

## News &amp; Highlights

## Artificial Intelligence Can Invent But Not Patent—For Now

Erika K. Carlson

Senior Technology Writer



As artificial intelligence (AI) becomes increasingly powerful and prevalent, some engineers have begun using machine learning and AI systems in the process of invention, employing them to help design more efficient electronics, materials with improved characteristics, or even to come up with original ideas for products [1–3]. But this use of AI poses a thorny legal question that is currently playing out: How should the concept of intellectual property—designed to encourage innovation and protect the rights of human inventors—apply to ideas created by AI? Agencies such as the United Nations' World Intellectual Property Organization are now grappling with this issue [4].

The question got pushed to the forefront in late 2019, when an international team of attorneys filed patents for two products designed by an AI system called Device for the Autonomous Bootstrapping of Unified Sentience (DABUS), listing DABUS as the inventor on the patent applications (Fig. 1) [5,6]. The team, which calls itself the Artificial Inventor Project (AIP), has begun receiving some of the patent agencies' decisions. Earlier this year, the United States Patent and Trademark Office (USPTO) denied the group's applications because the inventor listed on a patent must be a “natural person,” according to the agency's interpretation of existing law, and cannot be a machine [7,8]. So far, the European Patent Office and the UK Intellectual Property Office (UKIPO) have also rejected the team's patent applications, for similar reasons [9,10]. The group is now appealing the decisions of these agencies and waiting to receive decisions from patent agencies in several other countries, including China, India, and Israel [5]. In addition, in August 2020, the creator of DABUS also filed a lawsuit against the director of the USPTO, arguing that the rejection of the patent application creates new requirements for patentability that are inconsistent with existing law [11].

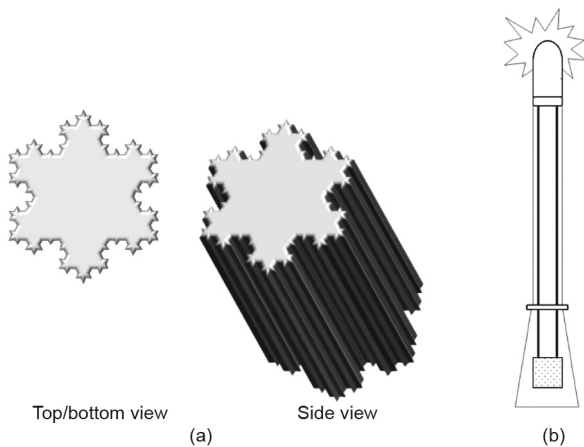
“If you have an invention, or a patentable AI output, without a person who qualifies traditionally as an inventor, can you get a patent on it?” said Ryan Abbott, a professor of law and health sciences at the University of Surrey and one of the patent attorneys of the AIP. “That is the issue we are primarily seeking to resolve with this case.” The case is not solely about obtaining patents for the two products in question but rather to serve as a test case to start conversations about how to manage intellectual property rights for inventions created by AI systems, said Abbott, whose recently published book, *The Reasonable Robot*:



**Fig. 1.** Whether AI can be named as an inventor on patents is being tested by the Artificial Inventor Project (AIP), a team of attorneys that has filed a patent application for two products invented by DABUS. DABUS was created by Imagination Engines, an AI company that seeks to develop “thinking machines,” neural networks that can generate original ideas and create inventions without being given specific goals or objectives by humans. Credit: mikemacmarketing, Wikimedia Commons (CC BY 2.0).

*Artificial Intelligence and the Law*, discusses the patent issue and other topics [12].

Abbott and the rest of the AIP team, including Stephen Thaler, the creator of DABUS, argue that only DABUS, and no human person, can legitimately be considered to have invented the two products—a new type of food container and a device that could be used as a signal beacon (Fig. 2) [6]. DABUS was not simply a tool used to aid in the design of the products, said Thaler, but conceived of the ideas itself. Thaler is the founder and chief executive officer of AI company Imagination Engines in St. Charles, MO, USA, which has been developing artificial neural networks called “Creativity Machines” for decades [13]. Thaler said he gave DABUS no instructions or directives, and no specific problem to solve. What he did provide DABUS with was general knowledge about the world. DABUS can then combine ideas together to form “revelations,” Thaler said—like the realization that attaching a piece of plastic



**Fig. 2.** The two inventions designed by the AI system DABUS and included in the as-yet unsuccessful patent application include (a) a food container whose walls have a fractal profile, allowing it to fit together with others and improving grip and heat transfer into and out of the container, and (b) a signal beacon that would emit pulses of light in specialized patterns designed to be uniquely identifiable from other, potentially competing light sources [6]. Credit: Stephen Thaler, with permission.

of a certain shape and size could make something easier to hold, for example. If a revelation seems potentially useful or important to DABUS, according to the knowledge it has about the world, it will save it as a memory and potentially combine it with other revelations to create ideas for new objects.

For example, Thaler would not explicitly instruct DABUS to create a device that could be used to clean teeth. But if DABUS happened to combine in a certain way its knowledge of human anatomy and material properties—like the fact that hair-like bristles can be used to clean a surface and that a length of rigid material like plastic would be convenient for human hands to hold—it might design a toothbrush-like object. On its own, DABUS will conceive of a number of potential new objects, for which humans like Thaler and Abbott can then submit patent applications. In this situation, they argue, no person traditionally qualifies as an inventor; the AI produced the idea on its own.

