it signals the beginning of a new era in which machine inventions will play an ever-increasing role in the inventive process.[5]

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    1.   *See* Tim W. Dornis, *Artificial Intelligence and Innovation: The End of Patent Law as We Know It*, 23 YALE J. L. & TECH. 97, 101–04 (2020).

    2.   Susan Decker, *Only Humans, Not AI Machines, Get a U.S. Patent, Judge Says*, BLOOMBERG: TECH. (Sept. 3, 2021, 3:06 PM), https://www.bloomberg.com/news/articles/2021-09-03/only-humans-not-ai-machines-can-get-a-u-s-patent-judge-rules [https://perma.cc/2LWK-4JZY]; *see* Thaler v. Hirshfeld, 558 F. Supp. 3d 238 (E.D. Va. 2021); Thaler v. Vidal, 43 F.4th 1207 (Fed. Cir. 2022).

    3.   *Dabus Described*, IMAGINATION ENGINES INC., https://imagination-engines.com/dabus.html [https://perma.cc/3DWC-CE47] (last visited Oct. 17, 2022); Matthew Bultman, *Patents and Artificial Intelligence: An 'Obvious' Slippery Slope*, BLOOMBERG LAW (Oct. 8, 2021, 7:03 AM), https://www.bloomberglaw.com/bloomberglawnews/ip-law/X9O35824000000?bna_news_filter=ip-law#jcite [https://perma.cc/X29C-WPC2].

    4.   *Patents And Applications*, ARTIFICIAL INVENTOR PROJECT, https://artificialinventor.com/patent-applications/ [https://perma.cc/3JB7-5L6F] (last visited Oct. 17, 2022).

    5.   *See* OFF. CHIEF ECONOMIST, U.S. PAT. & TRADEMARK OFF., INVENTING AI TRACING THE DIFFUSION OF ARTIFICIAL INTELLIGENCE WITH U.S. PATENTS, 2 (Oct. 2020), https://www.uspto.gov/sites/default/files/documents/OCE-DH-AI.pdf [https://perma.cc/6SKR-DGW2] (noting that from 2002 to 2018 annual AI patent applications increased by more than 100%); Ryan Abbott, *I Think, Therefore I Invent: Creative Computers and the Future of Patent Law*, 57 B.C. L. REV. 1079, 1079–80 (2016).

Even prior to taking this monumental step, AI has significantly impacted the US patent system.[6] Although current AI technology is still building to the point of widespread independent invention and is more appropriately viewed as a tool aiding human innovation,[7] it has already had substantial effects on the patent system.[8] AI's impact on the patent system is expected to not only continue, but increase.[9] As AI progresses, there is a substantial possibility that independent invention by AI will become widespread.[10] However, the US patent system does not recognize AI as a possible inventor.[11] To achieve the constitutional goal of incentivizing innovation,[12] though, the patent system should adapt to the emergence of AI.[13]

To modernize the patent framework to incorporate AI, this Note recommends establishing a new class of patents for AI inventions. This new class of patents should be subject to a compulsory license to limit the ability of early adopters of AI to monopolize any resulting patents. This framework provides incentives for innovation and, importantly, the disclosure of inventions discovered by AI.[14] Moreover, when the patent protection period terminates, the invention, like any created by a human inventor, will move into the public domain, theoretically providing a public benefit.[15]

This Note is divided into four parts. Part I provides background information that serves as the basis for analysis of the above proposed solution to the growing AI patent problem. Part II analyzes the problems and challenges that exist under the United States' current patent framework as applied to the future of AI inventorship. Part III recommends recognizing AI inventorship for the purpose of patent law but subjecting any resulting patents to a compulsory license. Part IV

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6.   *See* OFF. CHIEF ECONOMIST, *supra* note 5 (noting that from 2002 to 2018 annual AI patent applications increased by more than 100%).

7.   *See* Abbott, *supra* note 5, at 1094.

8.   *See* W. Keith Robinson & Joshua T. Smith, *Emerging Technologies Challenging Current Legal Paradigms*, 19 MINN. J.L. SCI. & TECH. 355, 360 (2018).

9.   *See id.* at 364–65.

10.   *See id.* at 360; CHRISTIAN HARTMANN, JACQUELINE E. M. ALLAN, P. BERNT HUGENHOLTZ, JOÃO P. QUINTAIS & DANIEL GERVAIS, TRENDS AND DEVELOPMENTS IN ARTIFICIAL INTELLIGENCE – CHALLENGES TO THE INTELLECTUAL PROPERTY RIGHTS FRAMEWORK 100–01 (Jacqueline E. M. Allan ed.) (2020).

11.   Thaler v. Vidal, 43 F.4th 1207, 1210 (Fed. Cir. 2022) ("[T]he Patent Act requires that inventors must be natural persons; that is, human beings.").

12.   *See* U.S. CONST. art. 1, § 8, cl. 8.

13.   Robinson & Smith, *supra* note 8, at 365.

14.   *See* Sean B. Seymore, *Patenting the Unexplained*, 96 WASH. U.L. REV. 707, 713 (2019).

15.   *See id.* at 713–15.

concludes by summarizing the findings and reasons that the United States should modify its patent laws to recognize AI as inventors.

I. BACKGROUND

To analyze the best way to adapt US intellectual property (IP) law to fully recognize the many benefits that advances in AI represent, one must first explore the contours of the current system. This Part provides a foundation and background on the concepts from which the analysis and proposed solution draw. This Note is concerned primarily with inventions and innovations created by AI. Any substantial analysis of the body of copyright law is beyond the scope of this Note.[16]

A. Artificial Intelligence

AI encompasses many different types of technology but generally refers to computer systems designed to replicate human thought processes.[17] These systems typically manifest themselves through some sort of machine learning taught from the provided data sets.[18] However, with ongoing investment, AI continues to advance and display increasingly humanlike characteristics as researchers focus their efforts on mimicking human brain function.[19]

AI is generally divided into two types: Narrow AI and General AI.[20] Narrow AI is a more limited version of AI and is the only version currently attainable.[21] Narrow AI can only perform the task for which it is developed.[22] Moreover, while Narrow AI can improve on the performance of its designed task, it cannot evolve to address new tasks or broaden its reach.[23] Narrow AI functions as a tool that needs some human direction in the inventorship process.[24] Like a computer, Narrow

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16.   Copyright law concerns itself with expression while the patent system serves to protect utilitarian innovations. *See* LYDIA LOREN & JOSEPH MILLER, INTELLECTUAL PROPERTY LAW: CASES & MATERIALS 325-27 (2021) (discussing the background of copyright law in the United States).

17.   *See* Robinson & Smith, *supra* note 8, at 358.

18.   *See* Jerry I-H Hsiao, *Back to the Future: The Reviving of the Mental Steps Doctrine and the Immature Demise of Artificial Intelligence?*, 31 ALB. L.J. SCI. & TECH. 179, 181 (2021).

19.   *See* Robinson & Smith, *supra* note 8, at 358.

20.   *See* David Kappos & Asa Kling, *Ground-Level Pressing Issues at the Intersection of AI and IP*, 22 COLUM. SCI. & TECH. L. REV. 263, 264–65 (2021); HARTMANN ET AL., *supra* note 10, at 35.

21.   *See* Kappos & Kling, *supra* note 20.

22.   *Id.*

23.   *Id.*

24.   *See* Abbott, *supra* note 5, at 1094; Kappos & Kling, *supra* note 20.

