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Artificial Inventors: A Shift in Traditional Policy Paradigm

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There has been a constant resonance on the legality of mentioning artificial computing entity as an inventor the world over. There have been various instances of judicial decisions with an elaborate commentary on the legality of a robot or AI becoming the inventor of a patent. Considering the legal implications of AI being the inventors of inventions through identifying gaps by analysing tonnes of information through various big data analysing means, a new policy framework is necessitated. However, the big question that arises is, should the development of such inventions and their consequent patenting should be disallowed as the recent judgments have been made, or should there be regulations on inventorship of such patents and their resulting ownership. The present article attempts to give a prognosis for adapting a new legal viewpoint for considering the AI as an inventor rather than just rejecting them.

Keywords: Artificial Intelligence, Inventor, Patent Law, Big Data, Policy, Industry 4.0, Device for Autonomous Bootstrapping of Unified Sentience, UK Patent Act, 1977, European Patent Convention, Neural Networks

The fourth Industrial Revolution or Industry 4.0 was introduced with the prediction of revolution to be more focused towards the entire value chain of the product lifecycle and pitched towards providing the customer a more tailormade experience to the desired goods and services.[1] The premise of Industry 4.0 revolves around the central theme of automating the stages for producing and providing the goods and services respectively with the pinpoint accuracy of customer needs and expectations.[2] This calls for comprehensive development of order management, R&D, manufacturing process commission, just-in-time delivery, and product cycle management.[3] However, Industry 4.0 needs to be assessed differently from Computer Integrated Manufacturing (CIM), which has its roots in Industry 3.0.[4] Figure 1 illustrates the relative industrial revolutions in manufacturing and services.

Figure 1 illustrates various stages of industrial revolutions in the past and present stage of scientific occurrence. The primary difference between Industry 4.0 and CIM is the connectivity to the internet.[5] In the case of CIM, the theme is more focused on worker less manufacturing, whereas Industry 4.0 is associated with the promotion of sensors, devices, and assets to be connected with each other and to the internet.[6] Consequently, Industry 4.0 has a basic principle of converting regular machines to entities having self-awareness and self-learning abilities for their overall improvement in terms of their performance and also assess and predict the subsequent requirements of the industry.[7] Artificial Intelligence (AI) has now taken a central stage on almost all discussions on Industry 4.0.

AI deals with the construction and deployment of intelligent computer programs that would involve basic principles of intelligent behavior and their applications to animal and artificial systems.[8] Almost all the work in AI is computational in nature and technique-oriented.[8] AI thus could be viewed as a discourse of machines that could mimic human intelligence such as, cognitive ability, learning and decision making. This ability to learn is the central principle of working on AI-based systems. For example, applications such as, self-driven cars,

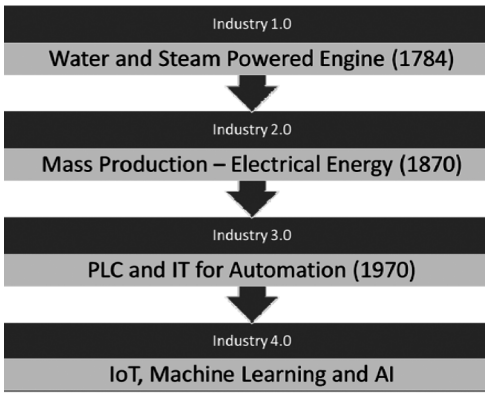

Fig. 1 — Illustration of relative industrial revolutions

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computational gaming, image perception and recognition, etc., have a huge impact and implication onthe development of AI.[9] There has been considerable development in the field of AI, and there is a projection of its futuristic impact on support in every human activity, including and as healthcare, communication, entertainment, business decisions, defense, etc. [9]

Consequently, there is a considerable push in securing rights over inventions that concern with AI and associated systems and processes.[10] However, with the recent advent of certain decisions on inventor rights of inventions generated from AI, wherein such patent rights were denied to such inventions, call for a review of the existing archaic laws defining the new age systems and a considerable policy review on such legislations by the law-making and enforcement authorities.

