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# Patent Pool in the Automotive Industry

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## ABSTRACT

*Realisation of Internet of Things (IoT) technologies requires technological inputs from various dissimilar technology sectors. Patenting of such technologies has created a technological barrier for the development of new technologies of IoT. This scenario has created a complex licensing landscape itself, which had already led to the sprouting of multiple issues and problems of varying degrees in various sectors of industries. Patent pools is said to be a one stop solution for these issues, only if it is carried out in a fair and non-discriminatory manner, for every single seekers of the technology.*

*As one of the early adopters of internet of things, the automotive industry, for the development of autonomous vehicles, is a relevant industry sector choice to have a study on how far the use of multiple dissimilar technologies of dissimilar industry sectors creates problems in the development of IoT technologies, when patent system allows the patentee to restrict the use of a patented technology by others.*

*In this paper, we shall discuss the technology requirements of automotive sector for the development of internet of automobiles (IoA) by developing and facilitating autonomous vehicles. We look into the shift the industry faces when moving from a traditional patent licensing terms within the industry to complex licensing mechanisms that has to be done with other industry sectors. How effective is patent pool mechanisms and the current working of it is important to look upon.*

**Keywords:** Patent, Patent pool, LiDAR, Light detection and ranging, Autonomous Vehicle, Automotive, Internet of Things, IoT, Internet of Automobiles, Artificial Intelligence, AI, Intellectual Property.

## I. INTRODUCTION

The era of Internet of things (IoT) is taking up the world in a very fast pace. Everything in our daily lives to manufacturing and industry are getting connected, automation is happening in every arena. One of the important and early adopters of IoT is the automotive sector, with its continuous efforts in developing the most efficient autonomous vehicle.<sup>2</sup> A combination of multiple technologies of various kinds required for its development in equal importance makes

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<sup>2</sup> Murari Venkataraman, Vijaya Krishna and George Koomullil, 'Is the Internet of Automobiles the next big thing?' (iam, 1 October 2017) < <https://www.iam-media.com/litigation/internet-automobiles-next-big-thing> > accessed on 02 August 2020

IoT technologies unique when it comes to development requirements. Patent law plays a crucial role in determining the future of this nascent technology.<sup>3</sup> Requirement of patented technologies from a number of different, non-related fields which exercise totally different licensing mechanisms makes the scenario even more complex. Need of sophisticated sensor technologies, reliable and efficient data processing and decision making requirements pointing to computer science technologies, highly fast and wide communication technologies etc. being vital to IoT technology development points to the importance of well defined licensing arrangement that covers the entire essential patents from all the essential heterogeneous sectors.

Automotive industry has a practice of pooling the technologies needed for the development of vehicles from a very long time, in the early 1900s itself. Automotive industry is known for its ‘gentlemen’s agreement’ within the industry.<sup>4</sup> Now in the case of autonomous vehicles which need technologies that are not invented by the auto industry, like, cellular technology, WiFi, networking technology, connectivity, security, audio technology, voice commands, video technology, mapping, GPS etc., licensing mechanisms play a major role, patent pools being the primary one. In this paper we shall discuss on how the development of autonomous vehicle technologies is affected by patent pools in the industry. We shall look if the existence of patent pools in the automotive industry brings down the incidence of patent litigation and the cost associated with enforcing patents.

## II. HISTORY OF PATENT POOL

The origin of patents pools can be traced from the Industrial revolution. The very first patent pool was formed as a solution to settle the disputes related to the manufacture of sewing machines.<sup>5</sup> It was in 1856, the Sewing Machine Combination where each firm joined and agreed to licence their patents with any firm in the collective for a fixed fee. This was divided among members and some money held in reserve to sue non-members for infringements.<sup>6</sup> This arrangement became common fixture in the industrial landscape in the US thereafter.<sup>7</sup> A

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<sup>3</sup> Rico L. T. Cho, John S. Liu and Mei Hsiu-Ching Ho, ‘Autonomous Vehicle Technology Development: A Patent Survey Based on Main Path Analysis’ (*Portland International Conference on Management of Engineering and Technology (PICMET)*, Portland, OR, USA, 2019)

<sup>4</sup> ‘IP and the Automotive Sector’ (Managing IP) <<https://gowlingwlg.com/getmedia/c8d76566-da7e-43b6-94c9-636eb126f467/ip-and-the-automotive-sector.pdf.xml?ext=.pdf>> accessed on 02 July 2020

<sup>5</sup> Ryan L. Lampe and Petra Moser, ‘Do Patent Pools Encourage Innovation? Evidence from the Nineteenth-Century Sewing Machine Industry’ (2010) 70 *The Journal of Economic History* 898

<sup>6</sup> Daniel S. Sternberg, ‘A Brief History Of RAND’ (2014) v. 20 *Journal of Science & Technology Law* 214,215  
Adam Mossoff, ‘The Rise and Fall of the First American Patent Thicket: The Sewing Machine War of the 1850s’ (2011) 53 (1) *ARIZ. L. REV.* 165, 193 <<https://arizonalawreview.org/mossoff/>> accessed 27 June 2020

\*Howe may be considered to have been the first patent troll.