AI increases the efficiency of some analysis—in some cases making otherwise infeasible analysis feasible—but requires that it be designed or directed to address the problem at hand.[25]

Conversely, General AI has a broader reach, like the human intelligence it is intended to mimic.[26] Importantly, General AI is not limited by the dataset used to create it, but rather can adapt and create new processes to solve new problems.[27] Though General AI is not yet available, some experts believe that there is a 25 percent chance that General AI will be developed by 2030.[28] It is this type of AI that will be able to independently invent on a large scale.[29]

The modern development and use of AI is not limited to research labs; businesses continue to accelerate the role that AI plays in daily life.[30] Additionally, AI systems employed in the inventorship process have already impacted the patent system.[31] The United States Patent and Trademark Office (USPTO) has seen significant increases in patent submissions related to the development of AI.[32] Moreover, AI is continuing to play an increased role in the inventorship process.[33]

B. Machine as Inventor

The first patent submitted with an AI system listed as the inventor has made it to federal court.[34] DABUS is an "Artificial Inventor" that functions by using "controlled chaos" to combine "neural nets," or a network of nodes designed to mimic human neurons,[35] to build complex ideas and inventions.[36] DABUS was listed as the inventor

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25.   *See* Kappos & Kling, *supra* note 20.

26.   *Id.* at 265.

27.   Kappos & Kling, *supra* note 20, at 265.

28.   Archil Cheishvili, *The Future of Artificial General Intelligence*, FORBES (July 16, 2021, 8:30 AM), https://www.forbes.com/sites/forbestechcouncil/2021/07/16/the-future-of-artificial-general-intelligence/?sh=4341e8253ba9 [https://perma.cc/78AQ-8RRT].

29.   *See* Robinson & Smith, *supra* note 8, at 359.

30.   Joe Mckendrick, *AI Adoption Skyrocketed Over the Last 18 Months*, HARV. BUS. REV. (Sept. 27, 2021), https://hbr.org/2021/09/ai-adoption-skyrocketed-over-the-last-18-months [https://perma.cc/HY66-RGYA].

31.   *See* OFF. CHIEF ECONOMIST, *supra* note 5 (noting that from 2002 to 2018 annual AI patent applications increased by more than 100%).

32.   *Id.*

33.   *See* Robinson & Smith, *supra* note 8, at 359.

34.   *See* Thaler v. Hirshfeld, 558 F. Supp. 3d 238, 241–42 (E.D. Va. 2021).

35.   *See Neural Networks*, IBM (Aug. 17, 2020), https://www.ibm.com/cloud/learn/neural-networks#toc-types-of-n-YgdI1-Kt [https://perma.cc/LH28-VBGM].

36.   *See generally Imagination Engines Inc. Announces a New Patent That Is Arguably the Successor to Deep Learning and the Future of Artificial General Intelligence (AGI)*, ARTIFICIAL

on patent applications throughout the world, including in the United States.[37] Though the international patent applications are receiving mixed results,[38] the US application was denied.[39] The patent applicant appealed the USPTO's decision to the US District Court for the Eastern District of Virginia.[40]

On cross-motions for summary judgment, the Eastern District of Virginia denied the appeal, answering the question of whether AI can be an "inventor" under US patent law in the negative.[41] The case before the court primarily hinged on the legality of the administrative action by the USPTO,[42] so the court reviewed the action under the Administrative Procedure Act (APA).[43] Because of that narrow review, the holding has a more limited, direct application to the question of whether AI can be an inventor under US patent law.[44]

Despite the interference of the APA in this case, the court stated that independent of any deference due to the USPTO under the APA, the USPTO correctly decided that an inventor must be a natural person.[45] In reaching that conclusion, the Eastern District of Virginia relied on the statutory definition of an "inventor": "'the individual, or if a joint invention, the individuals collectively who invented or discovered the subject matter of the invention.'"[46] Thus, the court held that an "individual" is a natural person.[47] The Eastern District of Virginia's judgment affirming the USPTO's decision to define an "individual" as a natural person was subsequently appealed to the US Court of Appeals for the Federal Circuit.[48]

INVENTOR PROJECT, https://artificialinventor.com/dabus/ [https://artificialinventor.com/dabus-receives-a-us-patent/] (last visited Oct. 18, 2022).

37.   *See Patents and Applications*, *supra* note 4.

38.   *See id.*

39.   *In re* Application of Application No.: 161524,30, No. 50567-3-01-US, 2020 WL 1970052 (Dep. Comm'r Pat. Apr. 22, 2020).

40.   *See* Thaler v. Hirshfeld, 558 F. Supp. 3d 238, 241 (E.D. Va. 2021).

41.   *Id.* at 249–50. Importantly, the court analyzed this case under the APA. *Id.* at 243–44. Thus, though the court did hold that that AI cannot be an inventor under the US patent statutes, the strongest part of this holding is that the USPTO did not abuse its discretion when it denied the patent application. *Id.* at 249–50.

42.   *Id.* at 243–44.

43.   *Id.*

44.   *See generally id.* at 249–50.

45.   *See id.* at 245–46.

46.   *Id.* at 245 (quoting 35 U.S.C. § 100(f)).

47.   *Id.* at 246.

48.   *See* Notice of Appeal at 1, Thaler v. Hirshfeld, 558 F. Supp. 3d 238 (E.D. Va. 2021) (No. 1:20-cv-903); Thaler v. Vidal, 43 F.4th 1207, 1209 (Fed. Cir. 2022).

The Federal Circuit affirmed the Eastern District of Virginia and USPTO.[49] In its ruling, the Federal Circuit held that US patent law unambiguously requires inventors to be human beings.[50] The court pointed out that the Patent Act requires that an inventor be an individual.[51] In reaching this conclusion, the Federal Circuit relied on the US Supreme Court's previous holding that "individual" means a human being unless there is some evidence that a different meaning was intended.[52] As the Federal Circuit highlighted, there is no evidence that Congress intended any other meaning, so "individual" refers only to humans in this cotext.[53]

Though this case is the first instance of an AI system being listed as an inventor on a patent application, as AI becomes more widespread, it will contribute to the innovative process in increasingly significant ways.[54] The results of this increased innovation may include the development of groundbreaking "pioneer inventions," or, the probable result, more "incremental innovations."[55] Regardless of which route is realized with the development and widespread deployment of AI, the resulting innovations will be in need of IP protection.[56]

C. Types of Intellectual Property Protection Available to Inventors

There are several legal regimes available to protect an individual's intellectual property.[57] Trade secret law and patent law are the most fitting regimes for inventions.[58] These two regimes protect inventions differently, providing different incentives and benefits to the public.[59] Given the varying requirements to receive either patent protection or trade secret protection, these regimes are usually mutually exclusive.[60]

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49.   *See Thaler*, 43 F.4th at 1209.

50.   *Id.* at 1210.

51.   *Id.* at 1211.

52.   *Id.* (quoting Mohamad v. Palestinian Auth. 566 U.S. 449, 454 (2012)).

53.   *Thaler*, 43 F.4th at 1211.

54.   *See* HARTMANN ET AL., *supra* note 10, at 101.

55.   *Id.*

56.   *See id.* at 101–02.

57.   *See* LOREN & MILLER, *supra* note 16, at 4–6.

58.   *See* Michael Abramowicz & John F. Duffy, *The Inducement Standard of Patentability*, 120 YALE L.J. 1590, 1622 (2011). However, in the realm of software, seeking or relying on copyright protection may be more likely. *See id.* at 1602. This Note's focus is on patentable inventions, however, so an examination of copyright law is beyond the scope.

