INTERNATIONAL INTELLECTUAL PROPERTY SYSTEM AND THE CHALLENGE OF ARTIFICIAL AND MONKEY INTELLIGENCE*

Abstract

The current internationally recognised system of intellectual property came about with the entering into force of the Convention for the Protection of Industrial Property in 1883 and the Convention for the Protection of Literary and Artistic Works in 1886. There are philosophic justifications that ground the protection of intellectual property. The intellectual property system developed as a result of the growth and development of technology during the industrial revolution. Since then, however, technology has developed to the level that it acts autonomously with no human intervention, and is capable of creating literary, musical and artistic works, and also making inventions. Similarly, monkeys have been shown to be capable of creating works that merit copyright. In spite of these developments, the intellectual property system has not recognised the capacity of non-humans to own intellectual property. The aim of this paper is to apply the philosophic justifications for intellectual property to demonstrate that non-humans are capable of owning intellectual property. The paper finds that the intellectual property system is designed to either vest moral or economic rights on a creator or inventor, and not to credit a person with intellectual property on the ground that the creator or inventor has a legal incapacity to protect the intellectual property. The paper concludes by advocating for legal mechanisms that recognise the intellectual property of non-humans through legal guardianship.

Keywords: *Intellectual Property, International, Artificial Intelligence, Monkey Intelligence*

1. Introduction

Intellectual property consists of two broad types of property i.e. industrial property and copyright. These broad types of property exist under the current international system for intellectual property under the foundations of the underlying principles of the Paris Convention[1] and the Berne Convention.[2] It refers to a thing or an idea that is expressed from the thought-process of a person, for which he is entitled or guaranteed to expropriate as his own. The presence of the elements of human intellect and effort therefore are central to the recognition and protection of a work or a thing as intellectual property.[3] Consequently, creations and innovations that do not arise from human intellect and endeavour are not entitled to IP protection under the current international system for IP. Since the entry into the Paris and Berne Conventions, there has not been any fundamental shift in legal thought in terms of the types of intellect whose creations and innovations are entitled to IP protection. The Agreement on Trade-Related Aspects of Intellectual Property[4] (TRIPS), which is the most recent major agreement between nations on IP matters did not address this either. However, in the last two decades, the world has witnessed the rise of a new form of intelligence, known as Artificial Intelligence (AI). In recent times there has been an unprecedented growth in AI, which is hardly surprising going by past indicators and past predictions as far back as 1996 to the effect that in the future AI would be used to undertake a number of human tasks by businesses, such as by airlines for ticket reservation.[5] In the last two decades AI has been effectively utilised in the rendering of services, the manufacturing industry[6] as the accomplishment of tasks which hitherto proved difficult to researchers and doing so within short

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[1] The Convention for the Protection of Industrial Property, 1883

[2] The Convention for the Protection of Literary and Artistic Works, 1886

[3] The concept is derived from a combination of two words. In the ordinary sense, 'intellectual' means "connected with or using a person's ability to think in a logical way and understand things"; and 'property' is generally regarded as the aggregate of rights belonging to a person, which is guaranteed and protected, including everything that is subject of ownership, corporeal or incorporeal, tangible or intangible, visible or invisible, real or personal. See S. Wehmeier, *et al* (eds) *Oxford Advanced Learner's Dictionary* (7th edn, Oxford University Press, 2005) 776. In the legal sense, intellectual property is a category of intangible rights protecting commercially valuable products of the human intellect, primarily trademarks, copyright and patent right, but also including trade secret rights, publicity rights, moral rights and rights against unfair competition. See B. Garner, *et al* (eds), *Black's Law Dictionary* (8th edn, Thomson West, 2004) 824 - 825

[4] This was entered into under the auspices of the World Trade Organization at the Uruguay Round of trade talks in 1994

[5] C. Karnow, 'Liability for Distributed Artificial Intelligences' [1996] (11) *Berkeley Technology Law Journal* 147, 153.

[6] D. Ben-Ari, Y Frish, A. Lazovski, U. Eldan, D. Greenbaum, 'Artificial Intelligence in the Practice of Law: An Analysis and Proof of Concept Experiment' [2017] (23) *Richmond Journal of Law and Technology*, 2.

time frames.[7] It is hardly surprising that between 2010 and 2016 funding for AI increased nearly seven fold.[8] The fourth quarter of 2015 experienced the highest level of funding. Experts have projected that by 2020 AI would become a $70 billion industry.[9]

AI performs significant roles[10] in the society as evidenced in its wide application in diverse fields of human endeavour[11] and activities.[12] Various examples of this abound. Take for instance in medicine, where AI has been used to detect misdiagnosis of a patient.[13] In legal research where a search tool called ROSS has been employed to enable users obtain legal answers from thousands of legal documents, statutes, and cases. AI has also been applied in dispute resolution through software called Modria, which functions as online dispute resolution mechanism system. AI has been applied in the arts where Aaron, a robotic artist produces paintings that are hardly distinguishable from human works.[14] In a related manner, in the creation of music, AI has been deployed via software called 'Emily' the music producer.[15] AI has been deployed in catering services via the use of smart coffee pots while IBM software known as Watson has being applied as a chef.[16] In aviation, it has been applied to control and manage air traffic.[17] It is clear to see that there has been a paradigm shift from human reliance to AI reliance as far as creativity and innovation is concerned. However, from an intellectual property (IP) law point of view, these creative works produced by AI fall into a legal grey area.[18] The reason being that just as in America, there is no guiding statutory provision or judicial precedence on AI globally.[19] There is a great need for guiding statutory provision on the use of AI in the same way statutes regulate other activities.[20] The aim of this paper is to ascertain whether there is a need for new rules regarding how the world views works of IP, against the background of the philosophic justifications of intellectual property. The paper therefore begins by looking at the traditional philosophic justifications for IP, and then a consideration of the problems that AI encounters within the realm of IP protection, in the context of copyright and patents. The paper also examines the challenges that confront traditional notions of ownership of works of IP, and it makes recommendations for the future.

