Actualités

SELF-DRIVING VEHICLES AND PATENTING TRENDS – EVIDENCE FROM EUROPEAN PATENT APPLICATIONS

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Technologies of the Fourth Industrial Revolution, such as the Internet of Things and Artificial Intelligence, are about to have a profound impact on the automotive sector. Self-driving vehicles (SDV) will create a multi-billion dollar opportunity for future mobility with the potential to improve road safety, provide better access to mobility services, increase energy efficiency, and reduce road congestion. Drawing on the European Patent Office's most recent patent information and advanced technology expertise of its patent examiners, this article provides a unique source of intelligence on the latest trends in SDV patenting.

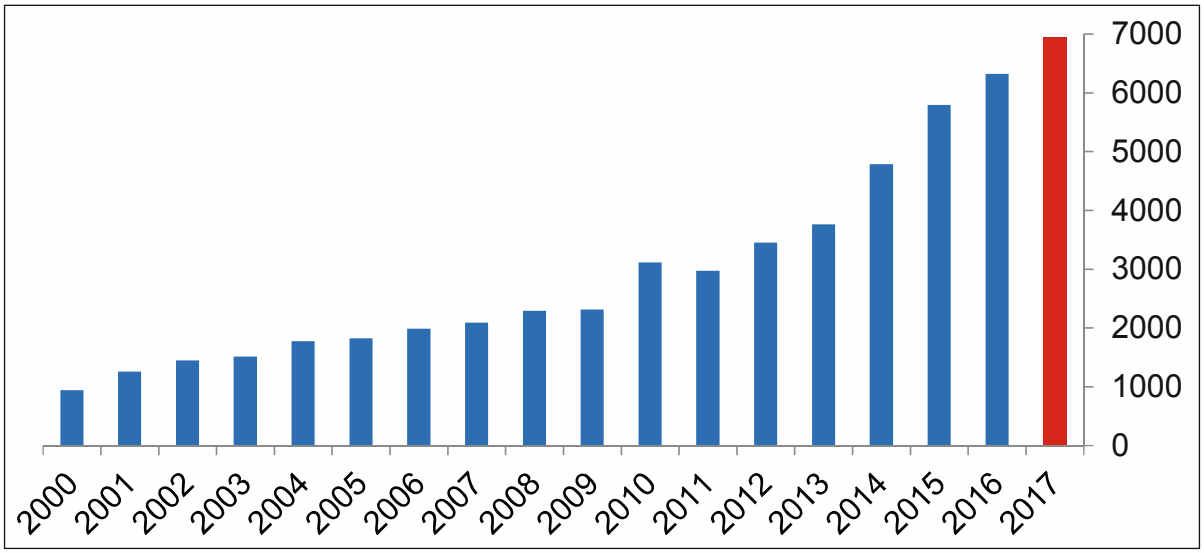
Les technologies de la quatrième révolution industrielle, telles que l'Internet des objets et l'Intelligence Artificielle, s'apprêtent à avoir un grand impact sur le secteur automobile. Les véhicules autonomes sont à même de créer une économie de plusieurs milliards de dollars pour la mobilité future avec le potentiel d'améliorer la sécurité routière, de fournir un meilleur accès aux services de mobilité, d'accroître la performance énergétique et de réduire les embouteillages. En s'appuyant sur les informations les plus récentes de l'Office européen des brevets en matière de brevets et sur l'expertise technologique avancée de ses examinateurs de brevets, cet article constitue une source de renseignement singulière sur les dernières tendances en matière de brevets concernant les véhicules autonomes.

Almost every part of our economy is currently exposed to profound changes, which are driven by new technologies such as the Internet of Things, Artificial Intelligence, Big Data or Cloud computing. Their implementation in traditional and new business sectors, thereby disrupting old and creating new business models, is pushing us towards the Fourth Industrial Revolution (4IR). Different from past industrial revolutions, which mainly resulted in the automation of physical work, the current one aims at automating intellectual, although still mostly repetitive, tasks.

Based on the knowledge and experience of its patent examiners, in 2017, the European Patent Office (EPO) developed cartography of technologies related to 4IR to observe and provide evidence on their most recent developments.[1] Using patent applications at the EPO as indicators of inventive activity, it clearly shows the immense growth in 4IR patent applications in the latest period. Indeed, annual patent applications related to smart and connected devices more than doubled between 2012 and 2017 to almost 7 000 (see figure 1).

1. See "Patents and the Fourth Industrial Revolution", by Yann Ménière, Ilja Rudyk and Javier Valdes, EPO 2017 (www.epo.org/4IR).

