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AI and Robotics: Charting the Legal Terrain of Patent Protection

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ABSTRACT

The rapid advancements in Artificial Intelligence (AI) and robotics are reshaping various sectors, prompting a reevaluation of intellectual property (IP) laws. This paper explores the intersection of AI, robotics, and IP, examining challenges and strategies in patenting AI innovations. As AI increasingly autonomously generates inventions, questions arise regarding patentability, inventorship, disclosure, and standardization. Novelty and inventive step criteria require scrutiny, with AI's ability to review prior art challenging traditional standards. Patent eligibility of AI inventions, particularly those involving human-computer interfaces, faces complexities under US law, necessitating precise claim drafting. Inventorship poses a dilemma as AI-generated inventions lack human inventors, raising legal and practical issues. Disclosure requirements become intricate with rule-based AI and artificial neural networks, potentially limiting patent scope. Standardization in wireless communication technologies for robotics necessitates navigating complex patent landscapes and disputes over essential patents. The conclusion emphasizes the evolving AI-IP landscape's impact on industries and the need for balanced IP regulations to accommodate technological shifts. The paper underscores the necessity for legal adaptations to address the growing influence of AI on inventive processes and the challenges it poses to the patent system. By analyzing the hurdles faced by innovating technologies, particularly in robotics and AI, the study highlights the importance of tailored legal strategies to protect AI-based innovations amidst evolving IP frameworks.

Keywords*: Artificial Intelligence (AI), Robotics, Intellectual Property, Patentability, Inventorship.*

I. INTRODUCTION

In this digital era, we are on the verge of revolution of robotics and artificial intelligence (AI) wherein the machine is having the capability to do things without the intervention of human beings. The main part of the AI is the intelligence showcased by the computer implemented algorithms and this technology is already being used in many areas such a medical, agricultural, marketing, military purposes etc. The increasing innovations through the artificial intelligence

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(AI) technology will force a re-examination of the basic rules of the IP law and the increasing pressure for the competitors make them seek IP protection for their inventions[2]. The sharing and collecting of data is having very much importance in AI inventions, because these data itself is an input to the innovations by artificial intelligence (AI) and it also generates new data. Creating new algorithms for a new product will cause considerable effort, and it is being hard for other entrants to get into the same area to cross over the existing patents without considerable amount of focused effort.

This paper discusses the acceptances and relevance of various thread of intellectual property to robotic and AI innovations and it also gone through some of the strategies followed by the inventors in claim drafting to get their inventions patented.

(A) What is Artificial Intelligence?

Artificial intelligence or AI is another broad, wage term used to describe any attempt to make a computer to do something that we normally associate with human intelligence like translate languages and playing chess, recognize object. The AI system covers a wide range of technologies which makes a machine to mimic "thought" functions of human brain for learning and problem solving[3].

The initial days of AI technologies are typically rule and logic based systems that exhibit some form of intelligence to the machines to handle or solve a problem and are referred to as "expert systems" which comprises a knowledge base (KB) or preset library of information provided by the experts and inference engine and user interface[4]. For example, when a situation came and a user input some query into the interface then the inference engine refer the library and report back the answer, such systems are working on the basis of If-Then rules.

In 60's the problem was that even new AI is getting better complex reasoning task like playing chess and proving mathematical theorems. It was incredibly difficult to actually get the programs to interact with the real world.

(B) Robotics and AI

AI is one of the upcoming fields in science and engineering. It is a collective contribution of computers, robots or other devices which making intelligent machine to behave in a human-like

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[2] Ben Hattenbach & Joshua Glucoft, "Patents in an Era of Infinite Monkeys and Artificial Intelligence",STAN. TECH. L. REV. 19(2), 32 (2015) ("The coming wave of computer-generated material is on a collision course with our patent laws."); see also Liza Vertinsky and Todd M. Rice, "Thinking About Thinking Machines: Implications of Machine Inventors for Patent Law", B.U. J. Sci. & Tech. L. 8(2), 574, 576-77 (2002)

[3] Daniel A. McKinley, "Artificial Intelligence – How patent law in the U.S. and internationally will deal with the next frontier in medical technology", Gestalt Law, (April 4, 2017), pp.1-13 at p.1

[4] *Id*

fashion. The influence of AI in the robotics is a pretty much big deal. While AI and robotics can be considered as from two independent disciplines, they are inevitably dependent on each other. In order to make an intelligent machine, the robot has to allow AI algorithms to explore the real world and vice versa robot has to be fit to the mold of AI.