<sup>7</sup> William Greenleaf, ‘Monopoly On Wheels: Henry Ford And The Selden Automobile Patent’ (Wayne State University Press 1961) 87–89

blueprint for the modern patent pool can be traced from the initiative in the automobile industry that streamlined and refined the patent pooling arrangement about thirty years later the ‘sewing machine war’.<sup>8</sup> The nascent automobile industry witnessed a number of patent applications in the early twentieth century. It was followed with a number of patent suits; warning notices and infringement threats were common in the automotive supply chain.<sup>9</sup>

Association of Licensed Automobile Manufacturers (ALAM) (1903) managed automobile patents in the early 1900s.<sup>10</sup> It originally handled the patent granted to George Selden for gasoline engine mounted in a car (US patent number 549,160).<sup>11</sup> Even though Selden filed his patent application in 1879, by taking advantage of the patent office rules, he continuously broadened the description of his invention to encompass all types of motor- vehicles with the petroleum- powered engine and get it granted 1895.<sup>12</sup> The invention wasn’t a major advancement in the industry, but any existing automobile in 1895 tend to infringe Selden’s patent and Selden used this opportunity to extract royalties from all gasoline car manufactures in US.<sup>13</sup> ALAM restricted the membership of new applicants in order to protect its members. Upon the denial of Henry Ford’s admission to the association, Ford continued using the technology declaring patents as silly things when they are used to hinder any industry or as means of blocking others from the market. ALAM’s suit against Selden is considered to be the important milestones in the automotive industry- Second Circuit found the patent valid but not infringed, reversing the Circuit Court’s decision- patent valid and infringed. This decision dissolved ALAM recognising it no longer had a viable business model and a new organisation, Automobile Board of Trade was formed. This organisation realised that patent wars were real threat to the whole industry and considered patent pool as solution. The association entered the patent pooling arrangement in 1914 and became effective by 1915. The arrangement was like members did a royalty- free cross- licensing for all the patents instead of paying licensing fee to the organisation. Also, the agreement not just covered already issued patents, but also all patents granted during the time the agreement was active. “Revolutionary” patents category was exempted from this arrangement agreement but no such patents arose at that time period of the

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<sup>8</sup> Ibid

<sup>9</sup> Ibid 242-243, 246

<sup>10</sup> David Serafino, ‘Survey of Patent Pools Demonstrates Variety of Purposes and Management Structures’(Knowledge Ecology international 2007) 8

<sup>11</sup> John Howells and Ron D. Katznelson, ‘The ‘Overly-Broad’ Selden Patent, Henry Ford and Development in the Early US Automobile Industry’ (27 June 2016) < <https://ssrn.com/abstract=2801309>> or <<http://dx.doi.org/10.2139/ssrn.2801309>> accessed 6 July 2020

<sup>12</sup> Donna Harris, ‘Landmark Patent Case Broke Selden’s Lock On Auto Industry’ (Automotive News, 16 June 2003) < <https://www.autonews.com/article/20030616/SUB/306160708/landmark-patent-case-broke-selden-s-lock-on-auto-industry>> accessed on 03 August 2020

<sup>13</sup> Supranote 6, Greenleaf at 49, 74

agreement. Being considered the most effective patent pool of in American industry at that time, it was the blueprint of all the pooling arrangements to come. The agreements scheduled to run for a period of ten years was renewed throughout the organisation's existence. When this patent pool had all the features of a modern pooling arrangement, what it lacked was the central corporate entity. This aspect can be traced from the patent pool formed by the aircraft industry.<sup>14</sup>

A patent war happened in the airline industry due to a preliminary patent and subsequent improvement. Flight stabilization problem solved by constructing a system that warped airplane wings in the opposite directions was done by Wright Brothers in 1903.<sup>15</sup> They also obtained a patent for the same. Somewhat around the same time, another system of flight stabilization using wing flaps was developed by Glenn Curtiss, which was adopted by the industry. This left Wright Brothers without royalties from the manufacturers of airplanes, and in order to benefit from the industry; they filed a patent infringement suit against Curtiss in 1909. It was then the United States government needed planes for the World War I and manufacturers refrained from taking contracts due to the fear of getting sued for patent infringement. The government wanted a solution for the patent was in order to ensure adequate supply of airplanes for the World War I. W. Benton Crisp, the attorney of Curtiss, who previously appeared for Ford against Selden, suggested pooling arrangement as a solution for Wright and Curtiss to come on terms. All the pooling arrangements were similar as that of the Automobile Board of Trade. The major difference was that the patent pool itself was a corporate entity, the Manufacturers Aircraft Association (MAA). It was a New York corporation and provided stock to the patent holders upon exchange of right to grant licenses for airplane patent which is owned by the patent holder. MAA was successful in showing characteristics of a modern patent pool. Its shareholders could licence all the patents owned by the shareholders and also received shares of royalties extracted from non- members in the form of dividends. Later in 1947, when the Court intervened in the patent pooling arrangements, it stated that if the patent pool had the effect of fixing prices or excluding competition, the arrangement would be found to be illegal. In 1972, upon the allegation of the Justice Department that MAA's patent policies restricted competition in research and development as well as in the airplane patent market; the MAA was forced to dissolution in 1975.<sup>16</sup> Still the former MAA members were allowed to licence their patents through RAND commitments. Later what the Court said was that patent pooling arrangements

