



Inventorship in the Age of AI

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Advances in Artificial Intelligence (AI) technologies are revolutionizing a range of industries and enabling a variety of new scientific discoveries. Various platforms, such as IBM Watson, Microsoft Azure, Amazon Web Services (AWS), to name a few, are making AI and machine learning accessible to a much wider audience than ever before. As with any new technology, the advent of AI is not without its legal complications.

With the widespread adoption of AI technologies, AI-generated inventions are becoming commonplace. The spectrum of AI-generated inventions includes everything from use of AI as a mere tool by a human **to** AI generating solutions to technical problems and objectives defined by humans **to**, one day, existence of a truly autonomous AI that generates inventions. The rather speculative end of the spectrum with 'full artificial intelligence' has drawn some criticism and cautionary warnings in the AI community^[1]

Nevertheless, the pervasive use of AI has given rise to a very interesting legal question of **who** should be considered the true inventor(s) of AI-generated inventions.

Section 27 of the Canadian *Patent Act* provides that "the Commissioner shall grant a patent for an invention **to the inventor or the inventor's legal representative** if an application for the patent in Canada is filed in accordance with this Act and all other requirements for the issuance of a patent under this Act are met"^[2] While the phrase "legal representative" has been defined in the *Patent Act* to include "heirs, executors, administrators ..., liquidators ..., guardians, curators, tutors, transferees and all other **persons** claiming through applicants ...",^[3] the term 'inventor' is not defined in the statute.

The guidance provided by the Canadian courts on the definition of 'inventor' relates to the amount of contribution required to be a named inventor or co-inventor on a patent application. In this regard, the courts provide that i) conception of the inventive idea, and ii) reduction to a definite and practical shape are the minimum requirements for inventorship^[4]

The question of inventorship is one that must be carefully addressed. Inventorship is a source of entitlement to the patent rights granted by the *Patent Act*. The entitlement to the patent rights further informs the rights to commercially exploit the invention falling within the claims of the patent. The patent rights, once allocated based on inventorship, can be subsequently transferred, assigned or licensed to others. However, inventorship cannot be contractually altered. The significance of correct determination of inventorship is also reflected in section 53(1) of the *Patent Act*, which provides that wilful omission of the names of the inventor(s) on a patent application, with the purpose of misleading, may be ground for patent invalidity^[5]

The question of whether AI that meets the 'conception' and 'reduction to practice' requirements of inventorship should be listed as an inventor or a co-inventor on a patent application remains to be addressed by Canadian jurisprudence. However, some known examples of AI generated inventions indicate that the human owners of such machines can be the exclusive inventors on corresponding patents.

One example of an AI generated invention is protected by U.S. Patent No. 5,852,815 ("US '815"), titled "Neural Network Based Prototyping System and Method". The invention claimed in US '815 was generated by 'Creativity Machine', developed by Dr. Stephen L. Thaler^[6] Dr. Thaler has claimed that the Creativity Machine mimics the human brain using two artificial neuron networks, and is accordingly capable of producing creative outputs to new scenarios without additional human input. The Creativity Machine has been used to compose music, design vehicles, improve surveillance etc. Another example includes U.S. Patent No. 6,847,851 ("US '851"), titled "Apparatus for Improved General-Purpose PID and non-PID



Controllers". The invention claimed in US '851 was generated by 'Invention Machine', developed by Dr. John Koza^[1]. Similar to the 'Creativity Machine', the 'Invention Machine' has also contributed to the field of science and technology by creating antennae, circuits, lenses etc. In both of these cases, the AI used to generate the claimed inventions were not listed as an inventor or a co-inventor on the patents. Instead, the inventors identified in the patent applications were the human developers of these machines.

A wide range of human and AI collaborations can exist in the realm of AI-generated inventions. The humans may be involved in creating the AI platforms (such as the research team involved in creating the IBM Watson). A same or a different group of humans may be involved in training the AI models (such as millions of people training the Google reCAPTCHA system). Once the AI is trained, a different group of humans may be involved in using the AI for one or more applications. Further, the AI-generated invention may be used as a component in a different invention invented by yet another group of humans. It can be appreciated that the existence of so many different players can complicate the determination of inventorship.

The problem is further compounded based on the roles played by the humans in the human-AI collaborations. If the human only defines the objective or the problem to be solved by the AI, and the AI generates the solution to the problem, presumably the human meets the 'conception' requirement but not the 'reduction to practice' requirement of inventorship. What if the human additionally identifies and specifies the parameters of the invention, and identifies the best of the many solutions generated by AI?

On the other hand, if the AI, trained in one field or developed for one purpose, autonomously generates an invention in an unforeseen manner or in an unrelated field, does the human even meet the 'conception' requirement of inventorship? To put it another way, has the AI now identified a problem, and then conceived of an inventive idea, and reduced it to a definite and practical shape?

Who, then, can claim (and deserves) to be the true inventor(s) of the invention?

At this time, no clear guidance on this topic appears in law or policy. In particular, there does not appear to be any Canadian case law regarding determination of inventorship in the context of AI-generated inventions. However, since AI is constantly evolving and catalyzing innovation, such issues are inevitable. We will continue to monitor how the Canadian patent office, courts and legislature attempt to fill this statutory gap.

[1] *Stephen Hawking - will AI kill or save humankind?*, BBC News, <https://www.bbc.com/news/technology-37713629> (last visited September 21, 2018); *Artificial Intelligence Is Our Future. But Will It Save Or Destroy Humanity?*, Futurism, <https://futurism.com/artificial-intelligence-is-our-future-but-will-it-save-or-destroy-humanity/> (last visited September 21, 2018).

[2] *Patent Act*, RSC 1985, c P-4, s 27(1).

[3] *Patent Act*, RSC 1985, c P-4, s 2.

[4] Fox on the Canadian Law of Patents, 5th Edition, 2018, Chapter 2.11.

[5] *Patent Act*, RSC 1985, c P-4, s 53(1).

[6] *What is the Ultimate Idea?*, Imagination Engines Inc., http://www.imagination-engines.com/iei_cm.php (last visited September 21, 2018).

[7] John R. Koza et al., *Evolving Inventions*, SCI. AM., Feb. 2003, at p. 52.

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