2. Philosophic Justifications for Intellectual Property

In the discourses into the justifications for intellectual property, philosophic thought provides the basis for the legal and economic justifications advanced in favour of intellectual property rights protection. The arguments for or against the protection of intellectual property rights often find their root in the notions of what constitutes property. Having recognised the rights of individuals to own property, whether real, personal or *choses-in-action*, the law is only concerned with determining whether the products of intellectual activity deserve protection as property. Not unexpectedly, there is no consensus amongst legal scholars on the justifications for the protection of intellectual property, neither is there consensus on the classification of the arguments advanced by legal scholars over the course of about a hundred years since the debate on the subject matter began to rage. For instance, according to Moore the arguments for the protection of intellectual property rights have taken three forms, which are the personality theory, the utilitarian and the Lockean philosophic principles.[21] On the other hand, Spence has identified several arguments advanced for the protection of intellectual property rights.[22] Unfortunately, the classification by these two writers cannot be reconciled because they proceed from very different viewpoints, even though the arguments put forward under a particular category identified by one of them may be discernible in

[7] R. Dowell, 'Fundamental Protections For Non-Biological Intelligences Or: How We Learn To Stop Worrying And Love Our Robot Brethren' [2018] (19) *Minnesota Journal of Science and Technology* 305, 308.
[8] B. Watson, 'A Mind of Its Own - Direct Infringement By Users of Artificial Intelligence Systems' [2017] (58) *IDEA* 65, 67.
[9] Ben-Ari et al (n 9) 7.
[10] D. Vladeck, 'Machines Without Principals: Liability Rules and Artificial Intelligence' [2014] (89) *Washington Law Review* 117, 118.
[11] Watson (n 11) 71.
[12] M. Hashiguchi, 'The Global Artificial Intelligence Revolution Challenges Patent Eligibility Laws' [2017] (13) *Journal of Business and Technology Law* 1, 1.
[13] Watson (n 14) 73.
[14] Ben-Ari et al (n 12) 6.
[15] A. Khoury, 'Intellectual Property Rights for Hubots: On the Legal Implications of Human-like Robots as Innovators and Creators' [2017] (35) *Cardozo Arts & Entertainment Law Journal* 635, 640.
[16] B Hattenbach and J Glucoft, 'Patents in an Era of Infinite Monkeys And Artificial Intelligence' [2015] (19) *Stanford Technical Law Review* 32, 34.
[17] Karnow (n 8) 184.
[18] K. Hristov, 'Artificial Intelligence and the Copyright Dilemma' [2017] (57) *IDEA* 431, 434.
[19] M Gerstner, 'Liability Issues With Artificial Intelligence Software' [1993] (33) Santa Clara Law Review 239, 239.
[20] Khoury (n 18) 637
[21] A. Moore, 'Intellectual Property', *The Stanford Encyclopedia of Philosophy* (Summer 2011 Edition), Zatta, E. (ed.) 8. URL< http://plato Stanford.edu/archives/sum2011/entries/intellectual property> accessed 12 July 2013.
[22] Ibid

another category set out by the other. However, the classification by Moore is better rooted in philosophy and it is easier to relate them to the existing IPRs that abound under the current international system for the IP.

3. Personality Theory

According to Moore, personality theorists maintain that individuals have moral claims to their own talents, feelings, character traits, and experiences and as such they are self-owners [of these attributes and their products] in this sense.[23] They go on to state that control over physical and intellectual objects is essential for self-actualisation, and that by expanding the self outwardly beyond the mind and fusing the self with tangible and intangible items, we not only define ourselves but also obtain control over our goals and projects.[24] Indeed, Hegel had postulated that the external actualisation of the human will requires property,[25] and property rights are necessary in two ways. The first being that by controlling and manipulating objects, both tangible and intangible, our will takes form in the world and we obtain a measure of freedom.[26] The second is that in some cases, our personality becomes fused with an object.[27] It is for this reason that moral claims to control feelings, character traits, and experiences may be expanded to intangible works.[28] However, Moore has identified four limitations associated with the personality theory. First, it is not certain that we own our feelings, character traits, and experiences, even though we may possess them. He states that an argument is needed to establish the relevant moral claims.[29] This critique to the personality theory is weighty because it is recognized that possession does not necessarily translate to ownership, and different sets of rights could arise from either of them. Consequently, it may be misleading to conclude that because we are imbued with certain feelings, character traits and experiences, we own them and as such own any other thing that flows from them. Secondly, according to critics of the personality theory, even if it is established that individuals own or have moral claims to their personality, it does not necessarily follow that such claims are expanded when personalities become infused with tangible or intangible works. But that rather than establishing property claims to such works, it should be viewed as an abandonment of personality.[30] In other words, the moment an individual's feelings, character traits or experiences are infused into either a tangible or intangible work, that individual has given up that feeling, character trait or experience. It no longer belongs to him but has been surrendered to the work that is created following the infusion.Thirdly, assuming that moral claims to personality could be expanded to tangible or intangible items, an argument would still be needed to justify property rights, as opposed to rights to use or prohibit alteration, which personality-based moral claims may provide.[31] Lastly, there are a great number of intellectual innovations, for instance a new safety-pin design, in which there is no evidence of a creator's personality. In cases such as this, the personality theory falls short of providing any justifications whatsoever for the protection of any right as there is no infusion of feelings, character traits or experiences of the innovator into the product.

