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Can robots have feelings? Should we now apologise to the AI-beast called DABUS and compliment ANNs instead?

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[Thaler v Comptroller-General of Patent, Designs and Trade Marks \[2023\] UKSC 49](#); [\[2023\] 12 WLUK 257 \(SC\)](#)

[Emotional Perception AI Ltd v Comptroller-General of Patents, Designs and Trade Marks \[2023\] EWHC 2948 \(Ch\)](#); [\[2024\] Bus. L.R. 14](#); [\[2023\] 11 WLUK 343 \(Ch D\)](#)

*183 Abstract

The article looks at two judgments with comparable subject matters, decided within a month of each other towards the end of 2023 by United Kingdom (UK) courts: the UK Supreme Court appeal in [Thaler v Comptroller-General of Patents, Designs and Trade Marks \[2023\] UKSC 49](#) and the High Court ruling in the [Emotional Perception AI Ltd v Comptroller-General of Patents, Designs and Trade Marks \[2023\] EWHC 2948 \(Ch\)](#) (Re ANNs). These cases ask the question whether an artificial intelligence (AI) system can be named as an inventor and whether a patent application can proceed without naming a human inventor. The Dr Stephen Thaler matter has been considered in various semblances before courts in Australia, Germany, Israel, New Zealand, South Africa, South Korea and the US. Dr Thaler's 'Device for the Autonomous Bootstrapping of Unified Sentience' (DABUS) was also considered at the European Patent Office (EPO) and by the South African Patent Office (SAPO). Except for South Africa, the overall message from the various global courts has been wholly negative. The decision from the UK Supreme Court in [Thaler](#) is the latest decision, providing no surprises. The UKSC held, in agreement with other courts around the world (except South Africa), that an AI machine, such as DABUS, could not own any rights in the alleged inventions and therefore there was no mechanism by which these could pass to Dr Thaler. The core of the UKSC's decision in [Thaler](#) revolved around two patent applications filed by Dr Stephen Thaler, where the alleged 'inventor' of the products and processes is an AI system named DABUS. The justices of the Supreme Court unanimously held that an AI system cannot be recognised as an inventor under the current legislative framework of the [Patents Act 1977](#). In his leading judgment, Lord Kitchin emphasised that an 'inventor' must be a natural person. Since DABUS, a non-human entity, created the inventions autonomously, it did not fit within the legal definition of an inventor. Lord Kitchin's examination of the role and status of DABUS in the [Thaler](#) case is particularly insightful: the crux of the court's decision hinged on the interpretation of the term 'inventor' within the [1977 Act](#) which defines an inventor as 'the actual deviser of the invention'. This interpretation adheres to the traditional understanding of inventorship, which inherently links human intellect and creativity to the concept of invention. The article compares the [Thaler](#) judgment with the High Court ruling in the [Emotional Perception AI Ltd v Comptroller-General of Patents, Designs and Trade Marks \[2023\] EWHC 2948 \(Ch\)](#), where Sir Anthony Mann permitted the patentability of Artificial Neural Networks (ANN) (pending an appeal).

Why is DABUS referred to as 'unified sentience'? Does DABUS have feelings?

Missouri-based inventor, computer scientist and AI researcher, Dr Stephen Thaler, is the creator of the 'Device for the Autonomous Bootstrapping of Unified Sentience' (DABUS) to generate new ideas and then to determine which are the most novel, useful, or valuable.¹ Dr Thaler evidently supposes his device is sentient because it says so in DABUS' full name. We could then go one step further that this artificial intelligence (AI) system is deemed to have feelings, can invent and ought to be granted moral status ('is it ok to lie to Siri?'²)? Which would then follow the age-old argument whether animals are sentient, which could now be applied to AI machines?³

DABUS itself is a patented AI paradigm, capable of accommodating trillions of computational neurons within extensive artificial neural systems that emulate the limbo-thalamo-cortical loop within the mammalian brain. A second system of neural networks detects critical consequences of these potential ideas and reinforces them *184 based upon predicted novelty and salience. DABUS ‘invented’ two inventions without human intervention, an improved beverage container (‘the fractal container’)⁴ and a ‘neural flame’ device, used in search-and-rescue missions.⁵

Professor Ryan Abbott argued that these two inventions should qualify for patent protection and did not assert that the AI should own the patents, but rather that ownership should run to the owner of the AI.⁶ This arrangement would allow IP protection for innovations invented by AI, while allowing humans to reap the benefits.