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<sup>14</sup> Joseph Scott Miller, 'Standard Setting, Patents, and Access Lock-In: RAND Licensing and the Theory of the Firm' (40 *IND. L. REV.* 2007) 387

<sup>15</sup> George Bittlingmayer, 'Property Rights, Progress, and the Aircraft Patent Agreement' (31 *J.L. & Econ.* 1988) 227, 230–31

<sup>16</sup> George Bittlingmayer, 'Property Rights, Progress, And The Aircraft Patent Agreement' (1988) Vol. XXXI *Journal of Law & Economics*, 234

cannot be considered anticompetitive as long as the patent pool members do not dominate in the relevant market with their market power. The nature of patent pools to form around existing marketplace that hold blocking patents, rather than around a future technical outcome is the drawback.

Patent pools were also successfully used by MPEG technology and DVD technology to help overcome the intellectual property holdups.<sup>17</sup>

### **III. COMPLEX LICENSING LANDSCAPE CREATED BY IOT**

Various studies and patent analysis have pointed that internet of things (IoT) driven digitalisation is showing agile innovation internationally. IoT era for its fulfilment requires interaction between enormous amount of heterogeneous data as well as technologies. This includes various smart machines, networked sensors, data analytics for a self reliant system with least human intervention with a distributed control. General and specific communication requirements like scalability, friendly IP (internet protocol) ecosystem, lean protocol stack implementations, reliability, latency, throughput, privacy concerns are important.<sup>18</sup>

The basic mechanism is, sensor collects data, computer processes this and then the mechanical parts execute the computer's commands. Depending on the type of automation, hardware and related technologies in related fields varies while the basic mechanism remains same. Which means upon upgradation of levels of automation, advanced technology and equipments in relevant fields is required.

#### **(A) Technology requirements for autonomous vehicle realisation**

The era of Internet of Things (IoT) is taking over the world in a fast pace, making everything smart, autonomous, self-reliant and connected. The automobile industry is one of the early adopters of internet of things, where research and development is so drastic to bring out self-driving vehicles with higher level of automation. Accurate and timely measurements or understanding of the environment is the crucial factor in any autonomous objects together with the ability to react to the environment accordingly. Integration of different technologies, say, mechanical engineering, electronics engineering, computer science, electrical engineering, control engineering is made use for the autonomous navigation. Road accidents are increasing at an alarming rate, which are caused majorly due to human errors. Making a vehicle

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<sup>17</sup> Arti K. Rai, 'Intellectual Property Rights in Biotechnology: Addressing New Technology' (34 WAKE FOREST L. REV. 1999) 841

<sup>18</sup> Maria Rita Palattella and others, 'Internet of Things in the 5G Era: Enablers, Architecture, and Business Models,' (2016) vol. 34 no. 3 *IEEE Journal on Selected Areas in Communications* 510-527 <<https://ieeexplore.ieee.org/document/7397856>> accessed 03 August 2020

autonomous can avoid these human made errors fully. In case of autonomous vehicles, the encounter environment of the vehicle include roads, lanes, other vehicles (at rest or at varying velocities), traffic signals and signs, pedestrians, animals, buildings, weather, various topographies of different conditions. With the use of sophisticated sensors and corresponding data processing and decision making software, these measurands can be handled with accuracy, making the vehicle efficient to 100%.

The innovations made for autonomous vehicle are countless which includes advanced sensors, radar, lidar, geolocation, telecommunication etc.<sup>19</sup> The areas which showed the most innovations growth were vehicle control systems, ancillary vehicle systems, AI integrated vehicles and vehicle navigational systems<sup>20</sup>. Patent filings in these areas also show a steady increase, ranging from domestic patents to international patents, making it a crucial area of study.