To these arguments, proponents of the personality theory state that by producing intellectual works, authors and inventors put themselves on display, thereby incurring certain risks for which intellectual property affords some measure of control over.[32] Moore states that it is the moral claims that attach to personality, reputation and the physical embodiments of individual goods that justify legal rules in the realm of intellectual property.[33] Undoubtedly, the personality theory is appealing because it is correct that most intellectual works reflect the personality of the originator. This is particularly true of literary works and other works of art where the author expresses his thoughts and inner feelings in his work. Unarguably, a person's thought-process or intellectual faculties are distinctly of his own making and are what lead to the eventual work or innovation. The act of another person, which alters the work, automatically alters the personality of the authors or at least has the capacity to alter the perception of the author among members of the society. By his work, an author is perceived by the society in a particular way, and so even if it is just that perception that could be altered, it is sufficient to ground intellectual property rights protection.

[23] Ibid, 9
[24] Ibid
[25] G. Hegel, *Elements of Philosophy of Right* (Allen Wood (ed) Cambridge University Press, 1991) 78
[26] Ibid, citing W. Humboldt, *The Limits of State Action*, (Coulthard, J. (tr) and Burrow, J. (ed.) Cambridge University Press, 1969)
[27] Ibid, citing J. Kohler, *Philosophy of Law* (Albretcht, A. (tr.) A.M. Kelley, 1969)
[28] Moore (n 24)
[29] Ibid
[30] Ibid
[31].Ibid
[32] Ibid
[33] Ibid, 10

4. The Utilitarian Incentives-Based Justification

This philosophy is incentives-based and it is rooted in the reasoning that in order to promote the creation of valuable intellectual works, there is a need to grant limited rights of ownership to authors and inventors. Bentham's work, where he posits that laws do not derive from natural rights but that they are socially justified if they bring the greatest happiness and benefit to a substantial number of people, grounds this justification.[34] According to the proponents of this philosophy, in the absence of such a system granting these rights, authors and inventors might not engage in intellectual activities; and that this control ought to be granted to authors and inventors as it provides incentives for social advancement.[35] Moore states that "coupled with the theoretical claim that society ought to maximise social utility", that is the general good and well-being of the society at large, a powerful argument for the protection of intellectual property is advanced.[36] The Utilitarian Incentives-Based theory is criticised on three fronts. First, that since it emphasises the need to provide incentives to authors and inventors, there are other means by which production could be encouraged without necessarily imposing the restrictiveness that intellectual property rights impose.[37] Secondly, even proponents of the utilitarian justification acknowledge that particularly with respect to trade secret, they do not yield any long term social benefit because they allow "authors and inventors the right to the slow dissemination of protected information indefinitely."[38] In such a case, it is difficult to see how the incentive to protect the property benefits the society as opposed to the benefits available to the owner. Lastly, that the cost and benefits of the intellectual property rights, particularly copyright, patent and trade secrets, are difficult to determine and as such this argument loses its "progress-enhancing appeal."[39] In other words, unless we are able to quantify the cost of the human intellect that has gone into producing a work that is protected by copyright for instance, and the benefits of the work to the society, it may be misleading to conclude that the society benefits as a result of such a work so as to ensure that such works are protected in the interest of the overall progress of the society.

In spite of the criticism directed at the utilitarian incentive-based theory, it offers one of the most pragmatic, though not conclusive, rationalisations for the protection of intellectual property rights. This is because of the fact that it takes the argument for protection from the "socio-economic value" point of view. After all, it cannot be argued that creations and innovations of the human mind do not have economic value. At least, a vital factor of production is involved; and that is entrepreneurship. That being the case, a creator or innovator who desires to extract the greatest economic benefit from his work should not be prevented from doing so, while requiring any other person who intends to exploit such a work to seek the permission of the creator or innovator. In this way, the society is the ultimate beneficiary because protection of intellectual property would promote competition and innovation, and ultimately, prosperity.

