The uncharted path for patenting Artificial Intelligence in the US

Marc V. Richards and Scott Ilhwan Yoo, of Brinks Gilson & Lione, examine the state of patenting AI-related and AI-generated inventions and a path forward in view of the rejection of the DABUS patent applications.

Many companies are rapidly investing in artificial intelligence ("AI") innovations to reduce costs and increase accuracy for tasks that might otherwise require human judgment.[1] Reflecting this trend, the number of patents and patent applications relating to AI in the United States has increased significantly in recent years. Between 2002 and 2018, annual AI patent application filings grew over 100%, from around 30,000 to more than 60,000.[2] As AI is widely used to develop these patent applications, the United States Patent and Trademark Office ("USPTO") is being confronted with difficult questions about whether to grant patent protection to AI-related patent applications. As AI increases in complexity and value to businesses, and as AI machines[3] become more involved in the inventing process, many view patent protection as vital to the economic growth and leadership of high tech industries in the United States.

Defining the many facets of AI
Although there is no universal definition of AI, the USPTO has recently released a new study defining AI as encompassing eight categories for the purposes of patent applications and grants :
- **Knowledge processing** – representing and driving facts about the world and using this information in automated systems (e.g., AI algorithm using a pre-defined "knowledge base" to automatically detect accounting errors).
- **Speech recognition** – techniques to understand a sequence of words given an acoustic signal (e.g., Siri, Alexa, and the like).
- **AI hardware** – physical computer components designed to meet the considerable computing power needed to handle AI processes through increased

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1   This article reflects only the present personal considerations, opinions and/or view of the authors, which should not be attributed to the author's current law firms or former or present clients.
2   The U.S. Patent and Trademark Office, *Inventing AI: Tracing the diffusion of artificial intelligence with U.S. patents* (Number 5, October 2020), available at https://www.uspto.gov/sites/default/files/documents/OCE-DH-AI.pdf.

processing efficiency and/or speed (e.g., hardware mimicking the synapses in a biological brain).
- **Evolutionary computation** – contains a set of computational routines using aspects of nature and, specifically, evolution (e.g., predicting available petroleum reserves with a mutating algorithm).
- **Natural language processing** – understanding and using data encoded in written language (e.g., using text to build an ontology by simulating human memory approaches).
- **Machine learning** – contains a broad class of computational models that learn from data (e.g., AI algorithm to optimize an e-commerce platform by classifying product descriptions, reviews, and other product features).
- **Computer vision** – extracts and understands information from images and videos (e.g., automating the detection of abnormalities in images taken during colonoscopies).
- **Planning and control** – contains processes to identify, create, and execute activities to achieve specified goals (e.g., method for detecting and addressing potential problems in processing plants through sensed environmental conditions).

The study found that patents containing AI appeared in just 9% of technologies in 1976, expanding to more than 42% of technologies in 2018.[5] While the growth of AI patent applications came from all AI-related technologies, "planning and control" and "knowledge processing" were the two categories with the greatest increase in AI use.[6]

The DABUS Decision: Denying Inventor Status to an AI Machine
While the study shows an increase in AI-related

patent applications and broad diffusion of AI across various technologies, there are still challenges faced by AI-related patent applications. One of them in particular, is whether to grant patents to inventions created by AI machines.

On July 29, 2019, the Artificial Inventor Project (AIP), a team dedicated to exploring the concept of AI patentability, filed two patent applications around the globe, including the United States. These patent applications named as the sole inventor an AI system called the Device for the Autonomous Bootstrapping of Unified Sentience ("DABUS"). Specifically, the application named DABUS as the inventor's first name and "invention autonomously generated by artificial intelligence" as the family name. The application also listed the applicant, Stephen Thaler, as the assignee. According to the patent applications, DABUS invented, without human assistance, an improved beverage container and a neural flame device used in search and rescue missions.

After reviewing the filing, the USPTO issued a "Notice to File Missing Parts of Nonprovisional Application" on August 8, 2019, noting that the DABUS application did not identify each inventor by his or her legal name. Mr. Thaler filed a first petition on August 29, 2019, requesting to vacate the August 8, 2019 notice. The USPTO dismissed the first petition on December 17, 2019. Mr. Thaler then filed a second petition on January 20, 2020, requesting reconsideration of the decision issued December 17, 2019.

In response to the second petition, the USPTO published a decision on April 22, 2020, stating the Office's position on whether AI can invent.[7] In ruling that an inventor must be a natural person, the USPTO relied heavily on existing statutes and case law. The USPTO stated that relevant patent statutory provisions consistently refer to inventors as natural persons and they preclude a broad interpretation of inventorship beyond natural persons. As a result, the USPTO held that interpreting the patent statutes broadly to encompass machines as well as natural persons would be contrary to the text of the law.

The USPTO also noted that federal courts likewise refer to inventors as natural persons. For example, in *Univ. of Utah v. Max-Planck-Gesellschaft zur Förderung der Wissenschaflen e.V.,* the United States Court of Appeals for the Federal Circuit ("Federal Circuit") held that a state could not be an inventor. The Federal Circuit wrote that in order to perform a mental act, inventors must be "natural persons and cannot be corporations or sovereigns." In another example, the Federal Circuit in *Beech Aircraft Corp. v. EDO Corp.* held that "only natural persons can be inventors".[10]

Finally, the USPTO pointed to Title 37 of the Code of Federal Regulations ("CFR"), which in

3   An "AI Machine" is used in this article to refer to the AI entity, AI software, AI agent, or AI algorithm implementing artificial intelligence to generate innovations.

4   *Id*. at 3-4.