DABUS’ food container and neutral flame inventions enter the world legal patent arena⁷

In a long series of world-wide high-profile legal actions, Dr Thaler and Professor Abbott have tried to prove that patent protection should be available for innovation invented by AI since 2018. In total, Thaler and Abbott launched more than a dozen patent applications across the globe, including in the UK, United States (US), New Zealand, Germany and Australia, all with the same aim to seek to have Thaler’s DABUS device listed as the inventor with its own patent.⁸ Here are just some of the examples:

In October 2019 Professor Abbott applied to the United States Patent and Trademark Office (USPTO), requesting that the AI-DABUS device be deemed the inventor and the AI’s owners to receive the patent rights. In April 2023 the US Supreme Court declined to hear a challenge by Dr Thaler to the USPTO’s refusal to issue patents for two inventions which his AI system DABUS had created. The justices turned away Thaler’s appeal of a lower court’s ruling on the grounds that patents can be issued only to human inventors and that his AI system could not be considered the legal creator of two inventions that Thaler said it generated.⁹

Thaler’s two DABUS patent applications were also rejected by the EU Patent Office (EPO) on 20 December 2019. The EPO refused the first patent application, which covers the ‘fractal’ food container (EP 18 275 163),¹⁰ and the second, which covers ‘fractal neutral flame’ light signal (EP 18 275 174),¹¹ on the grounds that they do not meet the requirement of the European Patent Convention (EPC); namely that an inventor designated in the application has to be a human being, not a machine.¹² It is important to note that the EPO’s decision does suggest future developments which *may* grant patents for AI systems:

”Under Article 52(1) of the European Patent Convention (EPC) any invention which is novel, industrially applicable and involves an inventive step is patentable. The appellant has argued that the scope of this provision is not limited to human-made inventions... How the invention was made apparently plays no role in the European patent system.”¹³

The decision refers largely to how EPO member states interpret the EPC, which in future could provide the creators behind AI-derived inventions with the scope to request a patent under national law. The EPO takes the approach that AI and machine learning are based on computational models and algorithms that are in themselves of an abstract mathematical nature, and consequently the guidance for excluded subject matter provisions, and specifically for mathematical methods, should apply. In practice, this means AI applications are assessed for patent eligibility, in which claim features found to fall within an excluded category can only be considered for the purposes of inventive step if they contribute to the solution to a technical problem.

The German Federal Patent Court (*Bundespatentgericht*) followed suit in 2021. The court’s decision was pragmatic: the listed inventor must be a natural person (*nattürliche Person* as defined by the German Civil Code), even if the AI device has identified both the problem and the solution. At the same time, however, the AI system itself can be additionally named. The Federal Patent Court did not comment on ‘true’ inventorship, making suggestions in its feedback how to draft a patent application to avoid its rejection for formal reasons. For example, the programmer or user of the *185 DABUS system, could assume the position of a ‘proxy inventor’ which might then be acceptable in a new patent application as a proxy for the AI device.¹⁴

In July 2021, the Australian Federal Court determined in *Thaler v Commissioner of Patents* [2021] FCA 879 that an AI system *could* be named as the inventor on a patent application. The decision was the first judicial determination in the world to say ‘yes’ to AI inventors. However, nine months later, on 13 April 2022, the Full Court of the Federal Australian Court overturned primary judge, Justice Beach’s decision, finding that the ‘inventor’ in an application for a patent must be a natural person (see: *Commissioner of Patents v Thaler* [2022] FCAFC 62). The FCAFC held that although not defined in the Australian Patents Act 1990, the term ‘inventor’ in s.15 is a reference to the inventor of the invention the subject of the patent application. The grant of a patent for an invention must reward human ingenuity.¹⁵

South Africa and Saudi Arabia grant DABUS ‘personhood’

