Trends In Automotive Technology: 2017 and the Road Ahead

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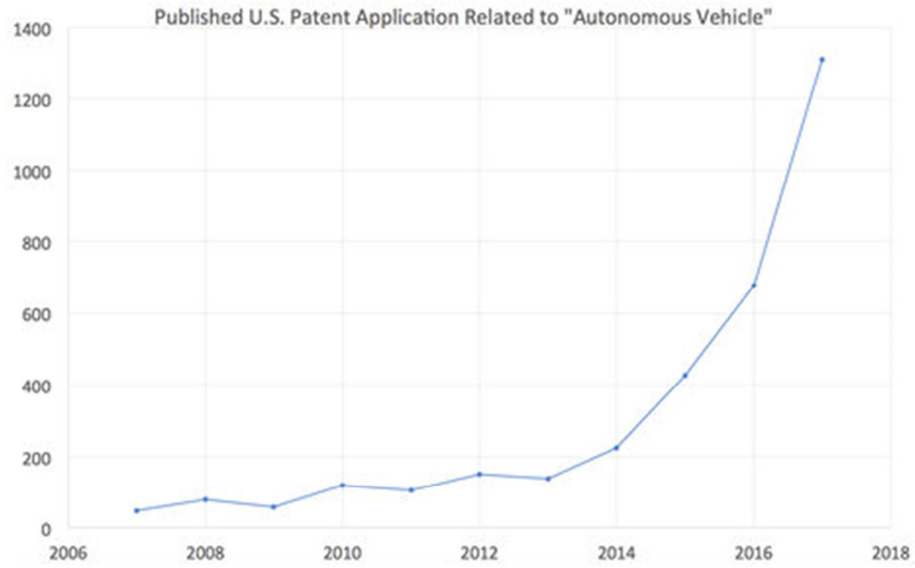
This has been a year in which automotive technology and the legal issues surrounding it have come increasingly to the forefront, both in legal circles and public perception. Given the many new entrants in the autonomous vehicle sector, and the tangible, visible progress toward viable driverless cars, automotive technology promises to be a focus of intellectual property disputes and regulatory attention in the coming years. This article looks back at 2017 to describe how the legal landscape for automotive technology has been developing, particularly with respect to autonomous vehicles, but also with any eye for where automotive technology and legal issues may be heading in 2018 and beyond. We start with an analysis of patenting trends in the automotive industry, followed by a discussion of intellectual property disputes in the industry, and we conclude with a brief summary of the developing regulatory landscape for autonomous vehicles.

Patenting of Automotive Technology

Over the last 10 years, there has been an explosive growth in patenting activity in the area of autonomous vehicles. The graph below shows the number of U.S. patent publications containing the phrase "autonomous vehicles." As shown, 2017 marks the year in which the number of U.S. patent publications exceeded 1,000 publications (1,310 to be exact).

