INVENTORSHIP IN THE ALGORITHMIC ERA: A LEGAL ANALYSIS OF PATENTABILITY STANDARDS FOR AI GENERATED OUTPUTS

Abhishek Kumar, LLM (IPR), National Law University, Delhi[1]

ABSTRACT

The Industry 4.0 revolution has been the main cause of the integration of AI into manufacturing. As a couple of effects, this revolution has necessitated the establishment of a strong intellectual property (IP) sector, which should be able to embrace AI technology for national economic growth. This research paper interrogates the existing patent system and highlights the pivotal issue of attributing inventor status to AI in a scenario of AI-generated inventions. Based on the analysis technological innovations are considered as the main enablers in this field with Artificial Neural Networks (ANN), Convolutional Neural Networks (CNN) and Fuzzy Logic being the most cited ones. Extensive research is conducted on the current legal repercussions of AI inventorship in the U.S. and India, demonstrating that traditional judicial procedures in rejecting the recognition of AI as an inventor. They insist that a natural person only fits the definition of an inventor. This study discards the conventional method and posits that the notion of AI as an inventor should not be simply rejected. It is proposed that AI should be allowed exclusive patent rights, especially when the invention is made autonomously without any human intervention. The writer supports the transformation of the old court perspective that considers AI just an instrument into one that paves the way for further patenting development. The article suggests that the Impediments of the U.S. patent system should lead to consideration of AI as an artificial person, and thus machine rights should be acknowledged, by the parties to International Agreements such as the TRIPS Agreement. Such a necessary paradigm shift can make courts more progressive and foster the development of the IP environment. In order to deal with the financial side of the problem of AI inventorship, a groundbreaking assignability model is put forward. This model indicates the rightful recipients of a patent generated by AI, especially differentiating between Active parties and Disruptive/Silent parties. The model recommends that AI patents should be assigned to active users of AI as they will be the ones who will be most willing to not only achieve maximum economic returns but also to promote the invention for the public benefit,

[1] LL.M. (IPR) (2025-2026), National Law University Delhi

thus making the potential of AI being considered as an inventor a plausible eventuality. The paper ends by proposing a future structure and giving suggestions derived from the research.

Keywords: Artificial Intelligence (AI), Artificial Neural Networks (ANN), AI-Generated Invention, Inventorship, Patent

1. INTRODUCTION

The invention with the application of AI is the future of the innovation and technological progress in this era. The Sustainable Development Goals (SDGs) give aimed goals on safeguarding resources and creating ecosystems to serve the current and forthcoming generations and these include equal resource allocation to individuals and the idea of intergenerational equity.[2] Patent system also is going to be global as a result of interrelation of people across borders. The intellectual property sector has promoted sustainable industrialization and inventiveness in this sector as is envisaged in Goal 9 of the SDGs.

AI is regarded as a new technology in various industries such as banking, transport, and healthcare. The AI technology has been viewed as a contemporary method of processing information and interpreting machine-facilitated information. Moreover, it is capable of acting as a human brain and reacting to the situations that it has been trained to react to.[3] The field of patenting is concerned with innovation and development by technology and this field encourages the use of AI in technological innovation. Another emerging solution to the Intellectual Property Rights (IPR) arena is invention by AI and treat AI as an inventor of an invention.

The conventional US court approach toward the inventor of AI generated inventions is well known as a public domain in which the courts have declined to acknowledge AI as the inventor of the said inventions saying that only a human being or natural person can be an inventor. This paper will argue against this conventional method to AI generated inventions and suggest that AI should be given exclusive rights to patent under the conditions of the absence of any human intervention. It is believed that AI technology is able to run without the involvement of humans and produce inventions that will improve technological development of the country.

[2] United Nations General Assembly, *Transforming Our World: The 2030 Agenda for Sustainable Development* (A/RES/70/1, 21 October 2015) Goals 9 and 12.
[3] Ryan Abbot, 'I Think, Therefore I Invent: Creative Computers and the Future of Patent Law' (2016) 57 *Boston College Law Review* 1079, 1095–1105.