The AI is realized in software and the robots are manufactured as hardware. The connection between those two is that the control of the robot is a software agent that reads data from the sensors decides what to do next and then directs the end-effectors to act in the physical world[5].

We know that the main aim of the AI is to make the machines to do things just as human can do without the human intervention. For serve this purpose, the perception, reasoning and learning ability of the robots has to be improved. In order to flourish these contributions of AI to robotics, researches were well under way.

The very latest development to improve the robots learning capability is positive reinforcement learning, which was inspired from the way that animal learns how to tend certain result in a positive and negative outcome. And the other one is the approach to simulate human brain using neural network as a tool, this technique helps to explain the inner working of neural networks which was trained on visual data.

II. AI AND ROBOTIC INNOVATION AND INTELLECTUAL PROPERTY

(A) Patentability of AI inventions

As computer assisted invention are becoming an integral tool in the inventive process, then there will be challenges in the inventiveness part of the invention. There are patents granted to the inventions created using the AI and until now no measures taken by the judiciary or legislative on the effect of patenting inventions created using the artificial intelligence (AI)[6]. The interesting thing is that, the U.S.C Section 103 stated: "patentability shall not be negated by the manner in which the invention is made" i.e. we can say US law has codified prevention on discrimination on this basis.

a. Novelty and Inventive step

Here, in the AI generated invention the novelty will mostly depend on the inventive process used. There will a lack on novelty in the invention if there is no change in the output produced, or if it is depending on same sets of input data. Now these days, the computers are having the potential to review the prior arts more quickly and accurately than a human inventor, and to

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[5] Tim Niemueller and Sumedha Widyadharma "Artificial Intelligence: An Introduction to Robotics", July 8, 2003.
[6] Ben Hattenbach & Joshua Glucoft, "Patents in an Era of Infinite Monkeys and Artificial Intelligence", (2015), pp.33-50 at pp. 44

ensure the novelty, functionality should be added into the invention.

Further, the patentability of an invention step demands that the invention "is not obvious to the person skilled in the art, having regard to any matter which forms part of the state of the art."[7] The grant of patent to an obvious invention will give a monopoly power and it would contribute only a little to the society and block other entrants to engaging in modification of the technologies. The computational power of the computers to receipt the human perception and work accordingly make it necessary to re-examine the level of obviousness and the notion of skilled person so as to serve the objective of inventive step. Due to this factor there is need for assessing inventive step separately for AI.

b. Patentability of Interface between human brain and a computer

In an interview at code conference 2016, Elon Musk noted that the coming step in an AI is a "neural lace": which allows to interacting between the computer and the human brain. If this is the future of an AI system then the question arise here is, is it patent eligible? The answer to this question lies in the claiming strategies. Appropriate drafting of the claims will put them in the frame of patent-eligible one.[8] Current law presents several hurdles to protect the investments in AI innovation through IP. One of the fundamental challenges arise here is the patent eligibility of subject matter.

Under Section 101 of the US patent Act, the subject matter of patent claim must be directed to a "process, machine, manufacture or composition of matter." After the decision of *Mayo*, *Bilski* and *Alice* case means that AI is becoming more difficult to patent because of the involvement of the software. In *Alice*[9], the Supreme Court provided a framework for patentability of computer methods in two steps: (1) Determine whether the claims are directed to a patent-ineligible concept, (2) Determine whether the claim's elements, both individually and in combination, transform the claims into a patent-eligible application. At some glassy, all software can be viewed as an abstract ideas.