AI and Patent Litigations

The patent applications in the AI sector have increased tremendously, especially in the last eight years. More than 75% of the AI patent applications have been filed in the last eight years, wherein the top technology giants such as IBM, Microsoft, Samsung, etc., participated wholeheartedly. The filing trend also shows a tough competition between the Chinese and the US innovators on the dominance over the AI space. Additionally, it was also observed that some areas such as neural networks, machine learning, image processing were leading technical areas on which the bulk of the study have been undertaken.

Top Litigated Technology Areas

The increase in the patent filing trend also has significantly increased the consequent litigation trend in the AI space. For instance, machine learning, image analysis, audio processing and neural networks are the major technology areas for litigation having patents on AI[11] (Fig. 2).

Figure 2 illustrates the major technology areas on litigation with inventions related to AI. It can be observed that the neural networks are the top litigated technical area, which also follows the trendline of the previously discussed section wherein it was observed that computer vision, which takes in neural network technology as its baseline as the major area of development in AI patenting arena. For instance, an AI infringement suit filed by electrocardiography

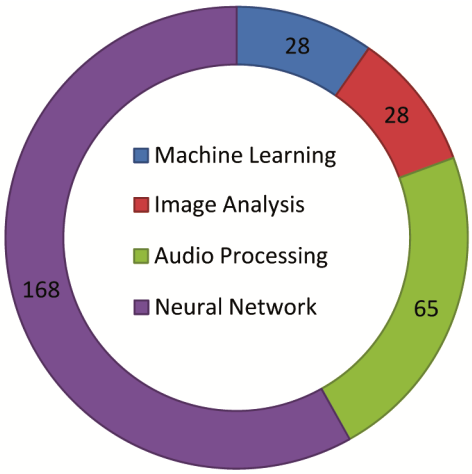

Fig. 2 — Major AI litigation areas (*Source: Bloomberg Law*)

device maker *Alivecor* against *Apple* alleges that *Apple* is infringing three of *AliveCor's* patents on cardiac diagnostic inventions.[11]

It could be observed from the patenting as well as litigation trends on AI that technology-oriented organizations have started a race to secure patents in their major line of business, which they deem would affect in long as well as medium term. This results in enhanced litigation activity in such areas. As the litigation in these specific areas is extremely nascent in stage, sustained jurisprudence is yet to be developed in AI litigation in major jurisdictions, including the US and EU.

AI and Inventor Rights

The engineering involved in AI is getting more complex and sophisticated,[12] and as a result, many organizations have started using AI as a tool of innovation that could come out with original ideas for a new product or component development.[13] However, this has to lead to a legal issue on patent law, i.e., how would the concept of patents apply to non-human beings? For addressing this issue, there are a number of deliberations on this frontier worldover.[14]

The issue of artificial inventors as in patents related to AI came into the limelight when a patent application in 2018 and 2019 was filed by an AI system called *DABUS* (Device for Autonomous Bootstrapping of Unified Sentience) listed as the main inventor of the patent application. The applicant of the applications, Stephen Thaler, primarily filed the application in USPTO, EPO and UK and listed *DABUS* as the one who had "identified the novelty of

its own idea before a natural person did" and as a result, it should be considered as an inventor. All the three offices refused the applications citing that the relevant patent laws required that the inventors should be natural persons, and there was no provision on inventors as artificial in existing patent laws.

UK Decision on *DABUS*

The applicant, Dr. Stephen Thaler, filed two patent applications (GB 1816909.4 and GB 1818161.0) which originally didn't list any inventor in the application. The UK Patent Office subsequently notified the applicant ofthe requirement of filing the statement of inventorship for subsequent processing of the application under Section 13 of the Patent Act 1977. Dr. Thaler subsequently filed the statement of inventorship on Form 7 for both applications in July 2019. The statement of inventorship stated that the inventor was the artificial intelligence machine called *DABUS*, and he had acquired the rights of the application by "ownership of the creativity machine *DABUS*."