59.   *See id.* at 1622; Seymore, *supra* note 14.

60.   *Compare* Alois Valerian Gross, Annotation, *What Is "Trade Secret" So as to Render Actionable Under State Law Its Use or Disclosure by Former Employee*, 59 A.L.R.4th 641, § 2 (1988)

1. Patent Protection

This Note proposes changes to the framework of the existing patent system in the United States. To provide an adequate foundation, this Note first provides a background on the underlying goals of the patent system. It then provides a brief explanation of the current patent requirements and how those requirements define the patentability of AI inventions.

a. Goals of Patent Law

Patent law in the United States is based in a constitutional grant of power.[61] In relevant part, the grant reads: "The Congress shall have Power . . . To promote the Progress of . . . useful Arts, by securing for limited Times to . . . Inventors the exclusive Right to their respective . . . Discoveries."[62] Inherent in this power grant is that the very purpose of the US patent system is to incentivize progress and innovation.[63] This incentive has shaped the way the market has organized around inventorship.[64] From this foundation, the US patent system has grown to incentivize two distinct goals.[65]

First, the US patent system serves to encourage innovation.[66] Economic theory suggests that the prospect of receiving patent protection can serve to stimulate creation.[67] The economic incentive captured by the patent system must work on two levels: to counteract the threat of copying and to incentivize disclosure of inventions.[68] First, the threat of copying disincentivizes creation because copiers can do so at substantially reduced costs in the absence of any legal protection.[69] Patent law, and intellectual property law generally, attempts to counteract this disincentive by providing a period of exclusive rights, making the investment of capital more worthwhile.[70] The period of

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(explaining that trade secrecy protection requires that the information be kept secret), *with* Seymore, *supra* note 14, at 712–13 (discussing the disclosure required to receive patent protection).

61.   *See* U.S. CONST. art. I, § 8, cl. 8.

62.   *Id.*

63.   *See id.*

64.   *See* David Taylor, *Patent Eligibility and Investment*, 41 CARDOZO L. REV. 2019, 2053–54 (2020).

65.   *See* Seymore, *supra* note 14.

66.   *See id.* at 713–14.

67.   Elizabeth Hoffman, David Schwartz, Matthew Spitzer, & Eric Talley, *Patently Risky: Framing, Innovation and Entrepreneurial Preferences*, 34 HARV. J.L. & TECH. 191, 197–98 (2020).

68.   *See id.* at 198; Seymore, *supra* note 14, at 712–15.

69.   Hoffman et al., *supra* note 67, at 198.

70.   *Id.*

exclusivity also incentivizes the risk-taking associated with innovation.[71] When choosing to set out on the innovative journey, an inventor faces the risk of toiling for no benefit.[72] The period of exclusive rights embodied by patent protection allows for monetization of the results of an inventor's efforts, providing an incentive to take on the risks associated with the invention.[73]

Second, US patent law incentivizes the disclosure of inventions.[74] To receive patent protection, and thereby monetize an invention as discussed previously, an inventor must disclose his or her invention in the patent application.[75] In contrast to the protection of trade secrets briefly discussed below, the patent system attempts to move information about an invention, not just the invention's products, into the public domain.[76] Patent law's disclosure requirement may be the cornerstone of the patent system's effectiveness.[77] The disclosure requirement is quintessential in moving inventions into the public domain and therefore foundational to the US patent system.[78]

The disclosure requirement of patent law directly serves the underlying goal to "promote the progress" of innovation.[79] Specifically, the disclosure requirement enables patent law to move information that would otherwise be kept secret into the public domain.[80] Despite the period of exclusivity granted by patent protection, the required disclosure becomes available as soon as the patent document is published,[81] usually eighteen months after the application is submitted.[82] This provides several immediate public benefits and allows others to leverage newly disclosed inventions and technologies to develop more innovative technologies, even before the patent term expires.[83]

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71.   *Id.*
72.   *See id.*
73.   *Id.*
74.   Seymore, *supra* note 14, at 712–15.
75.   *Id.* at 712–13.
76.   *See id.* at 713–14.
77.   *See* Bonito Boats, Inc. v. Thunder Craft Boats, Inc., 489 U.S. 141, 150–51 (1989) (discussing the difference between keeping an innovation secret and the disclosure required to receive patent protection); Seymore, *supra* note 14, at 715.
78.   Seymore, *supra* note 14, at 715.
79.   *See* U.S. CONST. art. I, § 8, cl. 8; Seymore, *supra* note 14, at 713–15.
80.   Seymore, *supra* note 14, at 713–14.
81.   *Id.* at 714.
82.   35 U.S.C. § 122; 37 C.F.R. § 1.211.
83.   Seymore, *supra* note 14, at 714–15.

b. Patentability Requirements

Patents are not necessarily available for any invention; rather, an inventor must meet several criteria prior to being awarded a patent.[84] Though there are several requirements, the most important considerations in any patentability analysis of inventions by AI are the requirement that inventors be "individuals"[85] and the concept that an invention be the result of a "mental act."[86] These constraints tend to weigh against recognizing AI as an inventor.[87] Courts have interpreted these elements to mean that an inventor must be a natural person, thereby excluding corporations or machines from recognition as inventors.[88]

Additionally, the subject matter of a patent must be "non-obvious."[89] This requirement seems to be aimed at ensuring that patentable inventions be the result of mental processes and that human mental action is part of the conception of the invention.[90] Ultimately, these baseline conditions are aimed at ensuring that the patent system incentivizes and rewards ingenuity.[91] This requirement further embodies the prohibition of recognizing AI as inventors in United States patent law.[92]

2. Trade Secrecy

Trade secrecy offers a competing form of intellectual property protection and is currently available to AI-created inventions.[93] A brief overview of trade secret law is helpful to fully understand the importance of the disclosure requirement and its role in the patent system. Generally, a trade secret receives protection if it meets a series of requirements, including that the information is generally unknown,

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84.   *See* Abbott, *supra* note 5, at 1096–97.

85.   35 U.S.C. § 100(f) ("The term 'inventor' means the individual or . . . individuals who invented or discovered the subject matter of the invention.").

86.   Abbott, *supra* note 5, at 1097 (citing Townsend v. Smith, 36 F.2d 292, 295 (C.C.P.A. 1929)).

87.   *See* Abbott, *supra* note 5, at 1096–97; Robinson & Smith, *supra* note 8, at 364–65.

88.   Russ Pearlman, Article, *Recognizing Artificial Intelligence (AI) as Authors and Inventors Under U.S. Intellectual Property Law*, 24 RICH. J.L. & TECH. no. 2 ¶ 21 (2018) (quoting Beech Aircraft Corp. v. EDO Corp., 990 F.2d 1237, 1248 (Fed. Cir. 1993)).

89.   *Id.* at ¶ 22.

90.   *See id.*

91.   *See* Jessica Silbey, *The Mythical Beginnings of Intellectual Property*, 15 GEO. MASON L. REV. 319, 331–37 (2008) (discussing the reasons and underlying theory for the novelty and non-obviousness requirements in U.S. patent law).

92.   *See* Pearlman, *supra* note 88, at ¶ 22.