5. The Lockean Justification

This is rooted in the arguments of Locke who posited that individuals own their bodies and labour; and that when an individual labours on an un-owned object, that labour becomes infused in the object in such a manner that the object and the labour cannot be separated.[40] Consequently, as soon as a person's labour is joined with the un-owned object, the right to control the result of this fusion is generated.[41] In spite of the quality in this argument, Waldron had contended that the idea of mixing an individual's labour is incoherent as according to him, actions cannot be mixed with objects.[42] It is difficult to appreciate Waldron's reasoning here. This is because it is generally accepted that goods are the result of the combination of the factors of production, which are land, labour, capital and entrepreneurship. That being the case, it should not be difficult to appreciate and accept Locke's argument that labour mixes with an un-owned object. Waldron went ahead to state that mixing one's labour with an un-owned object ought to yield more limited rights than rights of full ownership.[43]

6. Rights in Works of Intellectual Property

From the philosophic justifications of IP discussed above, there are two broad rights that are identifiable as far as IP is concerned. The personality theory of IP focuses on the character traits, personal experiences and values that a

[34] M. Warnock, (ed.), *Utilitarianism: Including Mills on Liberty and Essay on Bentham and Selections from the Writings of Jeremy Bentham and John Austin*, (William Collins Sons & Co. Ltd., 1962) 34 – 35
[35] E. Hettinger, 'Justifying Intellectual Property', *Philosophy and Public Affairs*, (18), 31 – 52
[36] Ibid
[37] Ibid., 11
[38] Ibid.
[39] Ibid.
[40] T. Aplin, and J. Davis, *Intellectual Property Law: Text, Cases and Materials*, (Oxford University Press, 2009) 6 – 9
[41] Moore (n 36) 12
[42] J. Waldron, 'Two Worries about Mixing One's Labour', *Philosophical Quarterly*, (33) 37 – 44
[43] Ibid.

creator brings to bear on his work of IP. It is conceivable that a deeply religious painter for instance would be inspired by his religious values in the course of his work. Consequently, he is more likely to paint a piece that reflects those values. The personality theory is apt in terms of copyright where the author's personality and experiences are embedded in works such as songs, musical compositions, literary works, paintings, sculptors, and the like. The utilitarian incentives-based justifications amplifies the economic aspects of IP protection, by considering the subject matter from the perspective of the economic and social benefits that accrue to society from creations and innovations; thereby justifying some form of protection in economic terms to encourage creativity and innovation. It encompasses all the IPRs that exist under the IP system. The Lockean theory emphasises the inherent rights dimension of IP protection by stating that a man is entitled to reward for the work of his labour. This finds expression in instances where some physical or mental effort is expended in bringing about the creation or innovation. It would normally apply where all that is required by the author is to do apply physical effort in bringing about the work. These justifications generally give rise to the two broad rights that are recognised in IP, that is moral rights and economic rights.

Moral Rights

Moral rights protect an author's non-economic interests in copyright, and they relate to the protection of the author's personality and the integrity of his work.[44] The Berne Convention provides the legal basis for moral rights under the international IP system by giving authors the right to claim authorship of the work and object to any distortion, mutilation, or other modification of, or other derogatory action in relation to the said work, which would be prejudicial to his honour or reputation.[45] These rights are referred to as the right to paternity or right of attribution since it is only the author of the work who may claim authorship, as opposed to ownership of the work; the right of integrity since the author has a right to object to any mutilation, distortion or modification of his work.

Economic Rights

Economic rights consist of the aggregate of rights that exclusively allow the owner of a work protected by copyright to publish and distribute his work, or the owner of industrial property to work his invention to the exclusion of any other person, except with the licence or authorization of the owner of the industrial property. They are designed to give the author or other rights owner the opportunity to control and participate in the benefits of the use of the work.[46] In the case of copyright, it includes the right of translation,[47] reproduction,[48] broadcasting,[49] adaptation[50] and control of circulation, presentation and exhibition of the work.[51] In the case of industrial property, economic rights consist of the monopoly rights over the invention or other IP, the right to licence and assign these rights and the right to recover damages for unlawful exploitation by unauthorised persons.

6. Character of Artificial Intelligence

There is no single universally accepted[52] definition of artificial intelligence.[53] Artificial intelligence has been defined severally from multiple perspectives.[54] Below are some definitions of artificial of intelligence. AI[55] has been defined from the perspective of systems and machines to the effect that it aims to improve these systems and machines so that they are able to reason, learn, self-collect information, create knowledge, communicate autonomously, as well as manipulate their environment in unexpected fashions.[56] AI has also been defined as the ability of a system to act appropriately in an uncertain environment.[57] AI is a subset of computer science that allows machines to mimic aspects of human intelligence. AI is a broad set of methods, algorithms, and technologies that make software 'smart' in the sense that it mimics human behaviour. AI relates to software which, behave in a way

[44] D. Zografos, *Intellectual Property and Traditional Cultural Expressions* (Edward Elgar Publishing Ltd., 2010) 48
[45] Article 6*bis* of the Berne Convention
[46] Zografos (n 47)
[47] Article 8 of the Berne Convention
[48] Article 9 of the Berne Convention
[49] Article 11*bis* of the Berne Convention
[50] Article 12 of the Berne Convention
[51] Article 17 of the Berne Convention
[52] M. Scherer, 'Regulating Artificial Intelligence Systems: Risks, Challenges, Competencies, and Strategies,' (2016) 29 Harvard Journal of Law and Technology 353, 359.
[53] R. Calo, 'Artificial Intelligence Policy: A Primer and Roadmap' [2017] (51) *University of California Davis Law Review* 399, 404.
[54] N. Talley, 'Imagining the Use of Intelligent Agents and Artificial Intelligence In Academic Law Libraries' [2016] (108) *Law Library Journal* 383, 386.
[55] J. Zatarain, 'Artificial Legal Intelligence On The Internet: The Next Approach To Enforcing The Law Online' [2015] (2) *Edinburgh Student Law Review* 64, 65.
[56] Ben-Ari et al (n 17)
[57] Khoury (n 23) 639.