The point of the moot in this litigation revolved around the point that "inventorship should not be restricted to natural persons, and the machine which meets the inventorship criteria like a natural person also qualifies as an inventor." The applicant contended that neither UK Patent Act, 1977 nor European Patent Convention Treaty specifically excludes protection for autonomous machine inventions. The applicant further argued that, as a matter of practice by EPO and the UK, inventorship for natural persons was relegated to prevent company inventorship. The arguments of the applicant contended that the inventions of autonomous machines could be patentable if it meets the requirement of patentability set out in the Act. The basic reason for establishing patent law was to incentivize innovation, disclosure and development of the invention. As long as an invention is addressing these issues, there is no change in the premise of the function between a human inventor and an artificial inventor. Failure to recognize the inventors (be it be a natural person or AI) would undermine the whole intellectual property system for failing to undermine the furtherance of innovation on socially recognized innovation needs. Additionally, patent laws also have the motive to protect the moral rights of inventors and infact, acknowledging the autonomous system as inventors would actually facilitate this function. This gives an assertion that in the reverse instance of inventorship, wherein if a human takes in the credit of an invention developed by the autonomous machine is equally wrong. With these arguments, the court acknowledged *DABUS* as an inventor of the current and any resultant patent with Dr. Thaler as assignee of any such patent.

However, the primary concern in the case was on the declaration mentioned on Form 7, which contended on the absence of legal personality on the part of *DABUS*, and the application was not in the name of the said inventor but in the name of Dr. Thaler. The judges in this litigation cited the *Yeda*[15] case wherein they expressed the view that Section 7 is exhaustive in nature and has sufficiently explained who is entitled to grant a patent. The term in Section 7(2) illustrates by the words "and to no other person" that further explains that the patent may be granted to the inventor or someone claiming through the inventor. That means an employer (as a most common example) or by way of inheritance or succession, etc., are few instances by which the rights are transferred from the inventor. When read with Section 13 of the Patent Act, 1977, emphasizes the subjective state of mind of the applicant. Section 13 (2) (a) specifically requires the applicant to identify the actual inventors. Further, Section 13 (2) (b) requires the applicant to indicate the deprivation of his right to be granted the patent. For instance, an applicant may believe A as an inventor has assigned his rights to the applicant and may be wrong in the scenario. In normal cases, this may be difficult to prove by the patent office in every case. However, such instances make it liable for rejection, under Section 72 (1) (b) of the Patent Act 1977, providing the ground of rejection/revocation on the grounds that the patent was granted to a person who was not entitled to be granted that patent.

Furtherance to the contention of the applicant, on the ground that the applicant must be a person, the Court observed that *DABUS* is not a legal person because it has not been conferred upon it a legal personality by Law. For instance, in the case of corporations, actual legislations help to create a legal persona, which is not present in the present case. In the absence of any statutory legal intervention, AI cannot be recognized as a legal personality. Therefore, *DABUS* cannot be an applicant.

On the contention that *DABUS* may be considered as an inventor, the Court relied upon Section 7 (2) (a), Section 7 (2) (b) and Section 7 (2) (c). Section 7 (2)

(a) provides the right to be granted patent is given primarily to the inventor or joint inventor, which could be overridden in two situations as illustrated in Section 7 (2) (b) and section 7 (2) (c) that states that another person was entitled to the invention by either any enactment or the rule of law, treaty or international convention, or any enforceable agreement entered with such inventor before the making of such invention. This is generally the case in employments. The second situation (under Section 7 (2) (c)) arises when there are successor in the title of any person as mentioned in Section 7 (2) (a) and Section 7 (2) (c). The Court opined that all the cases mentioned under Section 7 (2) are related to persons, and Dr. Thaler was contending that the inventor was not necessary a person; this argument was rejected on the grounds of out of scope under Section 7.

Further, the court argued that in the Patent Act 1977, the meaning the inventor is always a person on the grounds that:

a. A person can have the property, and an invention, application for patent and a patent are all property rights.

b. Section 7 (2) (a) and Section 7 (2) (b) clearly define themselves by reference to a "person" that can transfer the inventor's rights.

In the present case, Dr. Thaler abjured the status of inventor where he stated *DABUS* as the inventor, and the fact was stated that *DABUS* is not a person and was incapable of transferring the rights to Dr. Thaler because since *DABUS* is a thing, and not a person, it cannot hold, or transfer any rights. Hence the application was rejected.