93.   *See* Gross, *supra* note 60.

valuable, and subject to reasonable security practices to protect its secrecy.[94] A trade secret receives protection as long as its secrecy is maintained, which may be indefinitely.[95] Though trade secrecy is not well suited for many inventions,[96] it does provide adequate protection to many innovations that can be exploited without requiring disclosure of the invention itself.[97] This is true even though the public may benefit from the invention itself being disclosed.[98] For inventions and innovations that can be exploited while maintaining their secrecy, for instance processes that can be kept secret while monetizing the products, this perpetual protection provides strong incentives to maintain secrecy as compared to the limited term of patent protection.[99]

D. Licensing

Licensing plays an important role in the ownership and exploitation of IP.[100] Licensing enables an IP rightsholder to allow others to use those rights for a previously agreed-upon purpose.[101] Importantly, though trade secret holders have the right to license secrets, doing so runs the risk of losing protection under trade secrecy.[102] Additionally, licensing can be voluntary or compulsory.[103] Compulsory licenses allow the government to direct a license without requiring the rightsholder's permission.[104] In fact, patent law already

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94.   *Id.*

95.   Keith Witek, *Trade Secret v. Patent*, *in* 2 INTERNET LAW AND PRACTICE § 21:31 (2022).

96.   For trade secrecy to be a viable protection alternative, exploitation of the invention must not require the disclosure of the invention or process itself. *See* Gross, *supra* note 60.

97.   *See id.*

98.   *See* Seymore, *supra* note 14, at 713–14 (discussing the ability to maintain the secrecy of things like complex molecules or processes while still exploiting those inventions in the market).

99.   Abramowicz & Duffy, *supra* note 58.

100.   *Licensing of IP Rights and Competition Law*, OCED, https://www.oecd.org/daf/competition/licensing-of-ip-rights-and-competition-law.htm [https://perma.cc/8ZVC-VHKT] (last visited Oct. 17, 2022).

101.   *See IP 101: The Fundamentals of IP Licensing*, THE MICHELSON INST. FOR INTELL. PROP.: BLOG (Apr. 29, 2020), https://michelsonip.com/fundamentals-of-ip-license/ [https://perma.cc/WU7M-9THM].

102.   *See* UNIF. TRADE SECRETS ACT § 1(2) & cmt. (amended 1985), 14 U.L.A. 538 (2005), available at https://www.uniformlaws.org/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=e58f19a0-6a5e-c90f-67c1-ac1f747ad47b&forceDialog=0 [https://perma.cc/W8P7-V3ER] (noting that a proper mean of discovery includes discovery under a license from the owner of the trade secret).

103.   *See* Jacob Victor, *Reconceptualizing Compulsory Copyright Licenses*, 72 STAN. L. REV. 915, 918 (2020).

104.   William Alan Reinsch, *Compulsory Licensing: A Cure for Distributing the Cure?*, CTR. FOR STRATEGIC & INT'L STUDIES (May 8, 2020), https://www.csis.org/analysis/compulsory-licensing-cure-distributing-cure [https://perma.cc/Q9CZ-4XZL].

includes several provisions that act similar to a compulsory license.[105] For instance, the federal government retains march-in rights that allow the federal government to require certain businesses to grant licenses for terms "reasonable under the circumstances" when the patented invention was developed with federal funding and the license would serve an approved purpose.[106]

1. FRAND Terms in Patent Licensing

In patent licensing, there is a framework requiring licensing on "fair, reasonable and non-discriminatory" (FRAND) terms.[107] FRAND licensing terms are currently used in the context of patents that are essential to a particular standard.[108] Using standards, such as computer hardware standards, has a net benefit for society but brings with it the risk of exploitation by owners of the underlying patents.[109] FRAND terms, by requiring the owners of the underlying patents to license them to users, reduce this risk.[110] Importantly, FRAND licensing puts the negotiation of the value of any license first in the hands of the parties and then subjects any disputes to judicial scrutiny.[111] In this sense, the non-discriminatory part of FRAND licensing is sometimes more important than the royalty rate.[112] The non-discriminatory element requires that patent owners license similar licensees on the same terms.[113] The nondiscriminatory aspect of FRAND arose from a focus on competition by ensuring that patent holders could not control the downstream markets by controlling the availability of component parts.[114]

II. ANALYSIS

Patent law currently does not recognize AI inventorship.[115] This creates several problems, including under-incentivization of the development of AI and the possibility of misstating the inventor on a

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105.   *See, e.g.*, 35 U.S.C. § 203.

106.   *Id.*

107.   Daryl Lim, *Standard Essential Patents, Trolls, and the Smartphone Wars: Triangulating the End Game*, 119 PENN ST. L. REV. 1, 4 (2014).

108.   *Id.* at 3–4.

109.   *See id.*

110.   *See id.* at 4–5.

111.   *Id.* at 29–30.

112.   *See id.* at 47–48.

113.   *Id.*

114.   *Id.* at 47–48, 48 n.254.

115.   Pearlman, *supra* note 88.

patent application to secure a patent.[116] Finally, and possibly most importantly, the lack of any possibility for the grant of a patent for an AI-created invention will force more actors to pursue trade secrecy for inventions that would otherwise be patented, depriving the world of the disclosure that accompanies a patent application.[117] In addition to precluding disclosure, trade secret protection can last indefinitely,[118] thus denying the public of any benefit derived from an invention entering the public domain.[119]

A. Inventorship

Despite only being a fledgling inventor, AI is solely responsible for an invention in at least one known instance.[120] Moreover, there is some evidence that even though there is only one published instance of a patent application naming an AI inventor, AI has created other inventions and will continue to do so.[121] This evidence alone, coupled with the profound likelihood that AI inventorship will become more pervasive, necessitates an update to US patent law to accommodate and embrace AI inventorship.[122]

B. Inadequacy of Trade Secrecy

Trade secrecy, though an adequate intellectual property regime in some circumstances, poses two significant challenges when applied to AI inventorship.[123] First, the value of trade secrecy is limited to information that can be kept secret.[124] Under the Uniform Trade Secrets Act (UTSA), which has been enacted in some form in the majority of states,[125] information is a trade secret insofar as that information "derives independent economic value . . . from not being generally known, and not being readily ascertainable by proper means"

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116. *See* Abbott, *supra* note 5, at 1085, 1104; Hoffman et al., *supra* note 67, at 197–99.

117. *See* Witek, *supra* note 95; Seymore, *supra* note 14, at 713–15.

118. Witek, *supra* note 95.

119. *See* Seymore, *supra* note 14, at 713–15.

120. Thaler v. Hirshfeld, 558 F. Supp. 3d 238, 241 (E.D. Va. 2021).

121. *See, e.g.*, Abbott, *supra* note 5, at 1083–91.

122. *See* Robinson & Smith, *supra* note 8, at 365.

123. *See infra* notes 124–29.

124. *See* UNIF. TRADE SECRETS ACT, *supra* note 102, § 1(4).

125. *See Trade Secrets Act,* UNIF. L. COMM'N, https://www.uniformlaws.org/committees/community-home?CommunityKey=3a2538fb-e030-4e2d-a9e2-90373dc05792 [https://perma.cc/2XM2-FF7C] (last visited Oct. 18, 2022) (providing a map and accounting of all states where the UTSA has been enacted).

and "is the subject of efforts that are reasonable under the circumstances to maintain its secrecy."[126]

Second, trade secrecy deprives the public of gaining ownership of the invention through the public domain.[127] Unlike the patent regime, which provides protection and exclusive rights for only a limited time,[128] trade secrecy can exist as long as the conditions required for a trade secret exist.[129] In this scenario, inventions created by AI that can be exploited while maintaining their trade secrecy may never make it into the public domain.[130] Such a result eliminates any potential benefits that may flow from public ownership of the invention in question.[131]

Trade secrecy does not maximize benefits to the public in all instances, even though it does provide adequate protection to some owners of AI inventors.[132] Further, relying only on trade secrecy may result in under-incentivizing the use of AI to pursue what would be socially beneficial inventions.[133] In some circumstances, AI's ability to analyze large and complex data sets may lead to innovations that would not be realized in the absence of AI.[134] If AI were not deployed in these situations, the public would be deprived of inventions that it could otherwise benefit from.[135]

Additionally, trade secrecy deprives the public of any knowledge of the invention itself.[136] Though the public may still benefit from the invention to the extent that it can be exploited while maintaining trade secrecy,[137] the public is deprived of the possibility of continued

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126.   UNIF. TRADE SECRETS ACT, *supra* note 102, §1(4).