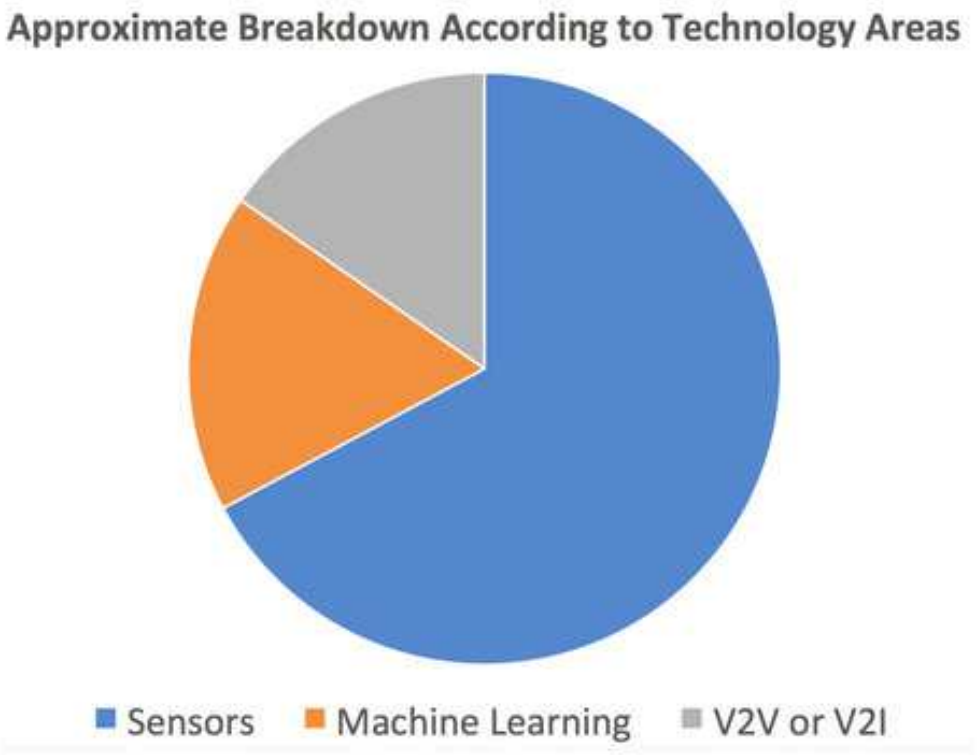


While there are undoubtedly many different areas of active research in the field of autonomous vehicles, we consider the following three technology segments to be of importance, which also reflects the direction in which the industry is generally moving.

First, the explosive growth in 2017 appears largely attributable to the heavy patenting activity in the area of sensors. For example, search of the 2017 autonomous vehicle patent publications containing the words "LIDAR," "sonar," "laser," "camera," or "radar" resulted in 1,032 publications.

Second, some of these publications directed to sensors may also be directed to machine learning applications, it is unmistakable that machine learning patenting activity is far less. A search of the 2017 autonomous vehicle patent publications containing the words "artificial intelligence," "machine learning," "deep learning," "behavioral reflex," "mediated perception," or "point cloud" resulted in only 268 publications.

The third area of interest is vehicle-to-vehicle ("v2v") and vehicle-to-infrastructure ("v2i") technologies. For example, search of the 2017 autonomous vehicle patent publications containing the words "vehicle-to-vehicle," "v2v," "vehicle-to-infrastructure," or "v2i" resulted in 236 publications.



The large number of patent publications related to sensor technology may be due to the fact that they serve as the underlying technology for much of the autonomous vehicle efforts. Moreover, given the recent breakthroughs in the field of machine/deep learning, we expect increased patenting activity in that field. It will also be interesting to analyze

potential ramifications of the various post-Alice decisions in this fiercely developing technology area. We suspect 2018 will bring forth even greater patenting activity associated with autonomous vehicle technology.

Design Patents

Even while new technologies such as sensors relating to autonomous vehicles have taken on new importance in utility patent filings, patentees have continued to seek design patent protection for more traditional automotive features. Based on data from the U.S. Patent and Trademark Office, the "Transportation" (D12) patent class has had the second or third most patents granted for all design patent classes for the past five years. Approximately 6 to 7 percent of all design patents granted in this period fall in this category. Of these D12 patents granted since 2013, auto manufactures constitute eight of the top 10 assignees, with tire manufacturers taking the other two spots.

Year	Number of D12 Patents Issued	% of Design Patents	Rank of Design Patents
2013	1567	6.37%	Third
2014	1620	6.53%	Second
2015	1896	6.17%	Third
2016	2144	7.06%	Second
2017	2498	7.93%	Second

Top 10 Current Assignees	D12 Patents
FORD MOTOR COMPANY	434
HONDA MOTOR CO. LTD.	374
GM GLOBAL TECHNOLOGY OPERATIONS LLC	342
GOODYEAR TIRE & RUBBER COMPANY THE	328
BAYERISCHE MOTOREN WERKE AKTIENGESELLSCHAFT	315
BRIDGESTONE CORPORATION	273
TOYOTA JIDOSHA KABUSHIKI KAISHA	265
JAGUAR LAND ROVER LIMITED	246
DAIMLER AG	226
NISSAN MOTOR CO. LTD.	161