OBJECTIVES OF THE STUDY

- The paper lists the various AI technologies that can be applied to the patent domain to produce an AI generated invention.
- The paper examines the current legal frameworks pertaining to inventorship of AI generated inventions in the United States and India.
- A model about the assignability of patents has been presented, which outlines the types of individuals to whom the patent office may assign such an invention.
- Future recommendations have been made based on the findings.

The research's second section addresses enabling technologies in patents, while the third section addresses the legal ramifications of inventorship under the patent regime. AI as the creator of the AI generated invention is covered in Section 4. Section 5 wraps up the paper's discussion while Section 6 offers recommendations.

RESEARCH QUESTION

1. What AI technologies, such as Artificial Neural Networks (ANN), Convolutional Neural Networks (CNN), and Fuzzy Logic enable the generation of patentable inventions in the algorithmic era?
2. How do current legal frameworks in the United States and India define inventorship and why do they restrict it to natural persons?
3. Can AI qualify as an inventor for autonomously generated outputs without human intervention, and what doctrinal and policy implications arise from reinterpreting "inventor" beyond natural persons?

2. RESEARCH METHODOLOGY

This research methodology is doctrinal in nature employing qualitative methods to develop an analytical research plan that provides a structured approach to evaluating the impact of artificial intelligence on patent law, analyzing the patentability of AI generated works.

3. FROM FOUDATIONAL TOOLS TO MARKET DISRUPTIORS: PATENT LAW IMPLICATIONS OF ENABLING TECHNOLOGIES

The term artificial intelligence (AI) includes any technology that can act like a human brain. This includes technologies such as machine learning, deep learning, data mining and fuzzy logic. In this mechanism, machines are trained in such a way that they learn from experiences adapt themselves and work. These machines work when a large amount of data is put into them and they are given the task of working through that data. AI is involved in activities that require human intelligence.[4] Common AI technologies include machine learning which can be further divided into artificial neural networks (ANN) and convolutional neural networks (CNN). These neural networks are trained to mimic the activities of the human brain and learn from experiences. These neural networks have greater data handling capabilities to perform complex activities and produce better results. These neural networks can also be incorporated into patented systems to make inventions that are new and have industrial applications.

Fuzzy logic technology is considered to be an advanced form of traditional or classical logical system. It creates a model that aims to produce logic based or rational results which is considered to be an intrinsic ability of the human mind. It uses a decision-making algorithm instead of giving binary results as true or false.[5] The fuzzy system also adapts itself to a particular situation so that there is no interruption in the process even in the absence of rules or expert instructions. This model can be used to derive a rational result by solving difficult problems. The patent system advocates technological advancement for the benefit of society and this need can be met by using fuzzy logic technology in the patent system to make inventions that can be game changers for society.

4. FROM CONTRIBUTION TO CREDIT: UNDERSTANDING THE LEGAL IMPLICATIONS OF INVENTORSHIP IN PATENT LAW

A patent is a form of IP which gives the holder exclusive rights over the invention. There are certain requirements for granting a patent including:

- Patentable subject matter - This requirement classifies the category of works that can be considered as inventions. The court considers that laws of nature physical

[4] Stuart Russell & Peter Norvig, *Artificial Intelligence: A Modern Approach* 1–5 (4th ed. 2021).
[5] Lotfi A. Zadeh, Fuzzy Sets, 8 *Information & Control* 338, 338–53 (1965).

phenomena and abstract ideas are not patentable.[6] The U.S. Supreme Court stated that "Congress intended to include everything created under the sun that man has created."[7]

- Utility - The second requirement is to decide whether such an invention has a useful purpose and the invention should be put to practical use.[8]

- Innovation - The invention should not be known to others or used by others and it should be a new product or process.[9]

- Non-obviousness - The subject matter of which the patent is being sought should not be obvious to a person of ordinary skill in that art.[10]

