Prophesee: the start-up designing a new generation of machine vision that has its eyes set on patent protection

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Founded in 2013, Prophesee is a start-up based in Paris which has created the most advanced neuromorphic vision system in the world.[1] Inspired by human vision and built on the foundation of neuromorphic engineering, Prophesee is a revolutionary system that gives Metavision to machines, enabling them to react much more intelligently, autonomously, faster and safer than before.[2]

The technology behind Prohesee is built on an event-based vision system, which differs from the framed-based technology currently used on conventional video cameras. Framed-based technology represents motion by capturing a number of still frames each second: when displayed rapidly, the images create an illusion of continuous movement.[3] However, in the space between these frames the camera has a brief moment of blindness, which means that it can possibly lose some information during this moment. This representation of motion is of little use for a computer considering that the camera can lose information on moving objects.[4]

The event-based vision system is inspired by natural human vision. Cells in the eyes report back to the brain when they detect a change in a scene (an event) and, if nothing changes, the cell does not report anything.[5] This process is very efficient since it does not waste time and energy reprocessing images of the unchanging parts of a

[1] Prophesee, About Prophesee. Available at: < https://www.prophesee.ai/about-prophesee/>. Accessed November 11, 2019.
[2] *Ibid.*
[3] Prophesee, What is event-based vision? Available at: <https://www.prophesee.ai/2019/07/28/event-based-vision-2/>. Accessed November 11, 2019.
[4] *Ibid.*
[5] *Ibid.*

scene.[6] Event-based vision has independent receptors collecting all the essential information, and nothing else.[7]

The start-up creates both neuromorphic sensors and bio-inspired algorithms that function like the eye and brain.[8] It produces up to 1,000 times less data than a conventional sensor whilst achieving a higher equivalent temporal resolution.[9]

Machine vision has a variety of fields of application such as automotive, healthcare, robotics, security and surveillance, industrial automation, mobile and devices.[10] Accordingly to Forbes, the global market for machine vision is expected to grow at a CAGR of 7.7%, reaching an amount of $10.24 billion by 2025.[11]

Considering how fast the market is growing, Prophesee decided to secure its R&D investments on this revolutionary technology through intellectual property rights. The company's intellectual property strategy is articulated around an active policy of filing patents.[12] Patents protect the interests of inventors whose technologies are truly groundbreaking and commercially successful by ensuring that they can control the commercial use of their invention.[13] Currently the start-up has 51 granted patents.[14] To register its patents internationally, the start-up files its patents under the Patent Cooperation Treaty (PCT), a process that has been ratified by more than 150 Contracting States. The PCT makes it possible to seek patent protection for an invention simultaneously in a large number of countries by filing a single international patent application.[15]

The PCT procedure consists of two main phases. The first one is the filing of an international application with a national, regional or the World Intellectual Property Office (WIPO). The international authorities will carry out searches, prepare a written opinion and transmit the reports to the WIPO, which will communicate to the designated national or regional patent offices.[16] Then, the second phase of the PCT procedure is initiated, where the applicant can start to pursue the granting of its

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[6] *Ibid.*
[7] *Ibid.*
[8] *Ibid.*
[9] *Ibid.*
[10] Prophesse, Markets. Available at: < https://www.prophesee.ai/markets/>. Accessed November 11, 2019.
[11] Forbes, How Machine vision can transform financial services (2019). Available at: <https://www.forbes.com/sites/cognitiveworld/2019/09/09/how-machine-vision-can-transform-financial-services/#38c54bd91e88>. Accessed November 11, 2019.
[12] Les Echos, Pour Prophesee, le bevret protège et valorise (2018). Available at: <https://www.lesechos.fr/2018/06/pour-prophesee-le-brevet-protege-et-valorise-973649>. Accessed November 11, 2019.
[13] WIPO, innovation and intellectual property. Available at: < https://www.wipo.int/ip-outreach/en/ipday/2017/innovation_and_intellectual_property.html> accessed November 11, 2019.
[14] Prophesee, Awards & Recognition. Available at: < https://www.prophesee.ai/recognition/>. Accessed November 11, 2019.
[15] WIPO, Protecting your inventions abroad: Frequently asked questions about the Patent Cooperation Treaty. Available at: < https://www.wipo.int/pct/en/faqs/faqs.html> Accessed November 11, 2019.
[16] *Ibid*

patents directly before the national patent offices of the countries it is interested in.[17] To carry out the drafting and registration work, Prophesee uses an intellectual property advisor.[18] Luca Verre, one of the co-founders and current CEO of Prophesee declared that this strategy is "expensive but necessary".[19]

Studies suggest that patents have an important function for start-ups in securing external finance.[20] Nowadays, intangible assets, such as trademarks, patents, copyright and domain names can make up to 80% of the value of a company.[21]

Prophesee won a start-up competition at the photonics-*focused Inpho Venture Summit* in Bordeaux at the end of the year 2016, winning €5000. Right after that, the start-up raised approximately €13.5 million in series B financing led by lead investor Intel Capital.[22] In October 2019, Prophesee announced the raising of €25 million in funding, bringing the start-up's total funding to €61 million.[23] Luca Verre declared that it was not always easy to obtain the necessary funds to develop his technology, 'especially when I only had patents and some scientific articles'.[24]

Several benefits come with patenting inventions. The size and quality of a patent portfolio could have direct impact on several factors of a company, such as the reputation of the company, securing investments and financing, access to the market, amongst others.[25] Even with the high costs of patenting and enforcing, Luca Verre understood the importance of protecting Prophesee's technology. Now the start-up has a competitive edge over its competitors thanks to the 20 years of exclusivity right to manufacture, use and sell their technology.[26] The recent raised funds will be used to drive the further development and commercialisation of the Metavision sensor and underlying neuromorphic algorithm innovations[27], which will possibly help the start-up to grow to its full potential.

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[17] *Ibid.*

[18] Les Echos, Pour Prophesee, le bevret protège et valorise (2018). Available at: <https://www.lesechos.fr/2018/06/pour-prophesee-le-brevet-protege-et-valorise-973649>. Accessed November 11, 2019.

[19] *Ibid.*

[20] Harhoff, D., The Role of Patents and Licenses in Securing External Finance for Innovation (2009). EIB Papers, 74-97.

[21] O'Connell D. – Inside the Patent Factory [2008]. Pg. 3.

[22] Prophesee, Chronocam receives $15 million funding led by Intel (2016). Available at: < https://www.prophesee.ai/tag/intel-capital/>. Accessed November 11, 2019.

[23] Loritz M., Paris-based Prophesee raises €25 million to transform machine vision sensors for use in industry and VR. Available at: < https://www.eu-startups.com/2019/10/paris-based-prophesee-raises-e25-million-to-transform-machine-vision-sensors-for-use-in-industry-and-vr/>. Accessed November 11, 2019.

[24] Trécourt F., Prophesee: Une camera qui reproduit lóeil humain (2018). Capital avec management. Available at: < https://www.capital.fr/votre-carriere/prophesee-une-camera-qui-sinscruste-dans-loeil-1295549>. Accessed November 18, 2019.

[25] O'Connell D. – Inside the Patent Factory [2008]. Pg. 2.

[26] *Ibid*

[27] *Ibid.*