Camera vision technologies: Vision technologies including camera vision technology shows maximum number of patents marking the importance of vision sensors in autonomous driving and shows the amount of innovations happening in this area. Higher efficiency vision sensors and image analysis techniques are evolving and seeking patent protection, which clearly shows the industry trend. *Stereo cameras* with multiples lenses are useful in extracting three-dimensional images from multiple two-dimensional images by matching stereo pairs. They find applications in obstacle detection, lane and sign recognition, distance estimation etc. *Infra Red (IR) cameras* illuminate the scene which cannot be seen by human eye and are good in low light conditions.

Light detection and ranging (LiDAR): LiDAR technology advancements can be seen in helping the vision requirements of an autonomous vehicle when camera vision fails. This is mainly due to the tolerance of LiDAR in climatic conditions, low lighting scenarios, large 360° coverage etc. Light detection and ranging is a sensing technology that detects objects and maps their distances. This works by illuminating a target with an optical pulse and measuring the characteristics of the reflected return signal from the object.<sup>21</sup> It measures the time and distance

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<sup>19</sup>Chethan K. Srinivasa, 'The Challenges of Patenting Autonomous Vehicle AI and Software' (Foley & Lardner LLP, 27 June 2019) <<https://1npdf11.onenorth.com/pdfrenderer.svc/v1/abcpdf11/GetRenderedPdfByUrl/Patenting%20Autonomous%20Vehicle%20AI%20and%20Software.pdf?url=https%3a%2f%2fwww.foley.com%2fen%2finsights%2fpublications%2f2019%2f06%2fpatenting-autonomous-vehicle-ai-and-software?format=pdf&attachment=false>> accessed 06 July 2020

<sup>20</sup> Thomas Franklin and Kate Gaudry, 'Patent Trends Study Part Five: Automotive Industry' (IPWatchDog, 7 May 2019) <<https://www.ipwatchdog.com/2019/05/07/patent-trends-study-part-five-automotive/id=108960/>> accessed 06 July 2020

<sup>21</sup> Motaz Khader and Samir Cherian, 'An Introduction to Automotive LiDAR' (Texas Instruments, 2018)

each pulse travelled, based on the physics of optics and light, measuring the wavelengths in micro to nanoseconds. Lidar emits laser rapidly, light travels and reflects off points of things like vehicles, buildings, trees etc and the reflected light energy is recorded in the Lidar sensor and calculations are made accordingly. Research and development of lidar is in a way to facilitate efficient sensing of the vehicle environment, on a real-time, cost effective and energy efficient basis. Here the produced light/laser must be of controllable nature and of eye safe wavelengths.

LiDAR sensor technology is one of the technologies which are getting patented from decades ago for its extensive use in mapping, environmental and coastal monitoring, defence and military uses, space vehicles and satellites etc. The capability to produce high-resolution, three-dimensional information of the surrounding environment made the LiDAR sensor technology vital for the realisation of autonomous cars. Use of LiDAR technology in autonomous vehicles paved way for rapid research in this technology so as to achieve high efficient, precise, real-time imaging of the surrounding environment. Even minute detailing of the environment needs to be sensed by the vehicle and should cope up in any climatic conditions and even in dark. This lead to rapid research for innovations in LiDAR technology, from source, detection, scanning mechanisms to data processing and decision making systems and methods. We could see a rapid increase in patenting activities covering these areas of lidar with applications in autonomous vehicles. Claims go covering components of lidar system to methods in lidar imaging to control of vehicle by the lidar. Some of them are protected as trade secrets also. This includes specific parameters or measurements for vertical beam spacing, distribution of beam evaluations and orientations, the beams' FOV measurements, the pitch or orientations between diodes, pitch measurements for optical cavities, pulse rates, fire rates etc. This approach may be used as a defence against rejection of patent, most of the patent applications being under prosecution.

RADAR technology: The speed and distance of an object is estimated by emitting microwaves and measuring the change in frequency of the reflected wave, making use of the Doppler effect. Microwaves are of longer wavelength than light and can travel more distances. Blind spot detection, cross- traffic alerts are given by RADARs.

Machine learning algorithms for object detection, classification and tracking: Machine learning (ML) algorithms for object detection, classification and tracking are the core technology to bring about automation in the autonomous vehicles. This makes it perform real-time functions in real-time situations. Artificial intelligence (AI) software when used creates drastic efficiency



in automation, neural network being the widely used one in autonomous driving functionalities. Machine learning algorithms are provided large training datasets for the purpose of learning and differentiate between objects in the vehicle environment. A common method or technique to classify and train images is use of a convolutional neural network (CNN) that consists of an input layer, multiple hidden layers, and output layer. Hidden layers constitute convolution and pooling layers which are used for the feature of extraction and a fully connected layer for classification. Depth estimation is done and system control is achieved by interpreting outputs from the previous discussed layers. This can be achieved only with efficient and accurate outputs from previous layers.