127.   *See Trade Secrets/Regulatory Data Protection*, U.S. PAT. & TRADEMARK OFF., https://www.uspto.gov/ip-policy/trade-secret-policy [https://perma.cc/7GUG-7QJ6] (last visited Oct. 18, 2022).

128.   *Cf.* 35 U.S.C. § 154(a)(2) ("[S[uch grant shall be for a term beginning on the date on which the patent issues and ending 20 years from the date on which the application for the patent was filed in the United States.").

129.   *Trade Secrets/Regulatory Data Protection*, *supra* note 127; *see* UNIF. TRADE SECRETS ACT, *supra* note 102, §1(4).

130.   *Trade Secrets/Regulatory Data Protection*, *supra* note 127.

131.   *See* Seymore, *supra* note 14, at 713–15.

132.   *See id.* (discussing the benefits of the patent system to the public).

133.   *See* Taylor, *supra* note 64 (describing the role of patent protection in investment decisions).

134.   *See* Pearlman, *supra* note 88, at ¶ 11.

135.   *See id.*

136.   *Trade Secrets/Regulatory Data Protection*, *supra* note 127.

137.   *See, e.g.*, Tierryicah Mitchell, *Shh!! It's a Secret!: Coca-Cola's Recipe Revealed*, WAKE FOREST J. BUS. & INTELL. PROP. LAW (Feb. 28, 2011) (explaining that the Coca-Cola recipe is protected by trade secrecy).

innovation and inventions developed from the primary invention.[138] Importantly, under US patent law, this benefit is realized when the patent application is published to the public,[139] which typically occurs no more than eighteen months after a patent application is submitted.[140]

C. Problems with Recognizing AI Inventorship Under the Current Patent Framework

While there are significant downsides to excluding AI inventorship from patent law, these negative effects do not necessarily support recognizing AI as inventors under the current patent framework.[141] If AI were to be recognized under the current patent framework, several major challenges would arise. First, patent eligibility is largely dependent on non-obviousness as measured against a "person having ordinary skill in the art" (PHOSITA).[142] If the patent system simply adopted AI as an inventor under its current framework with no changes, this concept would be significantly undermined.[143] As AI becomes more widespread, the concept of PHOSITA starts to break down.[144] However, if the standard was modified to account for widespread use of AI, some have observed that everything would become obvious, because the inventing machines would be able to draw connections between all existing prior art, and, therefore, nothing would be patentable.[145] Given AI's capacity to analyze robust and expansive data sets, coupled with the availability of data through electronic sources like the internet, any possible connection or innovation would be obvious to every other PHOSITA aided by AI.[146]

Under the current patent framework, the growing use of AI also challenges the construction of the novelty requirement of patent law.[147] The novelty test also relies on the hypothetical PHOSITA.[148] Given even weak AI's superior ability to analyze data, what would otherwise be inaccessible may in fact be accessible, changing what is novel in the

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138.   Seymore, *supra* note 14, at 714–15.

139.   *Id.* at 714–15.

140.   35 U.S.C. § 122; 37 C.F.R. § 1.211.

141.   *See supra* Section II.B.

142.   Ryan Abbott, *Everything Is Obvious*, 66 U.C.L.A. L. REV. 2, 17–19 (2018).

143.   *See id.*; Dornis, *supra* note 1, at 127–28.

144.   *See* Dornis, *supra* note 1, at 127–28.

145.   *Id.* at 128; *see* Abbott, *supra* note 142, at 34.

146.   Dornis, *supra* note 1, at 127–28.

147.   *Id.* at 126–27.

148.   *Id.* at 127.

context of patent eligibility.[149] This flows from an analysis similar to the obviousness inquiry discussed above.[150] Novelty depends on what references are accessible to the classic PHOSITA.[151] As AI supplements human capabilities and overtakes humans in inventive roles, the scope of what is considered prior art expands significantly.[152]

It is important to note that both of these challenges exist independently of the recognition of AI inventorship.[153] As the use of even Narrow AI expands, the concepts of novelty and non-obviousness are placed under increased tension.[154] However, dealing with these general challenges to patent law with the continued development of technologies is beyond the scope of this Note.

Nonetheless, these challenges are particularly acute in the context of AI inventorship. These tests are built into the statutory framework of US patent law.[155] One major question that arises under the current framework as it relates to recognizing AI inventorship is whether a machine-created invention can ever satisfy the non-obviousness requirement.[156] The requirement that an invention be non-obvious is patent law's way of ensuring that the inventions that are granted patents are deserving of the protection that patents carry.[157] Specifically, the non-obviousness requirement protects against granting patents to inventions that lack the element of creativity that patent law seeks to reward.[158] AI-as-inventor ultimately puts this concept at risk because AI is not exercising creativity in the traditional sense.[159] Much of the power that AI brings is drawing conclusions from large and unwieldy data sets.[160] Ultimately, there is a real possibility that continued development of AI to ever-increasing levels will result in everything being obvious.[161]

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149.   *Id.* at 124–28 (discussing challenges that the emergence of AI presents to patent law generally).

150.   *See supra* notes 144–146 and accompanying text.

151.   Dornis, *supra* note 1, at 126.

152.   *Id.* at 127.

153.   *See id.* at 124–25; Pearlman, *supra* note 88, at ¶ 20.

154.   Dornis, *supra* note 1, at 124–25; Kappos & Kling, *supra* note 20.

155.   *See* 35 U.S.C. §§ 102, 103.

156.   *See* 35 U.S.C. § 103; Abbott, *supra* note 142, at 10–11, 31–33 (discussing the need to evolve the obviousness standard in light of AI's developing role in the inventorship process).

157.   *See* Abbott, *supra* note 142, at 31–33.

158.   *Id.* at 10–11.

159.   *See id.* at 34.

160.   *See* Darrell West & John Allen, *How Artificial Intelligence is Transforming the World*, THE BROOKINGS INST. (Apr. 24, 2018), https://www.brookings.edu/research/how-artificial-intelligence-is-transforming-the-world/ [https://perma.cc/N5Z4-XLM2].

161.   *See* Abbott, *supra* note 142, at 34.

D. Monopolistic Results

Some may think the results discussed above are the natural products of the law; however, with the continued development of AI and the prospect of widespread adoption of General AI, the stakes are different.[162] With the eventual development of General AI, the breadth of invention by AI will likely increase.[163] In this hypothetical future, it is possible that large corporations and other first adopters of AI will be able to control most resulting innovations.[164] This is realistic because patent protection is especially important to smaller companies or individuals that face more challenges when pursuing protection for their developments through trade secrecy.[165] Theoretically, this makes the possibility of patent protection even more important for small companies, innovators, or individuals employing AI in their inventorship pursuits.[166]

The advent and continued development of AI may result in the consolidation of industries based on who first implements effective AI technology.[167] Given the relative costs associated with developing and maintaining AI, it is not unlikely that the first adopters will be existing corporations.[168] Hypothetically, early adopters able to license their AI technology for use by others could include terms claiming ownership of any intellectual property that results from the use of the AI technology as part of the licensing agreement, further compounding the possible monopolization of inventions and corresponding consolidation of industries.[169]

The monopolistic results of failing to recognize AI inventorship run in the face of at least some of the rationale for requiring human inventorship: to limit corporate patent ownership.[170] In that sense, barring patents to AI-generated inventions increases the likelihood that established corporations will be able to reap the benefits of AI while

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162.   *See* Dornis, *supra* note 1, at 128; Kappos & Kling, *supra* note 20, at 265.