More or less at the same time DABUS received the cold legislative shoulder from the US and Australian patent courts, DABUS received the landmark decision in July 2021 by the South African Patent Office (SAPO), which, under the auspices of the Companies and Intellectual Property Commission (CIPC), granted a patent to the device, listing ‘him’ or ‘her’ as the inventor of an AI system.¹⁶ The patent listed DABUS as the inventor and noted that DABUS received the patent for the food container based on fractal geometry that improves grip and heat transfer.¹⁷

The fact that South Africa became the first jurisdiction in the world to allow AI inventorship may well point to legal personhood and legal subjectivity, labelling DABUS as sentient, in spite the fact that the South African Patents Act 57 of 1978 is not unlike the [UK Patents Act of 1977](#)—except for the second clause:

”...an application for a patent in respect of an invention may be made by the inventor or by any person acquiring from him the right to apply or by both such inventor and such other person ...any person other than the inventor making or joining in an application for a patent shall in the prescribed manner furnish such proof of his title or authority to apply for a patent as may be prescribed.”¹⁸

Thaldar and Naidoo argue that it was the right decision from a legal perspective, which means that AI innovation now has the potential to improve human conditions in South African law, which means that AI is a special species of legal object that has the ability to invent.¹⁹

Saudi Arabia was the first state which granted a humanoid AI robot, ‘Sophia’, developed by the Hanson Robotics company, ‘electronic citizenship’ in 2017.²⁰ To date Saudi Arabia is the only country in the MENA region to have received a DABUS patent application.²¹ The DABUS application was made under the Saudi Authority for Intellectual Property (SAIP).²² On 23 November 2022 the SAIP received the patent application related to DABUS and the Commission’s decision on this request was regarded as ‘positive’ in the first instance in late 2023.²³

The Emotional Perception—ANNs case

Before we consider the UK Supreme Court’s judgment in [Thaler](#) of 20 December 2023, let us take a short detour to London’s High Court decision by Sir Anthony Mann, a month earlier. The High Court ruled on 21 November 2023 that Artificial Neural Networks (ANNs) *can* attract patent protection under UK law in [Emotional Perception AI Ltd v Comptroller-General of Patents, Designs and Trade Marks \[2023\] EWHC 2948 \(Ch\)](#). This appeal concerned the *exclusion* only under [s.1\(2\)\(c\) of the Patents Act 1977](#), which excludes from patent protection ‘a program for a computer ... as such.’ The High Court stated essentially that an ANN is *not* itself a program for a computer and therefore would fall outside the ‘program for a computer’ exclusion from patentability.²⁴

The subject of the patent application was the use of an ANN to provide improved media file recommendations to an end user, including sending a file and message in accordance with the recommendation. A typical field of *186 use is music websites, where a user may be interested in receiving music similar to another track of which they know or already has. The ANN is trained to discern semantic similarity (e.g. whether a piece of music is ‘happy’, ‘sad’, ‘relaxing’, etc.) from the physical properties of the music track. The ANN then offers suggestions of similar music in terms of human perception and emotion, irrespective of the genre of music and the apparently similar tastes of other people. Existing websites can offer similar pieces in, say, the same category (rock, heavy metal, folk, classical, etc.) but the categorisation tends to be limited to types of music, derived from human tagging, i.e. the playlists of others, which tend ultimately to derive from a human classification. As Justice Mann explained:

”...those criteria are not technical criteria in the sense that they can be described in purely technical terms, they are criteria nonetheless, and the ANN has certainly gone about its analysis and selection in a technical way”.²⁵

The [Emotion Perception AI](#) judgment has been regarded as a watershed moment for the patentability of Artificial Neural Networks (ANN) compared with other AI-related innovations such as DABUS. Following the High Court decision in [Re ANNs](#), the UKIPO released associated statutory guidance explicitly stating that, ‘the office is making an immediate change to practice for the examination of ANNs for excluded subject matter.’²⁶ This means that IPO patent examiners should *not* object to inventions involving an ANN under the ‘program for a computer exclusion’ of [s.1\(2\)\(c\) of the 1977 Act](#).

That said, the IPO has now been granted leave to appeal to the Court of Appeal. This means that the [Re ANNs](#) High Court decision by Sir Anthony Mann may well be reversed, so that the UK again becomes an unfavourable jurisdiction for ANN-inventions.