that appears to mimic human behaviour, such as creative thinking,[58] and is becoming increasingly proficient in performing human tasks. It is also becoming ubiquitous. More and more enterprises are incorporating artificial intelligence into their operations. This impacts a multitude of industries including law, healthcare, finance, engineering, customer service, entertainment, and communication. Also it is not uncommon to hear of artificial intelligence being used to develop new pharmaceutical compounds.[59] In December 2016, *Bloomberg* remarked that the year of the artificial intelligence revolution is here, while 2017 was dubbed the year of artificial intelligence.[60] From the foregoing, it can be seen that AI is a creation of technology, which is designed to perform tasks that are ordinarily carried out by humans. As has been shown above, there are instances where AI has created music and other works that are ordinarily protected IPRs. However, in spite of the fact that AI functions with a mind of its own, and it is independently capable of creativity and innovation, there are a number of challenges that inhibit the extension of IPRs to the works and innovations of AI. These challenges stem from the fact that the existing international instruments underlying the current system for IP i.e. the Paris and Berne Conventions, and TRIPs, which prescribes minimum standards in relation to the IP legislation under the world trading system, did not contemplate that technology would be deployed to the extent to which it has been with AI. Consequently, national laws on patent generally view inventions and inventors from a human angle alone.

7. Challenges Arising Within the Patent System

The aim of patents is to encourage innovation. Patents encourage innovation by vesting inventors with a monopoly over their inventions for a limited time in exchange for properly disclosing their inventions to the public. This is directly related to the economic rights that attach to IP. AI in contemporary times has being at the heart of innovation and invention. Many examples of the impact of AI to innovation have been given above. However, these developments come in tow with some questions or grey areas; the reasons for this being the non-existence of express statutory provisions, or judgments and rulings of the courts on patentability of such inventions. [61] The challenges posed by the patent system to AI arise in terms of the patentability of creations of AI, the inventor of AI innovation and the liability for infringement by AI.

The Patentability of Creations of Artificial Intelligence

This refers to the availability of protection for creations of AI. In Nigeria, the Patent and Design Act makes express provisions relating to patentable subject matter in the context of the conditions for patentability of an invention, and the subject matter of patents.[62] It is expressly provided that principles and discoveries of a scientific nature are not inventions for the purposes of that Act.[63] It therefore means that an invention is something that is of a tangible nature, which meets the requirements for patentability. The same may be said of the law in other jurisdictions; however, the US offers a unique circumstance in the interpretation of what is patentable under US law. There two important provisions on patent eligibility of patents in the US i.e. sections 101 and 103 of the United States Patent Act. Section 101 of the United States Patent Act provides for eligible subject matter and states that anyone who invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent there for, in line with the conditions and requirements of the statute. US courts have gone a step further by defining patentable subject matter as anything that is made by man. Section 101 does not state whether the methods and devices of implementing mental steps are eligible for patent protection. The United States Supreme Court has held that amongst other things abstract intellectual concepts cannot be protected by a patent.[64] It must be borne in mind that the decisions of the US courts that an invention is anything that is man-made were not given in the context of excluding inventions made by AI; rather they were given in order to distinguish inventions from matters that occur naturally. Consequently, it is not an interpretation on the capacity of an AI system as an inventor.

Now turning to section 103 of the USPA, it provides that patentability will not be negated by virtue of the manner in which the invention was made. It must be stated that the purport of section 103 is to validate an invention irrespective of the way and manner in which it came about. In other words, a patent or an application for grant of patent will not be defeated simply because the invention was a result of deliberate and conscious thought or effort, but by happenstance. It is arguable that by virtue of this provision AI inventions could be patentable and that refusal by the patent office to register a patent on the grounds of section 101 amounts to discrimination on the basis of the circumstances surrounding the invention in question, as well as violation the provision of section 103 of the

[58] Watson (n 16) 71.
[59] Hashiguchi (n 15) 4.
[60] Ibid 8
[61] Hattenbach and Glucoft (n 19) 43.
[62] Section 1
[63] Section 1 (5)
[64] Hattenbach and Glucoft (n 64) 35.

United States Patent Act. The argument often raised against granting such patents is to the effect that section 103, as well as the other sections, was intended for humans and not machines; and that the intention of the statute was to make it clear that an invention was patentable regardless of whether it resulted from a long toil and experimentation or from a moment of a flash of brilliance.[65] The present writer is of the view that since laws are interpreted by finding the intention of the legislature, then it is erroneous to determine that an invention which is new is not patentable only because it is the product of an AI system. This is because the primary intention of patent legislation is to protect that which is new, results from inventive activity and is capable of industrial application,[66] provided that it is a tangible invention and not merely a principle or discovery; and not to protect the inventions of humans as opposed to those of robots.

Who is the Inventor of Works Created by Artificial Intelligence?