The team is not pursuing the patent case for the AI's benefit. “Machines do not need patents,” Abbott said. “But people who build and use machines need patents. And if machines are going to be responsible for the next great wave of innovation, we need policies that encourage people to make, use, and develop inventive machines, which would come from accommodating these inventions in the patent system.”

The patent system was designed to provide incentives for innovation, said Matt Hervey, an intellectual property specialist and head of AI at the law firm Gowling WLG in London, UK. Creating an innovative new product and bringing it to market can be an expensive process. A patent gives the patent holder a monopoly on the invention for a limited time to make some money back on their investment. “Patent protection is also a social contract under which the patentee gains a temporary monopoly in exchange for making public how the invention works,” Hervey said. “If inventions by AI remain unpatentable, it would encourage companies to use trade secrets instead of patents and the related knowledge would not be shared and the advance of innovation could be slowed.”

There are also potential arguments against granting patents to inventions created by AI, Hervey said. An inventive AI might make innovation fast enough or cheap enough that the usual 20-year

monopoly would not be necessary. “A particularly successful and productive inventive AI might give the company operating it too much market share if its inventions attracted a monopoly,” Hervey said. “We need to watch how the use of AI develops and balance the needs for incentives and for competition.”

Although multiple agencies have denied the team's patent applications so far, Abbott said there have been promising signs for the project. Some patent agency representatives have suggested that the applications were rejected not because of disagreements with the team's policy arguments, but because of interpretations of current law that patents require human inventors; they have also acknowledged a need to discuss and potentially update the relevant policies.

“As the applicant says, inventions created by AI machines are likely to become more prevalent in future and there is a legitimate question as to how or whether the patent system should handle such inventions,” wrote Huw Jones, the UKIPO's deputy director, in the UKIPO's decision document [10]. “It is right that this is debated more widely and that any changes to the law be considered in the context of such a debate, and not shoehorned arbitrarily into existing legislation.”

And the team could still be awarded patents for DABUS's inventions. Some countries' existing patent laws are more open-ended than those in the United States and the United Kingdom, Abbott said. Cyprus and Monaco, for example, have reported that they do not require inventors on patents to be natural persons, and Israel does not require an inventor to be specified on a patent application. Even without a patent awarded, the project can still be considered a success, Abbott said. “It has been a very successful case in the sense of stimulating public discussion and the policy debate.”

## References

- [1] Hao K. Google is using AI to design chips that will accelerate AI [Internet]. Cambridge: MIT Technology Review; 2020 Mar 27 [cited 2020 Aug 12]. Available from: <https://www.technologyreview.com/2020/03/27/950258/google-ai-chip-design-reinforcement-learning/>.
- [2] Pownall A. First patent applications filed for designs created by AI [Internet]. London: Dezeen; 2019 Aug 1 [cited 2020 Aug 12]. Available from: <https://www.dezeen.com/2019/08/01/patent-ai-machine-products-technology/>.
- [3] Service RF. Als direct search for materials breakthroughs. *Science* 2019;366 (6471):1295–6.
- [4] Revised issues paper on intellectual property policy and artificial intelligence [Internet]. Geneva: World Intellectual Property Organization; 2020 May 29 [cited 2020 Aug 12]. Available from: [https://www.wipo.int/meetings/en/doc\\_details.jsp?doc\\_id=499504](https://www.wipo.int/meetings/en/doc_details.jsp?doc_id=499504).
- [5] Abbott R. The Artificial Inventor Project [Internet]. Artificial Inventor Project; c2019–2020 [cited 2020 Aug 12]. Available from: <https://artificialinventor.com/>.
- [6] Thaler SL, inventor; Abbott R, assignee. Food container and devices and methods for attracting enhanced attention. WIPO patent WO2020079499. 2020 Apr 23.
- [7] Bahr RW. Decision on petition, application no. 16/524,350. Alexandria: United States Patent and Trademark Office; 2019 Jul 29.
- [8] Porter J. US patent office rules that artificial intelligence cannot be a legal inventor [Internet]. New York: The Verge; 2020 Apr 29 [cited 2020 Aug 12]. Available from: <https://www.theverge.com/2020/4/29/21241251/artificial-intelligence-inventor-united-states-patent-trademark-office-intellectual-property>.
- [9] Grounds for the decision, application no. 18 275 163.6. Munich: European Patent Office; 2020 Jan 27.
- [10] Jones H. Patent decision, O/741/19. Newport: Intellectual Property Office; 2019 Dec 4.
- [11] Feathers T. This guy is suing the patent office for deciding an AI can't invent things [Internet]. New York: Vice; 2020 Aug 24 [cited 2020 Aug 25]. Available from: [https://www.vice.com/en\\_us/article/5dz44b/this-guy-is-suing-the-patent-office-for-deciding-ai-cant-invent-things](https://www.vice.com/en_us/article/5dz44b/this-guy-is-suing-the-patent-office-for-deciding-ai-cant-invent-things).
- [12] Abbott R. *The reasonable robot: artificial intelligence and the law*. Cambridge: Cambridge University Press; 2020.
- [13] IEI's patented Creativity Machine® Paradigm [Internet]. St. Charles: Imagination Engines, Inc.; c1997–2020 [cited 2020 Aug 19]. Available from: [http://imagination-engines.com/iei\\_cm.php](http://imagination-engines.com/iei_cm.php).