Vehicle to everything (V2X) communication technologies; V2X communication technologies refers to the class of technologies that helps vehicles with the ability to communicate or exchange information with other systems of the vehicular environment. Vehicle to everything (V2X) consists of data transmission from a vehicle to any kind of entities that may influence the vehicle. This consists of communications like vehicle to device, vehicle to road side, vehicle to pedestrian, vehicle to grid etc. Pedestrian collision warning (PCW) system was developed in the light of limiting accidents by effective communications between vehicle and pedestrians. This was achieved by wireless modules included in cell phones, which are Wi-Fi, Bluetooth, near field communication etc. This ranges from the initial unidirectional Wi-Safe technology<sup>22</sup> to Wi-Fi Direct<sup>23</sup> which is a peer- to- peer wireless standard which allows direct communication between smartphones without an access point<sup>24</sup> But this Wi-Fi based communication has drawbacks like high power consumption in the usage of access point, poor packet delivery rate and latency.

World market had shown its interest in two different technologies for intelligent transport systems (ITS) and vehicle to vehicle communications. These are Third Generation Partnership Project (3GPP) developed Cellular vehicle- to- everything (C-V2X) and IEEE 802.11p based ITS- G5 standards. Both can operate in 5.6 GHz spectrum band.<sup>25</sup> IEEE 802.11p standard has the advantage of earlier development and deployment and therefore incumbency. This is a

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<sup>22</sup> 'Wi-Safe Connect' (Fire Angel, 2018) <<https://www.wi-safeconnect.com/uk/>> accessed 24 March 2020

<sup>23</sup> Jae Hyeck Lee, Myong Soon Park and Sayed Chhattan Shah, 'Wi-Fi direct based mobile ad hoc network' (2<sup>nd</sup> International Conference on Computer and Communication Systems (ICCCS), Krakow, Poland, 2017) 116–120

<sup>24</sup> Steve Kinkade, Chris Naughton, Sara Pines and Robyn Eagles, 'Honda Demonstrates Advanced Vehicle-To-Pedestrian and Vehicle-To-Motorcycle Safety Technologies' (Honda, 28 August 2013) <<https://hondanews.com/en-US/releases/honda-demonstrates-advanced-vehicle-to-pedestrian-and-vehicle-to-motorcycle-safety-technologies>> accessed 03 august 2020

<sup>25</sup> 'Coexistence of C-V2X and ITS-G5 at 5.9GHz' (5GAA Automotive Association, April 2018) <<https://5gaa.org/wp-content/uploads/2018/10/Position-Paper-ITG5.pdf>> accessed 03 August 2020

mature technology which has already proven its potential in device to device communications. Cellular V2X is something that offers arguably a better performance than IEEE 802.11p, to employ both direct as well as network assisted communication. Lack of development of strong cellular network is the major block to the maturation of this technology. With the development of 5G, we can expect a tremendous innovation coming out in this technology. Most of the automotive companies are adopting C-V2X and different countries are running trials in this area of technology. Some automotive companies are even manufacturing vehicles with hardware compatible with both the standards.

The basic mechanism is, sensor collects data, computer processes this and then the mechanical parts execute the computer's commands. Depending on the type of automation, hardware and related technologies in related fields varies while the basic mechanism remains same. Which means upon upgradation of levels of automation, advanced technology and equipments in relevant fields is required.

**5G requirements in Autonomous Cars-** Autonomous cars are predicted to use really massive amounts of data which is estimated around 4000 GB of data in one hour driving. These are chiefly from high resolution sensors like cameras, lidar, radar etc which produce data in the rate of around 40 Mbps. With 4G having a download speed range of 8-10 Mbps and upload speed range of 5-6 Mbps, it is almost nil chance for working of autonomous vehicles. 5G with an expected data communication speed of 2Gbps makes it comfortable to handle the huge loads of data transfer requirements posed by autonomous vehicles.<sup>26</sup>

Patents in 5G technology ranging from radio layer specifications, architecture, security, services, internetworking with external networks, telecom management, mission critical applications, etc. are needed by autonomous vehicles in its realisation.<sup>27</sup> There is an economic risk aspect associated with integration of highly patented 5G standards for auto manufacturers and suppliers. Automotive industry licensing practices are very different from that of communication industry. Automotive industry follows a vertical licensing mechanism where Tier 1 manufacturer rarely collects royalties from original equipment manufacturer (OEM) and royalties in licence negotiations are based on single component improved by an invention. So licensing cost of patents doesn't impact the vehicle prices usually. Communication industry, in contrast, focuses mainly on net sale prices of the end product and at OEMs. So license fees are

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<sup>26</sup>Tom Furnival, '5G Autonomous Vehicles- accelerating Data Communication Speed' (Mewburn Ellis) <<https://www.mewburn.com/news-insights/5g-and-autonomous-vehicles-accelerating-data-communication-speed>> accessed 28 July 2020