Under Nigerian law, the right to a patent in respect of an invention is vested in the statutory inventor. The statutory inventor is the person who is the first to file or validly claim a foreign priority for a patent application in respect of the invention, irrespective of the fact that he is not the true inventor.[67] This law makes reference to "the person" who first files or claims priority for an invention. In this case, it could be argued that a person within the meaning of Nigerian patent law includes both natural and artificial persons. That being the case, an AI system could be viewed as an artificial person. However, the problem that would be encountered in so doing is that an artificial person in the context of Nigerian law generally is a registered entity within the meaning of Nigerian corporate or administrative law. Consequently, there needs to be specific legislation that recognises AI systems as persons within the meaning of the law, if patent protection is to be extended to AI inventions. There are similar provisions under US law. For instance, section 115 of the USPA requires an application for patent to state the inventor. An inventor can be defined as the individual or individuals responsible for conceiving an invention. This is the same definition of an inventor under section 100 of the USPA. This definition has been described as strict and rigid, as even legal entities do not qualify as inventors.[68] Therein lays the conundrum as AI cannot qualify as an inventor because it is a system and not an individual. It can be seen therefore, that universally AI suffers from a lack of recognition as a legal person or entity and this is a major impediment to extending patent protection to inventions of AI.

Who Bears Liability When Artificial Intelligence Infringes Intellectual Property Rights?

The possibility of an AI system infringing intellectual property rights cannot be ruled out, [69] this is because a system with the ability to create an invention also has the potential to imitate. Infringement here occurs when there is a replication of a patent-protected invention without authorisation from the patent owner. There have been reported cases of patent infringement by AI systems. On one occasion an AI system created an optical lens with design and functionality that infringed on an existent patent. The courts are yet to address liability for direct patent infringement by a party who sells or operates AI systems. Neither is there is laid down judicial precedence for determining who bears liability in the event of an artificial intelligence system infringing a patent. Consequently, the parties and even the courts would find it difficult to determine liability when infringements of patents occur.[70] Many laws assign liability when someone, in some way is responsible for injury and it should not be different with AI.[71] Tremblay argues that the user of AI should be vicariously liable for such infringement, and not the software designer the same way a dog owner is vicariously liable for its action and not the dog breeder.[72] The problem with this suggestion is that it takes away the implied duty of care the software designer owes the user to exercise due diligence in designing software that would not infringe intellectual property rights. The better approach would be to determine liability on the basis of negligence and incompetence. That is, in determining liability resort should be made to whose negligence and incompetence led to the infringement. The only drawback to this being that it may ultimately prove difficult to prove negligence or incompetence but it represents a better option as it introduces a balanced and objective way as opposed to an unfair and lopsided means of determining liability. In dealing with the above issue, Watson had suggested that a clause on liability should be inserted in an AI contract of sale.[73] This

[65] Ibid 43.
[66] Section 1 (2) of the Patents and Design Act, which is consistent with the minimum requirements prescribed under Article 27 of TRIPs
[67] Section 2 (1) of the PDA
[68] Hattenbach and Glucoft (n 67) 46.
[69] F. Marino, T. Nguyen, 'From Alappat to Alice: The Evolution of Software Patents' [2017] (9) *Hastings Science and Technology Law Journal* 1, 12.
[70] Watson (n 61) 69.
[71] Karnow (n 20) 154.
[72]Mario Tremblay, 'Should Robots Have Legal Rights?'(2015)< http://www.robotshop.com/blog/en/should-robots-have-legal-rights-17333 > accessed 4 July 2018.
[73] Watson (n 73) 83.

represents a good idea especially in light of the lacuna as far as liability and infringement are concerned. This would provide guidance and would be enforceable in the courts. However, the problem with this is that the parties may have vested interests which they may want to protect by way of making the said clause suit that interest as much as possible. As such parties may fail to come to an agreement or fail to reach a compromise on the infringement and liability clause. In the view of the present writer, the liability for infringement of existing patents by AI system should be determined on the basis of the cause of the infringement. If the infringement is occasioned by a failure of the AI system to function efficiently, then the software designer ought to be liable on the basis of a breach of an implied duty, and indeed an implied warranty that the software would function in a manner that does no harm to third parties in any manner whatsoever. The relationship between the software designer and the user is that of a contract of sale. The implication of this is that jurisdictions like Nigeria need to develop statutory rules relating to contracts of sale of software, making provisions for implied terms and the duty of care that a software designer owes users of his software. On the other hand, if the infringement is caused by the careless use or negligence of the software by the end user, then he ought to be liable for any infringement of such existing patent. However, it must be stated that it is advisable to apply technology in examining inventions by AI systems. Technology is better suited to determining whether any AI invention is prior art, and by extension whether it infringes existing patent.

8. Challenges Arising Within the Copyright System

The copyright system is designed to protect creations of works of a literary, artistic and musical nature; provided that sufficient effort has been expended in making the work original, and it is fixed in a medium of expression now known or to be known in future. The reward for copyright protection is two-pronged i.e. the enjoyment of both moral and economic rights. Even in cases where the author of the work is not the owner of the work as defined by law, the author still enjoys moral rights over the work, even though he may not necessarily enjoy economic rights. The copyright system also presents its challenges to the extension of protection to AI in the area of registration and the question of authorship and ownership.

Does Artificial Intelligence Expend Effort in Making a Work Original?