Position in US

According to the America Invents Act, patents can be granted on the following subject matter: Whomsoever invents or discovers any new and useful process, machine, manufacture, or composition of matter or any new and useful improvement thereof may take a patent therefor under the conditions and requirements of this title.[11] The inventor is not a specific term defined by the US patent law. According to the Manual of Patent Examining Procedure provided by the USPTO[12], the most important question in the inventorship determination is the person who conceived the invention and unless a person makes a contribution to the invention conception, he or she cannot be considered an inventor. The patent law specifically provides that people are inventors. This implies that corporations are not inventors. The one that does the conceiving of an invention is the inventor and him or her is usually a natural man.

The courts have given the meaning of the word conception. In *Townsend v. Smith*[13] stated that the concept of conception was defined as the full execution of the mental component of the inventive act and the development of a fixed and enduring conception in the mind of the inventor of the entire and working invention to be used in practice. In *Hybritech Inc. v.*

[6] Diamond v. Chakrabarty, 447 U.S. 303, 309 (1980).
[7] Id. at 309 (quoting S. Rep. No. 82-1979, at 5 (1952)).
[8] 35 U.S.C. § 101 (2018); Brenner v. Manson, 383 U.S. 519, 534–35 (1966).
[9] 35 U.S.C. § 102 (2018).
[10] 35 U.S.C. § 103 (2018); Graham v. John Deere Co., 383 U.S. 1, 17–18 (1966).
[11] 35 U.S.C. § 101 (2018).
[12] Manual of Patent Examining Procedure § 2137.01 (U.S. Pat. & Trademark Off. 9th ed. Rev. 10.2019).
[13] Townsend v. Smith, 36 F.2d 292, 295 (C.C.P.A. 1929).

Monoclonal Antibodies Inc.[14], the court noticed that conception is the pivotal formation of a mind of the inventor of an uncompromising and lasting idea of the entire and effectual invention, as it will be put into practice. In *Hiatt v. Ziegler*[15], According to the court Ziegler noted that conception occurs when the invention has become so evident that someone knowledgeable in the art will be able to bring it into practice without having to undergo much experimentation or use their inventive skills.

The definition on the U.S. Code on Patents concerning joint inventors in particular mentions as follows: "An invention may have joint inventors, whereby each has made a contribution of conception independently to at least one component, feature, or limitation of the invention." These definitions show that an inventive act needs an inventive mind, therefore, an inventor is a natural kind of person. An inventor is hence not a business entity or corporation and any other organization. This was decided by the Federal Circuit in the case of *Beech Aircraft Corp. v. EDO Corp.*[16] where it stated that inventors must be natural persons. An inventor is not a person who works by creating a prototype with the guidance of the other. In 1952, the Congress indicated that the subject matter of a patent is anything under the sun that is made by man. This assertion is an indication of the will of the lawmakers on the extent of the Patent Act and that the human being is the only one who can be considered as an author of the work. The right of owning an invention is as a result of invention. The ownership entails the right to receive patent protection, and the owner registers the patent. Those rights may be assigned by the owner. In the case of joint inventors, the rights are assigned by contract and the company is presumed to be the owner of the invention, when these joint inventors are both workers in the same company. When two firms are working on a patent together, they jointly own the invention. All companies share the undivided interest in the patent and can exercise the rights without the participation of the other company. In the case of the *HIP Inc. v. Hormel Foods Corp.*[17] the District Court held that joint inventor status is possible through the contribution to the invention.

Position in India

A patent application is submitted by the inventor of the invention, making it essential to address

[14] Hybritech Inc. v. Monoclonal Antibodies, Inc., 802 F.2d 1367, 1376 (Fed. Cir. 1986).
[15] Hiatt v. Ziegler, 179 U.S.P.Q. 757, 763 (B.P.A.I. 1973).
[16] Beech Aircraft Corp. v. EDO Corp., 990 F.2d 1237, 1248 (Fed. Cir. 1993).
[17] HIP, Inc. v. Hormel Foods Corp., 66 F.4th 1346, 1353–55 (Fed. Cir. 2023).

questions concerning inventorship. Typically, an inventor is characterized as an individual who has made a substantial contribution to the conception of the invention. The term 'conception' encompasses the development of the idea, the methodology employed for the clarity of the invention, and the element of practical utility.