<sup>27</sup> Dr. Tim Pohlmann, 'Fact Finding Study on Patents Declared to the 5G Standard' (IP Lytics, January 2020) <<https://pdfs.semanticscholar.org/94f5/863763490d1ac76ea5a8f06b7cd8b422fb90.pdf>> accessed 28 July 2020

in effect higher compared to manufacturers without a patent portfolio for cross licensing.<sup>28</sup>

### **(B) When Automotive Companies Adopt a ‘Plug and Play’ Model**

A trend of using driving systems made by technology companies in order to meet the real-time requirements of autonomous vehicles like sensing, imaging, data processing, decision making etc., is seen common among the automakers now a days. These involve sensors and AI solutions and software combination for real-time working of an autonomous vehicle. Advanced driver assistance systems to vehicle detection systems to security systems come under this. These technology companies work closely with car manufacturers in providing technology solutions to them. This also helps automakers who lack the capacity for such research and development with better autonomous driving systems that can be simply plugged or fitted to their cars to make them autonomous. Mobileye (acquired by Intel), Delphi automotive, start-ups such as Cruise Automation (acquired by General Motors), Otto (acquired by Uber) are examples of tech companies that develops combinations of sensors and artificial intelligence software that make technology solutions to autonomous cars development.<sup>29</sup>

The automakers’ “gentlemen’s agreement” to not assert patents may not be practising any longer. When technology solutions are being developed by tech companies and automakers are mere consumers of the tech companies’ autonomous driving solutions, major share of autonomous vehicle technology patents lies with these tech companies. They derive significant portion of their value through patents and may develop a business model to assert patents in order to protect their patents and flourish their business. This may lead to patent battles that can affect the innovation and thus the technology itself. Recent patent litigations in the automotive industry mark this. Voyage, a self driving car start up was sued by Sucexess for infringing their patents and argues that Voyage wouldn’t exist without these patented technologies of them, clearly trying to make money out of their patents. Also, a tech company, American GNC Corp sues Toyota in the name of infringing their autonomous car navigation patents. The way automakers are to react to these litigations, which are not their way and against their “gentlemen’s agreement”, are unclear. The acquisitions happening in the automotive sector, automotive companies acquiring tech companies are one solution to this patent battle, but not definitely the ultimate solution. Licensing terms with these companies are one way to end the battle related to patents. Creation of patent pools would be an effective solution to the

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<sup>28</sup> Ibid

<sup>29</sup> Jaime Condliffe, ‘Plug-and-Play Autonomy Could Soon Turn Your Car Into a Self-Driving Robot’ (MIT Technology Review, August 2016) <<https://www.technologyreview.com/2016/08/23/157937/plug-and-play-autonomy-could-soon-turn-your-car-into-a-self-driving-robot/>> accessed 28 July 2020

same, as automotive industry is known to be successful in this before.

#### IV. NEED FOR PATENT POOL

The above mentioned are some of the important technologies required for the control of autonomous vehicles. Autonomous vehicles require technologies outside the realm of automotive industry like communication devices and related technologies, sensor equipments and related technologies, safety technologies etc. in order to make them a reality. No one company has all these technologies needed to establish a safe and efficient autonomous vehicle on road. Here lies the importance of licensing mechanisms like licensing pools or patent pools for autonomous vehicle manufacturers to get every technology they need in one place. Since car manufacturers need multiple technologies, a licensing platform with a standard pricing for everything would be easier than buying multiple licenses from different suppliers.

Patent pools would reduce problems created by patent thickets, transactional cost of multiple patent licensing negotiations by offering a 'one stop shop' for essential patents<sup>30</sup> and also addresses royalty stacking issues. Patent pools also reduce litigation upon infringements of patents. Patent pools also assures to an extent the patents in the pool are essential to manufacture the products that comply with the standard.

Patent pools are proven effective when multiple patented technologies are required for the production of a standardised product.<sup>31</sup> Patent pools can lessen the effect of 'hold ups'<sup>32</sup> or 'hold out'<sup>33</sup> problems that may stymie the industry efforts to create a product that may become an industry standard.<sup>34</sup> This is very important in technologies like autonomous driving technologies that make use of multiple technologies in its development, which are nascent in development and are very much socially relevant.

##### (A) Patent Pool initiatives- AVANCI Patent Pool

Avanci is a patent pool launched in 2016 by Ericsson to license communication technology

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<sup>30</sup> Jeanne Clark, Joe Piccolo, Brian Stanton and Karin Tyson, 'Patent Pools: A Solution to the Problem of Access in Biotechnology Patents?' (U.S. Patent & Trademark Office, 5 December 2000) <<http://www.pharmacist.or.kr/sites/default/files/wp-content/uploads/2007/04/patentpool2.pdf>> accessed 27 July 2020

<sup>31</sup> U. S. Department Of Justice And The Federal Trade Commission, 'Antitrust Enforcement And Intellectual Property Rights: Promoting Innovation And Competition ' (April 2007)

<sup>32</sup> Oliver E. Williamson, *The Economic Institutions of Capitalism: Firms, Markets, Relational Contracting* (Collier Macmillan Publishers, 1985) 388

<sup>33</sup> A holdout is someone who refuses to agree to a bargain for strategic reasons.