EU Decision on *DABUS*

Dr. Thaler filed two patent applications at the EPO (EP 18275163 and EP 18275174) with *DABUS* as an inventor in both the applications. In both the applications, Dr. Thaler contended that *DABUS* identified the novelty before any natural person did, and therefore, such the machine needs to be considered as an inventor. Dr. Thaler considered himself as the applicant wherein he employed *DABUS* and acted as the successor of the title. The EPO rejected the application stating that the requirements of Article 81 of EPC (European Patent Convention) has not complied with that stated that the designation of the inventorship. Furtherance to Rule 19 (1) of the EPC, the article states that the designation of the inventor shall state the family name, given name and full address of the inventor, contain the statement under Article 81 and bear the signature of the applicant. Therefore, in the stated application, the real issue was the inventor, as mentioned by Dr. Thaler, was not human but a machine (*DABUS*). The EPO primarily relied upon the following grounds[16] for refusal:

(i) As observed under Article 81 and Rule 19(1) of the EPC, there is explicit mention about the inventor being a natural person, and there was no existing law that regarded the machine as a person capable of being designated as an inventor.

(ii) EPO stated that names given to natural persons do not have the same status as that of machines. The name of a natural person not only identifies a person but also identifies the right of inventorship, transfer of those rights and associated capabilities. This is not present for names identified with machines.

(iii) EPO also affirmed that AI machines have "no rights because they have no legal personality" since there is no legislation or jurisprudence establishing such legal fiction.

(iv) EPO also observed that since machines have no legal persona, they can neither be employed nor transfer any rights, including the right of inventorship, and therefore, Dr. Thales' claim of employing *DABUS* or associated successor in the title has no legal ground.

US Decision on *DABUS*

In the US, the USPTO denied the application titled "Devices and methods for attracting enhanced attention," having application no 16/524350. The impugned application was filed listing a single inventor with the name "*DABUS*" and with the family name "Invention generated by AI." The assignee was named "Stephen Thaler." The substitute statement under 37 CFR 1.64 *in lieu* of declaration under 35 USC 115 (d). Furtherance to this, an assignment document assigning the entire right, title and interest for the application transferred to Dr. Thaler was presented wherein it identified Dr. Thaler as both legal representative and the applicant for the inventor. Further, communication was sent to file additional details of the inventor wherein the presented details were not sufficient to identify the inventor with his/her legal name in addition to an US $80 fine on delay for failure to submit inventor declaration.

The applicant conveyed that the "creativity machine" *DABUS* is a series of neural networks programmed and trained with general information to independently create inventions. The USPTO cited 35 USC 100(a) that stated inventor as "the individual or, if a joint invention, the individuals collectively who invented or discovered the subject matter of the invention." In addition to this, the USPTO also cited the litigations of *Univ of Utah* v *Max Plank Gesellschaft Zur Forderung der Wissenschaftene V*,[17] *Burroughs Wellcome Co.* v *Barr Labs Inc*[18]and *Beech Aircraft Corp.* v *EDO Corp*,[19] wherein, all the cited cases projected the assertion that "only natural persons can be inventors." USPTO projected that the inventor is a natural person has been reflected in multiple court decisions and references in Title 37 of the Code of Federal Regulations. The USPTO also cited MPEP (Manual of Patent Examining Procedure) concerning inventorship explaining that the most important question for inventorship is "conception" with further explanation of "conception" being "the complete performance of the mental part of the inventive act" and "the formation in the mind of the inventor of a definite and permanent idea of the complete and operative invention as it is thereafter to be applied in practice." Here the terms "mental" and "mind" are recurring and referring to a natural person. The USPTO rejected the contention of the applicant on the inclusion of *DABUS* as the inventor of the cited patent application.

Based on the above study and analysis, the following gaps were identified:

(i) Though the legality of the USPTO on requirements of the natural person being an inventor is a debatable issue, a wide gap exists on the issue in other jurisdictions such as India.

(ii) Since this is recent litigation and the consequent jurisprudence on AI inventions is limited in patent law, a certain direction is missing in the literature on the legal footing of "persons" capable of being inventors.