There are specific criteria that can be used to ascertain who cannot be regarded as an inventor, which include:

1. If an individual has only provided suggestions;

2. If an individual has operated under the guidance of the inventor;

3. If an individual's contribution is restricted to offering advice for conducting experiments;

Section 6 of the Indian Patents Act[18] provides the list of the people who can apply to get a patent in India. The invention should be the invention of the first and real inventor. Section 2(1)(y)[19] has a definition of true and first inventor as follows - a person other than the first importer of an invention into India, or a person to whom an invention has been first communicated outside India. The Act however fails to specifically state what is meant by the terms in inventor or inventorship and so they can be subject to a subjective interpretation.[20]

The question of inventorship should be addressed in scenarios where there is more than one person in the invention and in cases of employer-employee relationships. *Mohammed Ibrahim v. V.B. Mohammed Ibrahim 1985*[21], According to the ruling made by Alfred Shefernik, the court held that the plaintiff has not provided any portion of his talent or ability or technical expertise or even the act of making financial contribution to perform the experiments and therefore the plaintiff could not be recognized as an inventor. The court further added that a corporation or a financial partner cannot be the sole inventor and it is only a natural person who puts his expertise and knowledge to the innovation and can claim inventorship. The challenge of determining inventorship when multiple contributors are involved poses difficulties for the courts. In the case of *National Institute of Virology v. Smt. Vandana S. Bhide*[22], the Patent Controller addressed the question of "who qualifies as an inventor" and

[18] The Patents Act, No. 39 of 1970, § 6 (India).
[19] Id. § 2(1)(y).
[20] Shamnad Basheer, *Intellectual Property Law* 296–98 (2d ed. 2012).
[21] Mohammed Ibrahim v. V.B. Mohammed Ibrahim, A.I.R. 1985 Mad. 233.
[22] Nat'l Inst. of Virology v. Smt. Vandana S. Bhide, Order No. 16/2012 (Controller of Patents, India).

indicated that several factors must be taken into account when identifying an inventor, including:

1. The individual must have made an intellectual contribution towards achieving the final results of the invention.

2. A person who has not contributed to the invention's development cannot be recognized as an inventor.

3. If an inventor seeks assistance from another individual for conducting experiments or fabricating equipment without any intellectual input, that individual will not be regarded as an inventor.

Additionally, the court made a distinction between an inventor and hired personnel. It noted that being an author of an article may signify a contribution to the writing of the paper, but it does not serve as evidence of being an inventor in a patent application. Consequently, several factors must be evaluated to determine inventorship, including:

1. If an individual contributes an idea that subsequently evolves into an invention, that individual will be recognized as an inventor.

2. If a person has made a technical contribution that lacks novelty, they cannot be deemed an inventor, as such a technical suggestion may represent routine laboratory work, which a skilled individual might already know.[23]

3. If the technical contribution is novel, then that individual can be acknowledged as an inventor, as their contribution has transformed the idea into practical application, resulting in an invention.

The legal rationale for granting patent rights to an "inventor" was elucidated in the Ayyangar Committee Report of 1959.[24] The report states that even if an individual does not possess full legal ownership of an invention, they may still be recognized as an 'inventor' if they hold moral rights. The aim is to grant inventors the financial rewards they are legally entitled to, even if agreements limit their specific rights. Currently, AI cannot be granted either moral or legal

[23] Bishwanath Prasad Radhey Shyam v. Hindustan Metal Indus., (1979) 2 S.C.C. 511, 522–23 (India).
[24] N. Rajagopala Ayyangar, *Report on the Revision of the Patents Law* ¶¶ 31–33 (1959).

rights.