The UK Supreme Court decision in Thaler of December 2023

On 20 December 2023 the UK Supreme Court ruled that an AI cannot be the sole named inventor on a patent under the UK's patent legislation, in [Thaler v Comptroller General of Patents, Designs and Trade Marks \[2023\] UKSC 49](#) heard on 2 March 2023. The [Patents Act 1977](#) requires a 'natural person' rather than a machine to be behind an invention for a patent to be granted.

The case was an appeal on patentability of two patent applications for inventions made autonomously by Dr Stephan Thaler's DABUS AI. The earlier appeal by Dr Thaler to the High Court had been unsuccessful. There then followed a split decision by the Court of Appeal: a majority (Arnold LJ and Elisabeth Laing LJ) agreed with the Hearing Officer of the IPO that the applications must be taken to have been withdrawn. Birss LJ, dissenting, would have allowed the appeal and permitted the applications to proceed. Ultimately, the Supreme Court found that the IPO Hearing Officer, High Court Judge and majority of the Court of Appeal were correct in deeming Thaler's (DABUS') applications withdrawn for failure to comply with the formal requirements to name an inventor. In this landmark decision the Supreme Court set a significant precedent in the realm of AI and patent law.

Lord Kitchin (with whom Lord Hodge, Lord Hamblen, Lord Leggatt and Lord Richards agreed) reiterated in his leading judgment that the inventor must be a natural person under [s.7\(3\) of the Patents Act 1977](#) which provides an exhaustive code for deciding who is entitled to the grant of a patent. In considering [ss.7](#) ('right to apply for a patent') and [13](#) ('mention of inventor') of the 1977, the Supreme Court held that an inventor within the meaning of the Act must be a natural person, which DABUS was not.²⁷ The court unanimously decided that DABUS was not an inventor of the two patent applications in question.²⁸

The Supreme Court's judgment underscores a human-centric approach inherent in the current patent system. It highlights that the patent system is designed around human inventors who are sentient, recognising their contribution and granting them rights which can be legally transferred and exercised. This approach reflects the traditional view that inventions are the fruit of human ingenuity. In Lord Kitchin's opinion, Dr Thaler does not satisfy any part of the [1977 Act](#), whereby [s.7](#) does not confer on any person a right to obtain a patent for any new product or process created or generated autonomously by a machine, such as DABUS, let alone a person who claims that right purely on the basis of ownership of the machine.²⁹ This fundamental premise is made explicit in [s.7\(2\)\(b\) of the Patents Act 1977](#) (on which Dr Thaler relied), as the references to 'the invention', necessarily devised by a human being. The court held that Dr Thaler also failed to satisfy [s.13\(2\) of the Act](#) since he failed to notify the UKIPO, identifying the person or persons whom he believed to be the inventor or inventors of the patent.³⁰ Lord Kitchin quoted the comments made by Elisabeth Laing LJ in the Court of Appeal in this regard:

"Whether or not thinking machines were capable of devising inventions in 1977, it is clear to me that that Parliament did not have them in mind when enacting this scheme. If patents are to be granted in respect of inventions made by machines, the [1977 Act](#) will have to be amended". *187³¹

The Supreme Court in [Thaler](#) made clear the limits of its judgment, acknowledging the increasing importance of these questions, considering the significant recent advances in AI technology, and the policy issues that accompany them. This means the court considered a narrow point of interpretation of the current law, rather than the wider question of what form protections for AI generated works might take in the future, which are, properly, questions for the legislature and not the courts.³²

Professor Abbott who had represented Dr Stephen Thaler (amongst others) at the 2 March 2023 hearing, commented via his LinkedIn page on the UKSC judgment:

"Alas, the Court took a textualist approach to resolving the issue, noting that a patent requires disclosure of an inventor, under the existing scheme an inventor must be a natural person, and so in the case of an AI-generated invention without an identifiable human inventor the invention is inherently unprotectable. It is now up to Parliament to change the law to allow AI-generated inventions to be protected and to make the UK a favourable jurisdiction for the use and development of AI in research and development. Until then, future legal disputes will likely focus on how much and what kinds of contributions from a natural person are required to devise an invention with AI involvement, and this is likely to become increasingly

challenging to determine as AI is increasingly adopted across industries and becomes increasingly sophisticated. In any event, it was great fun arguing the case before the Supreme Court, together with Robert Jehan at Williams Powell, and with invaluable assistance from Jacob Turner at Fountain Court Chambers”.³³