The purpose of copyright law is to incentivise authors to create new works for the enjoyment and benefit of the society.[74] In contemporary times, creative expressions are carried out by advanced technology and creative robots, which are driven by sophisticated AI systems acting autonomously.[75] Generally under the current IP system works created by AI are not copyrightable. The US Copyright Office for instance does not register works autonomously created by AI without any form of creative human input or intervention by a human author,[76] and AI-created works have no human input.[77] The US Copyright Office is yet to acknowledge AI-created works. It likens that the creations of AI to creations, patterns, shapes of weaving machines which are created by chance rather than the programmer of the weaving machine and as such the resulting patterns created by randomness cannot be protected by American copyright. Consequently such works are released into the public domain.[78] The problem with AI and copyright is not that AI is incapable of creating original literary, artistic or musical works. Rather, the real question is whether it can be said that sufficient effort has been expended on making the work to give it an original character.[79] It must be borne in mind that the effort contemplated here is not that expended in designing the AI system. Instead it is the effort that the AI system expends in making the work original that is in issue here. In this context, the effort that is contemplated involves the dissipation of physical energy and mental faculties in the creation of literary, musical and artistic works. Looking at it from the traditional perspective, AI-created works stand no chance of satisfying these requirements. However, there is a need to re-think our understanding of what it means to expend sufficient effort in making a work original as it concerns AI-created works. AI is admittedly not human, and as such it would be absurd to equate automation with the exertion of physical and mental effort. Consequently, the requirement for originality of literary, musical and artistic works needs to be considered from the standpoint whether the work is original. This would enable the IP system to achieve its underlying objective, which is to protect original works from unauthorised use and reproduction.

[74] R. Yu, 'The Machine Author: What Level of Copyright Protection Is Appropriate For Fully Independent Computer Generated Works' [2017] (165) *University of Pennsylvania Law Review* 1245, 1245.
[75] S. Ravid and L. Hernandez, 'Copyrightability of Artworks Produced by Creative Robots And Originality: The Formality-Objective Model' (2018) 19 Minnesota Journal of Science and Technology 1,13.
[76] Ibid
[77] Yu (n 77) 1255.
[78] Hristov (n 21) 431.
[79] This is one of the requirements as prescribed by section 1 (2) (a) of the Nigerian Copyright Act

Authorship and/or Ownership of Works Created By Artificial Intelligence

The criteria for eligibility of literary, musical and artistic works is on the basis of nationality of the author, place of publication and domicile of the author.[80] The Copyright Act vests ownership of literary, musical and artistic works in the author or authors of the work.[81] Under the Nigerian copyright statute, a person is an individual who is a citizen of or domiciled in Nigeria,[82] or a body corporate incorporated by or under the laws of Nigeria.[83] In a related development, a US court in *Naruto v Slater* recently held that non-humans cannot be considered creators for the purpose of copyright. As if to reinforce this, the latest publication of the Compendium of Best Practices by the US Copyright Office clearly states that copyright will only be granted to human authors.[84] This raises the question of who the owner of a work created by AI is. Miller and Acosta state that the answer to this question lies in whether AI was used as a tool by the creator of literary, musical or artistic expression or whether the AI system acted autonomously.[85] In the view of the present writer, Miller and Acosta seek to create a dichotomy between AI ownership and human ownership of copyrights. As ingenious as this seems, it must be stated that whether AI was a tool used in creating the work or it acted autonomously, it cannot act without having been given a set of instructions as to what to do to create the literary, musical or artistic work. The set of instructions given to AI can be equated with the idea, which originated from the person giving the instructions, while AI is the means by which the idea finds expression. The dichotomy sought to be created is non-existent and the human originator should own the moral rights in both cases. This is because in the first case AI is used as a tool, a means to an end. In the second case the fact that the creation is autonomous is irrelevant because autonomous creation was the purpose of AI and should, therefore be viewed as commissioned works of copyright. It must be stated that this is quite unlike inventions where the concern is the tangible invention, as opposed to copyright where the focus is both the idea and the expression of the idea.

9. Monkey Intelligence and Intellectual Property: A Critique of *Naruto v Slater*

AI is not the only form of intelligence that is contending for recognition within the IP system. Some forms of animal intelligence particularly that of monkeys, are also begging for recognition. Almost three decades ago, Phillips and Firth in attempting to distinguish the colloquial from legal meaning of IP stated that not everything that can be considered 'intellectual' necessarily emanates from the human brain and they gave the example of a hypothetical monkey that is shackled to an indestructible typewriter, hammering on keys at random until it types a work of merit.[86] Such a work, according to them, would be considered intellectual property in the colloquial sense, even though it does not originate from the human brain. The legal description according to Phillips and Firth differs from the colloquial description in the sense that it focuses upon the rights which are enjoyed in the produce of the mind, rather than the produce itself,[87] and that intellectual property means the legal rights which may be asserted[88] in respect of the product of the human intellect. Little did Phillips and Firth know at the time that the work of a monkey would be subject of copyright litigation 25 years down the line. This was in *Naruto v Slater* where British wildlife photographer David Slater travelled to the Tangkoko Reserve on the island of Sulawesi in Indonesia. He followed a troop of about twenty five endangered crested black macaque monkeys in the wild, and thereafter set up his camera on a tripod. The monkeys approached it, apparently being fascinated by their reflections in the lens. They began playing with the camera and took photos of themselves. One of the monkeys took many self-portraits, one of which became the cover of a book titled 'Wildlife Personalities' in which Slater is identified as the copyright owner of the selfies. In 2015, a non-profit organisation People for the Ethical Treatment of Animals (PETA) filed an action in a US District Court in California as friends of the monkey it calls Naruto, the plaintiff. The suit claimed for copyright infringement on the ground since the selfies resulted from series purposeful and voluntary actions by Naruto, unaided by Slater, resulting in original works of authorship. The standing of the plaintiff to sue was challenged with the central issue being whether the US Copyright Act permits the plaintiff's ownership of the works or gives him standing to sue to assert claims under that statute. In January 2016 the court ruled that while Congress and the president can extend protection of law to animals, there is no indication that they did so in the Copyright Act; and as such Naruto could not own the copyright to the photographs he took. In essence, Slater's copyright over the photographs was affirmed.