163.   *See* HARTMANN ET AL., *supra* note 10, at 101.

164.   Abbott, *supra* note 5, at 1119–20.

165.   *See* Arti K. Rai, Isha Sharma & Christina Silcox, *Accountability, Secrecy, and Innovation in AI-Enabled Clinical Decision Software*, 7 J.L. & BIOSCIENCES 1, 10 (2020) (discussing the role of patent availability as an incentive in the development of AI in the medical context).

166.   *See id.* at 8.

167.   Abbott, *supra* note 5, at 1119–20.

168.   *See id.*

169.   *See id.*

170.   *Id.* at 1098–99.

limiting the possibility of individual ownership due to the significant cost of developing AI technology.[171]

E. Under-Incentivization

Importantly, though the current legal system may offer protection to some AI inventors, it does so without providing the sorts of incentives that underly the reasoning for US patent law and other IP regimes.[172] As it relates to patent law, the US Constitution grants Congress the power to secure for inventors "the exclusive right to their . . . discoveries" in order "to *promote the Progress* of . . . useful Arts."[173] The very constitutional basis of the US patent system is to incentivize, or "promote," continued innovation that leads to new invention.[174] In the case of AI inventors, which cannot be inventors under US patent law,[175] the incentive function that the patent system is constitutionally intended to serve is missing.[176]

Absent any effective IP right to protect these inventions, owners of AI may not be encouraged to pursue the invention in the first place, depriving the world of any benefit it would have brought.[177] Moreover, denying patents to inventions generated by AI may also reduce the investment in the underlying AI technology, thereby slowing or eliminating the development of the technology in the first instance.[178] Absent this incentive, investment in the underlying technologies may be reduced, ultimately leading to development delays that may not occur if AI inventorship were adequately protected by patents.[179]

In the context of AI, the incentives are atypical because the machine itself does not need an incentive to create.[180] However, pursuing the inventions in the first instance still requires an

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171. *See id.* at 1106–07.

172. *See* U.S. CONST. art. 1, § 8, cl. 8; WILLIAM FISHER, THEORIES OF INTELLECTUAL PROPERTY 2–4, https://cyber.harvard.edu/people/tfisher/iptheory.pdf [https://perma.cc/22QR-H6UV] (last visited Oct. 18, 2022).

173. U.S. CONST. art. 1, § 8, cl. 8 (emphasis added).

174. *See id.*

175. Thaler v. Hirshfeld, 558 F. Supp. 3d 238, 247 (E.D. Va. 2021).

176. *See* U.S. CONST. art. 1, § 8, cl. 8.

177. *See* Abbott, *supra* note 5, at 1119–20.

178. *See id.* at 1119.

179. *See* Rai et al., *supra* note 165 (discussing the willingness of venture capital firms to invest given challenges to patenting different technologies).

180. Shlomit Ravid & Xiaoqiong (Jackie) Liu, *When Artificial Intelligence Systems Produce Inventions: An Alternative Model for Patent Law at the 3A ERA*, 39 CARDOZO L. REV. 2215, 2241 (2018).

incentive.[181] This is true in both the context of the initial investment in the AI technology as well as the subsequent application of that technology to inventorship.[182] Importantly, if patents were unavailable to an industry generally, one study shows there may be a resulting decrease in investment in that industry.[183] While this was true across all industries, it was especially true for medical industries including biotechnology, pharmaceuticals, and medical devices.[184]

III. RECOGNIZING AI INVENTORSHIP

The AI inventorship problem challenges some of the fundamental underpinnings of US patent law, and IP law generally.[185] In order to address this problem comprehensively, legislative action is required.[186] Even if the judiciary decided to interpret "inventor" to allow for the recognition of AI inventorship under US patent law,[187] to effectively embrace and incentivize continued invention, patent law in the United States should be modified by Congress to explicitly recognize AI inventorship.[188] This modification should expressly allow for the grant of patents to AI-generated inventions and impose a compulsory license on those patents. In addition, the act should clarify patentability requirements such that the widespread inclusion of AI does not render everything unpatentable.[189]

A. Recognizing AI as an Inventor

The US patent system's functioning will improve if AI is recognized as a possible inventor. Purely from the perspective of having a cohesive and efficient patent system, this is an important step. In at least one known case, a human inventor's name has been substituted for that of an AI machine and successfully received a patent, and this practice may become more widespread.[190] This occurred without the

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181.   *See* Taylor, *supra* note 64.

182.   *See id.* at 2055–57.

183.   *Id.* at 2064–65.

184.   *Id.* at 2064. The data in this study supports more than the hypothetical proposition that firms would choose to direct investments elsewhere and shows that in the wake of certain Supreme Court holdings negatively affecting patentable subject matter that there has been a subsequent shifting of investments away from the impacted industries. *Id.* at 2074–75.

185.   *See supra* Section II.C for a discussion of the challenges presented by AI inventorship.

186.   *See* Thaler v. Hirshfeld, 558 F. Supp. 3d 238, 249 (E.D. Va. 2021).

187.   *But see id.*

188.   *See, e.g.*, Abbott, *supra* note 5, at 1103–05; Dornis, *supra* note 1, at 147.

189.   *See supra* Section II.C; Dornis, *supra* note 1, at 124–28; Abbott, *supra* note 142, at 34.

190.   Abbott, *supra* note 5, at 1084–85.

knowledge of the USPTO, despite the fact that the USPTO has expressed that AI cannot be an inventor for the purposes of US patent law.[191] Although this patent may have faced a plausible validity challenge on these grounds, it would have required that the patent first be challenged.[192]

Recognizing AI as an inventor for the purposes of patent law solves many of the problems AI presents to the current patent law framework. First, recognizing AI inventorship removes the incentive to misstate the inventor for the purposes of receiving patent protection.[193] While patents with a misstated inventor would likely be found invalid if challenged, they have been issued and therefore carry a presumption of validity.[194] To overturn this, a patent must first be challenged, in which case the challenging party carries the burden of proof to show the patent is invalid.[195] Despite the validity challenges that actions like this give rise to, the efficiency of the patent system is best served by limiting any incentive to act fraudulently in the prosecution process.[196]

Allowing AI to be an inventor under US patent law also provides an incentive, to the extent it is necessary, to employ AI in the inventive process.[197] While this incentive may only play a small role in incentivizing the use of AI, as evidenced by the fact that companies and individuals are already using AI as inventive tools,[198] the incentive effect may lead to productive uses of AI that would otherwise not exist.[199] Regardless of the quality of these inventions, incentives that lead to their creation ultimately serve the underlying goals of the patent system.[200]

Embracing AI inventorship in US patent law, however, provides benefits beyond simply encouraging the continued and expanded use of AI in the inventive process.[201] Primarily, recognizing AI inventorship and providing patent protection serves patent law's goal of moving innovations and inventions into the public domain.[202] In order to do this,

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191. *Id.* at 1085; *Thaler*, 558 F. Supp. 3d at 249.