Is there hope for DABUS’ personhood? Vorsprung durch künstliche Intelligenz: Concluding comments

AI has grown ever more powerful and—as Dr Thaler and Professor Abbott would have us believe—can now create new innovations on its own, without a human inventor. From autonomous vehicles to improved medical diagnostics to voice assistants, AI is increasingly at the forefront of innovation. Proponents of granting patents for AI-generated inventions argue that it would incentivise innovation and investment in AI systems, promote disclosures of trade secrets and commercialisation of new products, prevent inappropriately crediting natural persons, and serve the function of public notice by informing the public about how an invention was made.

The South African patent office sent a clear message in 2021: the DABUS AI-system *can* be the bearer of its own rights and duties.³⁴ However, the UK Supreme Court and all other world courts and patent offices have so far ruled to the contrary (except for a recent decision by the Saudi Arabian authorities). After Dr Thaler lost several international law suits and patent applications, the UK Supreme Court asked the same questions which all courts had been considering since 2018: whether domestic current patent laws, regarding inventorship need to be revised to take into account inventions where an entity or entities other than a natural person contributed to the conception of an invention?

The crux of all world court decisions in Thaler’s DABUS device hinged on the interpretation of the term ‘inventor’ within domestic legislation, most of which date back to the 1970s, defining an inventor as ‘the actual deviser of the invention’ and a human being or ‘natural person’, thereby excluding non-human entities such as AI systems. This interpretation adheres to the traditional understanding of inventorship, human cognisance and sentience, which inherently links human intellect and creativity to the concept of invention. On a broader scale, the UKSC and all other global court decisions (except South Africa and Saudi Arabia) reflect the current limitations of intellectual property law in keeping pace with technological advancements.

The UK Supreme Court’s decision in [Thaler](#) has far-reaching implications, particularly in AI-intensive industries, underscoring the need for legislative evolution to accommodate the growing role of AI in innovation. We have seen a rapid rise of AI systems and machines where ‘*Vorsprung durch künstliche Intelligenz*’ (KI) (advancement through AI) is inevitable.

Both the [Thaler](#) and the [Emotional Perception AI Ltd \(Re ANNs\)](#) cases underline the need for legislative reform to address the evolving landscape of AI-driven innovation. The answers provided by Mr Justice Mann in the [ANNs](#) case appear at odds with the UKSC ruling in [Thaler](#) as well as the current approach of the UKIPO to examination of computer implemented inventions. The decision by the IPO’s Hearing Officers in relation to ANNs is then surprising, relating to a process by which a music or a video file, an artificial neural network (ANN) is used to identify another media file which is semantically similar to the input media file. Mann J decided that the trained ANN itself is not a program for a computer, and therefore that the claim as a whole could not fall under the exclusion of the [1977 Act](#). Therefore, ANNs are patentable (until the CA decides otherwise).

The UK Intellectual Property Office has been regarded as a more challenging jurisdiction for these types of patent applications compared with the EPO and the [Emotional Perception \(ANNs\)](#) case (see below). The AI judgment in [Re ANNs](#) has resulted in even further divergence between the UK and EPO in the extent to which ANNs are caught by the exceptions to patentability. It is now up *188 to the EPO member states to create more clarity regarding the patentability of AI-invented technology via legal challenges.

Until legal reforms are introduced by parliament(s), AI systems such as DABUS cannot be recognised as inventors, hindering the full exploitation of AI’s potential in critical sectors, such as life sciences and pharmaceuticals. Which of the world’s legislators will be the first to recognise in law that AI machines and robots are treated the same as human ingenuity?