5   *Id*. at 5.

6   *Id*.

7   Decision on Petition dated April 22, 2020, U.S. Application Serial No. : 16/524, 340, *available at* https://www.uspto.gov/initiatives/artificial-intelligence/artificial-intelligence-reports.

8   *Univ. of Utah v. Max-Planck-Gesellschaft zur Förderung der Wissenschaflen e.V.,* 734 F.3d 1315 (Fed. Cir. 2013).

9   *Id*. at 1323.

10   *Beech Aircraft Corp. v. EDO Corp.,* 990 F.2d 1237, 1248 (Fed. Cir. 1993).

11   *See* Decision on Petition dated April 22, 2020, U.S. Application Serial No. : 16/524, 340, at 6.

12   See *Id*.

13   *Thaler v. Iancu,* Case 1:20-cv-00903-LMB-TCB (E.D. Va., Aug. 6, 2020)

numerous places refers to an inventor as a "person," as well as the Manual of Patent Examining Procedure ("MPEP"), which closely adheres to the patent statutes and the Federal Circuit case law.[11] Although the CFR and MPEP are not law, they are rules and guidance governing USPTO operations, and both determine that the "conception" of an invention must come from a natural person. The USPTO found that continued use of terms such as "mental" and the "mind" imply that a natural person must conceive an invention.[12]

Accordingly, based on the relevant statutes and case law, as well as USPTO rules and regulations, all limiting inventorship to natural persons, the USPTO concluded that the DABUS applications could not name DABUS as the inventor.

This decision is not the final word on the issue. On August 6, 2020, the applicant, Mr. Thaler, sued the USPTO in the United States District Court for the Eastern District of Virginia, arguing that the USPTO decision should be overturned.[13] The complaint lays out Thaler's position that patent protection should be afforded to AI-generated inventions, and argues that this is a question of first impression and is consistent with the United States constitution, statutes and case law, which does not specifically exclude AI machines as inventors. As of the writing of this article, the USPTO has not filed a response.

After DABUS: lingering issues and considerations

While the DABUS decision may provide some clarity that AI cannot be an inventor under current law, it still leaves open the question of what, if any, legal protections are available for inventions created by an AI machine without

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human aid ("AI-generated inventions") as AI continues to evolve.

First, in the case of AI-generated inventions, even if a natural person believes that an AI-generated invention was created solely by an AI machine with no human contribution, there still may be at least one aspect of the invention that could be attributable to the human inventor. For example, a natural person who selects data sets for training an AI algorithm may be considered to be an inventor of an invention made using that AI algorithm because specific data sets among other data sets are carefully selected by the natural person and used to solve a specific problem. Similarly, a natural person who inputs certain operational constraints to instruct an AI algorithm may be considered to be an inventor of an invention made using that AI algorithm because the natural person inputted specific operational constraints or configurations with the purpose of solving a preexisting problem. Furthermore, a natural person who recognizes that an output of an AI algorithm constitutes an invention may be considered to be an inventor of such invention provided that the natural person creates some downstream operation using the output of that AI algorithm. Accordingly, identifying human involvement in

> **What, if any, legal protections are available for inventions created by an AI machine without human aid.**

AI-generated inventions prior to filing patent applications will be an important task for the applicants.

Second, as for AI-generated inventions, the DABUS decision may slow the pace of innovation until more robust human engagement in AI-generated inventions is discernible. As such, holding off on filing AI-generated patent applications until human contribution to the invention is cognizable, and, after such human involvement becomes identifiable, listing only human inventors in all AI-related patent applications will be a better approach for the foreseeable future.

Third, the DABUS decision should not be interpreted as forever excluding AI-generated inventions from patent protection. In order to foster innovation, further engagement with foreign patent offices and additional guidance from stakeholders may be necessary before considering changes to current law. In this regard, the DABUS decision may spur such consideration of changes to patent law to embrace AI machines as inventors or otherwise provide patent protection to AI-generated inventions, particularly as AI capabilities expand exponentially. For example, the International Association for the Protection of Intellectual Property, known as AIPPI, recently considered the global

harmonization of laws for patenting AI inventions. AIPPI passed a resolution that essentially stated that an AI machine should not be listed as an inventor, which is consistent with the DABUS decision. However, the resolution went further and stated that AI-generated inventions should not be excluded *per se* from patent protection even where there are no human inventors, provided there is a natural or legal person named as the applicant.[14] How the laws in countries and patent office rules and regulations could be adapted to make this work where no person is identified as an inventor remains to be seen.

Lastly, as with other computer-related and software-based inventions, there is always concern over patent eligible subject matter rejections during prosecution of AI-related subject matter. One approach may be to draft AI-related applications to expressly include information about the technical improvements associated with the claimed AI-related system and how the outputs of such AI-related systems are used for real-world impact on other systems. Many of the categories listed at the top of the article are considered patent eligible subject matter by the USPTO, but it is helpful to also describe how the invention integrates the use of

> ## "Only natural persons can be inventors."

AI into a practical application. Careful claiming of AI-related inventions will also help to minimize the impact of subject matter eligibility challenges.

Conclusion

Technology is advancing and patent laws will need to keep pace. Companies that rely on sophisticated AI machines in their technology research and development should prepare for the future as patent offices around the world adapt their rules to give their countries a competitive edge in allowing patents for AI-related and possibly AI-generated inventions.

14 *See* AIPPI Resolution, 2020 – Study Question – Patents, Inventorship of Inventions Made Using Artifical Intelligence, October 14, 2020, *available at* https://aippi.soutron.net/Portal/DownloadImageFile.ashx?objectId=8497.

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