Within the Transportation class, certain trends are apparent. For example, patents falling within the subclass D12169 — vehicle attached front or rear type radiator, grille or bumper — have been the most or second most commonly granted

design patents for the last five years. Patents within subclasses covering wheel or wheel covers (D12209 and D12211) and the hood or cowl (D12091 and D12092) also consistently rank within the top five most commonly granted design patents during this time period.

	2017		2016		2015		2014	
D12 Subclass	Patents Issued	% of D12 Patents	Patents Issued	% of D12 Patents	Patents Issued	% of D12 Patents	Patents Issued	% of D12 Patents
D12209	170	6.2615%	151	6.3821%	129	6.21%	104	6.04%
D12169	173	6.3720%	178	7.5232%	113	5.44%	112	6.50%
D12211	176	6.4825%	143	6.0440%	107	5.15%	95	5.52%
D12092	81	2.9834%	79	3.3390%	68	3.27%	91	5.28%
D12091	80	2.9466%	50	2.1133%	59	2.84%	77	4.47%

Patent Litigation

Despite fewer filings, 2017 continued to be a busy year for patent litigation involving the automotive ecosystems, especially as a broader group of technology companies expand into the automotive space. Overall district court filings against original equipment manufacturers were down with 22 filings as of December 2017, compared to 51 in 2016 and 94 in 2015. Filings against automotive suppliers were up slightly, with 65 cases filed in 2017, up from 53 in 2016 but still less than the 72 cases filed in 2015.

Patent litigation continued to be initiated by patent assertion entities against automotive OEM, tier one suppliers, and chip makers. See, e.g., Intellectual Ventures II LLC v. Aisin Seiki Co., Ltd. et al., Case No. 2-17-cv-13551 (MIED); Intellectual Ventures II LLC v. Denso Corporation et al., Case No. 1-17-cv-13563 (MIED); Somaltus LLC v. Cummins Inc. et al., Case No. 2-17-cv-00034 (TXED).

Automotive issues were also front and center in the U.S. International Trade Commission. In 2017, the ITC investigated patent infringement allegations concerning hybrid electric vehicle controllers and methods for coordinating the operation of the electric motor and gasoline engine to maximize vehicle performance, fuel economy and emissions efficiency. (In re Hybrid Electric Vehicles and Components Thereof, 337-TA-1042.) A hearing was held in early November, with an initial determination expected early in 2018. In October 2017, the ITC initiated a 337 investigation involving multiple automotive manufacturers and electric motor technology. (In re Thermoplastic-Encapsulated Electric Motors, Components Thereof, and Products and Vehicles Containing Same, 337-TA-107.) Other 2017 ITC cases included the settlement of an earlier case involving the same hybrid electric controller patents asserted against Volkswagen, Porsche, and Audi (337-TA-998), and settlement of an investigation involving design patents for passenger automotive wheels asserted against Daimler. (337-TA-1006).

Post-Grant Review Proceedings

Post-grant review proceedings provide another window into the types of legal disputes and threats faced by firms in the automotive sector. Post-grant proceedings at the USPTO are often initiated after district court litigation — over 85 percent of inter partes review proceedings have concurrent district court litigation — and an analysis of post-grant filings therefore gives two important indicators about legal issues arising for automotive companies. First, the data shows what types of entities are engaged in patent disputes with each other. Second, the data shows what types of patents are subject to IPR petitions and therefore what areas of technology are most contested in this space (e.g., core vehicle components, combined technologies such as automotive connectivity, autonomous vehicle technology).