Probable Positions in other Jurisdictions: India

With the advent of litigations arising out on the issue of inventorship taking a central space in major patent offices, it is imperative that this issue will surface in India and other patent offices; the question is not "if" but "when." Examining the Indian Patent Law provisions on dealing with the relevant issues would help the Indian Patent Office (IPO) to be better prepared on dealing with issues on applications mentioning the machine as inventors.

The Indian Patents Act, 1970, has few provisions[20] on dealing with the qualifications of an applicant, specifically Section 6, which mentions that a patent application can be made by:

a. any person claiming to be the true and first inventor of the invention;

b. any person being the assignee of the person claiming to be the true and first inventor in respect of the right to make such an application;

c. the legal representative of any deceased person who immediately before his death was entitled to make such an application;

d. either alone or jointly with any of the above-mentioned points (a-d).

Furtherance to Section 6, few provisions under Section 2 illuminate the stress on the legal footing of a person mentioning:

a. "Assignee" includes an assignee of the assignee and the legal representative of a deceased assignee, and references to the assignee of any person include references to the assignee of the legal representative or assignee of that person.

b. "Patentee" means the person for the time being entered on the register as the grantee or proprietor of the patent.

c. "Person" includes the Government.

d. "Person interested" includes a person engaged in, or in promoting, research in the same field as that to which the invention relates.

In all the above four considerations, the provision "person" comes into the forefront that would have all the relevance on deciding issues on the probable cause of action. However, whether the interpretation of the word "person" as in the three jurisdictions ultimately denying the patent application is quite debatable in India. There would be two schools of thought into it:

The legality of AI Systems as a Person

The most important debate on the legality of AI as "a person" (to be capable of being an inventor) is the required jurisprudential interpretation into it. The jurisprudential background on considering AI not to be excluded from the list of "persons" can be inspired by Salmond[21] that states that a person is any being whom the law regards as capable of rights or duties. In other words, any being having the capability of rights and duties, whether human or not, is a person. Salmond

further explains that legal persons may be of any kind as the law pleases. For considering AI as a legal person, where there is no history to construe such, there has to be a beginning in the jurisprudential thought processing. Considering the history of giving legal status to corporations and other entities, it is observed that there has been an entire jurisprudential construction of needs and necessities to the urgent requirement of the public at that time. Similarly, for an organic evolution of school of thought on legal sciences, there has to be tandem progress in accordance with the growth in socio-economic-scientific sectors of the society. For instance, in India and few other jurisdictions, legal personality has been bestowed to non-living non-corporate entities such as rivers, idols, etc. The Supreme Court of India, in the case of *M Siddiq* v *Suresh Das*[22], decided if Lord Ram is a legal person. The Supreme Court cited Roscoe Pound[23] with the following passage:

"In civilized lands, even in the modern world, it has happened that all human beings were not legal persons. In Roman Law, down to the Constitution of Antonius Pius, the slave was not a person. He enjoyed neither rights of family nor rights of patrimony. He was a thing, and as such, like animals, could be the object of rights of property. ... In French colonies, before slavery was there abolished, slaves were put in the class of legal persons by the Statute of April 23, 1833, and obtained a somewhat extended juridical capacity by a statute of 1845. In the United States, down to the Civil War, the free Negroes in many of the States were free human beings with no legal rights."

The Court stated that there is continuous development on the definition of legal persons, from the time where legal personality was denied to slaves to equality of rights of all-natural persons as legal persons in the eyes of the law. It construes that a legal person has the capacity to bear interests, rights and responsibilities. On the question of legal personality, the Court interpreted Salmondas: [21]

"Legal persons, being the arbitrary creations of the law, maybe as of as many kinds as the law pleases. Those which are actually recognized by our own system; however, all fall within a single class, namely corporations or bodies corporate. A Corporation is a group or series of persons which by legal fiction is regarded and treated as itself a person. If, however, we take account of other systems of our own, we find that the conception of legal personality is not so limited in its application…"

Considering the last line of Salmond, i.e., "legal personality is not so limited in its application, it could open up the doors for newer frontiers on construing AI as a possible system for being recognized as a legal person. The Supreme Court observed that, theoretically, there is no restriction on what fields the recognition of legal personality may be bestowed. The most important criteria to answer this is the actual purpose for doing so. In doing so, the court recognized the personification of the idol Lord Rama as having distinct legal rights and duties.