Robert P. Merges, 'Contracting into Liability Rules: Intellectual Property Rights and Collective Rights Organizations' (1996) 84 Cal 1293, 1298

<sup>34</sup> U.S. Dep't of Justice & Fed. Trade Comm'n, *Antitrust Enforcement and Intellectual Property Rights: Promoting Innovation and Competition* (2007) Chapter 3

patents and standards needed for the establishment of IoT technology. They license 2G, 3G and 4G patents and standard essential patents (SEPs) owned by its 38 licensor members.<sup>35</sup> 14 automotive brands are licensees of Avanci patent pool, which includes BMW, Volkswagen etc. They claim to license almost all the SEPs and other patents required for the wireless connectivity requirements of all the IoT technologies, with its 38 patent owners, Acer, Airscale, Asus, BlackBerry, BT, China Mobile, Conversant Intellectual Property Management, DT Mobile, NTT Docomo, Ericsson, Fujitsu, HPE, Intellectual Discovery, InterDigital, IS, IPBridge, KPN, LonghornIP, NEC, Nokia, NTT, Oppo, Orange, Panasonic, Panoptis, Philips, Qualcomm, Sharp, Siemens, SISVEL, SK Telecom, Sony, Sun Patent Trust, T-Mobile, TNO, Unwired Planet, Vodafone and ZTE. .<sup>36</sup>

On 29<sup>th</sup> July 2020, Avanci announced its 5G automotive licensing program which would be a milestone to the development of autonomous vehicles.<sup>37</sup> This would facilitate IoT and automotive companies 5G patents in a single license enabling the auto industry to develop the next generation connected vehicles, in an efficient and affordable manner, according to them. This announcement came following the US Department of Justice's (DoJ) Antitrust Division review of Avanci's 5G automotive programme confirming that it would not be anti-competitive and the department has no intention to challenge the platform.<sup>38</sup>

Even though Avanci proclaims to provide connectivity solutions to IoT development, the number of cases against it makes the scenario in the shadow of doubts. Baseband chipset makers and makers of connectivity modules that contains such chips are the essential enablers of IoT, but some cases clarifies that Avanci refuses to grant them exhaustive patent licenses to them, which act as a major impediment for the development and deployment of IoT technologies,

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<sup>35</sup> Amy Sandys, 'Avanci Launches 5G Automotive Licensing Programme' (Juve patent, 30 July 2020) <<https://www.juve-patent.com/news-and-stories/people-and-business/avanci-launches-5g-automotive-licensing-programme/#:~:text=Kasim%20Alfalahi%2C%20former%20head%20of,pool%20containing%2038%20patent%20owners.>> accessed 30 July 2020

<sup>36</sup> <<https://www.avanci.com/>> accessed on 29 July 2020

<sup>37</sup> Dan Oliver, 'Avanci Patent Pool Launches 5G Automotive Program' (5Gradar, July 2020) <<https://www.5gradar.com/news/avanci-patent-pool-launches-5g-automotive-program>> accessed on 29 July 2020

<sup>38</sup> In the Business Review Letter, Makan Delrahim, assistant attorney general for the Antitrust Division of the DoJ, says, "After soliciting input from a range of stakeholders in the automotive and telecommunications industries, including potential licensors and licensees, conducting an independent review, and considering our prior guidance and reviews of other patent pools, we conclude that, on balance, Avanci's proposed 5G platform is unlikely to harm competition. Therefore, the department has no present intention to challenge the platform."

"In sum, the proposed 5G Platform has the potential to yield efficiencies by reducing transaction costs and streamlining licensing for connected vehicles," "Together these efficiencies may allow cellular standards-essential patent owners and vehicle manufacturers to focus resources elsewhere, such as investment in further research and development in emerging 5G technologies and applications. This possibility could enhance competition in these technologies, improve safety, and benefit American consumers."