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Footnotes

1	Ursula Smartt is Associate Professor of Law at Northeastern University London. Contact: ursula.smartt@nulondon.ac.uk .
1	Dr Stephen Thaler founded Imagination Engines Inc, an advanced artificial neural network technology company based in Saint Charles, Missouri.
2	See: M. Gibert and D. Martin, “In search of the moral status of AI: why sentience is a strong argument” (2022) 37(2) <i>AI & Soc</i> 319–330, available at: https://doi.org/10.1007/s00146-021-01179-z .
3	For further discussion see: K. Hogan, “Is the machine question the same question as the animal question?” (2017) 19 <i>Ethics Inf Technol</i> 29–38, available at: https://doi.org/10.1007/s10676-017-9418-4 .
4	Fractal Container—defined in the patent abstract as: “A container for use, for example, for beverages, has a wall with an external surface and an internal wall of substantially uniform thickness. The wall has a fractal profile which provides a series of fractal elements on the interior and exterior surfaces, forming pits and bulges in the profile of the wall and in which a pit as seen from one of the exterior or interior surfaces forms a bulge on the other of the exterior or interior surfaces. The profile enables multiple containers to be coupled together by inter-engagement of pits and bulges on corresponding ones of the containers. The profile also improves grip, as well as heat transfer into and out of the container”: The Artificial Inventor Project, “Patent”, available at: https://artificialinventor.com/patent/ .
5	Neural Flame—defined in the patent abstract as: “The present invention discloses devices and methods for attracting enhanced attention. Devices include: an input signal of a lacunar pulse train having characteristics of a pulse frequency of approximately four Hertz and a pulse-train fractal dimension of approximately one-half; and at least one controllable light source configured to be pulsatingly operated by the input signal; wherein a neural flame emitted from at least one controllable light source as a result of the lacunar pulse train is adapted to serve as a uniquely-identifiable signal beacon over potentially-competing attention sources by selectively triggering human or artificial anomaly-detection filters, thereby attracting enhanced attention”: The Artificial Inventor Project, “Patent”.
6	Ryan Abbott, MD, JD, MTOM, PhD is Professor of Law and Health Sciences at the University of Surrey School of Law and Adjunct Assistant Professor of Medicine at the David Geffen School of Medicine at UCLA. He has published widely on issues associated with law and technology, including <i>The Reasonable Robot: Artificial Intelligence and the Law</i> (Cambridge: Cambridge University Press, 2020).
7	For all past and present applications re DABUS see Professor Ryan Abbott’s website The Artificial Inventor Project, available at: https://artificialinventor.com .
8	See P. Ragusa and N. Palmieri, “Artificial Intelligence as Inventor: DABUS Global Status” (2022) 39(2) <i>The Computer and Internet Lawyer</i> 1–5.
9	Dr Stephen Thaler v Katherine K. Vidal, Under Secretary of Commerce for Intellectual Property and Director of the United States Patent and Trademark Office US Court of Appeals for the Federal Circuit, No.21-2347 5 August 2022.
10	European Patent Register, “EP 18 275 163 Food Container”, available at: https://register.epo.org/application?number=EP18275163 .
11	European Patent Register, “Devices and methods for attracting enhanced attention” available at: https://register.epo.org/application?number=EP18275174&tab=main .
12	Both applications were made on 17.10.2018. See EPO commentary 17.1.2020, “Summary of relevant facts and submissions” at: https://register.epo.org/application?documentId=E4B63SD62191498&number=EP18275163&lng=en&npl=false .