Figure 1 : European patent applications in 4IR technologies



Source : EPO. Patent statistics in this table are based on patent applications filed at the EPO. They do not include patent applications filed with the national offices of the EPO Member States, and do not include patent applications filed only at national European patent offices. The reference date for each application is the filing date at the EPO.

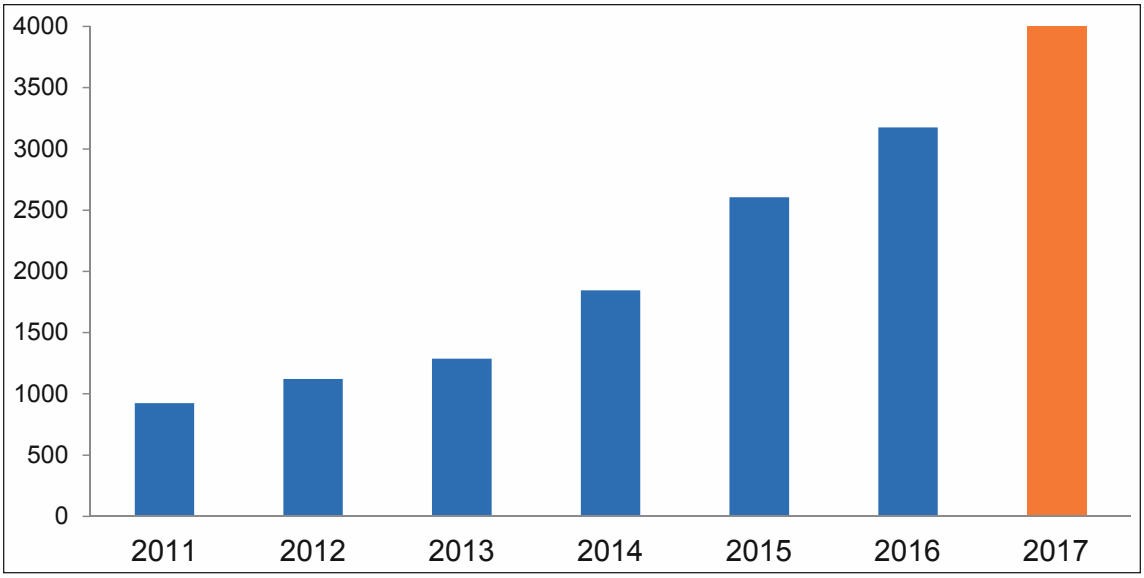
The revolutionary character of these inventions becomes apparent once we look at the industrial areas, where the potential of these inventions can be exploited. Although initially applied mostly in the information and communication technology (ICT) sector, they are increasingly penetrating many other application domains, including infrastructure, manufacture, personal or enterprise.

A specific sector where smart and connected objects are about to have a major impact is transportation. In particular, 4IR technologies will enable the transition towards high or even full automation of vehicles[2], which will have the potential to deeply transform the transport system. Such self-driving vehicles (SDVs) can improve road safety, provide better access to mobility services, increase energy efficiency, and reduce road congestion. With immense potential for welfare gains, they will have far-reaching implications not only for passengers, but also for all stakeholders in the industry.

Although SDVs are still about to be deployed, with most optimistic predictions mentioning end of 2020[3], the race for SDV technologies has already started. This is confirmed in a recent EPO study on "Patents and self-driving vehicles".[4] Based on cartography of SDV technologies, it shows that the number of related European patent applications has increased by 330 % between 2011 and 2017 to almost 4 000 (see figure 2).

2. High and full automation refer to levels 4 and 5 of the standard SAE J3016 of the Society of Automotive Engineers (SAE) International. Level 5 vehicles drive themselves autonomously at all times and under all conditions, while level 4 vehicles may not allow self-driving mode in unmapped areas or during severe weather conditions.
3. See "Elon Musk Promises a Really Truly Self-Driving Tesla in 2020", by Aarian Marchall https://www.wired.com/story/elon-musk-tesla-full-self-driving-2019-2020-promise/ last accessed 15 September 2019.
4. See "Patents and self-driving vehicles – The inventions behind automated driving", by Yann Ménière, Ilja Rudyk and Lucas Tsitsilonis, EPO 2018 (www.epo.org/sdv).