Email from Makan Delrahim, assistant Attorney General, U.S. Department of Justice to Mark H. Hamer, Baker & McKenzie (28 July 2020) <<https://www.justice.gov/atr/page/file/1298626/download>>

worldwide.<sup>39</sup>

Avanci's licensees including Nokia are fighting many patent suits. Out of 19 patent suits in Germany, 10 are against Nokia. Nokia vs Daimler, Continental Automotive v Avanci LLC are examples.<sup>40</sup> These are of the allegation that the licensees in the patent pools in the connected car space refused to provide fair, reasonable and non-discriminatory (FRAND) licenses to automotive component and system suppliers.<sup>41</sup> It is of prime importance in the case of autonomous vehicle developers when Nokia announced over 3,000 5G SEP declarations to European Telecommunications Standard Institute (ETSI) on 24<sup>th</sup> of March 2020, just six months after its declaration of about 2,000 patents.<sup>42</sup>

It is also that Avanci's membership agreement is instructive in nature. As per the IoT platform Master License Management Agreement, the licensing agent Avanci notify a particular company as "unwilling licensee" to its member licensor and asserts the member licensor to file infringement suits against the "unwilling licensee" in return of full reimbursement of the litigation costs.<sup>43</sup>

There is also allegations regarding transparency of Avanci patent pool, that they do not publish the list of patents that can be licensed from them nor the licensing terms. The bad effects caused by non-transparency in patent ownership and licensing are counted to be FRAND abuse.<sup>44</sup>

There are still many major technology solution companies and automotive companies active in the development of autonomous vehicles still not part of the Avanci patent pool. This extends a doubtful shade on this patent pool whether they actually produce relevant patented technologies in the technology development? Or is it because certain automotive companies acquire tech developer companies or make collaborations with them? Or is it because automotive companies find it better to bring about individual licensing agreements with

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<sup>39</sup> 'Without Transparency in Patent Ownership, The Avanci Pool Borders On A Scam Operation That Harms The IoT Industry' (Foss Patents, 15 June 2020) <<http://www.fosspatents.com/2020/06/without-transparency-in-patent.html>> accessed on 30 July 2020

<sup>40</sup> *Continental Automotive Systems Inc v Avanci LLC* (2019) United States District Court Northern District Of California 19-cv-2520 <<https://images.law.com/contrib/content/uploads/documents/403/16984/Continental-v.-Avanci.Complaint.pdf>> accessed on 29 July 2020

<sup>41</sup> Brett J. Rosen, 'Continental Makes A Big Splash In The Connected Car Patent Pool Over OEM-Only Licensing Practices' (RatnerPrestia, May 2020) <<https://www.ratnerprestia.com/2019/05/29/continental-makes-a-big-splash-in-the-connected-car-patent-pool-over-oem-only-licensing-practices/>> accessed on 29 July 2020

<sup>42</sup> 'Nokia Announces Over 3,000 5G patent Declarations' (Nokia, 24 March 2020) <<https://www.nokia.com/about-us/news/releases/2020/03/24/nokia-announces-over-3000-5g-patent-declarations/>> accessed on 29 July 2020

<sup>43</sup> John Jurata and Emily Luken, 'Glory Days: Do the Anticompetitive Risks of Standards-Essential Patent Pools Outweigh Their Procompetitive Benefits?' (2020) Vol. 58 No. 2 San Diego Law Review <<https://ssrn.com/abstract=3622615>> accessed 29 July 2020 Page 20

<sup>44</sup> Valerio Sterzi, Jean-Paul Rameshkoumar and Johannes Van Der Pol, 'Non-practicing entities and transparency in patent ownership in Europe' (Bordeaux Economics Working Papers 2020-10, June 2020) <<https://ideas.repec.org/p/grt/bdxewp/2020-10.html>> accessed 29 July 2020

licensees? Answers to these questions are of profound importance in examining the relevance of this specific patent pool as well as any kinds of patent pooling arrangements itself

The launch of the 5G automotive licensing programme can be a check for the above questions, at least for the autonomous vehicle development scenario. It's now time to wait and observe which all companies involved in the development of autonomous vehicles and related technologies are going to join the Avanci patent pool.

## **V. CONCLUSION**

Automotive industry is showing up a steady shift from its traditional car making when autonomous self-driving vehicles come to the market forefront. A steady shift from subject matter of patents in the automotive industry from mechanical engineering alone to computer software to bring about different cutting edge features in the vehicle can be traced from patent offices across the globe. Incorporation of these outside technologies in the automotive sector is facing barriers of intellectual property to an extent. Dissimilar sectors need to collaborate in terms of patents in a fair and non-discriminatory basis is the need of the hour. Patent pool is such an effective mechanism to fulfil the need of upcoming IoT technologies and their development.

A shift from internal patent pool arrangement within the automobile industry to other technology sectors like telecommunication sector, computer software industry etc. which are vital for the development of autonomous vehicle feature make it challenging for the industry. Upcoming court cases filed against automotive companies proves this. Also, absence of automotive companies in major patent pool initiatives, even though few are part of them, adds to this issue. This points to a scenario for every industry to rethink about their patenting strategies as well as licensing mechanisms. How well automotive industry is going to reframe their strategies is crucial for other IoT enablers and the whole IoT technology itself. This is of utmost important to the society as such, as a fast development of technology and affordable adoption of them is the public interest feature of patent system itself.

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