Taking the corollary of corporations being recognized as legal persons, it was observed that the legal personality of the corporation was originally granted by a positive act of the government. Prior to this, the independent legal personality of a corporation was never dependent on recognition by the Courts.[22] In fact, Smith[24] further elaborates that the function of legal personality is to regulate the behavior or conduct of the being on which the rights and duties are conferred. This is motivated to control and regulate the conduct of the legal person and the human towards each other to suit the purpose of the well-being of the society. Another argument citing on recognition of AI as a new legal persona is the subject of convenience. The bestowal of legal recognition on non-humans or objects has been a powerful tool of policymaking for adjudication of claims in a practical manner. Creating a framework helps in serving the settlement of disputes and saved the judicial effort on deferring to distinguish between artificial and natural persons in every dispute where it was not relevant. Therefore, the Courts, in fact, confer the rights as judicial persons to artificial entities to adjudicate upon claims of natural persons deriving benefits from or affected by the corpus of the legal personality.

Considering the arguments above, and with the upcoming needs of advancement of science in AI particularly, and the sustained growth of AI patent filing statistics, it is imperative to observe that certainly policy manifestations have to be reviewed for including AI as a part of non-living legal personality vertical. The arguments put forward in the judgments of the patent offices on *DABUS* and consequent rejection of the application would be difficult to hold ground in India.

Potential Difficulty in Considering Legality of AI Systems as a Person

While there are compact arguments on putting a special case of legalizing the AI as a recognized legal persona, however, the patent office actions are procedural in nature and,on their own, do not create new law on their own. For instance, the patent office controllers, while following the quasi-judicial authority bestowed to them, can only interpret the law and cannot make the law, for which there is already a separate set procedure. The relevant chapter for understanding the actual provisions of the Indian Patents Act is Chapter 15, which enumerates the powers of the controllers from Section 77 to Section 81. Section 77 bestows the powers of a Civil Court to the Controller on certain aspects such as taking into cognizance of evidence, examining documents, affidavits, etc. or any other matter that may be prescribed. Section 78 and Section 79 illustrate the power of the Controller for correcting the clerical errors and the procedure of submitting the evidence to the Controller, respectively. However, Section 80 gives certain discretionary powers to the controller. However, these discretionary powers are only related to providing opportunity on hearings and consequent disposal of the patent application according to the principles of natural justice. As a result, the current state of the Indian Patents Act doesn't have any provision for considering a non-recognized entity (person) as an inventor according to Section 6 of the Act.

Conclusion

In light of the discussions put forward, the author believes that, though suitable jurisprudence is available, a positive action needs to be taken to bring out clarity on the subjective policy for considering AI as a non-living legal personality. Extending the common law jurisprudence and citations of cases, along with non-clarification of existing policies on AI, would render the deliverables on legal clarity an unjust delay. For instance, in the case of *Bishwanath Prasad Radhey Shyam* v *Hindustan Metal Industries*[25] the Supreme Court cites the *Humpherson* v *Syer*[26], which stated that patent could not be granted by any means, whatsoever, apart from the true and the first inventor himself. The Supreme Court mentions that the true and the first inventor or his legal representative or assignee submits an application in a prescribed form to the patent office. The application must (emphasis) contain a declaration to the effect that the applicant must be in possession of the invention. Considering this requirement and extending the argument that there has to be some document that assigns the right of the inventor to the applicant, the argument in favor of *DABUS* decisions seems stronger at the present time. However, a policy level interference would help to give a clearer objective direction on the role of patent offices in such a crucial decision-making pedestal on patents related to AI. For instance, as relevant to legal bodies, such as corporations, the directors are considered to be responsible as the legal personalities of the conduct of such non-legal entities, recognition in the line of corporations, wherein the owner of such AI entity would be the ultimate responsible person answerable to all the legal compliances, could be created. Time is of the essence, and the question is not if, but when, the AI takes over the creations of inventions for our future survival and sanity.

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