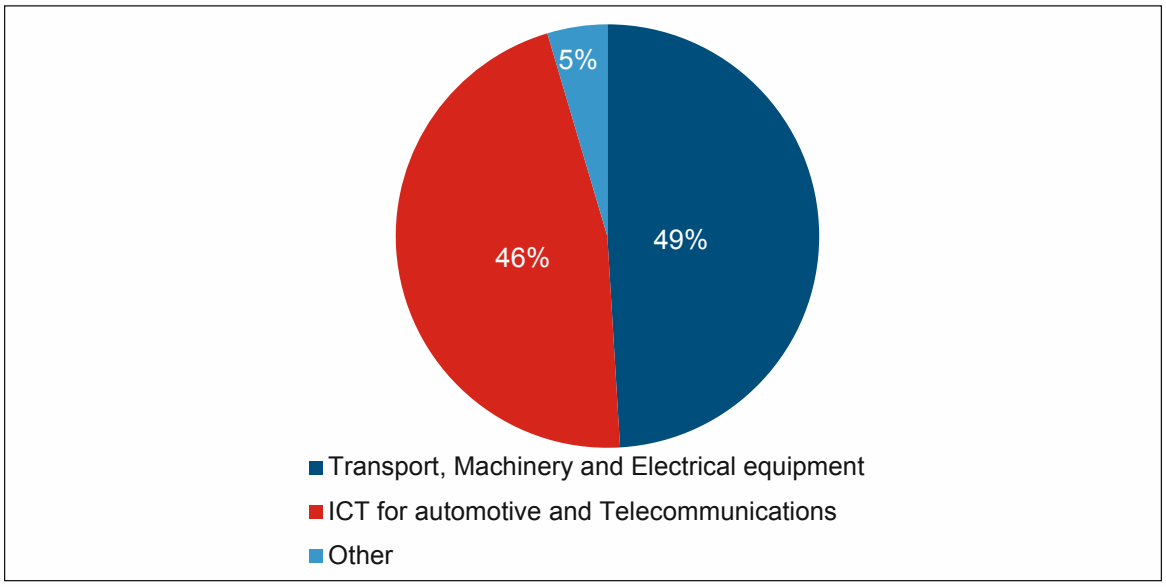
Figure 2 : European patent applications in SDV technologies



Source : EPO. Patent statistics in this table are based on patent applications filed at the EPO. They do not include patent applications filed with the national offices of the EPO Member States, and do not include patent applications filed only at national European patent offices. The reference date for each application is the filing date at the EPO.

With approximately one third each, US and European companies are contributing the most to SDV innovation. However, the types of applicants that file SDV patent applications at the EPO reveal even more interesting results. While half of the patent applications in the period 2011-2017 came from car manufacturers and their traditional suppliers, mostly companies from Transport, Machinery and Electrical equipment industries, almost as many patent applications were filed by companies from the ICT and Telecommunications sectors (see figure 3).

Figure 3 : SDV patent applications with the EPO (2011-2017) filed by the top 500 companies, by category



Source : EPO. Patent statistics in this table are based on patent applications filed at the EPO. They do not include patent applications filed with the national offices of the EPO Member States, and do not include patent applications filed only at national European patent offices. The reference date for each application is the filing date at the EPO.

New companies have entered the market for future mobility, mostly from the tech sector, leveraging their capabilities into the automotive sector. Their SDV inventions are largely concentrated on computing and communication functions, while the group of traditional players is contributing the most to SDV technologies related to functions such as perception, analysis and decision, or vehicle handling. Traditional players may therefore need to expand their own capabilities in ICT or to collaborate with tech companies to adjust to the new market conditions.

Another point to consider is that patent protection strategies for SDV related inventions are more international than usually observed in the automotive sector and therefore much closer to those that are common in the ICT sector. The study revealed that patent families of SDV inventions, on average, span a larger number of jurisdictions than patent families for inventions in established automotive technologies (see figure 4) and that SDV applications are filed more frequently with the EPO or via the international PCT route.

Figure 4 : Average patent family size in SDV technologies, 2011-2015

Source : EPO. The patent statistics in this figure are based on all inventions, i.e. patent families, in established automotive technologies or SDV technologies for which a patent application has been filed in one of the official languages of the EPO, and with at least one patent application at the EPO or a patent office of a contracting state to the EPC. The reference date for each patent family is the date of the earliest patent filing at the EPO or one of the national offices of the EPC contracting states.

As in SDVs, the importance of patent protection is likely to increase in all industry sectors that will be affected by 4IR. Since innovation in 4IR technologies is increasingly taking place in the virtual layer of software, patent systems need to adapt to support these developments by ensuring high quality of patents with a stable and predictable legal framework. To meet this challenge, the EPO, with a long-established approach to Computer Implemented Inventions (CII) provides an appropriate framework for addressing the growing software content of 4IR and SDV inventions in a rigorous and consistent manner. To ensure a harmonised CII practice for all 4IR and SDV patent applications the EPO constantly reviews and improves the CII content of the Guidelines for Examination and invests in a common understanding of CII procedures throughout all sectors.[5]

The full reports can be downloaded here :

www.epo.org/sdv

www.epo.org/4IR

5. See Guidelines for Examination in the European Patent Office, November 2018 edition (https://www.epo.org/law-practice/legal-texts/guidelines.html)