5. CAN AI BE AN INVENTOR? LEGAL, DOCTRINAL, AND POLICY IMPLICATIONS FOR PATENT SYSTEMS

The existing patent regime stipulates that an invention must be novel, possess industrial applicability, and qualify as patentable subject matter. These criteria are essential for patent registration. Traditionally, the ownership of a patent or the determination of inventorship has favored the 'individual who is the inventor.' The term 'person' encompasses natural persons, juristic entities, and legal entities capable of being sued or having the capacity to sue.[25]

There comes a relevant question whether AI can be considered a person or not as machines have not been identified as possessing legal rights. Different laws suggest that a human individual or a natural person can be granted a patent in case an invention has been created with the help of AI. At present, no case laws or statutes exist which acknowledge a computer program or AI as an inventor of an invention.[26]

In the case of *Thaler v. Vidal*[27], The court affirmed that an inventor must be a natural person, and it is impossible to consider AI an inventor in such cases when the invention is produced with the help of AI. The point that AI may also have a patent is justified by the fact discovered by the US Supreme Court in *Goldstein v. California*[28], the court observed that such terms as authors and inventors could not be read in a limited way but was supposed to be read in a broad manner to correspond to the constitutional provisions. Such an observation has brought in new opinions, that AI can be given inventorship in a situation where an invention is made solely by AI, and there is no human intervention.

Although it is a well-known fact that information is usually fed in the AI systems by human intervention, it does not make humans the sole owners of the right to be considered the creators of patentable inventions. The basic qualification to invent something is that a significant contribution should be made toward the invention. It is known that AI patents lead to innovation and creation of inventive machines, which will give a positive contribution to the technological advancement. This is held to mean that there has to be a clear and fixed concept

[25] Salomon v. A. Salomon & Co. Ltd., [1897] A.C. 22 (H.L.).
[26] Thaler v. Vidal, 43 F.4th 1207, 1213–15 (Fed. Cir. 2022).
[27] Thaler v. Vidal, 43 F.4th 1207 (Fed. Cir. 2022), cert. denied, 143 S. Ct. 1783 (2023).
[28] Goldstein v. California, 412 U.S. 546, 561 (1973).

of the invention, which is sufficiently well-known to a skilled person to carry out or make the invention actually work, even without need of experimentation.

The major question to ask is who will be the economic beneficiary of the innovation should a patent be granted to AI. It is believed that patent ownership of AI will give rise to the patent ownership dispute. The best solution would be to have the Patent Office license or assign the AI-generated patent to users of AI, including those who use AI to come up with new inventions. This model helps in keeping the innovation in the open source where the natural individual who has assigned or licensed it can get economic benefits out of the invention created by AI. It is this framework that renders the potential of AI being considered an inventor a realistic eventuality.

Invention created through AI is ineligible to be inventorship, AI machines are not treated as natural persons. Laws, natural phenomena and abstract ideas cannot be patented because it is a limitation of patentability. This has hence brought the burden on inventors to demonstrate the presence of the inventive concept.[29] In the example of Dr. Koza, the patent was granted even after he admitted that all the invention, so-called machine, was a computer/artificial intelligence invention. This implies that regardless of the method used to come up with the idea, only natural individuals are issued patents by the USPTO.

The rationale of considering AI as an inventor is based on its inherent cognitive capacity to reason and react just like a human mind, and excellent data processing functions. Opponents of the idea of awarding AI ownership rights in patenting argue that the AI system cannot be used without human intervention since a human has to feed the machine with information or guide it in working.