192. 35 U.S.C. § 282; *see* Abbott *supra* note 5, at 1085.

193. *See, e.g.*, Abbott, *supra* note 5, at 1085–88 (discussing instances in which a patent has been issued to a human inventor who has later described a machine as the inventor).

194. 35 U.S.C. § 282.

195. *Id.*

196. *See id.*; Abbott, *supra* note 5, at 1103–05.

197. Abbott, *supra* note 5, at 1103–05.

198. *See, e.g.*, *id.* at 1085–88.

199. *See id.* at 1103–05; Taylor, *supra* note 64.

200. *See* Seymore, *supra* note 14, at 713–16.

201. *See* Bonito Boats v. Thunder Craft Boats, 489 U.S. 141, 151 (1989).

202. *See id.*

individuals using AI in the inventive process must first receive a realistic and desirable option sufficient to entice the disclosure. Patent law, if constructed properly, can serve this purpose for AI-created inventions.[203] In fact, this is the very "bargain" that the system is built on.[204]

As at least one study shows, any exclusive protection provides an incentive for both investment in the inventive process and in decisions to pursue patent protection.[205] This supports the argument that having any level of patent protection for an invention creates investment incentives that will ultimately provide the capital necessary to create inventions.[206] Given the constitutional basis for US patent law,[207] this move makes sense and is the natural progression in the face of new technologies. The constitutional grant limits this power to "securing for limited Times to . . . *Inventors* the exclusive Right to their . . . Discoveries."[208] The patent statutes have been drafted and interpreted such that "inventors" are limited to natural persons.[209] However, given the purpose of patent law, it makes sense to reconsider the limitations with the advent and expanded use of new technologies that can significantly impact the inventive process. Recognizing AI as an inventor for the purposes of patent protection provides incentives to use AI as robustly as is feasible in the inventive process, thus better serving the goal of the US patent system.[210]

The goal of moving inventions into the public domain is realized in two ways by the patent system.[211] This manifests through public ownership at the end of the patent period and through the disclosure of the patent application itself.[212] While the importance of the first of these steps cannot be understated, the value of the initial public disclosure is increased in a world with substantial AI involvement.[213] It is likely that widespread adoption of AI in inventorship processes will result in increased incremental inventions due to its ability to analyze large data sets and make connections that are beyond the ability of AI inventors'

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203.   *See* Taylor, *supra* note 64.
204.   Bonito Boats, 489 U.S. at 150–51; Seymore, *supra* note 14.
205.   Taylor, *supra* note 64.
206.   *See id.*
207.   U.S. CONST. art. I, § 8, cl. 8.
208.   *Id.* (emphasis added).
209.   *Id.*; 35 U.S.C. §§ 100(f), 101; HARTMANN ET AL., *supra* note 10, at 101.
210.   *See* U.S. CONST. art. I, § 8, cl. 8.
211.   Seymore, *supra* note 14, at 713.
212.   *Id.*
213.   *See* Seymore, *supra* note 14, at 713; HARTMANN ET AL., *supra* note 10, at 113.

human analogs.[214] In this context, the initial disclosure that comes approximately eighteen months after a patent application provides additional data points from which other AI can continue to innovate.[215] Even if these new innovations do not lead to patentable inventions,[216] the innovations and inventions themselves provide a public good by improving the devices, processes, and knowledge available and in use by society.[217]

Though it is not possible under the current patent law's statutes and judicial interpretations, recognizing AI inventorship serves the primary purpose of US patent law: "To promote the Progress of . . . useful Arts."[218] Given this goal, it does not follow that an entire class of artificial inventors should be excluded.[219] While it is true that AI itself does not need the incentives that a human inventor needs, the goal of patent law is not just to promote the pursuit of inventions but also to promote their disclosure and public use.[220] Recognizing AI inventorship in US patent law is a significant step towards achieving these goals.[221]

B. Compulsory License

While this Note argues that it is important that US patent law recognize AI as an inventor,[222] it is also important to account for the fact that AI inventors are not human inventors and treating them as such does not serve the goals of the patent system. First, the machines themselves do not require an incentive to invent or even disclose, but rather the humans or companies that direct them require incentivization.[223] Additionally, recognizing AI inventorship may have some level of monopolization effect.[224] Even without the possibility of countering these negative effects, this Note still argues for recognizing AI inventorship. However, this Note contends that Congress should

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214.   HARTMANN ET AL., *supra* note 10, at 101.

215.   *See* Seymore, *supra* note 14; HARTMANN ET AL., *supra* note 10, at 101.

216.   For example, it is not inconceivable that an incremental innovation that results from connecting two pieces of prior art would not be patentable due to its obviousness. 35 U.S.C. § 103.

217.   HARTMANN ET AL., *supra* note 10, at 101.

218.   U.S. CONST. art. I, § 8, cl. 8; HARTMANN ET AL., *supra* note 10, at 101.

219.   *See* 35 U.S.C. §§ 100(f), 101.

220.   Bonito Boats, Inc. v. Thunder Craft Boats, Inc., 489 U.S. 141, 151 (1989); Seymore, *supra* note 14, at 713.

221.   *See* Robinson & Smith, *supra* note 8, at 359.

222.   *See supra* Section III.A.

223.   *See* Hoffman et al., *supra* note 67, at 198; Taylor, *supra* note 64.

224.   *See* Abbott, *supra* note 5, at 1119–20.

impose a compulsory license on inventions created by AI to adequately protect against the harms that recognizing AI inventorship may cause.

Seeking patent protection requires an affirmative choice to submit a patent application.[225] When the owner of an invention faces a choice between trade secrecy and patent protection, they need to be incentivized to choose patent protection, due to the shortened period of exclusivity and disclosure requirements it carries compared to the indefinite protection that trade secrecy offers.[226] There is some evidence that, at least as it relates to investing in opportunities, including any opportunity for financial recovery or patentability provides adequate incentives to pursue patent protection at the outset.[227] Imposing reasonable licensing terms ensures that patent owners have adequate opportunity to recoup their investment and makes it more likely that inventors choose patent protection when compared to a compulsory license with a single, government specified licensing fee.[228]

To address the monopolization concerns that exist in the context of AI systems regardless of their recognition as inventors,[229] a compulsory license should be applied to AI-generated inventions. Instituting a compulsory license allows for the productive use of AI while still allowing those who initially pursue the invention compensation.[230] A compulsory license, however, limits the exclusive power that a patent confers by limiting the choice of who can be excluded.[231] Under a compulsory licensing regime, the only individuals or entities that can be prevented from practicing the invention are those who do not pay the defined royalty;[232] the patent owner cannot choose to exclude an entity for any other reason.[233] Assuming that the royalty rate is reasonable,[234] this would not serve as a significant bar to competition, but would still provide a monetary incentive to seek patent protection.

Implementing a compulsory licensing system for patents on inventions created by AI would also limit the blocking effect that patents can have; a patent owner subject to a compulsory license cannot

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225.   Seymore, *supra* note 14, at 721.

226.   *Id.* at 713–14.

227.   *See* Taylor, *supra* note 64, at 2057.

228.   *See id.*; Lim, *supra* note 107, at 47.

229.   *See* Dornis, *supra* note 1, at 139.

230.   *See* Lim, *supra* note 107, at 47.

231.   *See* 35 U.S.C. § 271 (defining what constitutes patent infringement); Reinsch, *supra* note 104.

232.   *See* Lim, *supra* note 107, at 47.