[80] Article 3 of the Berne Convention
[81] Section 2 (1) of the Nigerian Copyright Act, with similar provisions in section 201 of the US Copyright Act
[82] Section 2 (1) (a) of the Copyright Act
[83] Section 2 (1) (b) of the Copyright Act
[84] Hristov (n 81) 449.
[85] A. Miller,' Copyright Protection for Computer Programs, Databases, and Computer-Generated Works: Is Anything New Since CONTU?' [1993] (106) *Harvard Law Review* 977, 1073.
[86] *Introduction to Intellectual Property* (2nd edn Butterworths, 1990) 3
[87] Ibid
[88] Ibid

It must be said that there is no justification for Slater having copyright over the photographs taken by the monkeys. There was no argument that the photographs were taken by the monkeys unaided. There was no intervention by Slater in the taking of the photographs. The only justification that is applicable to the circumstances of this case is the Lockean justification i.e. that the author is entitled to copyright because he had expended physical effort in bringing about the photographs. But then did Slater expend any effort in bringing about the photographs? In view of the fact that the photographs were taken unaided, the answer to that is in negative. The camera, which belonged to Slater, was simply a tool of the author to express his or her idea in a tangible form as was properly described in *Burrow-Giles Lithographic Co. v. Sarony* where copyright was first extended to photography. Slater never had the idea of monkeys taking selfies, but neither did the monkeys. But then IP, including copyright, is available notwithstanding the manner in which it came about. Secondly, the effort that should extend copyright to Slater in this case goes beyond merely setting up the camera on the tripod. For Slater to enjoy copyright over the photographs he must have been the person who took the photographs using the camera; but that is not the case here. This therefore calls into question the basis of extending moral and economic rights to Slater, even though US law does not recognise the ownership of copyright by non-humans. The implication of this decision is that a person could appropriate copyright over the works that he made no effort whatsoever to create. That is inconsistent with the fundamental essence of the copyright system arising from the Berne Convention.

10. Recognising Artificial and other Forms of Intelligence within the Intellectual Property System

AI and other forms of intelligence have been demonstrated to possess the ability to create works of IP that are original, and that would otherwise be protected by either patent or copyright had those works been created by humans. Some scholars have argued that the term "authorship" should be redefined to include both human and non-human authors.[89] The present writer reinforces these arguments on the ground that the underlying philosophic justifications of IP contemplate a system that rewards the author or inventor of works of IP. Consequently, in the case of copyright, the creator of a literary, musical or artistic work is entitled to be attributed as such, irrespective of the fact that he is non-human. The IP system does not contemplate rewarding a human who has appropriated a work of IP simply because a non-human, who would have owned the IPR, is incapable of doing so by virtue of his legal incapacity. There is a contradiction in the IP system which would not extend IPRs to AI and other forms of intelligence, but would have no problems doing so to a cloned human, because the clone is 'human.' Yet the clone is an artificial creation of biotechnology, and its humanity is only to the extent that it is genetically human. The IP system needs to create a legal mechanism to recognise the standing of AI and other forms of intelligence to own IPRs. In the case of AI, this can be protected by recognising their right of the owner of the AI system to sue on its behalf, while other forms of intelligence may sue through friends and guardians, as was the case in *Naruto v Slater*.

11. Conclusion

The internationally recognised system for the protection of intellectual property (IP) came into existence at a time when it was inconceivable that technology was capable of working autonomously without human intervention. Since then, however, technology has gotten to the level that it not only acts with little or no human intervention, but it is capable of innovation and creation through a system known as alternative intelligence (AI). In addition to this, animals have been known to be capable of creating works that a protectable by existing intellectual property rights (IPRs), particularly copyright. The IP notions of ownership have not changed to recognise ownership of IP by AI or animals that created works of merit, even though the IP system is not designed to reward a person for the creation and innovation of another. There is a need for the IP system to recognise the ownership of works of IP by AI and other non-humans. This is achievable by recognising the protection and enforcement of IPRs by AI and non-humans through legal guardians. In the case of copyright, especially for musical works, the threshold for the fulfilment of the originality requirement need not view effort expended in terms of physical or mental effort, but the fact that the AI system has created an original musical work should be sufficient to satisfy that requirement.

[89] R. Abbott , 'I Think, Therefore Invent: Creative Computers And The Future Of Patent Law' [2016] (57) *B.C. L. REV*. 1079 and; C. Davis , 'An Evolutionary Step In Intellectual Property Rights Artificial Intelligence And Intellectual Property' [2011] (27) *Computer Law Security Review* 601