Nonetheless, the argument may be refuted by the fact that technological progress and in particular development of machine learning makes the systems change and work upon the experience that they have without further data input. It is therefore a possibility that someday, human intervention will not be a major concern in the running of the AI systems hence they can operate independently. Artificial Neural Networks (ANN)[30] in its technology resembles the way humans think, and this technology can come up with new inventions, which can cause

[29] Diamond v. Chakrabarty, 447 U.S. 303, 309 (1980); Alice Corp. v. CLS Bank Int'l, 573 U.S. 208, 216–17 (2014).
[30] Stuart Russell & Peter Norvig, *Artificial Intelligence: A Modern Approach* 727–30 (4th ed. 2021).

a tremendous change in the technology in the society.

The issue of the use of AI-generated inventions in the future arises when the inventorship is reflected on the AI. In order to maximize the success of such innovations and to get the economic benefits of the invention, it is necessary that it should be presented to the common sphere, making it available to its application in the technological development. This study provides a system of knowing who would rightfully get the invention of the assignor, in this case, the AI. There are certain types of persons that can or cannot claim patent rights. One can only do this assignment process to those who are eager to maximize the economic returns that are related to the inventions.

These two groups of people exist (i) Active parties and (ii) Disruptive/Silent parties.

The disruptive or silent parties are the ones who never have a reason to make an income out of the invention and are instead interested in the invention not leaking into the public sphere. Such people hinder the process of patenting and this reduces the value of the patent. Since a patent comes with benefits that bear enormous economic worth in the future use of the invention it has been noted that organizations that fail to actively participate in the market and those that do not intend to do so in the future do not make capital in the field of the invention and this makes the invention useless. It is advisable that the right to software companies should not be granted to patent the assignment as it is felt that such companies will internalize the AI invention and become the users of such inventions and thus will be awarded the right to patent any further inventions. The active participants refer to those who are involved in receiving benefits either in an assignability or licensing. They promote their invention in the popular field to make it accessible to industries to enhance its usage. It is assumed that AI users are the most suitable recipients to be given the patent assignment. The users of AI are those who use AI to create software and thus they are better suited as assignees. It is contended that if inventorship is attributed to the AI, the invention may not be accessible to the public, potentially hindering its use for public benefit. In this context, a model concerning assignability is proposed. This model outlines the process for the assignability of AI-generated inventions. The initial step occurs when the invention is created by the AI and becomes known to the Patent Office; at this point, the Registrar should acknowledge AI as the owner of the invention. The patent registration process encompasses several steps, including the submission of provisional or complete specifications, publication of the specifications, examination by the registrar,

addressing objections related to the specifications, and ultimately, the granting of the patent.

The next step, after the patent is granted to the AI, the Registrar will communicate regarding the assigning the patent to a natural person, and this will allow the invention to be used further by the population in the multiple sectors. The proposed model outlines the persons who are to be allowed the patent grant under the category of active or silent parties.

The last step is an implementation of the assignment by the Patent Office under terms and conditions which can constitute financial business between the AI and the human over the assignment of the patented invention.

6. CONCLUSION

After analyzing the correlation between technology and patent industry, it is possible to suggest that the more the technology and research within the sphere of Intellectual Property evolve the more the importance of inventions with economic value and technological advancement become. The traditional view on inventorship must be reconsidered especially in situations where AI-generated inventions are involved, the courts previously declared that AI could not own patents. Rather, the inventor should be considered to be the human or natural person who has to use AI as an instrument. In this article, the author speaks about the development of the new technologies, as AI has started to work without human intervention and it is under its autonomous work. This idea of the acceptance of AI as an inventor must not be dismissed as a far-fetched concept in the Intellectual Property Law. The old judicial approach according to which AI is just an instrument should be changed because it may pave the way to the further development of patenting. Since the US patent system is yet to handle the possibility of giving inventorship to AI, it is up to the signatories of international agreements, including the TRIPS Agreement, to think about AI as part of the artificial person concept and recognize the rights of machines. This new paradigm shift may change the legal perception of rights and responsibilities and make the courts more progressive to promote the development of the Intellectual Property environment. Moreover, this paper gives a framework of determining the assignability of patent rights and the types of people that ought to be considered as an assignee by the Patent Office. Recommendations are also given as per the analysis conducted in the future.