13	See EPO decision of 20.12.2019, “EPO refuses DABUS patent applications designating a machine inventor” (20 December 2019), available at: https://www.epo.org/en/news-events/news/epo-refuses-dabus-patent-applications-designating-machine-inventor .
14	German Federal Patent Court Patent Application DE1020191281202 of 2020, 11 W (pat) 5/21 (Fractal Container), 18 W (pat) 28/20 (Neural Flame), 12 W (pat) 21/20 (Fractal Container). Federal Patent Court panel: Siegfried Höchst (presiding judge), Anton Eisenrauch, Timo Schwenke. Acting for Dr Stephen Thaler, Markus Rieck (patent attorney) of Fuchs IP (Frankfurt) and Malte Köllner (patent attorney) of Köllner & Partner (Frankfurt).
15	Federal Court of Australia: Commissioner of Patents v Thaler [2022] FCAFC 62 available at: https://www.judgments.fedcourt.gov.au/judgments/Judgments/fca/full/2022/2022fcafc0062 .
16	See Ryan Abbott’s blog post, “First Patent Granted to the Artificial Inventor Project” (28 July 2021), available at: https://artificialinventor.com/first-patent-granted-to-the-artificial-inventor-project/ .
17	See: Companies and Intellectual Property Commission of South Africa (CIPC) published the acceptance of South African patent No.2021/03242 in the South African Patent Journal 28 July 2021, available at: https://ipwatchdog.com/wp-content/uploads/2021/07/AP7471ZA00-Notice-of-Acceptance-1.pdf .
18	South African Patents Act 1978 s.25.
19	See D. Thaldar and M. Naidoo, “AI inventorship: The right decision?” (2021) 117(11/12) South African Journal of Science art.12509, available at: https://doi.org/10.17159/sajs.2021/12509 .
20	Following the Executive Regulations for the Saudi Arabian citizenship system of 19 November 1954, set out by the Ministry of the Interior (translation by Zoe Cordahi first year law student Northeastern University London), available at: https://www.moi.gov.sa/wps/wcm/connect/0f45008a-19c1-4af2-864e-6a2e80773fc2.pdf?MOD=AJPERES&CVID=o3GTNho . See also, <i>Abhishek G Bhaya</i> , “In a first, Sophia the humanoid robot gets Saudi citizenship” (26 October 2017), <i>CGTN.com</i> , available at: https://rb.gy/q452lw .
21	MENA stands for the Middle East and Northern Africa, referring to the countries between Iran in the East and Tunisia and Morocco in the West. Saudi Arabia Application no.521422019, available at: https://artificialinventor.com/wp-content/uploads/2023/01/Formal-Acceptance.pdf .
22	The SAIP is the authority in charge of granting protection documents, which give full protection within the Kingdom to an invention, a layout design of an integrated circuit, a plant variety, or an industrial design; See: Executive Rules for the Compulsory Licensing of Patents (English Translation), available at: https://rb.gy/wswg16 .
23	واخيراً، لا يخفى أن التقاطعات القانونية بين تقنية الذكاء الاصطناعي وحقوق الملكية الفكرية لم تعد مجرد فرضيات تطرح في الأروقة الأكاديمية لإثارة النقاش وتدريب الملكة القانونية، وإنما أصبحت إشكاليات حقيقة تواجه مكاتب الملكية الفكرية ومن ضمنها الهيئة السعودية للبراءة للاختراع والتأليف الإبداعية. وجميعنا يتربص باهتمام كبير قرار الهيئة حول هذا الطلب DABUS للملكية الفكرية التي تلقت طلب البراءة المتعلق بـ Saudi Government website: https://www.saip.gov.sa/en/articles/1475/ translation by Zoe Cordahi.
24	Emotional Perception AI Ltd v Comptroller-General of Patents, Designs and Trade Marks [2023] EWHC 2948 (Ch) at [4] .
25	Emotional Perception AI Ltd [2023] EWHC 2948 (Ch) at [76] .
26	IPO, “Statutory guidance: Examination of patent applications involving artificial neural networks (ANN)” (29 November 2023), available at: https://rb.gy/w7yih7 .
27	Thaler v Comptroller General of Patents, Designs and Trade Marks [2023] UKSC 49 at [79] .

28	Thaler [2023] UKSC 49 at [74]–[76].
29	Thaler [2023] UKSC 49 at [79].
30	Thaler [2023] UKSC 49 at [96]–[98].
31	Thaler [2023] UKSC 49 at [79].
32	Thaler [2023] UKSC 49 at [80].
33	Ryan Abbott’s LinkedIn Post (20 December 2023), available at: https://www.linkedin.com/posts/profabbott_thaler-appellant-v-comptroller-general-activity-7143259204022181891-R0WD .
34	For further discussion see: D.O. Oriakhogba, “Dabus Gains Territory in South Africa and Australia: Revisiting the AI-Inventorship Question” (2021) 9 South African Journal of Intellectual Property Law 87–108, available at: SSRN: https://ssrn.com/abstract=3998162 or http://dx.doi.org/10.2139/ssrn.3998162 .

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