However, in 2016, decisions were made in favor of patent eligibility of software inventions. Since, *Enfish*[10] significance is given to the first step of *Alice/Mayo* and the Federal Circuit has been willing not to automatically considered software to be an abstract idea, and rather to improvements in computer technology.[11]

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[7] Patent Act 1977, Section 3.
[8] Larissa Park, "Artificial Intelligence: Patentability of an Interface between the Human Brain and a Computer", DLA PIPER, 2017, PP.6-7, www.dlapiper.com/ip_global (accessed on 5/ 7/2017)
[9] Alice Corp. v. CLS Bank International, 134 S. Ct. 2347 (2014)
[10] Enfish, LLC v.Microsoft Corp., No. 15-1244 (Fed. Cir. May 12, 2016)
[11] *Supra note* 8, at pp.7

The USPTO make out that AI can be patentable through the express designation of class 706.[12] While the number of AI patent application filing in the US is increasing exponentially over the past several years and patent examiner were facing a unique set of challenges in view of the *Alice*, they reject the claims directed to AI algorithm under Section 101. We know that the aim of AI is to replace human activity, so the challenges practitioners face imbedded in how to claim AI into a patent-eligible subject matter.[13]

Newly arriving AI devices would likely have several traits available for claiming among them, one example for that is, software to control the human brain and a device. Under current status of the case laws, software is patentable if it is not an abstract idea, or else the claim element transforms the claim into a patent-eligible one. If this device permits a technical advancement in the software then it is patentable.[14]

These type of invention face issues when look from the *Mayo* and *Alice* side of eligibility. For example, if the software can imitate a biological process, for example the flickering of eye lashes, that process is considered non-patentable because it is naturally occurring, law of nature and an abstract idea. Or else this process should be viewed in the same way as genetically modified bacterium in *Diamond v. Chakrabarty,* and then it is patent eligible.[15] This scenario is evolving and the determination of patentability will rest in the language of claim.

(B) Inventorship issue

Patent rights are initially granted to the inventor of the patent. Here, the issue which is relevant is "who is the inventor". It is the key for determining who actually have or owns the rights in a patentable invention. Drawing the inventorship line is complicated in the case on an AI system, because the patent law does not allow a computer to be registered as an inventor of an invention. And this is outside the scope of the U.S Patent law. Currently, the patent statue defines "inventor"[16] to means the individual. But when it comes to the case of an AI-enabled machine which invents something? What if an AI algorithm, without any human involvement develops a method of recognizing diseases in medical images or develops a new drug form? [17]. By looking into the legislative history of this section the court have cited that congress intend on

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[12] Class 706: Data Processing- Artificial Intelligence, U.S. Patent & Trademark Office (June 30, 2000), available at www.uspto.gov/web/offices/ac/ido/oeip/taf/def/706.htm.

[13] F.A. DeCosta, A.G. Carrano, "Intellectual Property Protection of Artificial Intelligence", Westlaw Journal Intellectual Property, (30 Aug 2017), pp.1-6 at pp.3

[14] *Supra note* 8, pp.7

[15] *Id*

[16] 35 U.S.C.A. § 100(f)

[17] F.A. DeCosta, A.G. Carrano, "Intellectual Property Protection of Artificial Intelligence", Westlaw Journal Intellectual Property, (30 Aug 2017), pp.1-6 at pp.1

the patentable subject matter extending to "anything under the sun that is made by man."[18] i.e., the US Patent Act does not require specific human control in the invention process for granting patents but defines inventorship and patentability through human creation. The jurisprudence of Supreme Court regarding the eligible subject matter has grown, although not in a way that seems to eviscerate the implication that an inventor be human.[19]

So we get into the question that which humans (if any) are perfectly fit for the label of an inventor of advances engendered by a computer. The importance of this question came for many reasons, because a patent that improperly omits an inventor may be held unenforceable[20] and because the patent ownership again turns on the identity of the inventors.[21] Wherein, Inventorship grants initial patent rights, emphasizing the importance of rewarding human effort and creativity[22]. An invention requires "conception," meaning a clear and complete idea formed in the mind of an "individual."[23] The Federal Circuit has clarified that inventors must be natural persons, not corporations or sovereigns[24]. Sections 101 and 102 of the Patent Act highlight human involvement, focusing on "whoever" invents and prohibiting the patenting of subject matter not invented by a "person." The patent application process also mandates an oath from the individual inventor[25].