A review of post-grant proceedings in the automotive sector in 2017 shows that companies are using such proceedings to counter patent assertion entities far more than against competitors. That result is not surprising because IP litigation among competitors has traditionally not been common in the automotive industry, where competitors have held significant patent portfolios that could be used against each other and that therefore deter potential IP litigation. Among the post-grant proceedings we have seen, the tech industry consortium Unified Patents has filed multiple IPRs against patent assertion entities that have sued automotive companies in district court. Also among the other top filers of IPRs against PAEs are Toyota Motor Corp., Honda Motor Co. Ltd. and Ford Motor Co. Automakers such as Toyota and Honda frequently file petitions on behalf of multiple parties in interest after a PAE accuses multiple companies of infringement.

The IPRs appear to focus on existing technology already deployed in commercially available automobiles — not prospective technologies — because the IPRs have typically been spurred by PAEs that have accused automakers of infringement. In general, the technology at issue in most IPRs concerns safety and connectivity features, with conventional automobile technology (e.g., powertrain) accounting for only a small portion of the overall post-grant activity in the automotive space.

We are not yet seeing post-grant proceedings directed to the future-oriented autonomous vehicle technologies that many companies are developing. But as that automotive technology continues to mature and become incorporated into products, we expect to see an increase in litigation related to autonomous vehicles, both in district courts and in proceedings at the PTO. Such disputes also might not be as limited to PAEs as current disputes are, because the many new competitors in the autonomous vehicle space may not have the countervailing patent portfolios that traditionally have deterred patent litigation. Companies in the developing field of autonomous vehicles therefore would be wise to pursue IP portfolio strategies that take into account their competitors' patent portfolios and that attempt to deter future IP litigation.

Regulatory Developments

The wheels of the federal regulatory system started to turn with respect to autonomous vehicles in 2017, but the shape of any ultimate federal regulatory scheme remains unclear. The actions of both the Congress and the new administration suggested that the federal government intends to regulate early autonomous vehicles with a light touch. But the legislative

and executive actions also appear likely to create federal reporting requirements and federal oversight that could develop into a tighter federal grip on the autonomous vehicle industry in the future.

On Capitol Hill, legislation regarding driverless vehicles has been moving through both the House and Senate. The SELF DRIVE Act (H.R.3388) passed the House in September, and the AV START Act was reported out of the Senate Commerce Committee in October. Both bills seek to protect investment in the development of driverless cares by preempting certain state and local laws. Twenty states have already enacted laws regarding self-driving vehicles, which could create conflicting safety requirements for manufacturers or prevent driverless cars from crossing state borders. The House bill would preempt state and local laws regarding the design, construction, or performance of autonomous vehicles unless they are identical to federal standards. The Senate bill would create a different preemption criterion that would preclude state and local laws that regulate the design, construction, or performance of driverless vehicles with respect to certain "subject areas" — areas for which manufacturers would be required to submit "safety evaluation reports" to the National Highway Traffic Safety Administration.

Both bills also would allow the U.S. Department of Transportation to exempt a manufacturer from existing federal safety standards for up to 100,000 cars annually. The pending legislation, however, would require new federal oversight of manufacturers and impose new mandates — such as a requirement that manufacturers develop written cybersecurity plans to show how they will prevent cyberattacks on their driverless vehicles.

Meanwhile, on the administrative front, in September, NHTSA issued a "voluntary guidance" entitled "Automated Driving Systems: A Vision for Safety (ADS 2.0)." The new guidance from the Trump administration supplants an earlier 2016 document issued by the Obama Transportation Department. The new guidance proposes a voluntary framework for industry and states to follow as driverless technology develops. For example, the agency's guidance encourages — but does not require — automakers to disclose "Voluntary Safety Self-Assessments" showing how an automaker addresses 12 "safety elements," such as crashworthiness and how the automaker's vehicle will respond when a problem is encountered.

The guidance noted that NHTSA is commanded by Congress to protect the safety of the driving public against unreasonable risks of harm, "including risks that may arise in connection with [automated driving systems]." That note is a reminder that the agency could impose more forceful regulations over time as it monitors the progress and problems of autonomous vehicles.

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