233.   *See id.*

234.   This Note argues for the use of FRAND licensing terms. *See infra* Section III.B.1.

use their patent to "block" any future innovation that requires a use that would infringe the original patent in the absence of a license.[235] In the context of AI-generated inventions and their patentability, the most probable result of AI inventorship is that AI will be responsible for small, incremental innovations.[236] In this scenario, in order to realize the full benefits that the increased deployment of AI may lead to, it is important that AI be able to work on the entirety of pre-existing art.[237] Compulsory licensing solves this problem, at least to the extent that the underlying blocking patent was invented by AI, because there would be a requirement that the AI-invented blocking patent be licensed. Moreover, a compulsory license prevents any new AI-generated inventions that receive a patent from assuming a blocking role. By ensuring that AI-created inventions cannot hinder innovation and invention in any particular field, a compulsory license works towards patent law's incentive goals.[238]

However, the compulsory license contemplated by this Note should only be applied to patents granted to AI as inventor, and not to AI-assisted inventions.[239] In the context of inventions that include humans in the inventive step,[240] the concerns that exist with AI as sole inventor are diminished. Moreover, the incentives the current patent law framework intends to provide are still necessary when legitimate human effort and inventiveness are required, as is the case when AI is used only as an aid to invention.

1. License Pricing Models

There are numerous possible pricing models applicable to a compulsory license. Some examples include assigning a flat royalty rate, assessing a flat fee, or applying FRAND licensing terms.[241] Though a detailed analysis of the benefits of all possible pricing models is beyond the scope of this Note, a brief analysis of the recommended FRAND pricing structure follows.

In recognition of the fact that the value, utility, and effort required to invent varies from invention to invention, the terms of the

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235.   *See* Ian Simmons, Patrick Lynch & Theodore Frank, *"I Know It When I See It": Defining and Demonstrating "Blocking Patents"*, 16 ANTITRUST 48, 48–49 (Summer 2002) (providing a detailed explanation and definition of blocking patents).

236.   HARTMANN ET AL., *supra* note 10, at 101.

237.   *See id.*

238.   *See* U.S. CONST. art. I, § 8, cl. 8.

239.   *See* HARTMANN ET AL., *supra* note 10, at 102 (discussing the distinction between AI-assisted inventions and AI-created inventions).

240.   *See id.*

241.   *See* Lim, *supra* note 107, at 4.

compulsory license should be reasonable under the circumstances. Requiring reasonable licensing terms would allow for companies or individuals who own the patents that result from AI inventorship to ensure that the value of their invention is recognized in the licensing terms.[242] Additionally, enforcing reasonable licensing terms allows potential licensees uninhibited access to use patents at a reasonable price.[243] Conversely, ensuring that patent owners have adequate opportunity to financially exploit their patents creates adequate incentives to innovate and develop the technologies that will lead to AI inventorship.[244] Patent holders and those practicing in the particular field are the best suited to determine a fair and reasonable royalty rate and should therefore be provided the opportunity to do so in the first instance.[245] Only when the system fails should the judiciary be used to set a rate.

Though requiring reasonable licensing terms seems to provide the best financial incentive while balancing the desire to overcome exclusionary effects, it can also be time intensive to establish what FRAND is because it is fact dependent.[246] Since FRAND licensing terms allow for flexibility in valuing the license and defining other terms, they may lead to disagreements as to what "fair, reasonable, and non-discriminatory" terms are.[247] Ultimately, these disputes may end in litigation, increasing the need for judicial resources and potentially excluding those who cannot afford the process.[248]

Applying a flat royalty rate simplifies the issue of determining which rate would apply but raises two potential problems. First, there will be some challenges as to what the rate would be based on, which will inevitably result in disputes over accounting practices.[249] Additionally, a flat rate does not recognize the value of the patented invention but instead would rely on cost measures that may or may not be linked to the value of the underlying invention.[250] For instance, if a particular invention itself is not that valuable, but either required significant research and development costs or requires an expensive

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242.   *See* HARTMANN ET AL., *supra* note 10, at 37–38.

243.   *See* Victor, *supra* note 103, at 937.

244.   *See id.*

245.   *See* Lim, *supra* note 107, at 35–38, 48.

246.   *See id.*

247.   *See, e.g.*, *Broadcom Corp. v. Qualcomm Inc.*, 501 F.3d 297, 314 (3d Cir. 2007) (holding that failure to comply with FRAND licensing commitments may give rise to competitive harm in the context of antitrust law).

248.   *See id.*

249.   *See* Lim, *supra* note 107, at 35–38.

250.   *See* Victor, *supra* note 103, at 936.

process for production, the royalty rate may result in overpayment for the underlying intellectual property. Conversely, if the invention itself has significant value but took little resources to create or costs little to exploit, a flat royalty rate would result in underpayment for the value of the patent. In a system that seeks to provide adequate incentives to pursue patent protection while simultaneously providing adequate access to the public, a flat royalty system does not seem to provide the necessary balance.[251] Copyright law implemented a similar model in its enactment of the mechanical license.[252] However, unlike in the realm of copyright law, where there is no alternative protection for rightsholders in songs, individuals or companies considering whether to seek patent protection for their inventions often have an alternative: trade secrecy.[253] In this context, issues with valuation of a compulsory license may determine the outcome of the decision of whether to pursue patent protection for the invention.[254]

Similarly, applying a flat fee would likely not provide the adequate protection and access necessary to create a coherent and efficient system. If the established fee is too low, individuals or companies exploiting AI to create innovations will not be adequately incentivized to pursue patent protection for their inventions. In contrast, if the royalty fee is set too high, it could overcompensate those whose inventions are in and of themselves not that valuable or, alternatively, prevent their productive use by limiting the market for them.

A deeper cost-benefit analysis of the applied pricing model is recommended prior to the implementation of the compulsory license. This Note recommends applying FRAND licensing terms because of their flexibility, but the ultimate choice of which pricing model to enact must address many competing considerations and will involve a normative decision as to the value the United States wants to provide AI-generated inventions. This is best handled through the legislative process, where the opinions of the general population of the United States can best be effectuated.

C. Other Changes to the Patent System

The development and increasing use of AI as inventors poses challenges beyond the inventorship issues discussed in this Note, for

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251.   *See* Reinsch, *supra* note 104.

252.   17 U.S.C. § 115.

253.   *See* Seymore, *supra* note 14, at 713–14.

254.   *See* Victor, *supra* note 103, at 938.

instance, in the definition of a PHOSITA.[255] In fact, many of the substantial challenges to the patent system presented by AI exist independently from recognizing AI as an inventor. It is beyond the scope of this Note to make any substantial recommendations with respect to each of these numerous challenges.[256] However, these issues should be addressed rather than being treated as bars to recognizing AI inventorship. To the extent it is possible, some criteria may be modified only in the context of AI-created inventions.

IV. CONCLUSION

The development and increasing use of AI presents numerous challenges to the current US patent system.[257] One of these challenges is how to treat AI-created inventions.[258] The US patent statute currently limits inventorship to natural humans.[259] However, to continue to serve the goals of the patent system,[260] Congress should remove this limitation and recognize AI inventorship.[261] Embracing AI inventorship provides incentives for pursuit of AI-created inventions and, perhaps most importantly, for disclosing those inventions.[262] To address some of the negative effects of recognizing AI as an inventor and in recognition of the modified incentives at play in this scenario, patents granted to AI inventors should include a compulsory license.[263] Only by embracing the adoption of this new technology can the US patent system most effectively "Promote the Progress of . . . useful Arts."[264]

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