Conversely, the frequent mentions of human creativity in patent law likely stem from the time when the Patent Act was written[26]. Since AI-generated inventions are a recent development, there was no pressing need to consider non-human inventors. As a result, neither the US Congress nor the courts have yet addressed the patentability of AI-generated inventions or

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[18] Diamond v. Chakrabarty 447 U.S. 303, (1980)

[19] *Supra* note 6 at pp. 45

[20] Stark v. Advanced Magnetics, Inc., 119 F.3d 1551, 1555 (Fed. Cir. 1997) (holding section 256, provides for corrections to inaccurate inventorship as required under section 115)

[21] *Supra* note *6*, at pp. 46

[22] Vertinsky and Rice, *Supra* note 2, at 585; Erica Fraser, "Computers as Inventors – Legal and Policy Implications of Artificial Intelligence on Patent Law", SCRIPTed 13(3), 328 (2016)

[23] Burroughs Wellcome Co. v. Barr Labs., Inc., 40 F.3d 1223, 1227-28 (Fed. Cir. 1994); *Supra* note 16

[24] University of Utah v. Max-Planck-Gesellschaft Zur Forderung Der Wissenschaften EV, 734 F.3d 1315, 1323 (Fed. Cir. 2013); see also Beech Aircraft Corp. V. Edo Crop., 990 F.2d 1237, 1248 (Fed. Cir. 1993) ("[O]nly natural persons can be 'inventors.'" (citing 35 U.S.C. §§ 115-118)); New Idea Farm. Equip. Corp. v. Sperry Corp., 916 F.2d 1561, 1566 n.4 (Fed. Cir. 1990) (barring legal entities from obtaining inventorship status because "people conceive, not companies")

[25] Vertinsky and Rice, *Supra* note 2, at 585 (citing 35 U.S.C. §§ 101 and 102).

[26] Ryan Abbott, "I Think, Therefore I Invent: Creative Computers and the Future of Patent Law", B.C.L. Rev. 57(4), 1097 (28 September 2016), http://lawdigitalcommons.bc.edu/bclr/vol57/iss4/2 ("Legislators were not thinking about computational inventions in 1952") (citing Karl F. Milde, Jr., "Can a Computer Be an 'Author' or an 'Inventor'?", J. Pat. Off. Soc'y 51, 378, 379 (1969)); Colin R. Davies, "An evolutionary step in intellectual property rights – Artificial Intelligence and intellectual property", Computer L. & Security Report 27(6) (2011) ("[T]he writer would submit that this [any person] was simply a term of convenience by the drafters who had not considered the possibility of any conflicting claims"); see also Mark Lyon et al., "When AI Creates IP: Inventorship Issues to Consider", Law360 (10 August 2017) (pointing out that the bar against "corporations or sovereigns" was "premised on the fact that a corporation cannot contribute to the conception of an invention", and may thus be inapplicable to AI)

determined who should be credited as the inventor[27].

(C) Patent Disclosure Issues

The patent system is a quid pro quo, which views the patent as an exchange between the inventor and the public. In return for a limited monopoly obtained via a grant to exclude others from practicing the claimed invention, the inventor must disclose to the public the innermost secrets of how to make or use their invention.

Satisfying disclosure requirement for the AI invention can present challenges. For example, in the case of a rule based AI system, the research team may have developed a set of rule for the effective working of that invention for its specific application. The rules developed by them may not be direct the patent claims to a broader scope.[28] So the disclosure obligation of Section 112 of the US patent Act may not be get satisfied. Similar situation will be occurred in the AI embodied artificial neural network that depends on the network topology. This may include the number and type of layers, the number of neurons present in it, its properties, training algorithm and the training data set. Here, the scope of the claims depends on what the limited set of topologies disclosed in the patent, to be practiced by one skilled in the art.[29] In both of these examples heuristic development of the system is happening and there may be questions regarding whether the patent discloses generalizations necessary to support the desired scope of the claim. Millions of permutation of rule or network architecture is possible for various applications, so disclosing only a few and trying to define a broad claim is a risk factor.

(D) Standardization Issue

Wireless communication technologies will play a prominent role in the robotics. Robotics depends on the wireless communication technology to operate in the industrial production, logistic context or medical technologies. Remote controlling of the robots is done via wireless communication and inorder to link the robots to other devices standardization is made in the essential wireless technologies. Similarly to make a communication among robots at complex assembly line standardization of network components across manufactures and users are required. The standards should set to have interoperability between the components for its smooth functioning. This field will lead to patent litigation because the mobile communication in smart phone is already in the play today.[30] A specific standard must be established and

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[27] Lyon, *Supra* note 26.

[28] *Supra* note 17

[29] *Id*

[30] Dr. Jan Phillip Rektorschek, "IP developments in Europe the next challenges for the robotics industry", available at www.roboticslawjournal.com

followed by everyone to make a marketable product to operate in a particular market.

The technical standards of wireless communication comprise of several thousand patents and these are essential too. Then, it is becoming difficult for the technical reasons to make a standard compliant product without infringing these rights.

The dispute about the standard essential patents put forward the issues, (1) patent litigation, is the protected technology actually being used? (2) Is the proprietor required by antitrust law to issue a license on FRAND terms?. [31]

Over the past years, many law suits were happened and many of these cases were around the SEPs, on how the duties should be distributed among the patentee and the patent user. Later, the Court of Justice of the European Union (CJEU) defined EU wide rules on how this has to be done (ruling of 16 July 2015, case C-170/13).[32] The specific elaborations of this procedure are highly complicated but concern companies engaged in robotics, because the relevant technologies communication of the interacting devices comprises SEPs in one way or other.

III. CONCLUSION

Our intellectual property system is facing a lot of hurdles in this digital era. The AI and IP landscape are continuing to evolve and this is creating a new boundary for businesses, medicinal purpose, military purposes etc. The patent system must be prepared to respond to the technological reality where the bound of human inventions are replaced by the artificial intelligence, and the ration between the human-machine contribution to the inventive processes gradually shift in favour of the machines[33]. The companies investing the time and money in the development of artificial intelligence (AI) are seeking for appropriate patent protection for their invention and by that there will be an increase in the potential societal benefits. However this must be balanced as there is risk that the nature of computer-generated inventions will stretch the patent system to its breaking point both conceptually and practically as computers will replace humans. Currently our patent law does not seem to be well enough to manage the proliferation of computer-generated inventions, may leads towards the patent office and to the court.

 Here, in this paper it is analyzing the various fields were the innovating technologies such as robotics and AI are facing hurdles that hindering the smooth function of them. The so far analysis done across the patentability of computer related invention makes a conclusion that the

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[31] *Id*
[32] *Supra* note *30*
[33] P Marks, "Eureka Machines" (2015) 227 New Scientist, pp.32-35

faster and growing software components of the robotic innovation, concerns about software patentability may pose a challenge in relation to current and future robotics related patents.[34] The final patentability determination will rest in the language of claim, because the claim needs to be carefully drafted to avoid the current subject matter issues fronting life science and software patents. IP rights are extremely important for companies active in the robotic; they will need to make changes in the law to carry out the appropriate legal strategies to guide them as they organize and also to protect the AI based innovations.

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[34] *Supra note* 17